

## REVIEW ARTICLE

# Safety of service users with severe mental illness receiving inpatient care on medical and surgical wards: A systematic review

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**ABSTRACT:** This review aimed to synthesize the evidence on the likelihood of harm and mortality on medical and surgical inpatient wards for people with severe mental illness (SMI). From 937 results identified through database searching, and a further 10 papers identified through citation searching and hand searching, 11 papers met the criteria for inclusion in the final review. This review did not find strong evidence for higher in-hospital mortality in people with SMI. There was evidence that adverse events are higher in people with SMI. A higher likelihood of emergency instead of planned care, and poorer access to treatment were identified as potential contributing factors to these adverse events. In addition, service users with SMI were more likely to have a longer length of stay, associated with a higher cost of care. The severity of the mental illness increased the likelihood of harm or death, and people with schizophrenia were more likely than people with other mental illnesses to experience these adverse outcomes. There is evidence that people with SMI are provided with lower-quality health care, whereas higher-quality, better-planned care is required to overcome the inequalities in access faced by this vulnerable population.

**KEY WORDS:** bipolar disorder, hospitals, mortality, safety, Schizophrenia Spectrum and Other Psychotic Disorders [F03.700].

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## INTRODUCTION

Severe mental illness (SMI) refers to diagnoses of bipolar disorder, schizophrenia, or other psychosis (National Institute for Health and Care Excellence 2015). Mortality is higher in people with SMI than in the general population, and the majority of these deaths are due to physical illnesses, rather than suicide (Lawrence & Kisely 2010). Contributing factors to this increased mortality are believed to include poorer healthcare provision, lack of concordance with care plans, side effects of psychiatric medications, riskier lifestyle choices, and difficulties diagnosing physical illnesses (Lawrence & Kisely 2010). Among people with SMI, physical comorbidities are more common: an average of 1.0 per person compared to 0.6 in the general population (Reilly

*et al.* 2015). It is therefore important to consider the higher levels of risk when considering patient outcomes in people with SMI, and control for comorbidities when comparing groups of people with mental illness to those without.

Although evidence is scant, some literature suggests people with mental illness are more likely to experience harmful adverse outcomes during medical and surgical care, for example decubitus ulcers and postoperative hip fractures (Daumit *et al.* 2006; Li *et al.* 2008), and are less likely to receive guideline-consistent treatment (Kisely *et al.* 2009). For the purpose of this paper, an adverse outcome is 'an unintended and unwanted event or state occurring during or following medical care, that is so harmful to a patient's health that (adjustment of) treatment is required or that permanent damage results' (Marang-van de Mheen *et al.* 2007, p. 428).

## AIM

This review aimed to systematically identify evidence about the safety of service users with SMI, compared to those without mental illness, on medical and surgical wards, with a focus on the common types, causes, and mechanisms of harm.

## METHOD

A structured search of three electronic databases was conducted under the supervision of a healthcare librarian. The search was limited to include results that were primary research, peer-reviewed and written in English. The review included research published between 2007 and 2016. Mental health attitudes and health care are likely to have developed within the last decade, and research published before this may not be relevant to current healthcare systems.

### Search strategy

The following databases were searched:

- Cumulative Index to Nursing and Allied Health Literature (CINAHL)
- MEDLINE
- PsycINFO

The thesaurus function was enabled during the database searches to comprehensively select all variations of words relating to a concept. A healthcare

librarian was consulted on the choice of healthcare databases.

The following search terms were used:

- (MH 'Bipolar and Related Disorders+') OR (MH 'Schizophrenia Spectrum and Other Psychotic Disorders+') or psychosis or psychoses or schizophrenia or 'bipolar disorder' or 'manic depression' or schizophrenia or SMI or 'severe mental illness' or 'serious mental illness' or 'severe mental disorder' or 'serious mental disorder'

AND

- surger\* or surgical or postoperative or operation or 'general hospital\*' or 'medical care' or 'medical illness\*' or 'medical condition\*' or 'physical disease\*' or 'physical health\*' 'non-psychiatric hospital\*' OR 'non psychiatric hospital\*' or 'medical ward\*' or 'medical inpatient\*'

AND

- complications or safety or quality or 'adverse event' or 'adverse healthcare event' or 'adverse effects' or mortality.

### Inclusion/exclusion criteria

While many of the papers identified included peripheral factors related to safety, such as access to treatment, only those that specifically reported findings on adverse outcomes and mortality were included. Research papers were included in the systematic review if they met the following criteria:

- Reported findings about the safety of service users (e.g. adverse outcomes, adverse events, patient harm, or in-hospital mortality).
- Set in a medical or surgical ward (not a psychiatric ward of a general hospital).
- Compared adverse outcomes for service users with a prior diagnosis of SMI with adverse outcomes for service users with no prior diagnosis of mental illness.
- Included participants aged between 19 and 64. This is so that the research focused on SMI. Dementia is more common in adults aged 65 and over, and inclusion of this older patient group may have led to a lack of clarity and accuracy in service users' diagnoses if included.
- Papers examining safety within the Veterans Health Administration in the USA were excluded in this

review, due to lack of applicability outside of the US healthcare system.

## Quality appraisal

Quality appraisal was carried out using the Critical Appraisal Skills Programme tools. One author (ER) conducted the quality appraisal and a second (CH) reviewed the findings. Following the appraisal process, seven studies were assessed as high quality (Bot *et al.* 2014; Chen *et al.* 2011; Ishikawa *et al.* 2016; Maeda *et al.* 2014; Menendez *et al.* 2013, 2014b; Wu *et al.* 2013). Four studies were of unclear quality (Buller *et al.* 2016; Khaykin *et al.* 2010; Liao *et al.* 2013; Tsay *et al.* 2007); with two of these studies assessed as unclear on completeness of follow-up (Liao *et al.* 2013; Tsay *et al.* 2007); one assessed as unclear on results (Buller *et al.* 2015); and two assessed as unclear on results precision (Khaykin *et al.* 2010; Liao *et al.* 2013; Table 1). No aspects of the studies ranked unclear were considered likely to affect the quality of evidence reported. Therefore, all of these studies were considered to be of acceptable quality for inclusion.

## Data extraction

One author (ER) extracted the data using a form that was agreed in advance by all team members. Another (MH) audited the findings to check accuracy.

## RESULTS

Following the title and abstract search of 937 papers, 17 papers were identified for further consideration. Citation searching was carried out using Web of Science and imported into Mendeley. Citation

**TABLE 1:** Summary of studies ranked as unclear on CASP cohort study assessment tool criteria

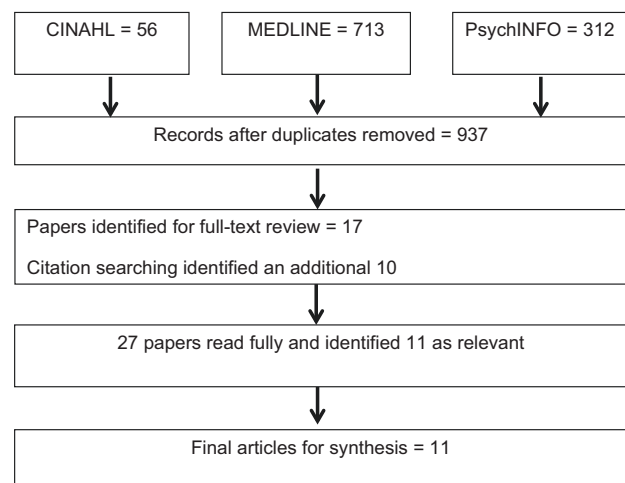
Author(s) and year	Appraisal criteria ranked unclear	
		Additional information
Buller <i>et al.</i> 2015	Results	Table 3, data reported appear anomalous. No clear inferences can be drawn
Khaykin <i>et al.</i> 2010	Results precision	<i>P</i> values not reported
Liao <i>et al.</i> 2013	Completeness of follow-up	Missing data not addressed <i>P</i> values not recorded for adjusted odds ratios
Tsay <i>et al.</i> 2007	Completeness of follow-up	Missing data not addressed

searching was also carried out on all subsequent papers found to be relevant. Citation searching identified a further 10 papers. Of the 27 papers identified for full-text review, 16 were excluded, for the following reasons: did not report findings on in-hospital adverse outcomes or mortality (14); did not compare people with SMI to people with no mental illness (1); and did not report findings for people with SMI specifically (1). There were 11 papers that met the criteria for the final analysis (Fig. 1).

## Types of studies

In the final papers retained, all studies were quantitative, two case-control studies (Table 2), and nine cohort studies (Table 3). All of the studies included patients with schizophrenia. Two also included patients with bipolar disorder, or affective psychosis, which includes some phases of bipolar disorder, and schizoaffective disorder. A number of studies also reported findings about patients with dementia, depression, and anxiety, and using these papers, we have only reported the findings for patients with SMI. The studies were conducted in three countries, the United States (Bot *et al.* 2014; Buller *et al.* 2015; Khaykin *et al.* 2010; Menendez *et al.* 2013, 2014b), Taiwan (Chen *et al.* 2011; Liao *et al.* 2013; Tsay *et al.* 2007; Wu *et al.* 2013), and Japan (Ishikawa *et al.* 2016; Maeda *et al.* 2014). Table 4 summarizes the findings of these studies.

All studies included in the review analysed data from nationwide population-based hospital data sets. All studies included large samples, providing ample



**FIG. 1:** Prisma flow chart. Adapted from Moher *et al.* (2009).

**TABLE 2:** *Case-control studies*

Lead author & year	Cases ( <i>n</i> )	Controls ( <i>n</i> )	Case confirmation	Age SMI cohort (years)	% females:males SMI cohort
Chen 2011	949	2847	NHIRD	Aged 18–64 mean age 44	33:63
Wu 2013	591 (schizophrenia) 243 (bipolar disorder)	2527	NHIRD	Aged 18+ mean age: 57 (schizophrenia) 64 (bipolar disorder)	40:60 (schizophrenia) 42:58 (bipolar disorder)

NHIRD, National Health Insurance Research Database.

**TABLE 3:** *Cohort studies*

Lead author & year	SMI cohort ( <i>n</i> )	No SMI cohort ( <i>N</i> )	Case confirmation	Age SMI cohort (years)	% females: males SMI cohort
Bot 2014	2093	324 406	National Hospital Discharge Survey	Mean age 65	43:57
Buller 2015	8947	7 890 747	National Hospital Discharge Survey	Aged 18+ mean age 61	55:45
Ishikawa 2016	2495	9980 (1:4 matching on age category)	Japanese diagnosis procedure combination database	40+	35:65
Khaykin 2010	269 387	37 092 651	Nationwide inpatient sample (AHRQ)	18+	55:45
Liao 2013	8967	35 868	NHIRD	Mean age 47	48:52
Maeda 2014	104	5319	Diagnostic procedure/per diem payment system	Median age 62	52:48 <sup>†</sup>
Menendez 2013	64 017	9 922 588	NHDS	Aged 18+ mean age 64	64:36
Menendez 2014	10 765	4 951 756	NHDS	Aged 18+ mean age 49	29:71
Tsay 2007	259 (schizophrenia) 123 (affective psychosis)	97 154	NHIRD	15+	48:52 <sup>‡</sup>

<sup>†</sup>In the psychiatric disorder group overall. <sup>‡</sup>Characteristics reported for entire sample. AHRQ, Agency for Healthcare Research and Quality; NHIRD, National Health Insurance Research Database.

statistical power to detect differences between groups. One study employed a randomized cohort of comparative cases (Chen *et al.* 2011) and others adjusted for possible confounding factors (Bot *et al.* 2014; Buller *et al.* 2015; Ishikawa *et al.* 2016; Khaykin *et al.* 2010; Liao *et al.* 2013; Maeda *et al.* 2014; Menendez *et al.* 2013, 2014b; Tsay *et al.* 2007; Wu *et al.* 2013). The use of hospital databases provided for standardized definitions across studies (ICD-9-CM coding) reduces bias in sample selection across the studies. A limitation of the use of these data sources is the possible inaccuracy or completeness of these administrative data sets.

### Thematic analysis

Four strong themes were identified across this set of papers. These were likelihood of in-hospital mortality

and adverse events; delayed and reduced access to treatment; emergency rather than planned admissions; and length of stay (LOS) and cost of hospital care.

#### *Likelihood of in-hospital mortality and adverse events*

For service users with schizophrenia, three studies reported higher mortality, with adjusted odds ratios between 1.35 and 2.70 (Ishikawa *et al.* 2016; Liao *et al.* 2013; Wu *et al.* 2013), while four studies found no significant difference in mortality after adjusting for demographic and medical factors (Bot *et al.* 2014; Buller *et al.* 2015; Chen *et al.* 2011; Menendez *et al.* 2014b), and one found that mortality was lower (Menendez *et al.* 2013). One of these studies reported that patients with schizophrenia, compared to patients with other mental illnesses and patients with no mental illness, had the lowest odds for in-hospital death after

**TABLE 4:** Summary of evidence

Author(s) and Year	Methods	Aims	Results
Bot, A. G. J., Menendez, M. E., Neuhaus, V., and Ring, D. (2014)	Cohort	To evaluate the relationship of psychiatric comorbidity with in-hospital adverse events, blood transfusion and nonroutine discharge in patients undergoing shoulder arthroplasty	For patients with schizophrenia, compared to those without mental illness: <ul style="list-style-type: none"> <li>• The rate of in-hospital adverse events was higher before adjusting for demographic and medical variables. There was no difference in the odds ratio after adjustments (other mental illnesses had a higher odds ratio after adjustments: depression, dementia, and anxiety)</li> <li>• Higher risk of blood transfusion, despite not being recorded as anaemic</li> <li>• Higher rate of discharge to a short-term or long-term facility (highest in those with schizophrenia than any other psychiatric disorder group)</li> <li>• LOS was higher in patients with schizophrenia, but in patients with depression, LOS was lower than the no mental illness group</li> </ul>
Buller, L. T., Best, M. J., Klika, A. K., and Barsoum, W. K. (2015)	Cohort	To measure the influence of psychiatric disorders on inpatient perioperative outcomes following total hip arthroplasty or knee arthroplasty	For patients with schizophrenia, compared to those without mental illness: <ul style="list-style-type: none"> <li>• More likely to be male</li> <li>• More likely to receive total hip arthroplasty than total knee arthroplasty</li> <li>• There was no significant difference in prevalence of comorbidities</li> <li>• Less likely to be discharged home; nonroutine discharge was more common</li> <li>• Longer LOS for cases with schizophrenia (5.7 days vs 5.1)</li> <li>• More likely to experience an adverse event. Specifically, more likely to experience: acute postoperative infection, acute postoperative anaemia, acute myocardial infarction, induced mental illness, pulmonary insufficiency, intubation, intensive care admission, acute respiratory failure, mechanical intervention. Less likely to experience: wound complications, postoperative shock, postoperative bleeding, acute renal failure, pneumonia, deep vein thrombosis. No difference in prevalence of pulmonary embolism</li> <li>• More likely to require a blood transfusion (after adjustment)</li> <li>• There was no difference in the risk of in-hospital death</li> </ul> <p>Other findings:</p> <ul style="list-style-type: none"> <li>• The prevalence of schizophrenia was 0.1%</li> </ul>
Chen, Y. H., Lin, H.-C., Lin, H.-C. (2011)	Case-control	To investigate the extent to which clinical outcomes of pneumonia were different among patients with schizophrenia	For patients with schizophrenia, compared to those with no mental illness: <ul style="list-style-type: none"> <li>• Greater risk of intensive care admission</li> <li>• Greater risk of acute respiratory failure</li> <li>• Greater risk of mechanical intervention</li> <li>• In-hospital death was not more likely</li> <li>• More likely to attend a lower-level district hospital than a medical centre</li> <li>• Less likely to be treated by a male doctor</li> <li>• More likely to be treated at a public hospital than private</li> <li>• Less likely to be treated by a pulmonary or critical care specialist</li> </ul>

*(Continued)*

**TABLE 4:** (Continued)

Author(s) and Year	Methods	Aims	Results
Ishikawa, H., Yasunaga, H., Matsui, H., Fushimi, K., & Kawakami, N. (2016)	Cohort	To investigate the likelihood of early diagnosis and treatment in patients with schizophrenia who have cancer, and their prognosis	For patients with schizophrenia, compared to those without mental illness: <ul style="list-style-type: none"> <li>• Higher Charlson Comorbidity Index</li> <li>• More likely to have a higher stage of cancer (after controlling for patient and disease characteristics)</li> <li>• Same average neighbourhood income per capita</li> <li>• Less likely to be admitted for cancer treatment</li> <li>• Less likely to receive surgical or endoscopic treatment</li> <li>• Of those receiving surgical treatment, less likely to receive laparoscopic or endoscopic treatment, and more likely to receive open treatment</li> <li>• Higher 30-day in-hospital mortality</li> <li>• Longer LOS (25 days vs 15)</li> </ul>
Khaykin, E., Ford, D. E., Pronovost, P. J., Dixon, L., & Daumit, G. L. (2010)	Cohort	To determine the association between diagnosis of schizophrenia and adverse events during nonpsychiatric admissions	For patients with schizophrenia, compared to those without mental illness: <ul style="list-style-type: none"> <li>• More likely to be non-White and male</li> <li>• More likely to have a medical admission (compared to surgical)</li> <li>• More were admitted as an emergency instead of planned</li> <li>• More likely to be in receipt of Medicaid</li> <li>• More likely to live in an area with lower income</li> <li>• Higher prevalence of comorbidities</li> <li>• More likely to die in hospital</li> <li>• Higher cost of care and a longer LOS</li> <li>• More likely to experience an adverse event</li> <li>• After adjusting for patient and hospital characteristics, more likely to develop: decubitus ulcer, infection due to medical care, postoperative respiratory failure, postoperative sepsis, pulmonary embolism, or deep vein thrombosis</li> <li>• There was no significant difference for the following: iatrogenic pneumothorax, haemorrhage, or haematoma</li> <li>• The risk of accidental puncture or laceration was lower</li> </ul>
Liao, C.-C., Shen, W. W., Chang, C.-C., Chang, H., & Chen, T.-L. (2013)	Cohort	To validate the full spectrum of the postoperative adverse outcomes, analysing the impact of disease severity and therefore proposing guidelines about the postoperative care for patients receiving in-hospital major surgeries	For patients with schizophrenia, compared to those without mental illness: <ul style="list-style-type: none"> <li>• A lower proportion received operations in a teaching hospital</li> <li>• Higher prevalence of long-term conditions</li> <li>• Higher rates of postoperative complications (stroke, bleeding, pneumonia, renal failure, septicemia)</li> <li>• Higher cost of care and a longer LOS</li> <li>• Higher likelihood of being admitted to intensive care</li> <li>• Higher risk of postoperative mortality. The risk was higher in those with more severe symptoms of schizophrenia</li> </ul>
Maeda, T., Babazono, A., Nishi, T., & Tamaki, K. (2014a)	Cohort	To quantify the effects of psychiatric disorders on major surgery outcomes and care resource use	For people with a psychiatric disorder, compared to those without: <ul style="list-style-type: none"> <li>• Older than those with no psychiatric disorder (median age 62 vs 57)</li> <li>• Abdominal surgery was more common (60% vs 46%)</li> <li>• More likely to be admitted by ambulance (31% vs 15%)</li> </ul>

(Continued)

TABLE 4: (Continued)

Author(s) and Year	Methods	Aims	Results
			<ul style="list-style-type: none"> <li>• CCI and mortality did not differ significantly</li> </ul> <p>For people with schizophrenia, compared to those with no mental illness, after adjustment:</p> <ul style="list-style-type: none"> <li>• Higher risk of postoperative complications</li> <li>• Higher cost of care and a longer LOS</li> <li>• Mortality was not higher</li> </ul> <p>For patients with schizophrenia compared to those without mental illness:</p> <ul style="list-style-type: none"> <li>• Less likely to be discharged home and more likely to be discharged to a facility</li> <li>• Longer LOS</li> <li>• Higher occurrence of adverse events (after adjusting for patient factors). More likely to experience: wound complications, acute posthaemorrhagic anaemia, acute renal failure, pulmonary congestion, deep vein thrombosis, and blood transfusion</li> <li>• Less likely to experience: cardiac complications, pulmonary embolism, fat embolism, induced mental illness, pulmonary insufficiency, and intubation</li> <li>• Less likely to die in hospital</li> </ul>
Menendez, M. E., Neuhaus, V., Bot, A. G. J., Vrahas, M. S., & Ring, D. (2013)	Cohort	To investigate the influence of psychiatric comorbidities on inpatient death, adverse events and discharge on lower extremity fractures	<p>For patients with schizophrenia, compared to those without mental illness:</p> <ul style="list-style-type: none"> <li>• Less likely to be discharged home and more likely to be discharged to a facility</li> <li>• Longer LOS</li> <li>• Higher occurrence of adverse events (after adjusting for patient factors). More likely to experience: wound complications, acute posthaemorrhagic anaemia, acute renal failure, pulmonary congestion, deep vein thrombosis, and blood transfusion</li> <li>• Less likely to experience: cardiac complications, pulmonary embolism, fat embolism, induced mental illness, pulmonary insufficiency, and intubation</li> <li>• Less likely to die in hospital</li> </ul>
Menendez, M. E., Neuhaus, V., Bot, A. G. J., Ring, D., & Cha, T. D. (2014)	Cohort	To evaluate the influence of preoperative depression, anxiety, schizophrenia, or dementia on: adverse events, mortality, and nonroutine discharge in patients undergoing major spine surgery	<p>For patients with schizophrenia, compared to those without, after adjustment:</p> <ul style="list-style-type: none"> <li>• More likely to be male and young</li> <li>• More likely to have medical comorbidities (most common were hypertensive disease, long-term pulmonary disease, diabetes)</li> <li>• More likely to be discharged to a rehabilitation facility (highest of any psychiatric disorder group)</li> <li>• Higher rate of adverse events overall</li> <li>• More likely to experience: wound complications, acute renal failure, pulmonary embolism, induced mental illness, pulmonary insufficiency, deep vein thrombosis, blood transfusion</li> <li>• Less likely to have acute postoperative anaemia, general complications not elsewhere specified, cardiac complications, iatrogenic hypotension, pulmonary congestion, intubation, or mechanical ventilation</li> <li>• Lower rate of in-hospital death</li> <li>• Longer LOS (11 days vs 4.7)</li> </ul> <p>Other findings:</p> <ul style="list-style-type: none"> <li>• The prevalence of schizophrenia increased over time</li> <li>• 0.2% of the study population had schizophrenia</li> </ul> <p>For patients with schizophrenia, compared to those without mental illness:</p> <ul style="list-style-type: none"> <li>• More to have a ruptured appendix than those without mental illness (after adjustments) Patients with affective psychosis, compared to those without mental illness:</li> </ul>
Tsay, J.-H., Lee, C.-H., Hsu, Y.-J., Wang, P.-J., Bai, Y.-M., Chou, Y.-J., & Huang, N. (2007)	Cohort	To investigate whether disparities in access to care for appendicitis still exist between patients with and without mental illness, specifically those with schizophrenia	<p>For patients with schizophrenia, compared to those without mental illness:</p> <ul style="list-style-type: none"> <li>• More to have a ruptured appendix than those without mental illness (after adjustments) Patients with affective psychosis, compared to those without mental illness:</li> </ul>

(Continued)

**TABLE 4:** (Continued)

Author(s) and Year	Methods	Aims	Results
Wu, S.-I., Chen, S.-C., Juang, J. J. M., Fang, C.-K., Liu, S.-I., Sun, F.-J., Stewart, R. (2013)	Case-control	To investigate inpatient mortality and the use of invasive diagnostic and revascularization procedures after acute myocardial infarction in patients with schizophrenia and bipolar disorder	<ul style="list-style-type: none"> <li>• No more likely to have a ruptured appendix.</li> <li>Other findings: <ul style="list-style-type: none"> <li>• The rate of ruptured appendix was higher in males and older people</li> </ul> </li> </ul> <p>For patients with schizophrenia, compared to those without mental illness:</p> <ul style="list-style-type: none"> <li>• The mean age at recorded AMI was lower (57.1 vs 66.8)</li> <li>• Lower income level</li> <li>• More likely to have diabetes, hyperlipidaemia, and alcohol use disorders</li> <li>• Less likely to receive PCTA or CABG, after adjustment</li> <li>• Less likely to be diagnosed in medical centres or teaching hospitals</li> <li>• Higher 30-day inpatient mortality</li> </ul> <p>For patients with bipolar disorder, compared to those without mental illness:</p> <ul style="list-style-type: none"> <li>• The mean age at recorded AMI was lower (64.2 vs 66.8)</li> <li>• Less likely to receive PCTA or CABG, after adjustment</li> <li>• Less likely to be diagnosed in medical centres or teaching hospitals</li> <li>• No difference in 30-day inpatient mortality</li> </ul>

AMI, acute myocardial infarction; LOS, length of stay; PCTA, percutaneous transluminal coronary angioplasty; CABG, coronary artery bypass graft.

sustaining a fracture, with an adjusted odds ratio of 0.17 (Menendez *et al.* 2013). Another study found that mortality was higher in those with schizophrenia, but there was no difference for those with bipolar disorder following acute myocardial infarction (AMI; Wu *et al.* 2013). Among these studies, there was little heterogeneity, with variation in the factors controlled for, the physical illnesses, treatments studied, and study design, which may also have affected the results. The severity and type of SMI was reported as an influencing factor for in-hospital mortality following surgical complications in one study, with mortality increased with the severity of schizophrenia (Liao *et al.* 2013).

In eight of nine studies examining adverse outcomes, patients with schizophrenia were reported to experience higher rates of postoperative complications or adverse events while in hospital, and the adjusted odds ratios for experiencing one or more adverse events varied from 1.56 to 2.83 in these studies (Buller *et al.* 2015; Chen *et al.* 2011; Khaykin *et al.* 2010; Liao *et al.* 2013; Maeda *et al.* 2014; Menendez *et al.* 2013, 2014b; Tsay *et al.* 2007). However, one study found that there was no significant difference in likelihood of

experiencing an adverse event after adjusting for patient and hospital factors for patients with schizophrenia who had been admitted to hospital for shoulder arthroplasty, compared to people without mental illness (Bot *et al.* 2014). Another study reported that while likelihood of appendix rupture was higher for service users with schizophrenia, there was no difference for service users with affective psychosis (Tsay *et al.* 2007; Table 5).

Studies differed on the types of adverse events that were more common in people with mental illness (Table 6). For example, in three studies, requirement for blood transfusion was more likely in patients with schizophrenia (Bot *et al.* 2014; Buller *et al.* 2015; Menendez *et al.* 2014b), while one found no difference (Menendez *et al.* 2013).

#### *Delayed and reduced access to treatment*

Three studies that compared service users with schizophrenia to people without mental illness found that they had difficulties or delays in accessing treatment for their physical illness (Ishikawa *et al.* 2016; Tsay *et al.* 2007; Wu *et al.* 2013). Of these studies, one



TABLE 5: Themes identified

Lead author, year	Study country	Universal health care	Comparison or control variables	Physical illnesses /treatments studied	Mental illnesses studied (relevant)	Mortality	Adverse outcomes	Delayed and reduced access to treatment	Emergency rather than planned admissions	LOS and cost of hospital care
Bot 2014	US	No	Patient characteristics, comorbid conditions, admission source, admission service, LOS, hospital teaching status, and bed size for hospitalizations within 30 days of death versus no death (applied to adverse outcomes)	Shoulder arthroplasty Osteoarthritis, proximal humeral fracture	Schizophrenia	0	0			Y
Buller 2015	US	No	Sex, age, type of procedure, primary diagnosis, comorbidities (applied to adverse outcomes)	Hip or knee arthroplasty	Schizophrenia	0	Y			
Chen 2011	Taiwan	Yes	Age-matched controls. Controlled for patient characteristics, age of physician, hospital characteristics, clustering effects (applied to mortality; adverse outcomes)	Pneumonia	Schizophrenia	0	Y			
Ishikawa 2016	Japan	No	Age, gender, Charlson Comorbidity Index (CCI), smoking status, site of cancer (gastric or colorectal), average neighbourhood income per capita, cancer stage, surgical or endoscopic treatment, reason for admission (applied to mortality; delayed or reduced access to treatment)	Cancer	Schizophrenia	Y		Y		Y
Khaykin 2010	US	No	Patient characteristics (age, sex, primary payer, median income, admission route, CCI, surgical vs medical admission) and hospital characteristics (urban vs rural, teaching status, ownership, patient volume) (applied to adverse outcomes)	All medical and surgical	Schizophrenia		Y		Y	Y
Liao 2013	Taiwan	Yes	Matched each case with four controls. Sex, age, types of surgery, anaesthesia (applied to mortality; adverse outcomes)	All surgical	Schizophrenia	Y	Y		Y	Y
Maeda 2014	Japan	No	Age (<65 years), ambulance use, major surgery category, Charlson	All surgical	Schizophrenia		Y		Y	Y

(Continued)

TABLE 5: (Continued)

Lead author, year	Study country	Universal health care	Comparison or control variables	Physical illnesses /treatments studied	Mental illnesses studied (relevant)	Mortality	Adverse outcomes	Delayed and reduced access to treatment	Emergency rather than planned admissions	LOS and cost of hospital care
Menendez 2013	US	No	Comorbidity Index (CCI) (applied to adverse outcomes) Sex, age, type of procedure, primary diagnosis, comorbidities (applied to mortality; adverse outcomes)	Lower extremity fractures	Schizophrenia	X	Y			Y
Menendez 2014	US	No	Sex, age, type of procedure, primary diagnosis, comorbidities (applied to mortality; adverse outcomes)	Major spine surgery	Schizophrenia	0	Y			Y
Tsay 2007	Taiwan	Yes	Patient characteristics (age, sex, ethnicity, SES), hospital characteristics (ownership, accreditation level, patient volume, geographic location) (applied to adverse outcomes; delayed and reduced access to treatment (both are inferred from the outcome of appendicitis rupture))	Appendicitis /appendectomy	Schizophrenia Affective psychosis	Y	Y	Y	0	
Wu 2013	Taiwan	Yes	Demographic characteristics, medical disorders, cardiac history, hospital properties (applied to mortality; delayed and reduced access to treatment)	AMI PCTA CABG	Schizophrenia Bipolar disorder	Y	0	Y	Y	

Y, poorer outcome for people with mental illness; 0, no difference between those with mental illness and those without; X, better outcome for people with mental illness; AMI, acute myocardial infarction; LOS, length of stay; PCTA, percutaneous transluminal coronary angioplasty; CABG, coronary artery bypass graft.

TABLE 6: Likelihood of cases experiencing different types of adverse events

Lead author & year	Physical illnesses/treatments studied	Comparison or control variables	Mental illnesses studied	Wound complication	Postoperative shock	Postoperative bleeding	Infection	Acute postoperative anaemia	Acute renal failure	Acute myocardial infarction	Pulmonary embolism	Induced mental illness	Pneumonia, pulmonary congestion	Pulmonary insufficiency	Deep venous thrombosis	Inubation or mechanical ventilation	Blood transfusion	Ventricular arrhythmias and arrest	Conversion of cardiac rhythm	ICU admission	Sepsis	Decubitus ulcer	Respiratory failure	Accidental puncture or laceration	Latrogenic pneumothorax	Haemorrhage or haematoma	Stroke	Acute posthaemorrhagic anaemia	Latrogenic hypotension	Fat embolism	Ruptured appendix
Bot, 2014	Shoulder arthroplasty; Osteoarthritis; Proximal humeral fracture	None	Schizophrenia	X				X	X	X	0	X	X	Y	0	X	Y	0	0												
Buller, 2015	Hip or knee arthroplasty	None	Schizophrenia	†	X	Y	Y	Y	X	Y	0	Y	X	Y	X	Y	Y														
Chen, 2011	Pneumonia	Demographics; comorbidities; physician, hospital and episode characteristics	Schizophrenia				Y						Y							Y		Y									
Khaykin, 2010	All medical and surgical	Demographics; medical factors; hospital and episode characteristics	Schizophrenia			Y				Y				Y							Y	Y		X	0	0					
Liao, 2013	All surgical	Demographics; comorbidities; procedure and hospital characteristics	Schizophrenia			Y			Y			Y									Y						Y				
Menendez, 2013	Lower extremity fractures	None	Schizophrenia						Y	X	X	X	Y	X	Y	X	0	X	X								Y	X	X		
Menendez, 2014	Major spine surgery	None	Schizophrenia					X	Y	X	Y	Y	X	Y	Y	X	Y	X	0								X				
Tsay, 2007	Appendicitis/appendectomy	Demographics; hospital and episode characteristics	Schizophrenia Bipolar disorder																											Y	0

Y, poorer outcome for people with mental illness; 0, no difference between those with mental illness and those without; X, better outcome for people with mental illness.

†In table 3 in Buller *et al.* (2015), the data reported are anomalous. No clear inferences can be drawn.

found admission to hospital for gastric cancer treatment was less likely for people with SMI compared to those with no mental illness; surgical or endoscopic intervention was also less likely; and when an intervention was given, it was more likely to be invasive (Ishikawa *et al.* 2016). The difference remained significant after controlling for cancer stage, demographic factors, comorbidities, and smoking history. Another study found that appendix rupture was more likely in service users with schizophrenia compared to people without mental illness, suggesting a lack of timely intervention, and this difference remained significant after controlling for demographic factors and hospital characteristics. However, there was no difference for those with affective psychosis (Tsay *et al.* 2007). A further study identified that percutaneous transluminal coronary angioplasty or coronary artery bypass graft surgery was less likely to be performed following AMI in those with schizophrenia and bipolar disorder (Wu *et al.* 2013), after controlling for demographic characteristics, medical disorder, cardiac history, hospital properties, and inpatient complications.

#### *Emergency rather than planned admissions*

All of the three studies that reported findings on emergency care found that service users with mental illness were more likely to present as an emergency, rather than for planned care, when compared to other populations (Khaykin *et al.* 2010; Liao *et al.* 2013; Maeda *et al.* 2014). This included a higher likelihood (2.0% vs 1.2%) of service users with schizophrenia receiving an emergency operation (Liao *et al.* 2013); a higher likelihood (70.2% vs 48.8%) of service users with schizophrenia being admitted through the emergency room (Khaykin *et al.* 2010); and a higher likelihood (30.8% vs 14.9%) of service users with mental illnesses being admitted by ambulance (Maeda *et al.* 2014).

#### *Length of stay and cost of hospital care*

Seven studies reported findings on LOS, and all found that LOS was longer for patients with SMI (Bot *et al.* 2014; Buller *et al.* 2015; Ishikawa *et al.* 2016; Khaykin *et al.* 2010; Liao *et al.* 2013; Maeda *et al.* 2014; Menendez *et al.* 2013, 2014b). The cost of hospital care was also higher for people with SMI in most of these studies (Bot *et al.* 2014; Buller *et al.* 2015; Khaykin *et al.* 2010; Liao *et al.* 2013; Maeda *et al.* 2014; Menendez *et al.* 2013). However, shorter LOS was found in service users with other mental illnesses such as depression (Bot *et al.* 2014; Buller *et al.* 2015; Menendez *et al.* 2013, 2014a) and neurotic disorder

(Buller *et al.* 2015; Maeda *et al.* 2014; Menendez *et al.* 2013, 2014a).

## DISCUSSION

Heterogeneity across the range of diseases, adverse events, study designs, and SMI diagnoses limits the inferences that can be drawn from this review. Nonetheless, the large patient populations employed in the studies reviewed provide sufficient evidence to confirm that the association between SMI and lower-quality hospital care warrants more detailed consideration.

This review did not find strong evidence that there was higher in-hospital mortality for people with SMI. However, this review did find evidence that adverse outcomes were more common for people with schizophrenia (Buller *et al.* 2015; Chen *et al.* 2011; Khaykin *et al.* 2010; Maeda *et al.* 2014; Menendez *et al.* 2013, 2014b; Tsay *et al.* 2007). There is a lack of available evidence about the likelihood of adverse outcomes on medical and surgical wards for people with bipolar disorder or other psychosis. The presence of adverse inpatient outcomes for people with SMI, compared to a lack of adverse inpatient outcomes for people with SMI, leads to a greater risk of death within 30 days of discharge (Daumit *et al.* 2016). This suggests that the quality of inpatient care has an important effect on the risk of mortality for people with SMI, and these effects may be realized after they leave hospital.

While studies differed on the types of adverse outcomes that were more likely to occur, all found that adverse events were more likely in those with mental illness. The differences in the types of adverse outcomes experienced may be explained by the finding that hospital characteristics, such as level of accreditation or being a teaching hospital, accounted for 5–20% of the variation in individual safety events (Li *et al.* 2008).

Worse outcomes for people with mental illness are often attributed to patient factors, such as pain insensitivity, lack of engagement with healthcare services, metabolic risk, or side effects of medications (Lawrence & Kisely 2010). While these factors may contribute to poorer outcomes, there is evidence from this review that there are also disparities in the provision of care for people with mental illness (Ishikawa *et al.* 2016; Wu *et al.* 2013). This evidence is supported by findings that people with mental illness are less likely to be given guideline-consistent treatment (Kisely *et al.* 2009) or have surgery (Chang *et al.* 2013). This suggests that there are inequalities in the way care is

provided, which may contribute to poorer patient outcomes.

There is evidence in this review that people with SMI are less likely to receive timely treatment, tests, assessments, or diagnostic procedures (Ishikawa *et al.* 2016; Tsay *et al.* 2007; Wu *et al.* 2013). People with mental illness are less likely to be offered dietary consultations despite higher rates of obesity (Briskman *et al.* 2012), and those with cardiovascular disease were less likely to receive blood tests, chest X-rays, stress tests, or visits to specialists than those without mental illness (Gal *et al.* 2016). Diagnostic overshadowing may dominate a medical assessment for people with SMI and prevent the clinician from focussing on the physical symptoms that are displayed. Beliefs about lack of cognition or lack of concordance with care plans may also contribute.

Inequalities in admission types may contribute to poorer care. Patients with schizophrenia are more likely to be admitted as an emergency (Chen *et al.* 2011; Dautmit *et al.* 2006; Schoepf *et al.* 2014). This finding is supported by recent UK data, which show that in 2013/14, emergency admissions were 6.7 times more common in people with mental illness compared to other people who had used hospital services, and planned admissions were 10% lower (Dorning *et al.* 2015). Planned admissions are even more important for people with mental illness, not only to improve their health outcomes, but to ensure that there is adequate emotional and psychiatric support for the patient during the period of acute illness (Kilcommons & Morrison 2005).

It is unclear whether the finding that LOS is longer for people with SMI reflects higher- or lower-quality care. The finding that LOS was longer (Bot *et al.* 2014; Buller *et al.* 2015; Ishikawa *et al.* 2016; Khaykin *et al.* 2010; Liao *et al.* 2013; Maeda *et al.* 2014; Menendez *et al.* 2013, 2014b) was not controlled for by variables such as comorbidities, age, sex, hospital characteristics, so the longer LOS may reflect a higher requirement for physical or mental health care. However, the higher likelihood of experiencing an adverse outcome may contribute to the need for a longer hospital stay (Khaykin *et al.* 2010; Liao *et al.* 2013; Maeda *et al.* 2014; Menendez *et al.* 2013, 2014b). An inpatient hospital environment may not be the best environment for recovery for all service users, and some may benefit by returning to their usual routine in a calmer, less pressured environment. While there has been extensive research from the perspective of staff caring for people with mental illness on medical or surgical wards (Chee *et al.* 2005; Minas *et al.* 2011; Noblett *et al.* 2015;

Ostrow *et al.* 2014; Reed & Fitzgerald 2005), there is a lack of explicit knowledge about the experiences of people with mental illness, whose experiences can only be inferred from these papers and other literature.

## CONCLUSIONS

The review has provided strong evidence that adverse outcomes are more common for people with schizophrenia, but not affective psychosis or bipolar disorder, after controlling for patient factors. In-hospital mortality was not found to be more common in people with SMI. There was also evidence that people with SMI experience other indicators of lower-quality health care, such as delayed and reduced access to treatment and a higher likelihood of emergency care. SMI was also associated with a longer LOS and a higher cost of health care. Both experience and safety are important in high-quality health care, and the experiences of service users with mental illness require further investigation.

People with mental illness have more comorbidities and possess riskier lifestyle factors that make them more susceptible to illness (Lawrence & Kisely 2010; Reilly *et al.* 2015). However, the level of care provided does not match these risks, and in many cases, people with mental illness receive poorer quality care (Briskman *et al.* 2012; Ishikawa *et al.* 2016; Tsay *et al.* 2007; Wu *et al.* 2013). High-quality care must be provided to people with mental illness to reduce inequalities in this group. Strengthened links between primary and acute care and early intervention strategies could help to reduce these inequalities in healthcare provision.

Future research examining the quality of health care for people with SMI must control for patient factors such as smoking, obesity, and socio-economic status in the analysis. It is important to control for these patient factors to determine whether the outcome is due to inequalities in provision of health care. Protection from emotional harm is particularly important in people with mental illness, whose psychological health is already compromised and may be further compromised by these negative experiences.

## RELEVANCE FOR CLINICAL PRACTICE

This review suggests that having SMI results in lower-quality hospital care. Additional care needs to be taken to reduce adverse outcomes for people with SMI, particularly schizophrenia, in medical and surgical wards. People with SMI require timely access to acute care

interventions, and priority must be given to identifying strategies to reduce emergency instead of planned care. The severity of mental illness appears to increase risk of harm during medical and surgical care, to address the inequalities faced by this vulnerable population, and in acute care settings, clinicians require skills and confidence in assessing and supporting people with mental illness.

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