

Exploring the physical health of patients with severe or long-term mental illness using routinely collected general practice data from MedicineInsight

Josephine Belcher, Rimma Myton, Jeannie Yoo, Claire Boville, Kendal Chidwick

Background and objective

Australian information on the physical health of general practice patients with a mental illness is limited. The aim of this study was to explore the physical health of patients with a severe and/or long-term mental illness (SMI).

Methods

Analysis was performed of routinely collected data from patients visiting one of 452 general practice sites participating in the national MedicineInsight program during 2017–18.

Results

Of the 173,861 participants, 9.1% had recorded SMI. Almost three-quarters had a record of the selected long-term physical health conditions, compared with half of patients without recorded SMI (adjusted odds ratio: 2.2, 95% confidence interval: 2.1, 2.3). Patients with SMI were also more likely to have a history of smoking or moderate-to-heavy drinking.

Discussion

More patients with SMI had records of the investigated health conditions than those without SMI. They also had higher rates of modifiable risk factors. As patients with SMI are likely to visit their general practitioners often, this presents an opportunity for intervention that may improve patient outcomes.

IN RESPONSE TO CONCERNING EVIDENCE that people with mental illness have poorer physical health and lower life expectancies than those without a mental illness, the Fifth National Mental Health Plan identified improving the physical health of people with mental illness as a key priority.¹

In the 2015 National Health Survey, 16% of Australians self-reported that they had both a mental health or behavioural condition and a physical health condition.² The 2010 National Survey of High Impact Psychosis (SHIP), which surveyed 1825 Australians living with a psychotic illness on a range of topics including their physical health and health service use, reported higher rates of chronic physical illness and biomedical risk factors when compared with the general population.^{3–5}

Information on the physical health of general practice patients in Australia with severe and/or long-term mental illness (SMI) is limited. This is despite data suggesting that most patients with a psychotic illness regularly visit a general practitioner (GP) to discuss a physical health condition.^{3,4}

This study explored the sociodemographic characteristics of Australian general practice patients with a record of SMI. It compared the prevalence of selected physical health conditions and biomedical risk factors among these patients with patients who do not have a record of SMI.

Methods

A cross-sectional study was conducted using MedicineInsight, a national general practice dataset managed by NPS MedicineWise, with funding support from the Australian Government Department of Health.⁶ MedicineInsight extracts and collates longitudinal, de-identified patient data from clinical information systems (Best Practice and Medical Director 3), including patient demographics, clinical encounters (excluding progress notes), diagnoses and prescriptions.

There were 452 general practice sites that met the researchers' standard data quality criteria (established for at least two years, no significant data interruptions and with at least 50 patients) and were included in the present study. Eligible patients were aged ≥ 15 years, had visited one of the general practices at least twice between 1 January 2017 and 31 December 2018, and were still alive at study end. Children were excluded because rates of mental illness begin to rise from adolescence onwards.⁷

The researchers developed coding algorithms for selected health conditions using coded and free-text data from the diagnosis, reason for encounter and reason for prescription fields. Patients were classified as having a severe mental illness if there was any record of schizophrenia or bipolar disorder at any time from the patient's earliest record up to 31 December 2018.

As a result of the nature of routinely collected data, information on depression or anxiety disorder severity was often missing, so patients with these conditions were included if they had at least two records of depression or an anxiety disorder recorded at least six months apart but within a consecutive two-year period at any time from the patient's earliest record up to 31 December 2018. For the analysis, these two cohorts of patients (ie those with bipolar disorder or schizophrenia, and those with long-term depression or anxiety) were combined into a single group described as having SMI. A full list of the terms used to identify SMI is in Appendix 1 (available online only).

Patients identified as having an alcohol or opioid use disorder (Appendix 1) but not SMI were identified but are not discussed further in this article. The general patient population (no SMI group) was defined as eligible patients with no record of SMI or alcohol or opioid use disorder.

Study outcomes

Sociodemographics included age, sex, socioeconomic status and remoteness. Patients' postcodes were used to determine socioeconomic status using Australian Bureau of Statistics Index of Relative Socio-Economic Advantage and Disadvantage (IRSAD)⁸ and remoteness areas.⁹ Patients were classified as having hypertension, dyslipidaemia or one of the selected physical health conditions if such a diagnosis had been recorded at any point in the clinical record from the patient's earliest record up to 31 December 2018. Information about smoking status and alcohol intake was collected from the clinical record. Patients were classified as being obese if body mass index (BMI) was recorded, or calculated using the most recently recorded weight and height, to be ≥ 30 kg/m².

Statistics

Study outcomes included descriptive statistics (percentages and robust 95% confidence intervals [CI] that adjusted for clustering by practice). The age- and sex-standardised prevalence of each physical condition and risk factor for patients with SMI was calculated

using direct standardisation of the MedicineInsight general patient population (those without SMI or substance use disorder; males and females only) as the reference population. Data manipulation and analyses were conducted using SAS software version 9.4 (SAS Institute Inc., Cary, NC, USA) and Stata/IC version 12.1 (StataCorp LP, Texas, USA).

The association between SMI and the two outcomes, physical conditions or risk factors, was explored via logistic regression (restricted to patients aged 15–75 years to avoid mortality attrition bias) using generalised linear modelling. The Stata `svy` command with logistic estimation was used to account for clustering by practice site. To adjust for potential confounders, purposeful selection of covariates and change-in-estimate criterion were used. The base model included SMI as the primary risk factor and age and sex as a priori confounders. Other potential confounders were added to the unadjusted model if their inclusion (one at a time) resulted in an absolute change to the odds ratio (OR) of 10% or greater. All confounders included in the final regression models for health conditions and biomedical risk factors were statistically significant at P value < 0.05 . The interaction between sex and age was tested for all regression models and did not have a statistically significant effect.

Ethics

This study was approved by The Royal Australian College of General Practitioners' National Research and Evaluation Ethics Committee (19-003) and the MedicineInsight independent external Data Governance Committee (DG 2019-011) in April 2019.

Results

Of the almost 1.94 million patients eligible for this study, 173,861 (9.0%; 95% CI: 8.5, 9.4) had a record of SMI (Figure 1). The mental illnesses most commonly recorded were long-term anxiety (108,660 patients) and long-term depression (93,578 patients). Many patients had more than one mental illness (Table 1).

Women made up a larger proportion of people with SMI (64.4%; 95% CI: 63.6, 65.3) than in the population without SMI (57.0%; 95% CI: 56.5, 57.6; Appendix 2, available online only). While the average age of both groups was similar (48.5 years, compared with 47.9 years), significantly more patients were aged 35–64 years, and significantly fewer aged 15–24 years and ≥ 75 years, in people with SMI when compared with the group without SMI (Figure 2). The distribution of rurality and socioeconomic status was similar (Appendix 2).

Having a record of SMI increased the likelihood that a patient would be identified as having each of the biomedical risk factors (Table 2). Patients with SMI were more than twice as likely to be smokers or risky drinkers and were significantly more likely to have hypertension or dyslipidaemia or be identified as being obese.

Almost three-quarters of patients with a record of SMI (71.1%) had at least one of the selected physical health conditions, compared with 53.6% of people without SMI (Table 3). The odds of having at least one physical health condition among patients with SMI was double that of patients without SMI (adjusted OR: 2.2; 95% CI: 2.1, 2.3).

The most prevalent of the selected physical health conditions among all patients were back pain, gastro-oesophageal reflux disease (GORD), arthritis and cancer (Table 3). The risk of every single physical health condition was significantly higher for patients with SMI when compared with patients without SMI. Having SMI was correlated with a doubling of the odds of back pain, COPD and GORD, and tripled the odds of chronic liver disease. The odds of cardiovascular disease, heart failure, dyslipidaemia, hypertension and osteoporosis were associated with at least a 50% increase for patients with SMI, while the odds of type 2 diabetes increased by 19%.

Discussion

This large study increases understanding of the physical health conditions and biomedical risk factors of general practice

Table 1. Patient prevalence of SMI* in the MedicineInsight general practice population (n = 1,939,881)

Mental illness*	All eligible MedicineInsight patients	
	Number	% (95% CI)
Any SMI	173,861	9.0 (8.5, 9.4)
Schizophrenia	15,156	0.8 (0.7, 0.9)
Bipolar disorder	23,788	1.2 (1.2, 1.3)
Long-term anxiety disorder	93,578	4.8 (4.5, 5.1)
Long-term depression	108,660	5.6 (5.2, 6.0)
Any SMI plus a substance use disorder	13,766	0.7 (0.6, 0.8)

*Patients may have more than one type of SMI
 CI, confidence interval; SMI, severe and/or long-term mental illness

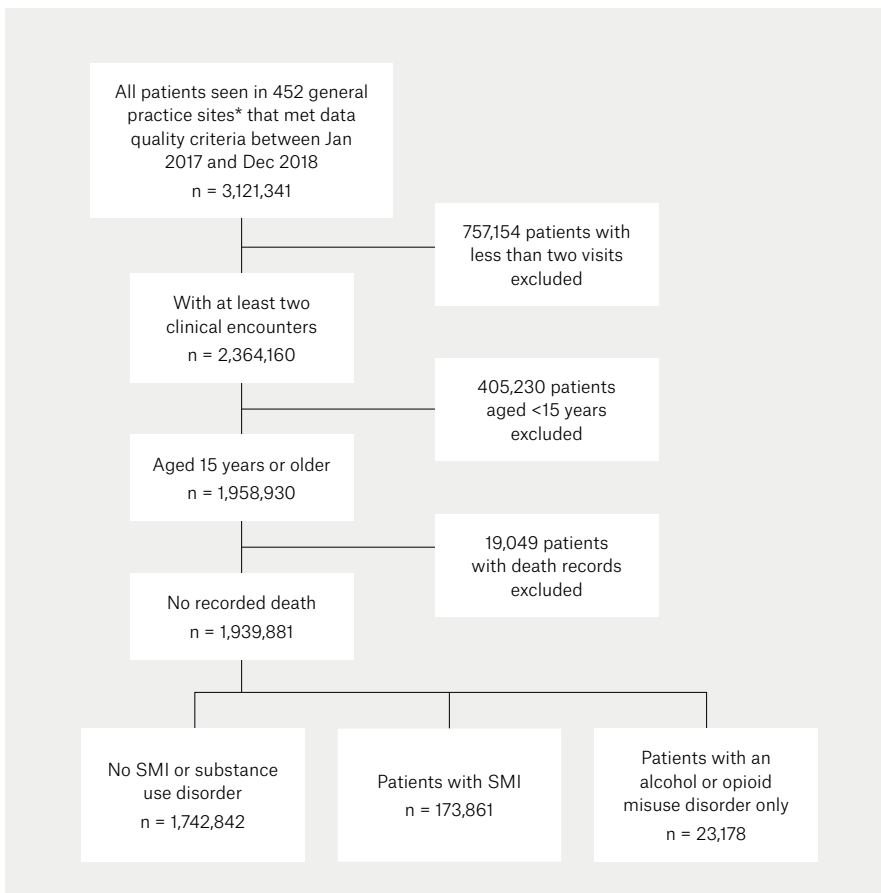


Figure 1. Patient eligibility

*The term 'general practice site' is used to describe one or more practices that share the same installation of the clinical information system (CIS). For example, one organisation may consist of a number of geographically diverse general practices that all share the same CIS, or a site may be a single general practice. There were 497 individual general practices included in the 452 general practice sites.

patients with a record of SMI. While the SHIP provided some information on GP visits among people with a mental illness, it focused on people with a psychotic illness whereas this study also included patients with long-term depression and long-term anxiety disorders.

Consistent with other Australian studies, there was an association between having SMI and physical ill health.²⁻⁵ For every biomedical risk factor and health condition investigated, this risk was higher for people with SMI than for those without SMI. The proportion of MedicineInsight patients with SMI with a recorded diagnosis of kidney disease, arthritis, back pain or asthma was similar to figures reported among SHIP respondents. However, a smaller proportion of MedicineInsight patients had a record of cardiovascular disease, diabetes, hypertension, obesity or dyslipidaemia than in the SHIP.^{3,4} For example, 9.9% of MedicineInsight patients had a record of diabetes, compared with 20.5% of SHIP respondents. These differences may be due to the inclusion of patients with long-term depression or anxiety disorders in the MedicineInsight cohort. People with a psychotic illness are at particular risk of cardiovascular events and diabetes, due to the illness itself and the side effects of medicines used to manage psychosis.³⁻⁵ Therefore, a study that only includes such patients is likely to report higher rates of these conditions than one that also included people with depression or anxiety disorders.

The Fifth National Mental Health Plan has made explicit reference to the use of electronic medical records to develop and measure indicators of physical health in people with mental illness.¹ The present study goes some way towards developing a baseline for measuring future changes among Australian general practice patients.

This is a cross-sectional study and cannot provide information on causality or temporality. It cannot distinguish if patients were initially diagnosed with mental illness, which then led to poorer physical health, or vice versa. The reasons for poorer physical health among people with a mental illness are complex. The medicines used to manage

mental illnesses can have side effects that increase the risk of physical illness. Mental health treatment may be prioritised over treatment of physical health conditions, patients may experience barriers to accessing healthcare and patients may be more likely to be exposed to lifestyle risk

factors and socioeconomic disadvantage. Being diagnosed with physical health conditions can also have an adverse impact on mental health.^{1,10,11} It would be interesting to further explore causality using MedicineInsight data to identify a cohort of patients newly identified as

having a mental health condition but no physical health condition, or vice versa, and follow them over time.

As a result of the nature of routinely collected data, information on whether a patient had mild, moderate or severe depression or anxiety was often missing.

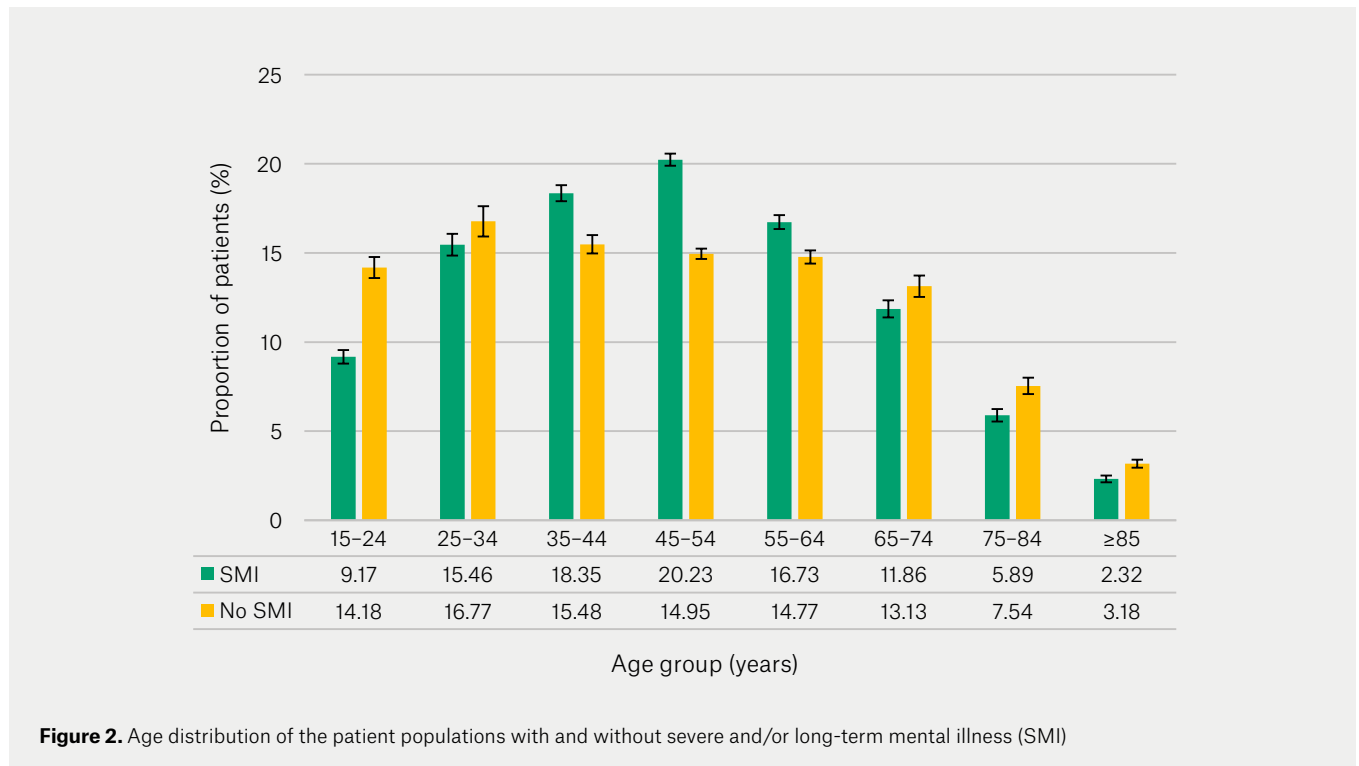


Figure 2. Age distribution of the patient populations with and without severe and/or long-term mental illness (SMI)

Table 2. Prevalence and odds of having a biomedical risk factor among Australian general practice patients with and without SMI

Risk factor	Prevalence* in patients with SMI (n = 173,831)	Prevalence in population without SMI† (n = 1,742,735)	Odds ratio (95% CI)*	
	% (95% CI)	% (95% CI)	Crude	Adjusted
Dyslipidaemia	25.21 (24.47, 25.96)	17.67 (16.98, 18.35)	1.69 (1.63, 1.76)	1.79 (1.72, 1.86)
Hypertension	27.25 (26.81, 27.69)	22.11 (21.24, 22.99)	1.40 (1.35, 1.45)	1.48 (1.44, 1.53)
Moderate-to-heavy drinker	4.71 (4.23, 5.25)	2.29 (2.07, 2.51)	2.27 (2.10, 2.47)	2.32 (2.15, 2.51)
Obesity	29.04 (28.17, 29.92)	18.56 (17.80, 19.31)	2.00 (1.94, 2.06)	1.91 (1.85, 1.97)
Current or past smoker§	46.88 (45.72, 48.04)	30.11 (29.24, 31.01)	2.25 (2.17, 2.34)	2.24 (2.17, 2.32)

*Age- and sex-standardised to the non-SMI population

†Patients with neither SMI nor a substance use disorder

‡Logistic regression modelling only included patients aged 15-75 and who were identified as male or female (n = 1,734,331). All models were adjusted for sex and age only.

§Smoking status was missing for 7.0% of the SMI population and 15.2% for the non-SMI population.

CI, confidence interval; SMI, severe and/or long-term mental illness

Table 3. Prevalence and odds of having a physical health condition among Australian general practice patients with and without SMI

Condition	Prevalence* in patients with SMI (n = 173,831)	Prevalence in population without SMI† (n = 1,742,735)	Odds ratio (95% CI)*		
	% (95% CI)	% (95% CI)	Crude	Adjusted	Confounders included in the model
One or more conditions	71.13 (70.33, 71.93)	53.61 (52.27, 54.95)	2.36 (2.27, 2.45)	2.19 (2.12, 2.26)	Sex, age, current/past smoking, obesity
Arthritis	27.40 (26.70, 28.10)	18.71 (17.87, 19.54)	1.76 (1.69, 1.84)	1.62 (1.57, 1.68)	Sex, age, dyslipidaemia, hypertension, current/past smoking, obesity
Asthma	22.18 (21.56, 22.81)	13.31 (12.88, 13.73)	1.89 (1.83, 1.96)	1.78 (1.72, 1.83)	Sex, age, obesity
Atrial fibrillation	3.58 (3.47, 3.70)	3.08 (2.89, 3.27)	1.10 (1.04, 1.16)	1.09 (1.05, 1.14)	Sex, age, dyslipidaemia, hypertension, current/past smoking, obesity
Back pain	35.09 (34.18, 36.02)	19.42 (18.79, 20.04)	2.42 (2.34, 2.49)	2.12 (2.06, 2.18)	Sex, age, current/past smoking, dyslipidaemia
Cancer	19.44 (18.56, 20.34)	14.90 (13.99, 15.82)	1.47 (1.40, 1.55)	1.39 (1.34, 1.45)	Sex, age, current/past smoking, obesity
Cardiovascular disease [‡]	10.19 (9.94, 10.46)	6.68 (6.31, 7.05)	1.62 (1.55, 1.70)	1.50 (1.46, 1.54)	Sex, age, dyslipidaemia, hypertension, current/past smoking, obesity
Chronic kidney disease	2.39 (2.17, 2.63)	1.64 (1.48, 1.79)	1.58 (1.49, 1.69)	1.35 (1.27, 1.43)	Sex, age, dyslipidaemia, hypertension, current/past smoking, obesity
Chronic liver disease	0.57 (0.52, 0.62)	0.17 (0.16, 0.19)	3.75 (3.41, 4.12)	3.03 (2.77, 3.32)	Sex, age, hypertension, current/past smoking, moderate-to-heavy drinking, obesity
COPD	7.39 (6.99, 7.82)	3.27 (3.07, 3.47)	2.78 (2.64, 2.94)	2.27 (2.17, 2.36)	Sex, age, dyslipidaemia, hypertension, current/past smoking, obesity
Gastro-oesophageal reflux disease	29.05 (28.15, 29.97)	14.93 (14.31, 15.54)	2.51 (2.42, 2.60)	2.22 (2.16, 2.29)	Sex, age, dyslipidaemia, current/past smoking, obesity
Heart failure	2.55 (2.39, 2.72)	1.55 (1.42, 1.68)	1.79 (1.65, 1.93)	1.54 (1.43, 1.67)	Sex, age, dyslipidaemia, hypertension, current/past smoking, obesity
Osteoporosis	8.63 (8.31, 8.97)	6.15 (5.77, 6.54)	1.58 (1.51, 1.66)	1.49 (1.43, 1.55)	Sex, age, dyslipidaemia, hypertension
Type 2 diabetes	9.94 (9.63, 10.26)	7.16 (6.84, 7.49)	1.52 (1.47, 1.58)	1.19 (1.15, 1.22)	Sex, age, dyslipidaemia, hypertension, current/past smoking, obesity

*Age- and sex-standardised to the general population

†Patients with neither SMI nor a substance use disorder

‡Logistic regression modelling only included patients aged 15–75 and who were identified as male or female (n = 1,734,331). Potential confounders included age, sex, socioeconomic status, remoteness, smoking status (current/past), obesity, moderate-to-heavy drinking, dyslipidaemia and hypertension.

§Includes coronary artery disease, peripheral vascular disease, stroke and transient ischaemic attack

CI, confidence interval; COPD, chronic obstructive pulmonary disease; SMI, severe and/or long-term mental illness

For this reason, duration of illness was used as a proxy of severity. However, this means patients with long-term but mild or moderate depression or anxiety (not normally considered to have SMI) may have been included and potentially reduced the strength of associations seen in this study.

Practice participation in the MedicineInsight program is voluntary, and practices are not randomly selected. As such, practices and GPs working in them may differ from the average Australian general practice. However, when compared with Medicare Benefits Schedule data, MedicineInsight patients have similar demographics to all patients who visit a GP.⁶ While the study attempted to control for confounders, it is possible that some residual confounding is present (eg if the marker of socioeconomic status based purely on patient postcode is relatively insensitive). In addition, the study relies on the extraction of information from clinical information software and may underestimate prevalence if information is not recorded in a field accessible to MedicineInsight. Patients may attend multiple practices so may be double counted if they attend multiple MedicineInsight practices – previous work estimates this to be fewer than 4.0% of patients.⁶ Similarly, data on patients who also attend non-MedicineInsight practices will be missing.

Similar to other Australian studies, these findings highlight the importance of addressing physical health needs in people with SMI.^{2-5,10,11} Three-quarters of Australians with a mental illness who seek medical help during a year consult a GP rather than specialist mental health services, and Australians with a psychotic illness visit a GP on average nine times per year.^{4,11} While people with a mental illness have a high morbidity burden, many of the risk factors and conditions identified are modifiable or manageable. If risk factors precede physical or mental health conditions, then GP management of these risk factors becomes increasingly important. Efforts to manage physical health conditions that may exacerbate mental illness, or vice versa, may improve patient wellbeing.

Authors

Josephine Belcher BSc, MMedSci (ClinEpi), Epidemiologist, NPS MedicineWise, Surry Hills, NSW
 Rimma Myton GradCertMath, MBIostat, Statistician/Data Analyst, NPS MedicineWise, Surry Hills, NSW
 Jeannie Yoo MBBS, MHealthEthics, FRACGP, Senior Medical Advisor, NPS MedicineWise, Surry Hills, NSW
 Claire Boville BPharm, Senior Clinical Program Officer, NPS MedicineWise, Surry Hills, NSW
 Kendal Chidwick BPharm, MEpi, Epidemiology Lead, NPS MedicineWise, Surry Hills, NSW
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Correspondence to:
 jbelcher@nps.org.au

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correspondence ajgp@racgp.org.au

Appendix 1. Clinical definitions used to identify long-term or severe mental illness

Condition	Definition
Long-term anxiety disorder	Patients were defined as having severe anxiety disorder if they had two or more relevant coded (Docle, Pyefinch) or free text entries – recorded at least six months apart but within two consecutive years – in one of the three diagnosis fields recorded at any time from the patient’s earliest record up to the download date. Relevant terms include: agoraphobia, anxiety, anxiety/depression, anxiety disorder, depressive anxiety disorder, GAD, generalised anxiety disorder, mixed anxiety/depressive disorder, nervous anxiety, neurotic anxiety, panic disorder, phobia, phobic anxiety, social anxiety disorder, social phobia
Bipolar disorder	Patients were defined as having bipolar disorder, if they had a relevant coded (Docle, Pyefinch) or free text entry in one of the three diagnosis fields recorded at any time from the patient’s earliest record up to the download date. Relevant terms include: bipolar affective disorder, bipolar 1 disorder, bipolar 2 disorder, bipolar spectrum disorder, manic depressive illness, manic depressive psychosis
Long-term depression	Patients were defined as having severe depression if they had two or more relevant coded (Docle, Pyefinch) or free text entries – recorded at least six months apart but within two consecutive years – in one of the three diagnosis fields recorded at any time from the patient’s earliest record up to the download date. Relevant terms include: depression (disorder, endogenous, major, melancholic, organic, non-melancholic, organic, psychotic or recurrent), anxiety/depression, neurotic depression
Schizophrenia	Patients were defined as having schizophrenia or schizoaffective disorder, if they met either of the below criteria: <ol style="list-style-type: none"> 1. relevant coded (Docle, Pyefinch) or free text entry in one of the three diagnosis fields recorded at any time from the patient’s earliest record up to the download date. Relevant terms include: schizophrenia (catatonic, chronic, disorganised, hebephrenic, paranoid, undifferentiated), schizoaffective disorder, schizophreniform disorder, psychosis senile, senile dementia with psychosis 2. two or more relevant entries in one of the three diagnosis fields ‘ever’ separated by at least six months to indicate chronicity. Relevant terms include: borderline schizophrenia, brief reactive schizophrenia, para schizophrenia
Substance use disorder	Patients were defined as having an opioid or alcohol use disorder if they met any of the below criteria: <ol style="list-style-type: none"> 1. relevant coded (Docle, Pyefinch) or free text entry in one of the three diagnosis fields recorded at any time from the patient’s earliest record up to the download date. Relevant terms include: (abuse or dependence or addiction) of an opiate, IDU, injecting drug user, intravenous drug use, IV drug use, long term opiate use 2. relevant coded (Docle, Pyefinch) or free text entry in one of the three diagnosis fields recorded at any time from the patient’s earliest record up to the download date. Relevant terms include: (abuse or dependence or addiction) of alcohol, alcohol addiction, alcohol dependence, alcohol related brain injury, alcohol use disorder, alcoholic, alcohol withdrawal, alcoholism, Antabuse type reaction, delirium tremens, Korsakoff’s dementia 3. relevant medicines recorded in the scripts issued table or prescription history/current medication table. Relevant medications include: naltrexone, buprenorphine or methadone products when solely indicated for opiate substitution therapy 4. relevant medicines recorded in the scripts issued table or prescription history/current medication table. Relevant medications include: acamprosate (Campral) disulfiram (Antabuse), naltrexone

Appendix 2. Socio-demographic characteristics of Australian general practice patients with and without SMI*

Characteristic		SMI (n = 173,861)		No SMI† (n = 1,742,842)	
		Number	% (95% CI)	Number	% (95% CI)
Sex	Male	61,831	35.56 (34.71, 36.42)	748,856	42.97 (42.43, 43.51)
	Female	112,000	64.42 (63.56, 65.27)	993,879	57.03 (56.49, 57.57)
	Intersex or indeterminate	30	0.02 (0.01, 0.02)	107	0.01 (0.00, 0.01)
Age	15–24	15,940	9.17 (8.79, 9.55)	247,146	14.18 (13.59, 14.77)
	25–34	26,876	15.46 (14.85, 16.07)	292,276	16.77 (15.92, 17.62)
	35–44	31,907	18.35 (17.90, 18.80)	269,715	15.48 (14.96, 15.99)
	45–54	35,175	20.23 (19.89, 20.57)	260,620	14.95 (14.66, 15.24)
	55–64	29,086	16.73 (16.34, 17.12)	257,337	14.77 (14.40, 15.14)
	65–74	20,613	11.86 (11.38, 12.33)	228,840	13.13 (12.53, 13.73)
	75–84	10,233	5.89 (5.54, 6.24)	131,438	7.54 (7.08, 8.00)
	≥85	4,031	2.32 (2.13, 2.51)	55,470	3.18 (2.96, 3.41)
Rurality	Major city	108,789	62.57 (56.58, 68.56)	1,150,717	66.03 (60.78, 71.27)
	Inner regional	45,753	26.32 (20.85, 31.79)	381,652	21.90 (17.40, 26.40)
	Outer regional	16,287	9.37 (5.82, 12.91)	169,464	9.72 (6.38, 13.07)
	Remote/very remote	1,509	0.87 (0.32, 1.42)	22,351	1.28 (0.42, 2.15)
	Missing	1,523	0.88 (0.13, 1.63)	18,658	1.07 (0.28, 1.86)
Socioeconomic status	1 (most disadvantaged)	30,105	17.32 (12.03, 22.60)	272,878	15.66 (11.57, 19.74)
	2	29,997	17.25 (12.73, 21.77)	268,642	15.41 (11.42, 19.41)
	3	40,447	23.26 (18.02, 28.50)	397,006	22.78 (17.86, 27.70)
	4	37,032	21.30 (16.08, 26.52)	370,668	21.27 (16.54, 25.99)
	5 (most advantaged)	35,647	20.50 (15.70, 25.31)	419,895	24.09 (19.23, 28.95)
	Missing	633	0.36 (0.00, 1.01)	13,753	0.79 (0.00, 2.06)

*Cells in which there is a significant difference between the SMI population and the no-SMI population (as identified via non-overlap of confidence intervals) have been bolded.

†Patients with neither SMI nor a substance use disorder

CI, confidence interval; SMI, severe and/or long-term mental illness