



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



## A 6-month study on the pattern of emergency department presentations for schizophrenia and other psychotic disorders during COVID-19 lockdown

Karuppiyah Jagadheesan<sup>a,b,\*</sup>, Vijay Danivas<sup>a</sup>, Quratulain Itrat<sup>a</sup>, Lokesh Shekaran<sup>a</sup>, Vinay Lakra<sup>a,b</sup>

<sup>a</sup> North West Area Mental Health Services, Melbourne Health, Melbourne, Australia

<sup>b</sup> Department of Psychiatry, University of Melbourne, Australia

### ARTICLE INFO

#### Keywords:

COVID-19  
Lockdown  
Schizophrenia  
Psychosis  
Emergency department

### ABSTRACT

This study investigated the characteristics of patients with schizophrenia and other psychotic disorders presenting to emergency departments (ED) for psychiatric treatment during the first six months of the COVID-19 lockdown in Melbourne. This cross-sectional data-base study included adult patients in the North West Area Mental Health Service's catchment area who had visited two emergency departments (EDs) during the study period (March 16–September 16, 2020) and the control period (March 16–September 16, 2019). Compared to the control period ( $n = 467$ ), the lockdown period ( $n = 451$ ) had a 6.8% more psychotic disorders. This increase was particularly noted for schizophrenia and acute transient psychosis. In a sub-analysis of psychotic disorder group alone, compared to the control period, more patients were discharged to the community in the lockdown period. In another sub-analysis, compared to the mood disorder group, psychotic disorder group included more patients in 26–35 and 46–55 age groups, men, emergency triage category, and hospital admissions and higher mean duration of ED stay in the lockdown period. Overall, patients with psychotic disorders had increased ED presentations and appeared to be in an emergency state when they present to ED during the lockdown.

### 1. Introduction

Population surveys amply show the negative effect of the COVID-19 pandemic and associated public health measures on the mental well-being (Wang et al., 2020; Pierce et al., 2020; Fisher et al., 2020). In the recent Australian national survey, about 10% of the participants reported self-harm thoughts and death wishes during the lockdown; particularly, Victorians found restrictions very stressful (Fisher et al., 2020). Individuals with mental illnesses experience the negative psychological effects of public health measures more (Hao et al., 2020). Contrary to these data highlighting the increased risk for and occurrence of mental health problems, studies show a 15–60% decline in emergency department (ED) visits for acute psychiatric care during the COVID-19 pandemic and lockdown (Beghi et al., 2020; Capuzzi et al., 2020; Hoyer et al., 2020; Goncalves-Pinho et al., 2020; Montalbani et al., 2020; McAndrew et al., 2020; Pham-Scottet et al., 2020; Pignon et al., 2020; Dragovic et al., 2020).

Some studies investigated the effect of the pandemic and lockdown

on patients with severe mental illnesses (SMIs) (table 1). Ambrosetti et al. (2021) observed a decrease in ED presentations for psychotic disorders, depression/anxiety disorders, and manic/hypomanic episode in the pandemic period. Beghi et al. (2020) found a decrease in psychotic disorders and an increase in mood disorders, although there was a decrease in absolute number of patients for both disorders, during the lockdown. Capuzzi et al. (2020) found the COVID-19 study group had a marginal increase in psychotic disorders, significantly lesser depressive disorders, and no difference in bipolar disorders.

Ferrando et al. (2020) found no differences in the rates of psychotic disorders, bipolar disorders, depressive disorders between the control and study periods in the adult sample. However, in a sub-analysis of COVID-19 positive vs negative patients, compared to the control period, psychotic disorders were significantly higher and depressive disorders were significantly lower in the study period. Gomez-Ramiro et al. (2021) did not find any differences in ED admission for psychotic and mood disorders. Goncalves-Pinto et al. (2020) described an increase in schizophrenia and other psychotic disorders and a reduction in mood

\* Corresponding author at: North West Area Mental Health Services, Melbourne Health, 35 Johnstone Street, Broadmeadows VIC 3047, Department of Psychiatry, The University of Melbourne, Melbourne, Australia.

E-mail address: [Karuppiyah.Jagadheesan@mh.org.au](mailto:Karuppiyah.Jagadheesan@mh.org.au) (K. Jagadheesan).

<https://doi.org/10.1016/j.psychres.2021.114081>

Received 23 April 2021; Received in revised form 14 June 2021; Accepted 25 June 2021

Available online 1 July 2021

0165-1781/© 2021 Elsevier B.V. All rights reserved.

**Table 1**  
Rates of psychotic and affective disorders between the comparison and study (pandemic/lockdown) periods.

Study	Country	Control and study periods	Psychotic disorders	Affective disorders
Ambrosetti et al. (2020)	Switzerland	April 1-May 15, 2016 vs April 1-May 15, 2020. On pandemic.	7.9% decrease ( $n = 18$ , 3.1% from 77, 11%) in psychotic episode ( $p < 0.001$ for overall group difference).	0.2% decrease ( $n = 10$ , 1.7% from 13, 1.9%) in manic/hypomanic episode; 14% decrease ( $n = 175$ , 30.2% from 310, 44.2%) in depression/anxiety ( $p < 0.001$ for overall group difference).
Beghi et al. (2020)	Italy	March 9-May 3, 2019 vs March 9-May 3, 2020. On lockdown.	4.9% decrease ( $n = 48$ , 12.5% from 79, 17.4%) in psychotic disorders ( $p = 0.032$ for overall group difference).	0.7% increase ( $n = 78$ , 20.3% from 89, 19.6%) in mood disorders ( $p = 0.032$ for overall group difference).
Capuzzi et al. (2020)	Italy	February 22-May 5, 2019 vs February 21-May 3, 2020. On lockdown.	5.8% increase ( $n = 52$ , 23.1% from 67, 17.3%) in psychotic disorders ( $p = 0.078$ ).	7.5% decrease ( $n = 25$ , 11.1% from 72, 18.6%) in depressive and adjustment disorder group ( $p = 0.015$ ) and no statistical difference ( $n = 21$ , 9.3% from 36, 9.3%) in bipolar disorders.
Ferrando et al. (2020)	USA	January 1-February 28, 2020 vs March 1-April 30, 2020. On pandemic.	1.1% increase ( $n = 45$ , 33.1% from 49, 32.0%) in psychotic disorders ( $p > 0.05$ ) in adults. However, within the study period, 25.8% increase of psychotic disorders among COVID-19 positives ( $p = 0.05$ ).	1.4% decrease ( $n = 23$ , 16.9% from 28, 18.3%) in bipolar disorders and 2.1% (34, 25.0% from 35, 22.9%) increase in depressive disorders in adults ( $p > 0.05$ ). However, within the study period, 29.8% increase for

**Table 1 (continued)**

Study	Country	Control and study periods	Psychotic disorders	Affective disorders
Gomez-Ramiro et al. (2021)	Spain	December 14, 2019-March 13, 2020 vs March 14-June 12, 2020. On lockdown.	1.1% ( $n = 67$ , 8.9% from 94, 7.8%), 0.7% ( $n = 25$ , 3.3% from 32, 2.6%), 0.2% ( $n = 3$ , 0.4% from 3, 0.2%) and 0.3% ( $n = 56$ , 7.5% from 87, 7.2%) increase in schizophrenia, schizoaffective disorder, delusional disorder and psychosis NOS, respectively ( $p > 0.05$ ).	depressive disorders ( $p = 0.008$ ) and 4.1% increase in bipolar disorders among COVID-19 negative patients ( $p > 0.05$ ). 1% increase ( $n = 34$ , 4.5% from 42, 3.5%) in bipolar I disorder; 0.7% decrease ( $n = 3$ , 0.4%) from 14, 1.1%) in bipolar II disorder; 0.4% decrease ( $n = 43$ , 5.6% from 74, 6.0%) in depressive disorder ( $p > 0.05$ ).
Gonçalves-Pinho et al. (2020)	Portugal	March 19-May 2, 2019 vs March 19-May 2, 2020. On lockdown.	9.8% increase ( $n = 147$ , 18.8% from 163, 10.0%) in psychotic disorders ( $p = NA$ ).	7.1% decrease ( $n = 108$ , 13.8% from 341, 20.9%) decrease for mood disorders ( $p = NA$ ).
Hoyer et al., al. (2020)	Germany	January 1-April 21, 2019 vs January 1-April 19, 2020. On lockdown.	-	42.3% reduction (absolute numbers NA) in affective disorders ( $p = 0.016$ ).
McAndrew et al. (2020)	Ireland	March 19-May 13, 2018 and March 18-May 12, 2019 vs March 16-May 10, 2020. Based on lockdown.	No significant difference (mean=7 (proportion 0.05) from 5 (proportion 0.06); $p > 0.05$ ).	No significant difference (mean=22 (proportion 0.15) from 28 (proportion 0.15); $p > 0.05$ ).
Montalbani et al. (2020)	Italy	March 11-May 3, 2019 vs January 1-March 10, 2020 and March 11-May 3, 2020. Based on lockdown.	0.5% decrease ( $n = 8$ , 13.8% from 19, 14.3%) in psychotic disorders (overall group difference, $p > 0.05$ ).	1.5% increase ( $n = 18$ , 31.3% from 39, 29.8%) in major depressive disorder; 1% increase ( $n = 11$ , 19.8% from 25, 18.8%) in bipolar

(continued on next page)

Table 1 (continued)

Study	Country	Control and study periods	Psychotic disorders	Affective disorders
Pignon et al. (2020)	France	4 weeks from March 17, 2019 and 2020. Based on lockdown.	7% increase ( $n = 172$ , 31.1% from 295, 24.1%) in psychotic disorders ( $p = 0.002$ ).	disorder (overall group difference, $p > 0.05$ ). 2.8% decrease ( $n = 156$ , 28.2% from 379, 31.0%) in mood disorders ( $p > 0.05$ ).
Rodriguez-Jimenez et al. (2021)	Spain	March 14-May 1, 2019 vs March 14-May 1, 2019. Based on lockdown.	10% increase ( $n = 73$ , 34.4% from 89, 24.3%) in schizo-psychotic disorders (overall group difference, $p = 0.069$ ).	1.2% decrease ( $n = 5$ , 2.3%) from 13, 3.5%) in depressive disorders; 1.1% decrease ( $n = 11$ , 5.2%) from 23, 6.3%) in bipolar disorders (overall group difference, $p = 0.069$ ).

disorders. Hoyer et al. (2020) found a significant reduction in ED access for mood disorders. McAndrew et al. (2020) and Montalbani et al. (2020) did not find a significant difference in the proportion of patients with psychosis and mood disorders. Pignon et al. (2020) mainly found a significant increase in psychotic disorders, although absolute number decreased, in the first four weeks of lockdown in 2020. Rodrigues-Jimenez et al. (2021) found a decrease in ED presentation in psychotic and mood disorders, but this was more pronounced in psychotic disorders.

Methodologically, all the published studies so far have a short period of data collection of 12 weeks or less. The findings of these studies data are likely to reflect an immediate and possibly, transient changes to ED presentations following the pandemic or lockdown. Another issue is the potential difficulty in accurately diagnosing an independent psychotic disorder when there is a substance use comorbidity because ED assessments are cross-sectional and time limited in nature. Further, previous Australasian studies did not explore this topic much (Dragovic et al., 2020; Kratochvil et al., 2020; Joyce et al., 2021). Also, most studies, except Goncalves-Pinto et al. (2020), have not investigated the characteristics of patients with psychotic disorders who presented to ED during the COVID-19 pandemic and lockdown.

### 1.1. Study objectives

In this background, the main objective of the present study was to examine the rate of ED presentation for schizophrenia and other psychotic disorders during the first six months COVID-19 lockdown compared to mood disorders. Additional objectives of this study were to describe socio-demographic and clinical characteristics of patients with psychotic disorders in the lockdown period.

## 2. Materials and methods

### 2.1. Study design and location

This cross-sectional retrospective study was based at the North West Area Mental Health Service (NWAMHS), a public mental health service of the North West Mental Health network of the Royal Melbourne Hospital, Melbourne, Victoria. NWAMHS provides psychiatric services to residents of north and western suburbs in metropolitan Melbourne. Adult patients of the NWAMHS catchment area who visited two EDs (the Northern Hospital ED and the Royal Melbourne Hospital ED) during the study period (March 16-September 16, 2020) and the control period (March 16-September 16, 2019) were included. The hospital databases were the sources of information.

### 2.2. Definition of study and control periods

The Victorian government implemented the lockdown measures to contain the COVID-19 pandemic on the March 16, 2020, and this was the starting point of our study period. As our target was to include the first three months of lockdown, September 16, 2020 was the end point. We chose the first three months of the lockdown period as it was longer compared to other studies, and also, it would give information about a sustained pattern of any change to ED access. A similar period in 2019 (March 16-September 16, 2019) was the control period.

### 2.3. Participants and variables of interest

Adult patients aged 18–65 years with a primary mental health diagnosis of schizophrenia, another psychotic disorder or a mood disorder presenting to the EDs during the study period were included. From the database, information about age, age category, sex, language, triage category, length of stay and discharge destination was gathered. All diagnoses were made based on ICD-10 AM by the ED mental health team. Psychotic disorder group included all conditions in F20–29, whereas mood disorder group as specified in F30–39. Only patients with a primary diagnosis of the above disorders were included (Independent Hospital Pricing Authority, 2017). For patients with a dual diagnosis, we included only if the main psychiatric diagnosis was a psychotic or mood disorder. All substance induced disorders were excluded.

### 2.4. Ethics approval

This study was part of a broader study exploring access to acute services during the COVID-19 lockdown period and it was approved by the Melbourne Health Human Research Ethics Committee. As this was a database study, patients were not approached individual consent. Data were de-identified to protect the privacy of patients.

### 2.5. Data analysis

The analysis was conducted in three steps. First, we compared the number of patients with psychotic and mood disorders in the control and lockdown periods. Second, a comparative analysis was carried out for only patients with psychotic disorders in the control and lockdown periods. Third, we conducted a sub-analysis of psychotic and mood disorders, but only for the lockdown data. Because the data followed non normal distribution as per Kolmogorov-Smirnov test, non-parametric inferential statistics were used. For group comparison, Chi-Square test was used for categorical variables and Mann-Whitney (U) and Kruskal-Wallis (H) tests were for ordinal and continuous variables. The alpha (significance) level  $\leq 0.05$  (two tailed) was the marker of statistical significance. Software SPSS Ver. 27.0 (IBM) was used for all analyses.

### 3. Results

#### 3.1. Comparison of diagnosis

Overall, the total number of patients with a serious mental illness (psychotic or mood disorder) in the control ( $n = 467$ ) and lockdown ( $n = 451$ ) periods were comparable. Compared to the control period, psychotic disorders were more ( $n = 297, 65.9\%$  vs  $n = 276, 59.1\%$ ) and mood disorders were less ( $n = 154, 34.1\%$  vs  $n = 191, 40.9\%$ ) in the lockdown period (change of 6.8%;  $p = 0.035$ ). In subgroup analyses, compared to the control group, there was a significant difference that schizophrenia ( $n = 140, 31.0\%$  vs  $n = 114, 24.4\%$ ), acute transient psychosis ( $n = 42, 9.3\%$  vs  $n = 23, 4.9\%$ ) and bipolar affective disorder ( $n = 38, 8.4\%$  vs  $n = 26, 5.6\%$ ) were significantly more whereas unspecified psychosis ( $n = 115, 25.5\%$  vs  $n = 139, 29.8\%$ ), mania ( $n = 6, 1.3\%$  vs  $n = 10, 2.1\%$ ), depressive disorder ( $n = 109, 24.2\%$  vs  $n = 152, 32.5\%$ ) and unspecified mood disorder ( $n = 1, 0.2\%$  vs  $n = 3, 0.6\%$ ) were significantly less in the lockdown period ( $p = 0.001$ ) (table 2).

#### 3.2. Characteristics of patients with psychotic disorders in control and lockdown periods

Comparison to the control period, the lockdown period included more patients with schizophrenia ( $n = 140, 47.1\%$  vs  $n = 114, 41.3\%$ ) and acute transient psychosis ( $n = 42, 14.1\%$  vs  $n = 23, 8.3\%$ ) but less patients with unspecified psychosis ( $n = 115, 38.7\%$  vs  $n = 139, 50.4\%$ ) ( $p = 0.008$ ). In terms of discharge destination, less patients were hospitalised ( $n = 192, 64.6\%$  vs  $n = 202, 73.2\%$ ) in the lockdown ( $p = 0.027$ ). There was no other group difference (table 3). Fig. 1 is about the number of ED presentations over months. This shows a sustained level of increase in the presentation for schizophrenia throughout the study period and a fluctuating pattern for unspecified psychosis during the lockdown months. Acute psychosis presentation was higher in the lockdown period than the control period.

#### 3.3. Comparison between mood and psychotic disorders within the control and lockdown periods

In the control period, in comparison to the mood disorder group, psychotic disorder group had higher age at trend significance ( $p = 0.06$ ), a higher proportion of 26–35 ( $n = 99, 35.9\%$  vs  $n = 45, 23.6\%$ ) and 36–45 ( $n = 72, 26.1\%$  vs  $n = 38, 19.9\%$ ) age categories ( $p < 0.001$ ), female gender ( $n = 111, 58.7\%$  vs  $n = 100, 36.2\%$ ;  $p < 0.001$ ), resuscitation ( $n = 4, 1.4\%$  vs  $n = 1, 0.5\%$ ) and emergency triage categories ( $n = 79, 28.6\%$  vs  $n = 14, 7.3\%$ ) ( $p < 0.001$ ), longer mean duration of ED stay ( $n = 177, 64.1\%$  vs  $n = 54, 28.3\%$ ) and higher hospital admission ( $n = 177, 64.1\%$  vs  $n = 54, 28.3\%$ ) and

**Table 2**  
Number of patients with psychotic and mood disorders in control and study periods.

Variables	Control period N = 467 n (%)	Lockdown period N = 451 n (%)	P
Type of disorder			
Psychotic disorders	276 (59.1)	297 (65.9)	0.035
Mood disorders	191 (40.9)	154 (34.1)	$\chi^2 = 4.46$
Subtypes			
Schizophrenia	114 (24.4)	140 (31.0)	0.001
Acute transient psychosis	23 (4.9)	42 (9.3)	$\chi^2 = 21.55$
Unspecified psychosis	139 (29.8)	115 (25.5)	
Mania	10 (2.1)	6 (1.3)	
Bipolar affective disorder	26 (5.6)	38 (8.4)	
Depressive disorder	152 (32.5)	109 (24.2)	
Unspecified mood disorder	3 (0.6)	1 (0.2)	

**Table 3**  
Characteristics of patients with psychotic disorders.

Variables	Control period n (%) / mean $\pm$ SD	Lockdown period n (%) / mean $\pm$ SD	P
Age in years	37.5 $\pm$ 11.2	37.2 $\pm$ 11.3	0.64 $U = 40,063.5$
Age categories			
18–25	34 (12.3)	46 (15.5)	0.8
26–35	99 (35.9)	101 (34.0)	$\chi^2 = 1.64$
36–45	72 (26.1)	70 (23.6)	
46–55	48 (17.4)	55 (18.5)	
56–65	23 (8.3)	25 (8.4)	
Gender			
Male	176 (63.8)	198 (66.7)	0.47
Female	100 (36.2)	99 (33.3)	$\chi^2 = 0.53$
Language			
English	268 (97.5)	205 (97.2)	0.84
Non-English	7 (2.5)	6 (2.8)	$\chi^2 = 0.04$
Triage category			
Resuscitation	4 (1.4)	3 (1.0)	0.22
Emergency	79 (28.6)	68 (22.9)	$\chi^2 = 5.69$
Urgent	170 (61.6)	189 (63.6)	
Semi-urgent	23 (8.3)	35 (11.8)	
Non-urgent	0 (0)	2 (0.7)	
Diagnosis			
Schizophrenia	114 (41.3)	140 (47.1)	0.008
Acute transient psychosis	23 (8.3)	42 (14.1)	$\chi^2 = 9.73$
Unspecified psychosis	139 (50.4)	115 (38.7)	
ED stay (in minutes)	757.2 $\pm$ 444.2	723.4 $\pm$ 464.0	0.28 $U = 38,863$
Discharge destination			
Not admitted to a hospital bed	74 (26.8)	105 (35.4)	0.027
Admitted to a hospital bed	202 (73.2)	192 (64.6)	$\chi^2 = 4.86$

also, self-discharge to home ( $n = 20, 7.2\%$  vs  $n = 6, 3.1\%$ ) ( $p < 0.001$ ) (table 4).

In the lockdown period, compared to mood disorders, psychotic disorder group had a higher proportion of 26–35 ( $n = 101, 34.0\%$  vs  $n = 33, 21.4\%$ ) and 46–55 ( $n = 55, 18.5\%$  vs  $n = 21, 13.6\%$ ) age categories ( $p = 0.002$ ), male gender ( $n = 198, 66.7\%$  vs  $n = 81, 52.6\%$ ;  $p = 0.004$ ), emergency triage category ( $n = 68, 22.9\%$  vs  $n = 10, 6.5\%$ ;  $p < 0.001$ ) and hospital admission ( $n = 159, 53.5\%$  vs  $n = 51, 33.1\%$ ;  $p < 0.001$ ). The mean length of ED stay was significantly higher for patients with psychotic disorders ( $p < 0.001$ ) (table 4).

#### 3.4. Comparison of subtypes of mood and psychotic disorders in the lockdown period

There were significant groups differences between subtypes of mood and psychotic disorders in age categories ( $p = 0.016$ ), gender ( $p = 0.02$ ), triage category ( $p < 0.001$ ), duration of ED stay ( $p < 0.001$ ), and discharge destination ( $p < 0.001$ ) (table 5).

## 4. Discussion

### 4.1. Main findings

We noted a small increase of 6.8% in psychotic disorders in ED presentations during the six months of lockdown period. While it is an interesting finding, it needs to be interpreted with caution as there was no substantial difference in the absolute number of patients between the control and study periods and also, such a percentage change could be a result of a broader variation in patients with serious mental illnesses presenting to the ED. We also found a higher rate of ED presentations for schizophrenia and acute transient psychosis whereas a lower rate for unspecified psychosis. There is no local data to compare our findings as

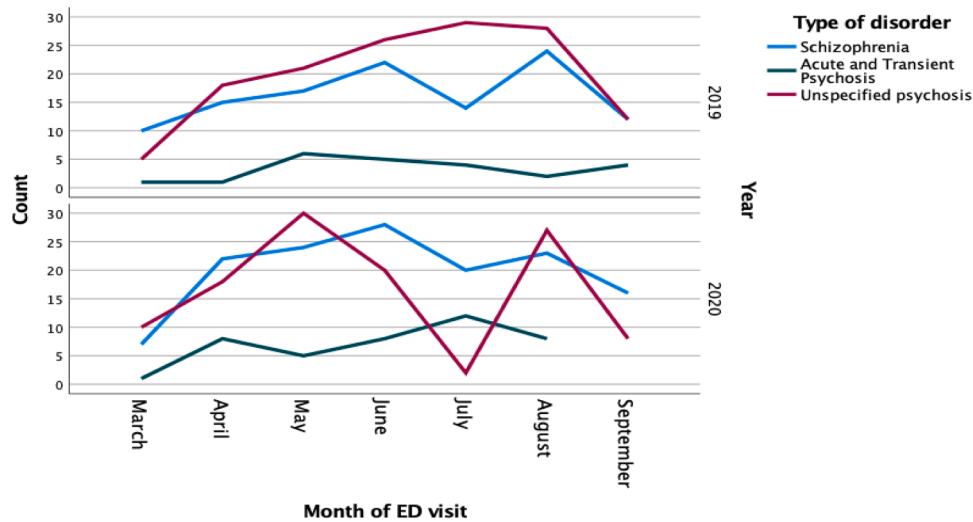


Fig. 1. Subtypes of psychotic disorders presenting to emergency departments.

Table 4

Comparison between mood and psychotic disorders: separate analysis for the control and the lockdown periods.

Variables	Control period Mood disorders n (%) / mean ± SD	Psychotic disorders n (%) / mean ± SD	p	Lockdown period Mood disorders n (%) / mean ± SD	Psychotic disorders n (%) / mean ± SD	p
Age in years	35.75 ± 12.25	37.53 ± 11.20	0.06 <i>U</i> = 23,661.0	37.1 ± 13.1	37.2 ± 11.3	0.66 <i>U</i> = 22,287.0
Age categories						
18–25	57 (29.8)	34 (12.3)	<0.001	43 (27.9)	46 (15.5)	0.002
26–35	45 (23.6)	99 (35.9)	$\chi^2 = 25.9$	33 (21.4)	101 (34.0)	$\chi^2 = 17.49$
36–45	38 (19.9)	72 (26.1)		36 (23.4)	70 (23.6)	
46–55	38 (19.9)	48 (17.4)		21 (13.6)	55 (18.5)	
56–65	13 (6.8)	23 (8.3)		21 (13.6)	25 (8.4)	
Gender						
Male	176 (63.8)	78 (41.3)	<0.001	81 (52.6)	198 (66.7)	0.004
Female	100 (36.2)	111 (58.7)	$\chi^2 = 22.9$	73 (47.4)	99 (33.3)	$\chi^2 = 8.51$
Language						
English	187 (97.9)	268 (97.5)	0.75	108 (97.3)	205 (97.2)	0.94
Non-English	4 (2.1)	7 (2.5)	$\chi^2 = 0.10$	3 (2.7)	6 (2.8)	$\chi^2 = 0.005$
Triage category						
Resuscitation	1 (0.5)	4 (1.4)	<0.001	1 (0.6)	3 (1.0)	<0.001
Emergency	14 (7.3)	79 (28.6)	$\chi^2 = 43.92$	10 (6.5)	68 (22.9)	$\chi^2 = 23.28$
Urgent	135 (70.7)	170 (61.6)		108 (70.1)	189 (63.6)	
Semi-urgent	38 (19.9)	23 (8.3)		33 (21.4)	35 (11.8)	
Non-urgent	3 (1.6)	0 (0)		2 (1.3)	2 (0.7)	
ED stay (in minutes)	384.57 ± 365.95	757.18 ± 444.22	<0.001 <i>U</i> = 12,901.5	366.2 ± 381.8	705.7 ± 450.9	<0.001 <i>U</i> = 13,778.5
Discharge destination						
Home-self-discharge	6 (3.1)	20 (7.2)	<0.001	4 (2.6)	36 (12.1)	<0.001
Home-planned	76 (39.8)	52 (18.8)	$\chi^2 = 75.54$	59 (38.3)	68 (22.9)	$\chi^2 = 41.07$
Hospital admission	54 (28.3)	177 (64.1)		51 (33.1)	159 (53.5)	
Short stay unit	54 (28.3)	25 (9.1)		39 (25.3)	33 (11.1)	
Residential/correction	1 (0.5)	2 (0.7)		1 (0.6)	1 (0.3)	

previous Australian research did not describe severe mental illnesses (Dragovic et al., 2020; Kratochvil et al., 2020; Joyce et al., 2021). Potential factors such as challenges in carrying out complex psychiatric assessments in ED setting during the pandemic when there is a naturally increased demand in ED space for medical assessments and treatment during the pandemic, variations in clinicians' skills and experience, and clinicians' familiarity with ICD AM diagnoses could have contributed to the observed differences within psychotic disorder group. Substance use is a major confounder in relation to the diagnosis of acute psychosis even though we excluded patients with substance induced disorder (e.g., induced psychosis) in our study. Holzie et al. (2020) reported that patients with mood disorders had higher perceived stress than patients with schizophrenia during the pandemic. Our finding of increased presentation for psychotic disorders indirectly disagrees with Holzie et al.

(2020).

#### 4.2. Psychotic vs mood disorders in the lockdown period

Our finding of increased ED presentation by patients with psychotic disorders agrees with previous studies (Ferrando et al., 2020; Pignoni et al., 2020; Rodriques-Jimenez et al., 2021) but it differs from some studies (Ambrosetti et al., 2021; Beghi et al., 2020; Gonçalves-Pinho et al., 2020). The finding of reduced ED access by mood disorders as a group concurs earlier studies (Ambrosetti et al., 2021; Beghi et al., 2020; Capuzzi et al., 2020; Gonçalves-Pinho et al., 2020; Hoyer et al., 2020) but disagrees with others (Rodriques-Jimenez et al., 2021). Some studies reported no difference in the access for the entire group of SMIs (Gomez-Ramior et al., 2021; McAndrew et al., 2020; Montalbani et al.,

**Table 5**  
Comparison between subtypes of mood and psychotic disorders within the lockdown period.

Variables	Mania	Bipolar disorders n (%) / mean $\pm$ SD	Depressive disorders n (%) / mean $\pm$ SD	Unspecified mood disorder	Schizophrenia n (%) / mean $\pm$ SD	Acute Psychosis n (%) / mean $\pm$ SD	Unspecified Psychosis n (%) / mean $\pm$ SD	p
Age in years	35.7 $\pm$ 15.8	38.7 $\pm$ 13.3	36.5 $\pm$ 12.9	50.0 $\pm$ 0.0	38.6 $\pm$ 11.8	34.9 $\pm$ 11.9	36.2 $\pm$ 10.2	0.30 $H = 6.86$
Age categories								
18–25	3 (50.0)	10 (26.3)	30 (27.5)	0 (0.0)	22 (15.7)	10 (23.8)	14 (12.2)	0.016
26–35	0 (0.0)	8 (21.1)	25 (22.9)	0 (0.0)	38 (27.1)	14 (33.3)	49 (42.6)	$\chi^2 = 41.22$
36–45	1 (16.7)	6 (15.8)	29 (26.6)	0 (0.0)	33 (23.6)	9 (21.4)	28 (24.3)	
46–55	1 (16.7)	8 (21.1)	11 (10.1)	1 (100)	31 (22.1)	6 (14.3)	18 (15.7)	
56–65	1 (16.7)	6 (15.8)	14 (12.8)	0 (0.0)	16 (11.4)	3 (7.1)	6 (5.2)	
Gender								
Male	5 (83.3)	22 (57.9)	53 (48.6)	1 (100)	96 (68.6)	24 (57.1)	78 (67.8)	0.02
Female	1 (16.7)	16 (42.1)	56 (51.4)	0 (0.0)	44 (31.4)	18 (42.9)	37 (32.2)	$\chi^2 = 14.94$
Language								
English	3 (100)	31 (100)	74 (96.1)	0 (0.0)	98 (97.0)	32 (100)	75 (96.2)	0.77
Non-English	0 (0.0)	0 (0.0)	3 (3.9)	0 (0.0)	3 (3.0)	0 (0.0)	3 (3.8)	$\chi^2 = 2.57$
Triage category								
Resuscitation	0 (0.0)	1 (2.6)	0 (0.0)	0 (0.0)	1 (0.7)	2 (4.8)	0 (0.0)	<0.001
Emergency	1 (16.7)	7 (18.4)	2 (1.8)	0 (0.0)	31 (22.1)	8 (19.0)	29 (25.2)	$\chi^2 = 57.91$
Urgent	4 (66.7)	28 (73.7)	76 (69.7)	0 (0.0)	90 (64.3)	24 (57.1)	75 (65.2)	
Semi-urgent	1 (16.7)	2 (5.3)	29 (26.6)	1 (100)	16 (11.4)	8 (19.0)	11 (9.6)	
Non-urgent	0 (0.0)	0 (0.0)	2 (1.8)	0 (0.0)	2 (1.4)	0 (0.0)	0 (0.0)	
ED stay (in minutes)								<0.001
	854.17 $\pm$ 398.9	701.5 $\pm$ 471.2	308.7 $\pm$ 325.4	155.0 $\pm$ 0.0	663.9 $\pm$ 478.6	740.7 $\pm$ 475.3	789.6 $\pm$ 435.5	$H = 81.56$
Discharge destination								
Home-self-discharge	0 (0.0)	1 (2.6)	3 (2.8)	0 (0.0)	21 (15.0)	1 (2.4)	14 (12.2)	<0.001
Home-planned	3 (50.0)	10 (26.3)	45 (41.3)	1 (100)	32 (22.9)	11 (26.2)	25 (21.7)	$\chi^2 = 128.8$
Hospital admission	3 (50.0)	23 (60.5)	25 (22.9)	0 (0.0)	74 (52.9)	10 (23.8)	75 (65.2)	
Short stay unit	0 (0.0)	0 (0.0)	1 (0.9)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.9)	
Residential/correction	0 (0.0)	4 (10.5)	35 (32.1)	0 (0.0)	13 (9.3)	20 (47.6)	0 (0.0)	

2020) or only for mood disorders (Pignon et al., 2020). Factors such as differences in the duration of study periods, study site, the severity of COVID-19 pandemic across countries and regions, in the structure and functioning of community mental health and primary health services during the pandemic and lockdowns and the public perception of risk of infection in hospitals could have contributed to these differences in the rates of ED access by the patients with psychotic and mood disorders.

Like a previous study (Gonçalves-Pinho et al., 2020), we did not find differences in gender and age between the control and lockdown periods. We found psychotic disorders as a group appeared to have more acuity, as evidenced by emergency triage category, longer ED stay and hospital admissions. In the lockdown, we noted increased presentation of men but a reduction of those in the 36–45 age range in the psychotic disorder group compared to the control period. On further analysis based diagnostic subtypes, we observed schizophrenia and other psychotic disorder groups to have higher emergency triage category than mood disorders. There is no previous research to compare our findings, but these data collectively suggest that patients with psychotic disorders presented more acute treatment needs than patients with mood disorders.

#### 4.3. Implications

There are important clinical implications of our findings. First, we found increased ED presentations and also, higher clinical acuity, as marked by duration of ED stay and hospital admission rate, for patients with schizophrenia and other psychotic disorders. In general, patients with schizophrenia and related disorders are highly socially and

economically disadvantaged (Zhand and Joobar, 2021). During the COVID-19 lockdown, community support services had changed their programs, e.g., cessation of day programs, face-to-face activities, etc. which would have increased social isolation and risk of deterioration in mental health (Hamada and Fan, 2020). Also, social isolation consequent to lockdown and fear of infection (Gonçalves-Pinho et al., 2020) could have increased stress and lead to mental state deterioration. All these factors could have played a role in increased ED access by patients with schizophrenia and other psychotic disorders. A question is what supports are available for early identification and timely management of clinical deteriorating patients with psychotic disorders during the pandemic at a mental health service and population levels? Integration of early intervention strategies as part of public health response to COVID-19 will help to improve clinical outcomes and quality of life of patients with SMIs. This is an important matter as the pandemic is still continuing with repeat waves of infections. Also, patients with severe mental illnesses, despite their vulnerability for COVID-19 infection and mortality, are not a priority group for vaccination in many countries (Siva, 2021; Stip et al., 2021).

Second, our finding of significant reduction in ED access by patients with depressive disorders is also a concerning finding. There is a possibility that these patients could have accessed psychiatric services through telehealth, which was rolled out widely in Australia during the pandemic as part of the changes to the health service delivery (Reay et al., 2020). However, it is not known how successful telehealth is for this vulnerable group of patients. Other potential reasons for such a reduced access for patients with depression and anxiety include the fear of the pandemic, avoiding hospitals, finding different coping strategies

and increased tolerance of family members (Clerici et al., 2020) Third, the results based on six months of data collection in our study, the longest period of data collection so far, show a medium-term pattern rather than a quick and transient fluctuation in ED visits to the lockdown. Further longitudinal studies including 12 months of the pandemic/lockdown period will help explain long-term patterns in ED access by patients with schizophrenia and related disorders. This will be a valuable information for planning appropriate service delivery methods to meet the needs of patients with SMIs.

#### 4.4. Strengths and limitations

The important strengths of our study are the long duration of data collection and analysis of different SMIs. Whereas limitations are inclusion of limited dataset, retrospective design and risk of classification bias. The latter would have been less an issue as all psychiatric diagnoses were made by experienced clinicians based on ICD-10-AM. However, difficulties in delineating a substance induced psychotic disorder from an independent or primary psychotic disorder in ED assessments could have affected our numbers. A prospective study that includes multiple EDs from metropolitan and regional area would provide more information about this matter.

#### 5. Conclusions

The six months of the lockdown period were associated with a small increase in ED presentations for psychotic disorders, particularly schizophrenia. In general, patients with psychotic disorders appeared to have higher clinical acuity when they presented to ED. Because the pandemic is lingering with repeat waves of infections along with emergence of new strains and there is increased risk of psychiatric disorders because of the stresses associated with the pandemic and public health measures, a regular monitoring of patient access to acute psychiatric care is important. Data gained through such surveillance can help to improve and optimize care delivery at hospital and community levels.

#### Author contributions

All authors had equal contribution to this study and approved the final version of the manuscript.

#### Declaration of Competing Interest

None.

#### Acknowledgements

The authors thank Sanjit Tisseverasinghe for help in database access.

#### Financial disclosure

None to be declared.

#### References

- Ambrosetti, J., Macheret, L., Aline, F., Wullschlegler, A., Amerio, A., Aguglia, A., Serafini, G., Prada, P., Kaiser, S., Bondolfi, G., Sarasin, F., Costanza, A., 2021. Impact of the COVID-19 pandemic on psychiatric admissions to a large Swiss emergency department: an observational study. *Int. J. Environ. Res. Public Health* 18, 1174. <https://doi.org/10.3390/ijerph18031174>.
- Beghi, M., Brandolini, R., Casolaro, I., Beghi, E., Cornaggia, C.M., Fraticelli, C., De Paoli, G., Ravani, C., Castelpietra, G., Ferrari, S., 2020. Effects of lockdown on emergency room admissions for psychiatric evaluation: an observational study from the AUSL Romagna, Italy. *Int. J. Psychiatry Clin. Pract.* 2, 1–5.
- Capuzzi, E., Di Brita, C., Caldiroli, A., Colmegna, F., Nava, R., Buoli, M., Clerici, M., 2020. Psychiatric Emergency Care During Coronavirus 2019 (COVID 19) Pandemic Lockdown: results from a Department of Mental Health and Addiction of Northern Italy. *Psychiatry Res* 293, 113463.
- Dragovic, M., Pascu, V., Hall, T., Ingram, J., Waters, F., 2020. Emergency department mental health presentations before and after the COVID-19 outbreak in Western Australia. *Australas. Psychiatry* 1–5. <https://doi.org/10.1177/1039856220960673>.
- Ferrando, S.J., Klepac, K., Lynch, S., Shahar, S., Dornbush, R., Smiley, A., Miller, I., Tavakkoli, M., Regan, J., Bartell, A., 2020. Psychiatric emergencies during the height of the COVID-19 pandemic in the suburban New York City area. *J. Psychiatry Res.* <https://doi.org/10.1016/j.jpsychires.2020.10.029>.
- Fisher, J.R.W., Tran, T.D., Hammarberg, K., Sastry, J., Nguyen, H., Rowe, H., Popplestone, S., Stocker, R., Stubber, C., Kirkman, M., 2020. Mental health of people in Australia in the first month of COVID-19 restrictions: a national survey. *Med. J. Aust.* 213, 458–464.
- Gomez-Ramiro, M., Fico, G., Anmella, G., Vazquez, M., Sague-Vilavella, M., Hidalgo-Mazzei, Pacchiarotti, I., Garriga, M., Murru, A., Parellada, E., Vieta, E., 2021. Changing trends in psychiatric emergency service admissions during the COVID-19 outbreak: report from a worldwide epicentre. *J. Affect. Disord.* 282, 26–32.
- Goncalves-Pinho, M., Mota, P., Ribeiro, J., Macedo, S., Freitas, A., 2020. The impact of COVID-19 pandemic on psychiatric emergency department visits – a descriptive study. *Psychiatr. Q.* <https://doi.org/10.1007/s11126-020-09837-z>.
- Hamada, K., Fan, X., 2020. The impact of COVID-19 on individuals living with serious mental illness. *Schizophr. Res.* 222, 3–5.
- Hao, F., Tan, W., Jiang, L., Zhang, L., Zhao, X., Zou, Y., Hu, Y., Luo, X., Jiang, X., McIntyre, R.S., Tran, B., Sun, J., Zhang, Z., Ho, R., Ho, C., Tam, W., 2020. Do psychiatric patients experience more psychiatric symptoms during COVID-19 pandemic and lockdown? A case-control study with service and research implications for immunopsychiatry. *Brain Behav. Immun.* 87, 100–106.
- Holzle, P., Aly, L., Frank, W., Forstl, H., Frank, A., 2020. COVID-19 distresses the depressed while schizophrenic patients are unimpressed: a study on psychiatric inpatients. *Psychiatry Res* 291, 113175.
- Hoyer, C., Ebert, A., Szabo, K., Platten, M., Meyer-Lindenberg, A., Kranaster, L., 2020. Decreased utilization of mental health emergency service during the COVID-19 pandemic. *Eur. Arch. Psychiatry Clin. Neurosci.* 1–3. <https://doi.org/10.1007/s00406-020-01151-w>.
- Independent Hospital Pricing Authority, 2017. Emergency Department ICD-10-AM Principal Diagnosis Short List. [https://www.ihpa.gov.au/sites/default/files/Documents/ed\\_icd-10-am\\_principal\\_diagnosis\\_short\\_list\\_quick\\_reference\\_guide\\_for\\_principal\\_diagnosis\\_reporting\\_tenth\\_edition.pdf](https://www.ihpa.gov.au/sites/default/files/Documents/ed_icd-10-am_principal_diagnosis_short_list_quick_reference_guide_for_principal_diagnosis_reporting_tenth_edition.pdf) (accessed 19 January 2021).
- Joyce, L.R., Richardson, S.K., McCombie, A., Hamilton, G.J., Ardagh, M.W., 2021. Mental health presentations to Christchurch hospital emergency department during COVID-19 lockdown. *Emerg. Med. Australas.* 1–7. <https://doi.org/10.1111/1742-6723.13667>.
- Kratovichil, D., Hill, H., Moylan, S., 2020. The impact of stage 3 COVID-19 lockdown on psychiatric presentations at a regional Victorian emergency department. *Australas. Psychiatry* 29, 105–106.
- McAndrew, J., O'Leary, J., Cotter, D., Cannon, M., MacHale, S., Murphy, K.C., Barry, H., 2020. Impact of initial COVID-19 restrictions on psychiatry presentations to the emergency department of a large academic teaching hospital. *Ir. J. Psychol. Med.* 1–24. <https://doi.org/10.1017/ipm.2020.115>.
- Montalbani, B., Bargagna, P., Mastrangelo, M., Sarubbi, S., Imbastro, B., De Luca, G.P., Anibaldi, G., Erbuto, D., Pompili, M., Comparelli, A., 2020. The COVID-19 outbreak and subjects with mental disorders who presented to an Italian psychiatric emergency department. *J. Nerv. Ment. Dis.* <https://doi.org/10.1097/NMD.0000000000001289>.
- Pham-Scottet, A., Silva, J., Barruel, D., Masson, V.D., Yon, L., Trebalag, A., Gourevitch, R., 2020. Patient flow in the largest French psychiatric emergency centre in the context of the COVID-19 pandemic. *Psychiatry Res* 291, 113205.
- Pierce, M., Hope, H., Ford, T., Hatch, S., Hotopf, M., John, A., Kontopantelis, E., Webb, R., Wessely, S., McManus, S., Abel, K.M., 2020. Mental health before and during the COVID-19 pandemic: a longitudinal probability sample survey of the UK population. *Lancet Psychiatry* 7, 883–892.
- Pignon, B., Gourevitch, R., Tebeka, S., Dubertret, C., Cardot, H., Dauriac-Le, Masson, V. D., L., Trebalag, A.K., Barruel, D., Yon, L., Hemery, F., Loric, M., Rabu, C., Pelissolo, A., Leboyer, M., Schurhoff, F., Pham-Scottet, A., 2020. Dramatic reduction of psychiatric emergency consultations during lockdown linked to COVID-19 in Paris and Suburbs. *Psychiatry Clin. Neurosci.* 74, 557–559.
- Reay, R.E., Looi, J.C.L., Keightley, P., 2020. Telehealth mental health services during COVID-19: summary of evidence and clinical practice. *Australas. Psychiatry* 28, 514–516.
- Rodrigues-Jimenez, R., Rentero, D., Romergo-Ferreiro, R., Garcia-Fernandez, L., 2021. Impact of outbreak COVID-19 pandemic on psychiatric emergencies in Spain. *Psychiatr. Res.* 295, 113581 <https://doi.org/10.1016/j.psychres.2020.113581>.
- Siva, N., 2021. Severe mental illness: reassessing COVID-19 vaccine priorities. *Lancet* 397, 657.
- Stip, E., Javaid, S., Amiri, L., 2021. People with mental illness should be included in COVID-19 vaccination. *Lancet Psychiatry* 8, 275–276.
- Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C.S., Ho, R.C., 2020. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int. J. Environ. Res. Public Health.* 17, 1729.
- Zhand, N., Joobar, R., 2021. Implications of the COVID-19 pandemic for patients with schizophrenia spectrum disorders: narrative review. *BJPPsych. Open.* 7, e35. <https://doi.org/10.1192/bjo.2020.157>.