Consequences of the COVID-19 pandemic on admissions to general hospital psychiatric wards in Italy: Reduced psychiatric hospitalizations and increased suicidality☆

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ABSTRACT

Aims: The present investigation aimed at evaluating differences in psychiatric hospitalizations in Italy during and after the lockdown due to the novel coronavirus disease 2019 (COVID-19), compared to the same periods in 2018 and 2019.

Methods: We obtained and analyzed anonymized data on psychiatric admissions ($n = 4550$) from 12 general hospital psychiatric wards (GHPWs) in different Italian regions (catchment area = 3.71 millions of inhabitants). Using a mixed-effects Poisson regression model, we compared admission characteristics across three periods: (a) March 1–June 30, 2018 and 2019; (b) March 1–April 30, 2020 (i.e., lockdown); and (c) May 1–June 30, 2020 (i. e., post-lockdown).

Results: During the COVID-19 lockdown, there was a 41% reduction (IRR = 0.59; $p < 0.001$, CI: 0.45–0.79) in psychiatric admissions in the enrolled GHPWs with respect to the 2018 and 2019 control period. Conversely, admission rates in the post-lockdown period were similar to those observed in the control period. Notably, a consistent and significant reduction in psychiatric hospitalizations of older patients (aged >65 years) was observed in the lockdown (40%; IRR = 0.60; 95% CI: 0.44–0.82) and post-lockdown (28%; IRR = 0.72; 95% CI: 0.54–0.96) periods. Long-stay admissions (>14 days) increased (63%; IRR = 1.63; 95% CI: 1.32–2.02) during the lockdown and decreased by 39% thereafter (IRR = 0.61; 95% CI: 0.49–0.75). A significant 35% increase in patients reporting suicidal ideation was observed in the post-lockdown period, compared to the rate observed in the 2018 and 2019 control period (IRR = 1.35; 95% CI: 1.01–1.79).

Conclusion: The COVID-19 lockdown was associated with changes in the number of psychiatric admissions, particularly for older patients and long-stay hospitalizations. Increased admission of patients reporting suicidal

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ideation in the post-lockdown period merits special attention. Further studies are required to gain insight into the observed phenomena.

1. Introduction

In the weeks and months following the announcement of the novel coronavirus disease 2019 (COVID-19) outbreak (World Health Organization, 2019), healthcare resources focused on tackling the physical impact of the virus on patients worldwide. However, in line with previous epidemics (e.g., Mak et al., 2009), the current pandemic has had a significant effect on mental health, especially considering long-term psychiatric sequelae (for reviews, see Brooks et al., 2020; Rogers et al., 2020; Szcześniak et al., 2021; Torales et al., 2020; Wu et al., 2021). On this basis, several clinicians, researchers, and policymakers have announced the emergence of a "global mental health crisis" (Rahman et al., 2020; UN, 2020).

Given these premises, an increase in referrals for psychiatric treatment during the lockdown might be expected; conversely, a reduction in the number of patients seeking psychiatric emergency care during this period was observed by clinicians worldwide (e.g., Fagiolini et al., 2020; Fusar-Poli et al., 2020). A retrospective study in a large mental health institute in Germany reported a decrease in the utilization of psychiatric services by up to 26.6% during the lockdown period, in comparison with 2019; decreased utilization of psychiatric inpatient facilities was also observed in the same period, as well as an impact of the pandemic on the increased number of presentations of affective disorders (Hoyer et al., 2020). In this regard, several reports have focused on the challenges associated with managing psychiatric patients in the acute inpatient setting during the pandemic (Bojdani et al., 2020; Li, 2020; Li and Zhang, 2020).

Italy was one of the first countries to be severely affected by COVID-19; thus, it was one of the first to face such challenges (Starace and Ferrara, 2020). An Italian retrospective study (Clerici et al., 2020) analyzed medical records from inpatient psychiatric units in the Lombardy region, reporting a reduction in voluntary admissions but a steady compulsory admissions rate during the lockdown period. The authors attributed the decrease in voluntary admissions to avoidance behaviors due to a fear of contagion in hospital settings, as well as to the reduce ability of families and clinicians to detect behavioral changes in patients (Clerici et al., 2020).

Overall, the potential combination of increased psychiatric morbidity and decreased provision of psychiatric treatment during the lockdown is alarming (Öngür et al., 2020), and studies are needed to address this critical scenario. In particular, investigations of the utilization of inpatient psychiatric units might provide valuable information both for the development of policies and processes and for the tailoring of inpatient care. Moreover, by analyzing diagnostic data pertaining to psychiatric inpatients, such investigations might indirectly provide information on the burden of the COVID-19 pandemic and social distancing measures in terms of the onset, exacerbation, and relapse of severe mental illness.

Previous studies (Hoyer et al., 2020; Itrat et al., 2020) collected data during the height of the pandemic, when government restrictions were at their most severe. Nevertheless, the pandemic is ongoing, and changes to lockdown measures and other restrictions over the course of the pandemic may have affected clinical presentations. Similarly, some potential detrimental effects of suspending the psychiatric care and treatment of subjects prone to relapse early in the lockdown may only emerge over time.

The present study aimed at addressing these concerns by collecting data on psychiatric admissions from general hospital psychiatric wards (GHPWs) in different Italian regions, extending the observed period to the "second phase" of the government lockdown (i.e., restrictions easement), which coincided with a significant reduction in contagion

following the first wave of the COVID-19 pandemic in Italy. The goals of the study were to examine the effect of both the COVID-19 lockdown and the easement of government restrictions (post-lockdown) on: (a) psychiatric admissions in GHPWs; (b) changes to bed-flow parameters (i. e., length of stay, readmission); and (c) inpatient characteristics (i.e., sociodemographic characteristics, primary diagnosis at discharge, suicidal ideation).

2. Methods

2.1. Procedures and sample

We obtained admissions records ($n = 5547$) from 12 GHPWs in different Italian regions, predominantly within Lazio and Lombardy. Supplementary Table S1 shows the main demographic and service-related characteristics of the 12 GHPWs: they cater for almost 3.71 million inhabitants.

After controlling for records integrity, missing data, and two GHPWs with coding issues (which were omitted), 4550 admissions that met the selection criteria were included in the study, representing an overall inclusion rate of 82% (Supplementary Table S2).

Admission information included sociodemographic data, hospital admission and discharge dates, suicidal ideation, and primary diagnosis at discharge, classified using the International Classification of Diseases version 9, Clinical Modification (ICD-9-CM). ICD-9-CM codes were grouped into five categories (i.e., mood disorders, personality disorders, schizophrenia spectrum disorders, suicide attempt,[1] other diagnoses), using the Agency for Health Care Quality and Research (AHRQ) Clinical Classifications Software (CCS) for the ICD-9-CM, as reported in previous studies (González-Blanco et al., 2020). To preserve privacy, GHPWs anonymized the identification codes for all patients prior to transferring the data to the research team. The Ethics Committee of the Department of Dynamic and Clinical Psychology, and Health Studies of the Sapienza University of Rome (No. 446/2020) approved the study.

2.2. Time periods

Beginning on February 23, 2020, the Italian government initiated strong actions to restrict residents' freedom, aimed at reducing the spread of COVID-19. The most severe of these restrictions was the imposition of a nationwide lockdown in early March (March 8, 2020). This lockdown caused unprecedented changes in daily personal and professional activities, forcing Italian residents to avoid unnecessary face-to-face interactions and social gatherings, and limiting their movement to the strictly necessary. Following the successful "flattening of the curve" of viral spread, the government began restrictions easement (e.g., allowing access to church services, weddings, salon services, and short-term hospitality without boarding) on May 4, 2020. The present study used these key dates of government action to define the study periods. For comparison, the control period was March 1–June 30 in both 2018 and 2019.

Finally, the study compared the number and characteristics of admissions in three periods: (a) March 1–June 30, 2018 and 2019 ($n = 3270$ admissions); (b) March 1–April 30, 2020 (i.e., lockdown; $n = 589$); and (c) May 1–June 30, 2020 (i.e., post-lockdown; $n = 691$).

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[1] The "suicidal attempt" category was solely determined by medical records (as a reason to referral to the GHPWs), rather than ICD-9-CM diagnoses.

2.3. Statistical analysis

Frequency tables and figures were produced to summarize the data. A chi-squared test was employed to verify the presence of significant differences in the frequencies of categorical variables, while a T-Student test was used to assess differences in continuous variables among strata. Admission rates were modelled by means of a mixed-effects Poisson regression model considering the GHPW variable as a random intercept and time period duration (i.e., 2018 and 2019: 244 days; lockdown: 61 days; post-lockdown: 61 days) as an offset variable. Fixed effects included the period (i.e., 2018 and 2019, lockdown, post-lockdown), age class (i.e., <25, 24–45, 45–65, >65 years old), patient gender (i. e., female, male), admission modality (i.e., voluntary, compulsory), length of stay (i.e., <7, 7–14, >14 days), type of admission (i.e., first hospitalization, readmission), and primary diagnosis class. Results were reported employing incidence rate ratios (IRR) with exponentiated regression coefficients and 95% confidence intervals (95% CI).

The presence of significant interactions with the period variable were tested using an analysis of variance (ANOVA) for the mixed-effects model on the basis of a likelihood ratio test, which followed a chi-squared distribution. Ultimately, significant interactions between period and age class, period and length of stay, and period and primary diagnosis class were included in the final model (Supplementary Table S3).

All analyses were performed with the software R (3.6) using the lmer function from the lme4 package (Bates et al., 2015) and the LmerTest package for the ANOVA function for the mixed-effects model. Statistical significance was set to 5%.

3. Results

Table 1 shows the demographic and clinical characteristics of all patients in the sample. The average age of inpatients was 45.4 years (*SD*:17.4 years), and there was a slight predominance of the female gender (52.7%). Most admissions represented a first admission (63.4%), and there was a large prevalence of voluntary admission (84.9%), though less frequent among females ($p < 0.001$). A short length of stay (<7 days) was the most representative category of admission (43.6%). With respect to the primary diagnosis class, more than one-third of the admissions were for schizophrenia spectrum disorders (37.1%), followed by mood disorders (21.0%), and suicide attempt (15.5%), with some differences between genders ($p < 0.001$).

A marginal significant difference was found in the admission frequency determined by the period, with respect to age class ($p = 0.004$), length of stay ($p < 0.001$), and primary diagnosis class ($p = 0.03$), as reported in Table 2. Table 3 reports the estimated IRR of the mixed-effects regression model: admission rate significantly decreased by 41% (IRR = 0.59; 95% CI: 0.45–0.79) during the lockdown compared to the 2018 and 2019 period, whereas it increased in the post-lockdown period, which did not significantly differ from the 2018 and 2019 period.

There was a significant interaction between period and patient age, indicating that the admission rate of patients >65 years old significantly decreased by 40% (IRR = 0.60; 95% CI: 0.44–0.82) during the lockdown and by 28% (IRR = 0.72; 95% CI: 0.54–0.96) relative to the 2018 and 2019 period (Fig. 1). As graphically reported in Fig. 2, the interaction between period and length of stay revealed an increase in the frequency of hospital admissions during the lockdown period, both for medium stay (7–14 days; IRR = 1.27; 95% CI: 1.03–1.58) and long-stay (>14 days, IRR = 1.63; 95% CI: 1.32–2.02) admissions, while the post-lockdown period registered a significant reduction of 39% only for long-stay admissions (IRR = 0.61; 95% CI: 0.49–0.75). Finally, the interaction between period and primary diagnosis class shown in Fig. 3 registered a slight but significant increase in admissions for suicide attempt in the post-lockdown period (IRR = 1.35; 95% CI: 1.01–1.79), compared to the figure observed in the 2018 and 2019 period.

Table 1

Main characteristics of psychiatric hospital admissions, by gender (frequency [%]).

Characteristic	Overall (n = 4550)	M (n = 2154)	F (n = 2396)	p-Value
GHPW (region), *n*(%)				<0.001
Melzo (Lombardy)	375 (8.2)	180 (8.4)	195 (8.1)	
Niguarda (Lombardy)	839 (18.4)	399 (18.5)	440 (18.4)	
San Salvatore (Abruzzo)	354 (7.8)	156 (7.2)	198 (8.3)	
Sandro Pertini (Lazio)	433 (9.5)	254 (11.8)	179 (7.5)	
Santo Spirito (Lazio)	182 (4.0)	77 (3.6)	105 (4.4)	
Monza (Lombardy)	456 (10.0)	205 (9.5)	251 (10.5)	
Bolzano (Sud-Tirol)	474 (10.4)	232 (10.8)	242 (10.1)	
Colleferro (Lazio)	275 (6.0)	119 (5.5)	156 (6.5)	
San Filippo Neri (Lazio)	451 (9.9)	216 (10.0)	235 (9.8)	
Sant'Andrea (Lazio)	271 (6.0)	124 (5.8)	147 (6.1)	
Spedali Civili (Lombardy)	209 (4.6)	77 (3.6)	132 (5.5)	
Vizzolo (Lombardy)	231 (5.1)	115 (5.3)	116 (4.8)	
Age at admission, mean (*SD*)	45.4 (17.4)	47.5 (17.8)	43.6 (16.8)	<0.001
Month, *n* (%)				0.50
March	1164 (25.6)	550 (25.5)	614 (25.6)	
April	1090 (24.0)	500 (23.2)	590 (24.6)	
May	1286 (28.3)	607 (28.2)	679 (28.3)	
June	1010 (22.2)	497 (23.1)	513 (21.4)	
Year, *n* (%)				0.09
2018	1532 (33.7)	760 (35.3)	772 (32.2)	
2019	1738 (38.2)	802 (37.2)	936 (39.1)	
2020	1280 (28.1)	592 (27.5)	688 (28.7)	
First hospitalization, *n* (%)	2885 (63.4)	1378 (64.0)	1507 (62.9)	0.45
Voluntary recovery, *n* (%)	3861 (84.9)	1879 (87.2)	1982 (82.7)	<0.001
Length of stay, *n* (%)				0.79
<7 days	1985 (43.6)	933 (43.3)	1052 (43.9)	
7–14 days	1395 (30.7)	671 (31.2)	724 (30.2)	
>14 days	1170 (25.7)	550 (25.5)	620 (25.9)	
Primary diagnosis class, *n* (%)				<0.001
Mood disorders	957 (21.0)	566 (26.3)	391 (16.3)	
Personality disorders	548 (12.0)	277 (12.9)	271 (11.3)	
Schizophrenia spectrum disorders	1688 (37.1)	693 (32.2)	995 (41.5)	
Suicide attempt	705 (15.5)	347 (16.1)	358 (14.9)	
Other diagnoses	652 (14.3)	271 (12.6)	381 (15.9)	

4. Discussion

At the time of writing, the present study represented the first multi-site study to assess the characteristics of psychiatric admissions during different time periods during the COVID-19 pandemic. In line with previous investigations (Clerici et al., 2020; Hoyer et al., 2020), we found a significant drop in psychiatric admissions during the COVID-19 lockdown (i.e., March 1–April 30, 2020). Several and not mutually exclusive explanations might be proposed for this result. First, a fear of

Table 2
Characteristics of psychiatric hospital admissions, by temporal period.

Characteristic	2018–2019 (n = 3270)	Lockdown (n = 589)	Post-lockdown (n = 691)	p-Value
Age class, n (%)				0.004
<25	482 (14.7)	98 (16.6)	117 (16.9)	
25–45	1122 (34.3)	205 (34.8)	252 (36.5)	
45–65	1207 (36.9)	233 (39.6)	253 (36.6)	
>65	459 (14.0)	53 (9.0)	69 (10.0)	
Gender (male), n (%)	1562 (47.8)	271 (46.0)	321 (46.5)	0.65
First hospitalization, n (%)	2086 (63.8)	380 (64.5)	419 (60.6)	0.25
Voluntary recovery, n (%)	2769 (84.7)	490 (83.2)	602 (87.1)	0.13
Length of stay, n (%)				<0.001
<7 days	1425 (43.6)	206 (35.0)	354 (51.2)	
7–14 days	1001 (30.6)	184 (31.2)	210 (30.4)	
>14 days	844 (25.8)	199 (33.8)	127 (18.4)	
Primary diagnosis class, n (%)				0.03
Mood disorders	714 (21.8)	119 (20.2)	124 (17.9)	
Personality disorders	403 (12.3)	69 (11.7)	76 (11.0)	
Schizophrenia spectrum disorders	1216 (37.2)	217 (36.8)	255 (36.9)	
Suicide attempt	467 (14.3)	103 (17.5)	135 (19.5)	
Other diagnoses	470 (14.4)	81 (13.8)	101 (14.6)	

Table 3
Incidence Rate Ratios (IRR), estimated by the mixed-effects Poisson regression model[a].

| Predictor	IRR	95% CI	p-Value
(Intercept)	0.00	0.00–0.00	**<0.001**
Period (lockdown)	0.59	0.45–0.79	**<0.001**
Period (post-lockdown)	1.00	0.78–1.29	0.985
Age class (<25)	0.40	0.36–0.44	**<0.001**
Age class (25–45)	0.93	0.86–1.01	0.078
Age class (>65)	0.38	0.34–0.42	**<0.001**
Gender (female)	1.11	1.05–1.18	**<0.001**
Admission type (compulsory)	0.18	0.16–0.19	**<0.001**
Length of stay (7–14)	0.70	0.65–0.76	**<0.001**
Length of stay (>14)	0.59	0.54–0.64	**<0.001**
First hospitalization (yes)	1.73	1.63–1.84	**<0.001**
Primary diagnosis (mood disorders)	1.52	1.35–1.71	**<0.001**
Primary diagnosis (personality disorders)	0.86	0.75–0.98	**0.023**
Primary diagnosis (schizophrenia and other)	2.59	2.33–2.88	**<0.001**
Primary diagnosis (suicide injury)	0.99	0.87–1.13	0.922
Period (lockdown)[a] Age class (<25)	1.05	0.81–1.36	0.694
Period (post-lockdown)[a] Age class (<25)	1.16	0.91–1.48	0.237
Period (lockdown)[a] Age class (25–45)	0.95	0.77–1.16	0.598
Period (post-lockdown)[a] Age class (25–45)	1.07	0.88–1.30	0.481
Period (lockdown)[a] Age class (>65)	0.60	0.44–0.82	**0.001**
Period (post-lockdown)[a] Age class (>65)	0.72	0.54–0.96	**0.023**
Period (lockdown)[a] Length of stay (7–14)	1.27	1.03–1.58	**0.028**
Period (post-lockdown)[a] Length of stay (>14)	0.84	0.70–1.02	0.079
Period (Lockdown)[a] Length of stay (>14)	1.63	1.32–2.02	**<0.001**
Period (post-lockdown)[a] Length of stay (>14)	0.61	0.49–0.75	**<0.001**
Period (lockdown)[a] Primary diagnosis (mood disorders)	0.97	0.71–1.31	0.830
Period (post-lockdown)[a] Primary diagnosis (mood disorders)	0.81	0.61–1.08	0.146
Period (lockdown)[a] Primary diagnosis (personality disorders)	0.99	0.70–1.41	0.971
Period (post-lockdown)[a] Primary diagnosis (personality disorders)	0.88	0.63–1.22	0.432
Period (lockdown)[a] Primary diagnosis (schizophrenia spectrum disorders)	1.04	0.79–1.36	0.804
Period (post-lockdown)[a] Primary diagnosis (schizophrenia spectrum disorders)	0.98	0.76–1.26	0.850
Period (lockdown)[a] Primary diagnosis (suicide attempt)	1.28	0.93–1.76	0.128
Period (post-lockdown)[a] Primary diagnosis (suicide attempt)	1.35	1.01–1.79	**0.043**

Significant p-Values are reported in bold.

[a] Reference category: period 2018 and 2019; age class 45–65; male gender; length of stay <7 days; voluntary recovery; not a first hospital admission; and other diagnoses as primary diagnosis class.

contagion might have impacted patients' willingness to seek help for mental health problems in the form of hospital admission. The media has placed great emphasis on the high risk of contagion in hospital settings, supported by reports showing, for example, a cumulative incidence of COVID-19 infection of 11.33% in healthcare workers in the Lombardy region—the most represented region in the present data (Colaneri et al., 2020). In particular, fearful attitudes may have prevent elderly individuals—who are the most vulnerable age group to COVID-19—and their relatives from requesting hospital admission, thus explaining the present finding of a decline in hospitalization for patients older than 65 years in all time periods observed in 2020.

Nevertheless, according to this "hospital avoidance" hypothesis, the drop in psychiatric hospitalization should have mostly been explained by voluntary admission, as shown by Clerici et al. (2020). Conversely, we did not find significant differences for voluntary versus compulsory admission in GHPWs during the investigated time periods. This may give rise to a second explanation, pertaining to a reduced ability to *detect* acute psychiatric manifestations, which are often the trigger for compulsory admission. Most compulsory admissions are managed by clinicians working in community mental health centers (CMHCs), and the activities of CMHCs were strictly reduced during the lockdown, thereby limiting the monitoring of patients' clinical status. In addition, reduced social contact during the lockdown may have hindered the process of emergency service referral, which typically results from patients with acute psychiatric conditions interacting with others in everyday situations.

A third possible explanation refers to the severe impact of COVID-19 on the health system (WHO, 2020a), including psychiatric wards, which were likely undersupplied during the lockdown (Xiang et al., 2020). According to anecdotal reports, in some of the most affected Italian regions (i.e., Lombardy), several psychiatric units were downsized due to staff shortages, while others dedicated a proportion of their inpatient beds to patients infected with COVID-19 (Fusar-Poli et al., 2020). A recent survey study on data roughly reported by Italian Mental Health Department managers showed a reduction in the number of psychiatric wards during the lockdown (−13%), mainly due to conversion into general COVID-19 units; in addition, a reduction in the number of available beds (−30%) was also found, due to the need for increased distance between patients and for separate isolation rooms (Carpiniello

et al., 2020).

In addition, there may have also been a tightening of criteria for admission. Inpatient psychiatric units present unique challenges regarding the risk of COVID-19 infection (i.e., open space settings with close contact between patients and medical staff), and patients with severe mental illness may also have a higher risk of COVID-19 infection than the general population (Taquet et al., 2020), for several reasons (Shinn and Viron, 2020), including their difficulty in meeting hygiene requirements (due to cognitive, depressive, or negative symptoms; Fusar-Poli et al., 2020). Since the onset of the COVID-19 pandemic, several contagions in inpatient psychiatric facilities have been reported (e.g., China News Weekly, 2020; National Health Commission of China, 2020); as a result, new protocols and contingency plans for emergency psychiatry departments have been proposed, including the exercise of caution in admitting patients at risk for infection or with uncertain recent contacts or movements (e.g., Brody et al., 2020; Xiang et al., 2020). In Italy, the recommendations of national and local healthcare agencies to limit admission to the most severe cases, in order to reduce the risk of hospital contagion (Starace and Ferrara, 2020), may have influenced admission policies. This might also explain the reduced admission of older patients found in the present study. Older individuals have paid a huge toll in terms of mortality during the COVID-19
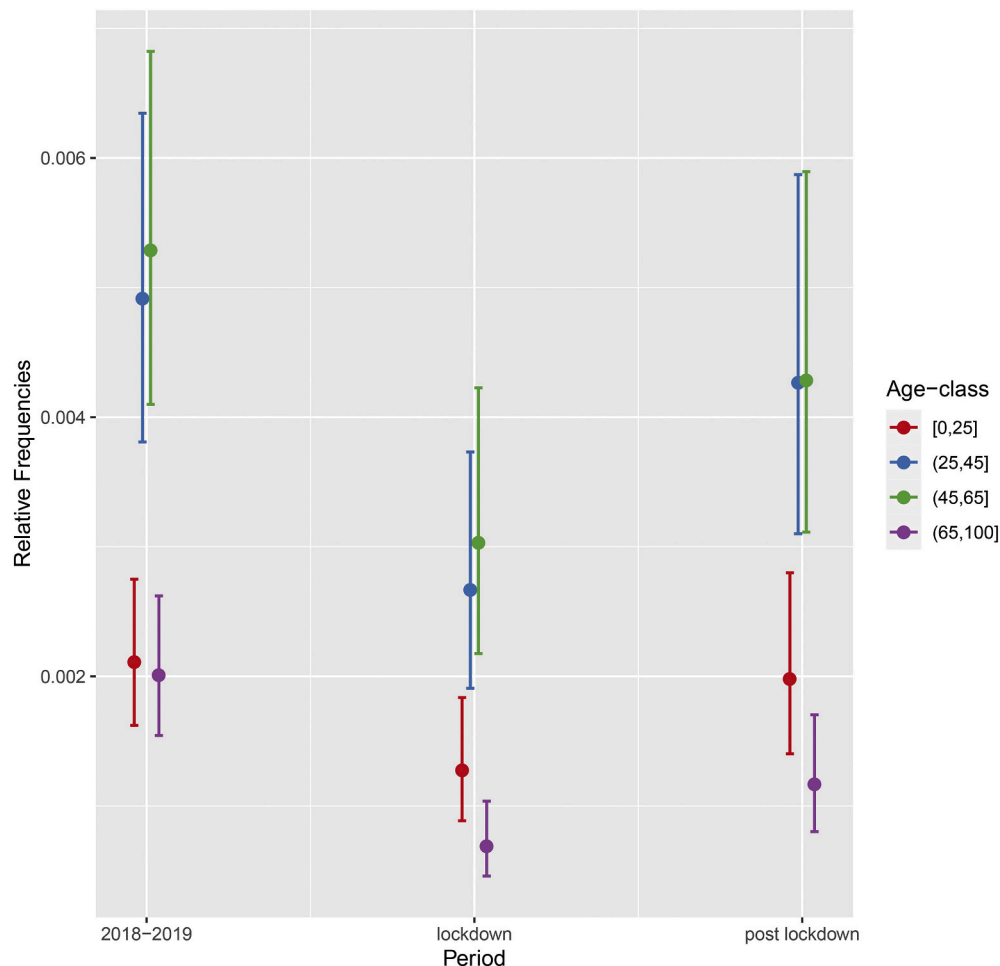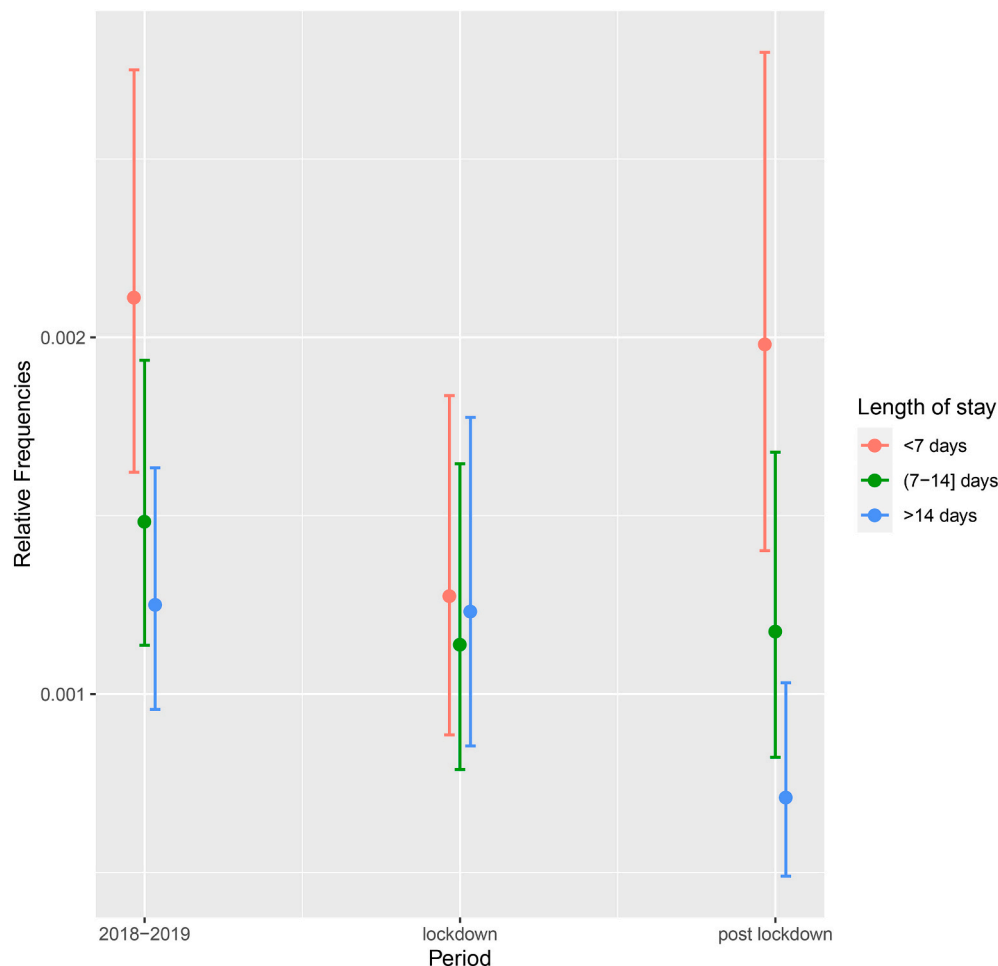
Fig. 1. Predicted relative frequency of admission, by period (i.e., March 1–June 30, 2018 and 2019; lockdown [March 1–April 30, 2020]; post-lockdown [May 1–June 30, 2020]) and age class (i.e., <25, 24–45, 45–65, >65 years old).

pandemic (Maltese et al., 2020), and clinicians may have adopted alternative solutions to hospitalization (e.g., domiciliary intervention, intensive and remote treatment) in an attempt to protect them from a potentially fatal COVID-19 infection.

Finally, although contrary to many expert suggestions (e.g., Kozloff et al., 2020; Pfefferbaum and North, 2020), the decreased admissions observed in the present study might be explained by a reduction in symptoms and relapses in individuals (or at least some individuals) with severe mental illness during the early months of the COVID-19 pandemic. In fact, findings on the effects of quarantine on individuals with severe mental illnesses are mixed. Cross-sectional survey studies have reported greater depression, anxiety, and stress in individuals with self-reported affective disorders (i.e., bipolar or major depressive disorders), compared with individuals without affective disorders (Van Rheenen et al., 2020); and among individuals with bipolar or psychotic disorders, compared with healthy controls (González-Blanco et al., 2020). In contrast, the only longitudinal study incorporating pre-pandemic patients' clinical data found, contrary to expectations, no significant changes in mood experiences, psychotic symptoms, and sleep duration in a sample of individuals with severe mental illness (i.e., schizophrenia spectrum and affective disorders), when assessed between April–June 2020 (i.e., the start of the U.S. lockdown measures); this study provided the first evidence that individuals with severe mental illness may have shown resilience, rather than deterioration, in the early stages of the COVID-19 pandemic (Pinkham et al., 2020). Furthermore, there has been some suggestion of a differential impact across diagnoses, such that individuals with affective disorders may report greater COVID-

19–related stress relative to individuals with schizophrenia spectrum disorders, who seem relatively unperturbed by global crises—or less likely to seek help (Hölzle et al., 2020).

Notably, the present study found no increase in admissions to GHPWs during the post-lockdown period (i.e., May 1–June 30, 2020), which instead showed rates similar to those of the 2018 and 2019 control periods. This suggests that the admissions missed in the early months of the pandemic may have been substantially lost. This scenario is particularly concerning, since a significant shortage in mental healthcare provision was also observed in outpatient services, potentially placing an additional burden on emergency psychiatric units. In Italy, approximately 20% of CMHCs were closed and approximately 25% were forced to introduce restricted access hours (Carpiniello et al., 2020) during the lockdown. Moreover, remote contacts with CMHCs users had been set up in about 75% of cases, thus leaving 25% of outpatients without clinical support (Carpiniello et al., 2020). Besides, semi-residential clinics, psychiatric diurnal centers, and day hospitals were restricted, if not closed, in most affected Italian regions (Fusar-Poli et al., 2020). A 40% reduction was also observed in the provision of psychotherapy treatment in private settings during the height of the pandemic (i.e., March–April), across the country (Boldrini et al., 2020). Thus, the pandemic and the social distancing measures implemented to limit viral spread may have not only increased the incidence of mental disorders, but also led to a substantial reduction in the provision of mental health treatments capable of containing the increased psychopathological distress (Öngür et al., 2020). Future studies are needed to address the serious healthcare and economic consequences of potential
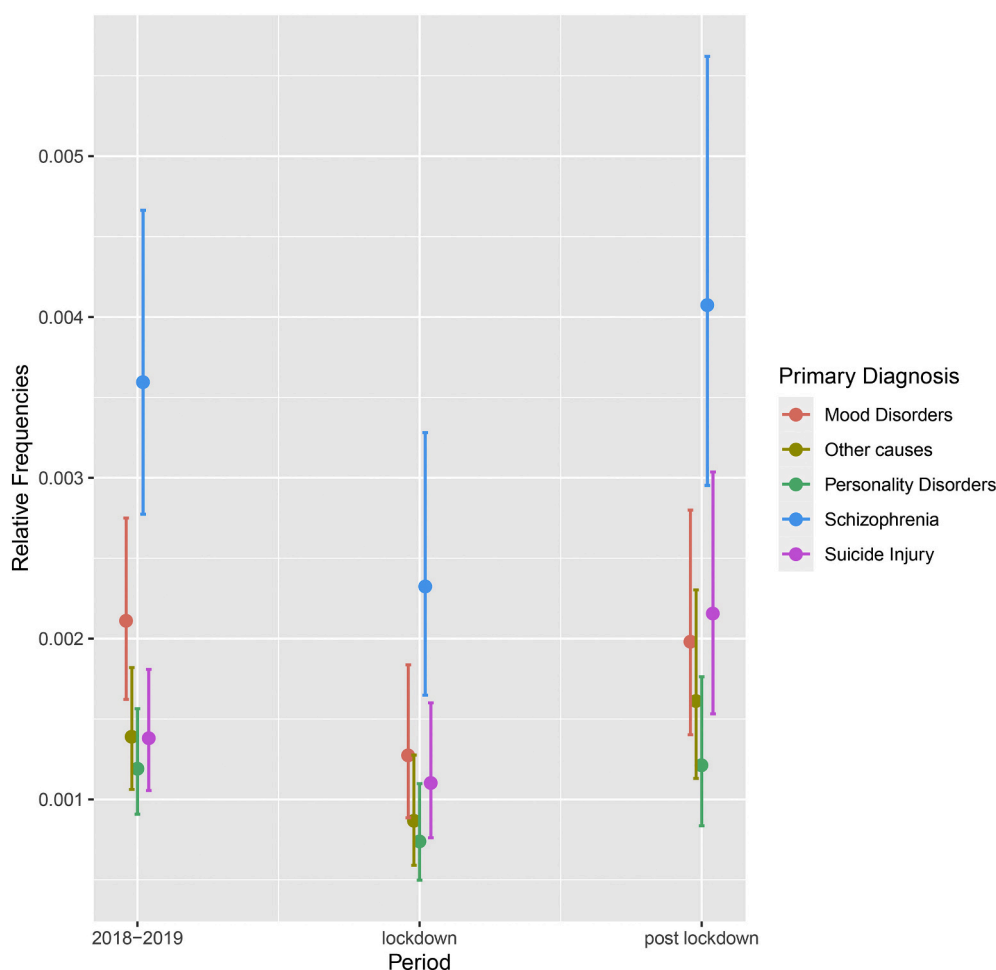
Fig. 2. Predicted relative frequency of admission, by period (i.e., March 1–June 30, 2018 and 2019; lockdown [March 1–April 30, 2020]; post-lockdown [May 1–June 30, 2020]) and length of stay (i.e., <7, 7–14, >14 days).

undiagnosed or untreated mental disorders during the lockdown.

Regarding bed-flow parameters, we found an increase in the frequency of medium (7–14 days) and long-stay (>14 days) inpatient hospitalization during the lockdown period, whereas a trend for shorter admissions was found during the post-lockdown period, as demonstrated by a significant 39% reduction in long-stay admissions. If there was indeed a tightening of admission criteria for psychiatric hospitalization during the lockdown (Xiang et al., 2020), this may have resulted in a greater clinical severity of inpatients, thus explaining the longer hospitalizations during that period. Clinicians may have also opted for longer hospitalization periods in order to minimize the risk of readmission, due to a higher risk of contagion outside the facility. Moreover, during the lockdown, there may have been an objective inability to return many patients from residential facilities back to those facilities, or even to refer them to post–acute care pathways; consequently, the hospitalization periods of those patients may have been extended. Finally, the longer hospitalization periods might be partly explained by the presence of COVID-19–positive patients. As psychiatric patients would have been admitted to hospital for safety concerns, they could not have been discharged home to self-quarantine if they developed symptoms of COVID-19 (Li, 2020). On the other hand, the trend of shorter hospitalizations during the post-lockdown period may be due to a greater demand for emergency treatment and more efficient COVID-19 screening for hospitalized patients. Further studies are required to gain insight into these observed phenomena.

Finally, we found a limited evidence of a 35% increase in patients reporting suicidal ideation was observed in the post-lockdown period (i.

e., May 1–June 30, 2020), compared to the rates observed in 2018 and 2019. This finding is aligned with the literature on previous epidemics and pandemics. Deaths by suicide increased in the U.S. during the 1918–1919 influenza pandemic (Wasserman, 1992), as well as among older people in Hong Kong during the 2003 severe acute respiratory syndrome (SARS) epidemic (Cheung et al., 2008). The COVID-19 pandemic has severely impacted the global economy (International Labor Organization, 2020), and loss of employment and financial stressors are well-recognized risk factors for suicide (Stuckler et al., 2009). Based on a previous study on the relationship between suicide risk and unemployment during the 2000–2011 economic crisis (Nordt et al., 2015), a predictive model was recently developed to estimate the non-linear connection between unemployment and suicide in the current context (Kawohl and Nordt, 2020). The authors estimated that, in a pessimistic scenario (global unemployment rate increase from 4.9% to 5.64%), an increase in suicides of approximately 9570 per year would be expected; in an optimistic scenario (i.e., unemployment rate increase to 5.088%), the increase would amount to approximately 2135 suicides per year. According to the World Health Organization, each registered suicide is accompanied by more than 20 suicide attempts (WHO, 2020b). Consequently, the number of mentally distressed people seeking help from mental health services might be expected to increase in the context of the COVID-19 pandemic, as observed in the present study. Moreover, the pandemic might adversely affect other known precipitants of suicide, including domestic violence and alcohol consumption (Gunnell et al., 2020). The present results are thus crucial to developing policies and strategies for suicide prevention, in part because the mental health

Fig. 3. Predicted relative frequency of admission, by period (i.e., March 1–June 30, 2018 and 2019; lockdown [March 1–April 30, 2020]; post-lockdown [May 1–June 30, 2020]) and primary diagnosis class (i.e., mood disorders, personality disorders, schizophrenia spectrum disorders, suicide attempt, other diagnoses). N.B. The "suicidal attempt" class was determined by medical records, rather than ICD-9-CM diagnoses.

consequences of suicidal ideation and attempts are likely to be long-lasting, and may peak even after the actual pandemic.

It is necessary to recognize the limitations of the present study. Since a naturalistic approach was applied, we could not control for potential sources of bias. For example, we cannot rule out the possibility that mental health professionals became more sensitive to assessing suicidal ideation during the COVID-19 pandemic. In addition, despite the high representativeness of the sample (i.e., the twelve GHPWs included in the study cater for 3.71 million inhabitants), the observed GHPWs were not equally distributed among all Italian regions, thus potentially reducing the generalizability of the results. Finally, not all observed GHPWs had automated registers, so some data were manually extracted from medical records, leading to potential coding issues and biases in the data collection. However, control of data integrity occurred and data from GHPWs with observable coding issues were removed from the study.

Ethical statement

To preserve privacy, general hospital psychiatric wards anonymized the identification codes for all patients prior to transferring the data to the research team. The Ethics Committee of the Department of Dynamic and Clinical Psychology, and Health Studies of the Sapienza University of Rome (No. 446/2020) approved the study.

Declaration of Competing Interest

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. All Authors declare no competing interests.

Appendix A. Appendix

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Appendix B. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.pnpbp.2021.110304.

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