

COVID-19 Pandemic Effects on Adolescent Neuropsychiatric Patients in Emergency Department

Manuel Murciano

Bambino Gesù Pediatric Hospital: Ospedale Pediatrico Bambino Gesù

Roberto Aversa

Bambino Gesù Pediatric Hospital: Ospedale Pediatrico Bambino Gesù

Umberto Raucci (✉ umberto.raucci@opbg.net)

Ospedale Pediatrico Bambino Gesù

Nicoletta Della Vecchia

Bambino Gesù Pediatric Hospital: Ospedale Pediatrico Bambino Gesù

Anna Maria Caterina Musolino

Bambino Gesù Pediatric Hospital: Ospedale Pediatrico Bambino Gesù

Maria Pontillo

Bambino Gesù Pediatric Hospital: Ospedale Pediatrico Bambino Gesù

Mara Pisani

Bambino Gesù Pediatric Hospital: Ospedale Pediatrico Bambino Gesù

Milena Labonia

Bambino Gesù Pediatric Hospital: Ospedale Pediatrico Bambino Gesù

Sebastian Cristaldi

Bambino Gesù Pediatric Hospital: Ospedale Pediatrico Bambino Gesù

Maria Laura Pucciarini

Bambino Gesù Pediatric Hospital: Ospedale Pediatrico Bambino Gesù

Raffaella Nacca

Bambino Gesù Pediatric Hospital: Ospedale Pediatrico Bambino Gesù

Valentina Annarosa Ferro

Bambino Gesù Pediatric Hospital: Ospedale Pediatrico Bambino Gesù

Antonino Reale

Bambino Gesù Pediatric Hospital: Ospedale Pediatrico Bambino Gesù

Stefano Vicari

Bambino Gesù Pediatric Hospital: Ospedale Pediatrico Bambino Gesù

Alberto Villani

Bambino Gesù Pediatric Hospital: Ospedale Pediatrico Bambino Gesù

Massimiliano Raponi

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Abstract

Objective: Italy was the first country affected in Europe by the new coronavirus disease pandemic, so a national lockdown was set up. Side effects were anxiety, discomfort and social pressure, among others. This study analyses the characteristics of adolescent who required emergency help for neuropsychiatric disorders in the year before and after lockdown beginning.

Methods: Data were collected from 1428 patients aged 12-18 years who enter the Emergency Department with a diagnosis of neuropsychiatric disorders in a pediatric tertiary Hospital in Rome, between March 2019 and March 2021.

Results: History of previous neuropsychiatric episodes ($p < 0.001$) and comorbidities ($p = 0.003$) were more frequent in the pre-covid era. During post-lockdown, onset time of acute symptoms was longer ($p < 0.001$) and number of hospitalizations was higher ($p < 0.001$) but their length was the same. Psychomotor agitation was less frequent during post-lockdown period ($p < 0.001$); there was a reduction in hetero-aggressiveness ($p = 0.005$) but increment in suicidal ideation ($p = 0.002$) and suicide attempt ($p < 0.001$).

Conclusion: Rates of suicide ideation and attempts were higher during some months but admission for psychomotor agitation was reduced after lockdown, probably due to protective factors, like anxiety reduction referred to school performances and the major presence of parents at home. First lockdown forced children and parents at home; second lockdown left children lonely for most of the day. Patients waited longer before going to the emergency room in the post-lockdown phase, probably because the media focus on pandemic and the fear of contagion in hospital. Breaks in schooling can lead to educational inequalities over time.

Introduction

Since December 2019, an outbreak of a new coronavirus disease (COVID-19) has spread from Wuhan, China, [1] which subsequently became pandemic with extension to all continents [2]. Italy was the first country to be affected in Europe, with the first person-to-person transmission diagnosed on February 20, 2020. The national response to contain the pandemic began on February 23, 2020, with severe social containment measures in 11 municipalities in northern Italy, continued with social distancing and school closures on March 4, 2020. More restrictive decrees followed gradually until 9 March, when the lockdown was extended to the entire Italian territory and culminated in an announced national lockdown on 11 March 2020, lasted until 4 May 2020 [3].

The COVID-19 outbreak resulted in more than 239 millions confirmed cases worldwide with more than 4.87 millions deaths [4].

COVID-19 has a major impact on the lives of millions of people around the world not only because of its rapid spread and significant mortality, but also due to the changes in people's daily lives, the devastating impact on economy and the profound reformulation of social structures and health systems [5]. In fact,

national governments adopted an emergency protocol that imposed restrictions never experienced and social distancing with significant impact on the emotional and social sphere of children. During this period, many non-emergency outpatient activities and home therapy services were suspended, even in the context of neuropsychiatric diseases in patients in developmental age. The limitation of freedom, home confinement, reduced social interaction and poor access to therapeutic pathways have generated states of anxiety, discomfort, loss of references, increased social pressure and tensions in the general population, and even more in pediatric patients and fragile subjects and in their family context. Summer and holiday periods schools' closure was linked with a reduction in physical activities, an increase in the use of smartphones and other media devices, dysregulation of the sleep-wake rhythm, alterations in diet and weight gain [6–8].

The COVID-19 pandemic is having a psychological impact on all individuals, particularly the most fragile groups. For adolescents with psychiatric disorders, lockdown can result in sudden interruption of care or delayed care delivery. Recent findings, based on the current pandemic, indicated that experiencing extreme fear is the most significant predictor for both depression and post-traumatic stress disorder, followed by short sleep duration and living in the most affected areas [9]. In a survey of Chinese adolescents aged 12-18 years, a high prevalence of symptoms of depression (43%), anxiety (37%), and in combined form (31%) was found during the COVID-19 outbreak, and the female gender was the greatest risk factor [10].

A survey of adolescents in the United Kingdom found that 83% of them agreed that the pandemic had worsened their mental health and 26% said they were unable to access mental health support.

Adolescents are therefore more vulnerable and require careful consideration by health care providers and health system adaptations for mental health support during lock-down.

Adolescents are experiencing a period of insecurity resulting from concerns about the health and work of their relatives, the theme of death replayed daily, separation from friends, and the lock-down of school; for some of them this is an unbearable experience [11–13].

In addition, it should be considered how the COVID-19 pandemic has been changing the use of tools such as social media, the Internet, and access to information that have never been more developed, easy, and immediate. Social media could play an important role during the confinement as it could allow for more socialization, learning opportunities, even for adolescents' access to information about their health. Thus, the use of social media could be a positive factor in helping adolescents maintain social interaction during lockdown; however, social media is also associated with negative phenomena. According to a recent systematic review of the literature, time spent and investment in social media is correlated with levels of depression, anxiety, and psychological distress and be associated with insomnia [14].

Understanding the extent and type of issues related to psychiatric patients' access to emergency departments is of utmost importance, as the pandemic is still ongoing, and issues related to lockdown and possible lack of access to mainstream care may recur [9, 15]. Furthermore, during and after the

COVID-19 outbreak, we may see an increase in suicidal ideation and behaviour among at-risk populations. According to the WHO, each suicide in a population is accompanied by more than 20 suicide attempts, and a recent model based on global public data from 63 countries predicted a 20-30% increase in suicide rates due to the COVID-19 pandemic [16, 17]. In fact, Hill et al. (2021) recently reported that rates of suicide ideation and attempts were higher during COVID-19 period but were not universally higher across this period. Months with significantly higher rates of suicide-related behaviours appear to correspond to times when COVID-19-related stressors and community responses were heightened, indicating that youth experienced elevated distress during these periods. Emergency Departments (ED) play a pivotal role in the identification, treatment, and coordination of care for children with mental health disorders, often serve as a safety net for children with mental health disorders seeking care [18, 19], and may be essential to identify populations at risk for delayed presentations of undiagnosed, untreated, or complicated mental health conditions. Timely recognition of at-risk children may help improve children's and adolescents' health and well-being as well as develop long-term capacities for mental health services [20].

Therefore, it is very important to know the impact of pandemic COVID-19 and lock-down on adolescent psychiatric disorders, considering that this situation could increase the risk of developing or worsening these disorders. However, no study has evaluated changes in ED visits for mental health conditions during a large 1-year COVID-19 pandemic period.

This study aims to define whether in the population of patients referred to our ED there was a change in the presentation of neuropsychiatric disorders in COVID-19 period compared to the previous year (pre COVID-19 year), analysing ED admissions of the pediatric population with neuropsychiatric disorders and evaluating a possible difference in both quantity and quality in the accesses of both periods.

Methods

We conducted a retrospective observational, single-centre cohort study that was carried out in the Emergency Department (ED) of the Bambino Gesù Children's Hospital (OPBG), a pediatric tertiary Hospital in the metropolitan area of Rome, between March 2019 and March 2021. ED diagnoses have been considered according to DSM-5 criteria [21]. The study protocol was approved by the institutional ethics committee of the Hospital. Patients' identification was performed through searching in the ED electronic database all patients accessed for neuropsychiatric disorders and potential cases were manually screened by medical chart review. All patients under 18 years of age attending our ED from March 2019 to December 2021 were considered for inclusion. Inclusion criteria include patients older 12 years and younger than 18 years who enter the ED with a diagnosis of neuropsychiatric disorders. The text searching was performed in our management program, called "GIPSE", in the "Diagnosis" and "History" fields and searching by ICD-9 CM code (International Classification of Diseases - 9th revision - Clinical Modification) in the "Diagnosis" field. From each medical record, demographic and clinical features, examination findings, investigations performed, hospital admission and length of stay (where applicable) were retrieved. C-SSRS (Columbia-Suicide Severity Rating Scale) was applied when indicated and used to

screen for suicide risk. Priority of consultation on our ED was based on a 4-colours triage coding scale according with Italian Health System Guidelines in force during the study period. For the purposes of this study, the priority of ED consultation was classified as follows: 1) High/Intermediate priority: including patients classified as “Red code” (critical medical state) and “Yellow code” (serious state, risk of evolution into critical conditions); 2) Low/non urgent priority: including patients classified as “Green code” (Fair state, stable vital signs) or “White code” (good state, non-urgent consultation).

We retrospectively analysed their records, evaluating clinical, laboratory and imaging parameters, data regarding age, sex, primary diagnoses, and so on. The main parameters analysed are shown in Table 1. Data gathered was stored in an Excel (Microsoft Corporation) electronic database for analysis and evaluation.

Table 1

Analysis of the characteristics of 1428 adolescent patients aged between 12 and 18 years: comparison among patient groups according to Emergency Room access periods pre-Covid19 and post-lockdown.

	Total	PRE-COVID19	POST-LOCKDOWN	p-value
Patients	1428	715 (50,1%)	713 (49,9%)	-
Age in months (median, 1°-3° interquartile)	189 (189-202)	189 (173-201)	189 (175-204)	0,124 ^U
Females	877 (61,4%)	432 (60,4%)	445 (62,4%)	0,447 ^F
Males:Females Rate	1:0,63	1:0,66	1:0,84	-
Onset time in days (median, 1°-3° interquartile)	1 (1-3)	1 (1-2)	1 (1-7)	<0,001 ^U
Previous psychiatric episodes	956 (66,9%)	531 (74,3%)	425 (59,6%)	<0,001 ^F
Exposures to toxic agents	204 (14,3%)	104 (14,5%)	100 (14%)	0,821 ^F
Tox-Screening alteration	116 (8,1%)	58 (8,1%)	58 (8,1%)	1 ^F
Acute therapy needing	74 (5,2%)	34 (4,8%)	40 (5,6%)	0,106 ^F
Home therapy	756 (52,9%)	377 (52,7%)	379 (53%)	0,874 ^F
Suspected Covid19 contact	8 (0,6%)	-	8 (1,1%)	-
Positive SARS-CoV-2 swab	4 (0,3%)	-	4 (0,6%)	-
Hospital admission	570 (39,9%)	248 (34,7%)	322 (45%)	<0,001 ^F
Comorbidity	432 (30,3%)	242 (33,8%)	190 (26,6%)	0,003 ^F
Self-harm	344 (24,1%)	165 (23,1%)	179 (25%)	0,387 ^F
Hetero aggressiveness	388 (27,2%)	218 (30,5%)	170 (23,8%)	0,005 ^F
Suicidal ideation	393 (27,5%)	170 (23,8%)	223 (31,2%)	0,002 ^F
Attempted suicide	142 (9,9%)	48 (6,7%)	94 (13,1%)	<0,001 ^F
Psychomotor agitation	833 (58,3%)	464 (64,9%)	369 (51,6%)	<0,001 ^F
In-hospital length of stay	5 (2-8)	5 (2-8)	4 (2-8)	0,685 ^U
U = Mann-Whitney U test with independent samples; F = Fisher's exact test.				

Patients have been divided into two subgroups according to the access date, setting the 8th of March 2020 as the cut off for the start of the Covid-19 related lockdown in Italy. In particular, ED diagnoses from 9th March 2019 till 8th March 2020 (pre-Covid19 era) and from 9th March 2020 till 8th March 2021 (Covid19 era) have been considered. We also studied the eligible population into subgroups in order to identify any prognostic factors reflecting ED's severity. We selected the exact time period (month and day) in order to prevent the possible effects of seasonality in psychiatric disorders manifestations. The clinical and demographic features were described in the overall cohort. Each variable was compared between the two subgroups to identify significant differences (see Table 1).

Statistical analysis. The distribution of the factors under study was evaluated by means of the Shapiro–Wilk test and the indices of asymmetry (skewness) and kurtosis (kurtosis). Since the main factors did not follow a Gaussian distribution, the quantitative variables were described using the medians and the interquartile range (first and third quartiles) and compared by the Mann–Whitney test. Absolute and percentage frequencies were calculated for qualitative variables, and comparison between groups was performed with Chi-square test or Fisher's exact test, when appropriate. $p < 0.05$ (two-tailed test) were considered statistically significant. The data were collected in an Excel database, and the statistical analysis was carried out with the IBM SPSS Statistics software version 22.0 (IBM, SPSS Inc., Chicago, IL).

Results

The accesses of neuropsychiatric relevance at the Pediatric Emergency Department of the Bambino Gesù Pediatric Hospital in Rome were analysed during the period between 9th March 2019 and 9th March 2021 (see Figure 1). The period from 9th March 2019 till 8th March 2020 was called pre-covid19, while the period from 9th March 2020 till 8th March 2021 was called post-lockdown and it runs from the beginning of lockdown including school reopening.

The population analysed was stratified by age and the age group between 12 and 18 years was analysed (see Table 1).

Patients under the age of 3 years, those who accessed for purely neurological pathologies and cases of abuse of minors for which a neuropsychiatric evaluation is always carried out were excluded.

Analysing the population of adolescents aged between 12 and 18 years, the results are as follows (see Table 1). 1428 subjects were analysed, of which 61.4% female and 48.6% male. About sex, female patients were 432 vs 445 (pre-covid vs post-lockdown: 60.4% vs 62.4%; p -value 0.447). 715 patients were enrolled in the pre-covid period and 713 in the post-lockdown period. The average age was 187 months with a median of 189 months and 1st-3rd quartile 189-202 months (pre-covid vs post-lockdown: 189 (173-201) vs 189 (175-204); p -value 0.124). In 66.9% of cases, they reported a history of previous neuropsychiatric episodes (pre- vs post-lockdown: 74.3% vs 59.6%; p -value < 0.001). The onset time of acute symptoms presenting a median of 1 day (1st-3rd quartiles = 1-3 days); also, in the pre- and post-lockdown groups the median is one day but with statistically significant differences in the 1st-3rd

interquartile range (1-2 and 1-7 days, respectively; p-value <0.001). Comorbidities were present in 30.3% of patients (pre- vs post-lockdown: 33.8% vs 26.6%; p-value 0.003). Exposure to toxic substances (including both drugs of abuse and drugs taken for anticonservative purposes) was reported in 204 subjects (14.3%); toxicological screening for substances of abuse was positive in 116 patients (8.1% of the total population). There were no statistically significant differences between the two periods examined (p-value=0,821 and p-value=1, respectively). 52.9% of patients received home therapy (pre vs post: 52.7% vs 53%; p-value 0.874). Acute state required therapies in 5.2% of cases in the emergency room (pre vs post: 4.8% vs 5.6%; p-value 0.106). 39.9% of patients were hospitalized (pre vs post: 34.7% vs 45%; p-value <0.001). The median length of hospitalization was 5 days (1st-3rd quartiles = 2-8 days). 58.3% of patients presented with psychomotor agitation (pre vs post: 64.9% vs 51.6%; p-value <0.001); 24.1% presented self-harm phenomena (pre vs post: 23.1% vs 25%; p-value 0.387); 27.2% hetero-aggressiveness (pre vs post: 30.5% vs 23.8%; p-value 0.005); 27.5% suicidal ideation (pre vs post: 23.8% vs 31.2%; p-value 0.002) but suicide was attempted by 142 subjects (9.9% of cases) (pre vs post: 6.7% vs 13.1%; p-value <0.001). During the post-lockdown period, 8 out of 713 patients (1.1%) reported suspected contact with SARS-CoV-2; only 4 patients (0.6%) tested positive for the virus swab.

Discussion

We detect a change in the neuropsychiatric population who referred to our hospital before and after lockdown caused by COVID-19 infection. The first significant data is that age and gender were approximately the same during pre and post lockdown, showing that females suffer from psychopathological disorders more than males in both periods (more than 60% of patients are females). This data is in accordance with the literature, which shows a female preponderance, in particular about mood disorders, anxiety disorders and eating disorders [22].

Furthermore, our data suggest that the reasons and conditions that led patients to our ED were probably more serious after lockdown compared to pre-covid, probably because the COVID-19 pandemic and lockdown may have had a negative influence on the mental health because of confinement and social distancing or probably because of the fact that people often avoided going to the hospital during and after COVID-19 pandemic due to the fear of contagion.

From a recent review of the literature, [23] conducted by Panda, it emerges that children were indirectly affected negatively by the pandemic and quarantine and there was a high prevalence of anxiety, depression, irritability, inattention, and sleep disturbance. Similar results were shown in the study conducted by Zhou [10], that is a cross-sectional study among Chinese students aged 12-18 years during the COVID-19 epidemic period; they were assessed with an online survey and results showed a high rate of depressive and anxiety symptoms.

Probably, this is also the cause which can explain why patients who came to our center from another psychiatric clinic were more before than after lockdown. They came to medical attention only when necessary and when the conditions were already advanced.

The reduction of number of patients with a neuropsychiatric history and neuropsychiatric comorbidity after lockdown could suggest that confinement and social distancing imposed by COVID-19 pandemic revealed disorders that previously did not required medical attention.

Our study revealed also that lockdown did not increase substance abuse. The same results were shown in literature [24, 25].

The main clinical difference between the 2 groups considered was referred to the reason for hospital admission: stress, depression and anxiety caused by lockdown determined an increase of number of cases of suicidal thoughts and suicide attempts.

Data found in literature were discordant. In a study conducted by Isumi [26], preliminary findings show that during the first wave of COVID19 pandemic and the subsequent school closure in Japan, there wasn't a significant increase in suicide rates; while in another study, [27] results indicated a significantly higher rate of suicide ideation in March and July 2020 and higher rates of suicide attempts as compared with the same months in 2019.

Conclusion

During the two periods, no change in self-harm phenomena ($p=0.387$) was detected but during post-lockdown era it is reported a reduction in psychomotor agitation ($p<0.001$) and hetero aggressiveness ($p=0.005$) with an increment in suicidal ideation ($p=0.002$) and suicide attempt ($p<0.001$). Rates of suicide ideation and attempts were higher during some months. At the same time, admission for psychomotor agitation and need of containment because of the agitation were significantly reduced after lockdown, probably because during the COVID-19 pandemic there were also protective factors, like the reduction of anxiety referred to the school performances and the major presence of parents at home.

It is useful to underline a fundamental difference between the first and second lockdowns: the first lockdown was harder with the suspension of all school activities in the presence and most of the work activities, forcing both children and their parents into the house; the second lockdown saw the continuation of distance learning activities and the resumption of normal work rhythms, leaving only children at home for most of the day without parents.

In the pre-covid period, most patients arrived in the emergency room within 2 days from the onset of symptoms, while in the post-lockdown phase, most patients went to the emergency service within 7 days. This can be explained by a media storm regarding the pandemic and the fear of contagion in a hospital setting. The number of hospitalizations increased in the post-lockdown phase, but there was no change in the length of hospital stay.

This prolonged break is of concern, as even short breaks in schooling can cause significant loss of learning for children and lead to educational inequalities over time.

List Of Abbreviations

ED = Emergency Department; COVID-19 = new coronavirus disease; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2.

Declarations

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Not applicable

Authors' contributions

Manuel Murciano, conceptualized and designed the study, coordinate and supervised collected data, performed all statistical analyses and drafted the initial manuscript; Roberto Avena and Umberto Raucci conceptualized and designed the study, coordinate and supervised collected data, and drafted the initial manuscript; Nicoletta Della Vecchia, Anna Maria Caterina Musolino, Maria Pontillo, Mara Pisani, Milena Labonia, Sebastian Cristaldi, Maria Laura Pucciarini, Raffaella Nacca and Valentina Annarosa Ferro, collaborate to the design of the study, contributed to manuscript drafting, critically reviewed and revised the manuscript; Antonino Reale, Stefano Vicari, Alberto Villani and Massimiliano Raponi designed the study, supervised data collection, and reviewed and revised the manuscript for important intellectual content; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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Availability of data and materials

The datasets generated and analysed during the current study are not publicly available due privacy protection but are available from the corresponding author on reasonable request and subject to the permission being obtained from Ospedale Pediatrico Bambino Gesù, IRCCS, Rome.

Ethics approval and consent to participate

The study protocol was approved by the institutional ethics committee of the Bambino Gesù Children's Hospital, IRCCS, Rome, Italy.

Consent for publication

The study was approved for publication by Scientific Direction of the Bambino Gesù Children's Hospital, IRCCS, Rome, Italy.

Competing interests

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest

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Figures

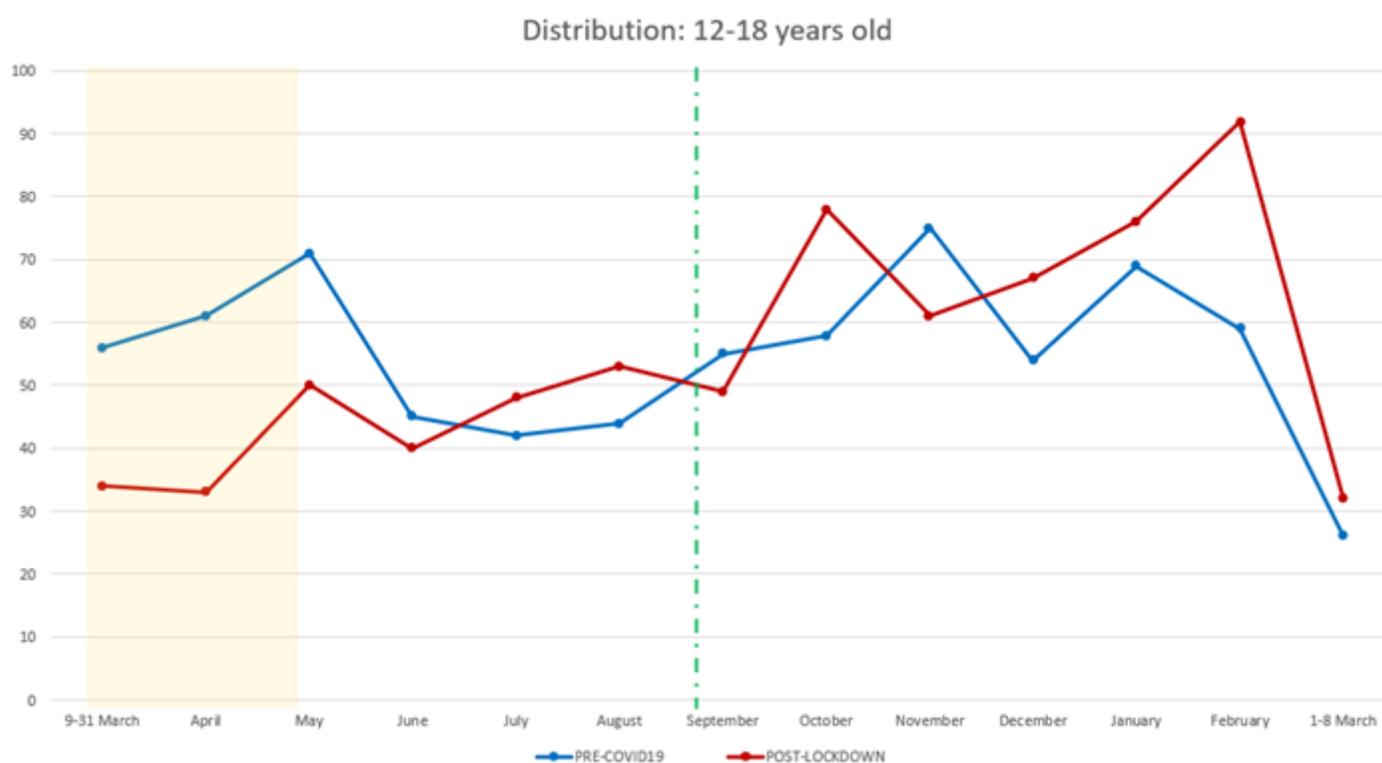


Figure 1

Emergency Department access by neuropsychiatric adolescent patients per month. The blue line represents the year before lockdown, the red line represents the year since the beginning of lockdown. The highlighted area indicates the 2020 lockdown duration, while the dotted line indicates the resumption of school activity in 2020.