



Pediatric emergency department mental health assessments in the 2 years following the COVID-19 outbreak reveal higher vulnerability for eating disorder and suicide risk

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ARTICLE INFO

Keywords:

Child and adolescent neuropsychiatry
Psychopharmacological therapy
Risk factors

ABSTRACT

Background: In the post-COVID era an increase in Emergency Department (ED) mental health assessments has been consistently reported among youth populations.

Methods: Pediatric ED mental health assessments in the 2 years following the COVID-19 pandemic (March 2020–February 2022) were compared to those in the immediately preceding same period (March 2018–February 2020), in terms of rates and risk profiles.

Results: During the pre-pandemic and post-pandemic periods, 158 and 268 ED accesses were counted respectively, and an overall 1.64 (95 % CI: 1.34–1.99) monthly IRR was estimated. During the post-pandemic period, youth accessing ED were less likely to have a personal history of psychiatric disorders (OR: 0.49; 95 % CI: 0.28–0.86) and to receive an extemporaneous administration of psychopharmacological therapy in ED (OR: 0.28; 95 % CI: 0.14–0.57), despite being more frequently discharged from ED with a background psychopharmacological therapy in place (OR: 2.02; 95 % CI: 1.02–4.01). Finally, during the post-pandemic period, an increase in ED accesses for eating disorder (OR: 2.77; 95 % CI: 1.49–5.13) and suicidal thoughts-self-harm (OR: 2.00; 95 % CI: 1.07–3.74) was observed, when compared to ED access for anxiety-agitation.

Conclusions: This report suggests higher rates of post-COVID pediatric ED mental health assessments, especially for eating disorder and suicide risk, with a preponderance of youth whose ED access may be their first mental health specialist contact.

1. Introduction

Accumulating evidence suggests detrimental effects of the COVID-19 pandemic on the mental health of children and adolescents. In fact, different outcomes have been imputed to the pandemic outbreak, including precipitating relapse in the context of pre-existing mental health vulnerabilities (Colizzi et al., 2020), generating distress in otherwise healthy youth (Pigaianni et al., 2020), and resulting in higher requests of specialist consultations often ending in inpatient admissions (Bortoletto et al., 2022). Independent of the post-COVID syndrome, that is a potentially direct effect of the virus in COVID-19 survivors who present

with subsequent mental health symptoms (Colizzi et al., 2022), studies have warned against the *collateral damage* of the pandemic, that is the negative indirect effect to all life aspects caused by both the pandemic and the implemented response to it, such as school and workplace closures, stay-at-home restrictions, cancelation of public events, restrictions on socialization and public gatherings, restrictions on international and internal travel (Crawley et al., 2020; Eigi et al., 2022).

Despite the alleged initial contraction in mental health-related emergencies, possibly due to underutilization of Emergency Departments (ED) during the most risky and uncertain phase of the pandemic, in the following time periods an increase in ED referrals for

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<https://doi.org/10.1016/j.jadr.2023.100687>

Received 5 March 2023; Received in revised form 16 October 2023; Accepted 13 November 2023

Available online 15 November 2023

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urgent mental health visits and inpatient care pathways has been consistently reported among youth populations (Chadi et al., 2021; Coates et al., 2021; Krass et al., 2021; McNicholas et al., 2021). When it comes to identify youth at risk, several sociodemographic and clinical risk factors have been associated with accessing ED for mental health issues, such as being older (i.e., being adolescent rather than child) (Davico et al., 2021; Krass et al., 2021), female (Krass et al., 2021), suffer from severe depression (Zhou et al., 2020), have suicidal thoughts (Mayne et al., 2021), attempt suicide (Coates et al., 2021), present with self-harm in the context of an emotional disorder (Ougrin et al., 2021), and have an eating disorder (Chadi et al., 2021; Otto et al., 2021). The aforementioned collateral damage of social isolation, school closures, and enduring uncertainty have been called into question to explain such a specific risk profile (Huang and Ougrin, 2021).

The aim of the study was to describe the ED mental health assessments of youth presenting to a pediatric ED in the 2 years following the beginning of the COVID-19 pandemic (March 2020 to February 2022) as compared to those admitted in the immediately preceding same period (March 2018 to February 2020), both in terms of rates and risk profiles. To our knowledge, there is a paucity of longer-term observational studies. Based on previous evidence, pediatric ED mental health assessments were hypothesized to have increased and to differ in terms of sex ratio and reason for ED assessment, with a higher preponderance of female patients as well as patients with eating disorder and suicidal behavior, in the post-pandemic period.

2. Methods

This study was conducted at the pediatric ED of the Friuli Centrale Health University Authority, Udine, Italy, a referral ED for children and adolescent health emergencies, including mental health ones. A retrospective study design was adopted to collect critical information from the electronic medical records regarding all consecutive ED mental health assessments over the 2-year period following the COVID-19 outbreak (March 2020–February 2022). To obtain a control group, the same strategy was applied to collect data regarding the ED mental health assessments occurring over the same period before the beginning of the pandemic (March 2018–February 2020).

The following data was collected for each ED mental health assessment: (i) age (years), (ii) sex (male/female), (iii) access season (spring/summer/autumn/winter), (iv) access day (midweek/weekend), (v) reason for access (anxiety-agitation/eating disorder/suicidal thoughts-self-harm/other), (vi) personal history of psychiatric disorders (no/yes), (vii) ED access resulting in inpatient admission (no/yes), (viii) psychopharmacological therapy at ED access (no/yes), (ix) psychopharmacological therapy administered in ED (no/yes); (x) psychopharmacological therapy at ED discharge (no/yes); (xi) traumatic events (no/yes); (xii) substance use (no/yes); (xiii) school attendance (no/yes).

Continuous variables were described by mean and standard deviation if normally distributed or by median and interquartile range in case of skewness. Counts and percentages were used for categorical variables. Normality distribution of continuous variables was verified by Shapiro-Wilk test. The frequency distribution of the variables was compared between the pre-pandemic and the post-pandemic periods using *t*-test and Mann-Whitney for the normally distributed and skewed continuous variables, respectively. Differences between categorical variables were analyzed by ordinary chi-squared tests, and Fisher exact in case of low sized (<5) cells. A simple Poisson regression was used to estimate the monthly Incidence Rate Ratio (IRR) between the pre-pandemic and the post-pandemic periods. A multiple logistic model was used to study the differences in the socio-demographic and clinical characteristics of ED accesses in the pre-pandemic and post-pandemic periods. In the model, the period variable (pre-/post-pandemic) was regressed on ED access characteristics. Model selection was performed according to Akaike and Bayesian information criteria. Hosmer and Lemeshow test and Pearson-standardized residuals were used to assess the model goodness of fit and

presence of outliers.

The analysis had exploratory and hypothesis-generating aims. No *a priori* strategies for treating missing data were established and no formal power analysis was performed. Statistical significance was set at 5 %. The analyzes were conducted by the statistical package STATA.16.0 (www.stata.com). The study was conducted according to the guidelines of the Declaration of Helsinki, and ethical approval was not required.

3. Results

During the pre-pandemic and post-pandemic periods, 158 and 268 ED accesses were counted respectively, and an overall 1.64 (95 % CI: 1.34–1.99) monthly IRR was estimated. Children and adolescents accessing ED in the pre-pandemic period (14.7; IQR: 13.0–15.5) did not differ in age from those in the post-pandemic period (14.8; IQR: 13.4–15.8). Female youth accessed ED more frequently, both in the pre-pandemic (72.2 %) and in the post-pandemic (79.1 %) periods. Socio-demographic and clinical characteristics of ED access are presented in Table 1a. The selected logistic regression model (Table 1b) indicated that children and adolescents accessing ED in the post-pandemic period were less likely to have a personal history of psychiatric disorders (OR: 0.49; 95 % CI: 0.28–0.86) and to receive an extemporaneous administration of psychopharmacological therapy during the ED stay (OR: 0.28; 95 % CI: 0.14–0.57), despite being more frequently discharged from the ED with a background psychopharmacological therapy in place (OR: 2.02; 95 % CI: 1.02–4.01). Finally, during the post-pandemic period, an increase in ED accesses for eating disorder (OR: 2.77; 95 % CI: 1.49–5.13) and suicidal thoughts-self-harm (OR: 2.00; 95 % CI: 1.07–3.74) was observed, when compared to ED access for anxiety-agitation. The selected logistic model showed a satisfactory goodness of fit (Hosmer and Lemeshow test, $p = 0.579$) and the analysis of Pearson-standardized residuals did not suggest the presence of possible highly influential data.

4. Discussion

Despite the accumulating evidence regarding the mental health effects of the COVID-19 pandemic among children and adolescents (Samji et al., 2021), longer-term studies, that may offer a clearer picture of such phenomena, are limited. This report focused on pediatric Emergency Department (ED) mental health assessments in the 2 years following the pandemic outbreak. The choice of such an outcome measure was driven by evidence that other mental health services may have faced disruptions and redeployment during the pandemic surges (Ornell et al., 2021) and thus not be a reliable measure.

This study indicates that, in the 2 years following the beginning of the pandemic, there has been a significant increase in the number of ED assessments for mental health needs. Also, among several potentially relevant socio-demographic and clinical characteristics, a few were found to occur more likely in the post-pandemic period. Specifically, children and adolescents accessing ED for a mental health assessment in the post-COVID period were less likely to suffer from pre-existing mental health problems and to require acute psychopharmacological treatment in ED, but more likely to be discharged from the ED with a background psychopharmacological regimen in place and to be assessed for eating disorder and suicidal risk. Such findings may indicate a higher likelihood of *ex novo* difficulties in the specific domains of eating and suicidal behavior in the post-pandemic period, in youth possibly unknown to services. Also, on one hand in the post-pandemic phase ED seemed to guarantee an environment to maintain safety, preferring non-pharmacological approaches to contain the potential acute distress; on the other, it more likely prescribed background therapies.

Immediately after the pandemic outbreak, studies consistently reported a contraction in ED mental health assessments worldwide (Chen et al., 2020; Krass et al., 2021; McNicholas et al., 2021; Ougrin et al., 2021), with Italy being no exception (Davico et al., 2021; Ougrin et al.,

Table 1a

Sociodemographic and clinical characteristics of pediatric Emergency Department (ED) mental health assessments during the pre-pandemic and post-pandemic periods.

| | | Pre-pandemic period | | Post-pandemic period | | p |
|---|-----------------------------|---------------------|-----------|----------------------|-----------|----------|
| | | Median | IQR | Median | IQR | |
| Age | Years | 14.7 | 13.0–15.5 | 14.8 | 13.4–15.8 | 0.150* |
| Sex | Male | 44 | 27.8 | 56 | 20.9 | 0.102 |
| | Female | 114 | 72.2 | 212 | 79.1 | |
| Season | Spring | 44 | 27.8 | 50 | 18.7 | 0.130 |
| | Summer | 33 | 20.9 | 54 | 20.2 | |
| | Autumn | 36 | 22.8 | 69 | 25.7 | |
| | Winter | 45 | 28.5 | 95 | 35.4 | |
| Access day | Weekend | 33 | 20.9 | 49 | 18.3 | 0.510 |
| | Midweek | 125 | 79.1 | 219 | 81.7 | |
| Reason for ED access | Anxiety-agitation | 88 | 56.1 | 119 | 44.4 | 0.001 |
| | Eating disorder | 23 | 14.6 | 70 | 26.1 | |
| | Suicidal thoughts-self-harm | 32 | 20.4 | 67 | 25.0 | |
| | Other | 14 | 8.9 | 12 | 4.5 | |
| Personal history of psychiatric disorders | No | 76 | 48.4 | 119 | 44.4 | 0.424 |
| | yes | 81 | 51.6 | 149 | 55.6 | |
| Inpatient admission | no | 135 | 86 | 223 | 83.2 | 0.448 |
| | Yes | 22 | 14 | 45 | 16.8 | |
| Pharmacological therapy at ED access | No | 120 | 76.4 | 170 | 63.4 | 0.005 |
| | Yes | 37 | 23.6 | 98 | 36.6 | |
| Psychopharmacological therapy in ED | No | 120 | 76.4 | 204 | 76.1 | 0.942 |
| | Yes | 37 | 23.6 | 64 | 23.9 | |
| Psychopharmacological therapy at ED discharge | No | 120 | 76.4 | 165 | 61.6 | 0.002 |
| | Yes | 37 | 23.6 | 103 | 38.4 | |
| Traumatic events | No | 144 | 91.7 | 227 | 84.7 | 0.036 |
| | Yes | 13 | 8.3 | 41 | 15.3 | |
| Substance use | No | 148 | 94.3 | 246 | 91.8 | 0.343 |
| | Yes | 9 | 5.7 | 22 | 8.2 | |
| School attendance | No | 2 | 1.3 | 50 | 18.7 | <0.001** |
| | Yes | 155 | 98.7 | 218 | 81.3 | |

Statistical significance assessed by Pearson’s chi-squared test except * (Wilcoxon-Mann-Whitney test) and ** (Fisher’s exact test).

Table 1b

Multivariate logistic regression model assessing differences in pediatric Emergency Department (ED) mental health assessments during the pre-pandemic and post-pandemic periods.

| Outcome: post-pandemic period vs pre-pandemic period | O.R. | 95 % C.I. | P |
|---|------|-----------|--------|
| Reason for ED access (reference: anxiety-agitation) | | | |
| Eating disorder | 2.77 | 1.49–5.13 | <0.001 |
| Suicidal thoughts-self-harm | 2 | 1.07–3.74 | 0.03 |
| Other | 0.5 | 0.21–1.21 | 0.126 |
| Personal history of psychiatric disorders (reference: no history) | 0.49 | 0.28–0.86 | 0.013 |
| Psychopharmacological therapy in ED (reference: no treatment) | 0.28 | 0.14–0.57 | <0.001 |
| Psychopharmacological therapy at ED discharge (reference: no treatment) | 2.02 | 1.02–4.01 | 0.045 |
| School attendance (reference: no attendance) | 0.02 | 0.01–0.11 | <0.001 |

Odds Ratio; C.I., Confidence Interval; Hosmer and Lemeshow goodness-of-fit test: $p = 0.579$.

2021; Raffaldi et al., 2021), possibly due to imposed social restrictions (Ougrin et al., 2021) as well as self-isolation and fear (Raffaldi et al., 2021). However, when compared to pediatric ED assessments for any reason, those for mental health needs were found to have increased (Coates et al., 2021; Leeb et al., 2020). Also, longer-term evidence revealed that such service underutilization regarded only the initial and critical pandemic months, while a sustained increase in ED referrals and inpatient admissions was found in the remaining months of 2020 (Chadi et al., 2021; Coates et al., 2021; Krass et al., 2021; McNicholas et al.,

2021) and in the subsequent year (Bortoletto et al., 2022), resulting in higher rates than in the pre-pandemic period (Coates et al., 2021).

Results from this report add to such evidence suggesting an increase in ED mental health assessments. In fact, ED may have acted as the main service for containment and management of new onset mental difficulties at a time when other services’ clinical routine might have been disrupted. Such hypothesis is corroborated by the specific pattern of psychopharmacological prescription observed in this study, that was not related to the containment of a transitory acute episode but rather associated with a longer-term mental health support. Further, a shift in mental health needs requiring acute assessment was confirmed, with an increase in the number of children and adolescents presenting with eating disorder (Chadi et al., 2021; Otto et al., 2021) and suicidal risk (Coates et al., 2021; Mayne et al., 2021; Ougrin et al., 2021). A number of factors have been suggested to have specifically increased eating disorder risk and symptoms during the pandemic, including, but not limited to: daily routine disruptions and outdoor activity constrains increasing weight and shape concerns; social restrictions depriving youth of social support and adaptive coping strategies; increasing exposure to eating disorder-specific or anxiety-provoking media; increasing reliance on video conferencing; and fears of contagion increasing health concerns and incentivizing restrictive diets to increase immunity (Rodgers et al., 2020). Of interest, a higher proportion of patients with eating disorders in the first phases of the pandemic was found to have suicidal ideation or attempt suicide (Taquet et al., 2021). Evidence indicates that pandemic-induced stress and negative affect have been contributing to increase the risk of eating disorder manifestations (Rodgers et al., 2020), with higher rates of suicide-related behaviors during the most critical periods of the pandemic, possibly reflecting a dose-response effect of COVID-19-related stressors on youth distress (Hill et al., 2021).

Several limitations must be highlighted when inferring conclusions from the current study. Other relevant variables may not have been

considered, thus offering a partial representation of a multifaceted phenomenon such as the development of acute mental health symptoms in the pandemic aftermath. Also, the present findings may not be generalizable to other services, such as outpatient clinics and non-children's hospitals, whose COVID-19 aftereffects may have been different. Finally, while helping quickly collecting clinical data, electronic patient records do not permit standard assessments as those obtained with data primarily gathered for research purposes. Nevertheless, this report suggests higher rates of pediatric ED mental health assessments since the COVID-19 outbreak, especially for eating disorders and suicide risk, with a preponderance of children and adolescents whose ED access may be their first mental health specialist contact.

Declaration of Competing Interest

M.C. has been a consultant/advisor to GW Pharma Limited, F. Hoffmann-La Roche Limited, and GW Pharma Italy SRL, outside of this work. All the other authors declare no conflict of interest.

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