



Pediatric emergency care admissions for somatic symptom disorders during the COVID-19 pandemic

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Abstract

During the COVID-19 pandemic, children and adolescents with psychiatric disorders experienced an exacerbation of their symptoms with more access to the emergency department (ED). However, little is known about the experience of somatic symptom disorders (SSDs) during the COVID-19 pandemic in children. Therefore, we aimed to compare the rates of pediatric ED admissions for SSDs before and during the COVID-19 pandemic and to understand whether the relative risk of ED admissions for SSDs changed between the two periods. We retrospectively enrolled all children between 4 and 14 years admitted for SSDs in the pediatric ED of Santobono-Pausilipon Hospital, Naples, Italy, from March 11th, 2020, to March 11th, 2021 (pandemic period), and in the same time period of the previous year (pre-pandemic period). We identified 205/95,743 (0,21%) children with SSDs presenting in ED in the pre-pandemic year and 160/40,165 (0,39%) in the pandemic year ($p < 0.05$). Considering the accesses for age, we observed a relative decrease of the accesses for SSDs over 12 years old (IRR 0,59; CI 0,39–0,88), while we found no differences under 12 years old (IRR 0,87; CI 0,68–1,10).

Conclusion: In this study, we found that despite the massive decrease in pediatric admissions due to the COVID-19 pandemic, somatic symptom disorders' admissions to the pediatric ED increased, suggesting an impact of the pandemic also on pediatric psychiatric disorders.

What is Known:

- During the COVID-19 pandemic, children and adolescents with a psychiatric disorder experienced exacerbation of their symptoms with more accesses in Emergency Department.

What is New:

- We found that despite the massive decrease of the pediatric admissions due to the COVID-19 pandemic, somatic symptom disorders admissions in healthy children to the pediatric Emergency Department increased, suggesting an impact of the pandemic also on the pediatric psychiatric disorders

Keywords Somatic symptom disorders · COVID-19 · Emergency department · Children

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Abbreviations

ED Emergency department
IRR Incidence rate ratio
SSDs Somatic symptom disorders

Introduction

Coronavirus-19 (COVID-19) infection, caused by SARS-CoV-2, was declared a pandemic by the World Health Organization on March 11th, 2020 [1]. COVID-19 radically changed medical practices and the provision of health services in all specialties [2, 3]. Since the beginning of the

pandemic, a clear correlation between age and disease severity and mortality has been identified [4, 5]. A systematic review of 1065 children infected with SARS-CoV-2 demonstrated uniformly mild phenotypes of disease, presenting mostly with self-limiting respiratory symptoms [6]. Nevertheless, the impact of COVID-19 on children and their families has been high not only because of the disease itself but also because of all the containment measures to reduce virus spread. Children and adolescents experienced a drastic routine disruption due to the loss of social interaction, the schools' closure, and the interruption of recreational activities. The impact of these measures on the routine children's lifestyle is unexpected [7]. Wenter et al. showed that the COVID-19 pandemic spread among children's negative effects on their mental health [8]. In particular, a recent survey of 23 different hospital emergency departments in 10 countries demonstrated an increased proportion of children and adolescents with self-harm presentation [9]. Satcher and Kenned observed that anxiety and increased fear are the most common symptoms reported among people living under lockdown [10]. Emergency departments (ED) are often the first point of care for children experiencing mental health emergencies, particularly when other services are inaccessible or unavailable [11]. During the pandemic, children and adolescents with psychiatric disorders experienced an exacerbation of their symptoms with more access to ED [12]. However, little is known about the experience of somatic symptom disorders during the COVID-19 pandemic in children. Therefore, we aimed to investigate the impact of the COVID-19 pandemic on somatic symptom disorders in children and to understand whether the relative risk of ED admissions for somatic symptom disorders changed between pandemic and pre-pandemic periods. Moreover, we aimed to understand if children with somatic symptom disorders had a similar ED presentation pattern between the two periods.

Methods

This retrospective study was conducted at the Santobono-Pausilipon Children's Hospital of Naples, Italy. The inclusion criteria were as follows.

aged from 4 to 14 years old, admission to the pediatric ED; and diagnosis of "somatic symptom and related disorders" according to the DSM V [13], including somatic symptom disorders, illness anxiety disorder, conversion disorder (functional neurological symptom disorder), psychological factors affecting other medical conditions, factitious disorder, other specified somatic symptom and related disorder, and unspecified somatic symptom and related disorder.

The onset symptoms were classified into three large groups:

1. pain symptoms (head, abdomen, back, joints, extremities, chest, rectum, during menstruation, during sexual intercourse, or during urination);
2. gastrointestinal symptoms (nausea, bloating, vomiting other than during pregnancy, diarrhea, or intolerance of several different foods);
3. pseudo-neurological symptoms (conversion symptoms such as impaired coordination or balance, paralysis, or localized weakness, difficulty swallowing or lump in throat, aphonic, urinary retention, hallucinations, loss of touch or pain sensation, double vision, blindness, deafness, seizures; dissociative symptoms such as amnesia; or loss of consciousness other than fainting).

Data included demographic characteristics, gender, age, and previous ED admissions. Moreover, data concerning the psychiatric evaluation were collected as well as the need for psychiatric follow-up. The data were anonymously recorded and analyzed. We excluded children with known psychiatric disorders or with chronic diseases as well as children with acute diseases that required hospitalization or those with multiple accesses in a single month.

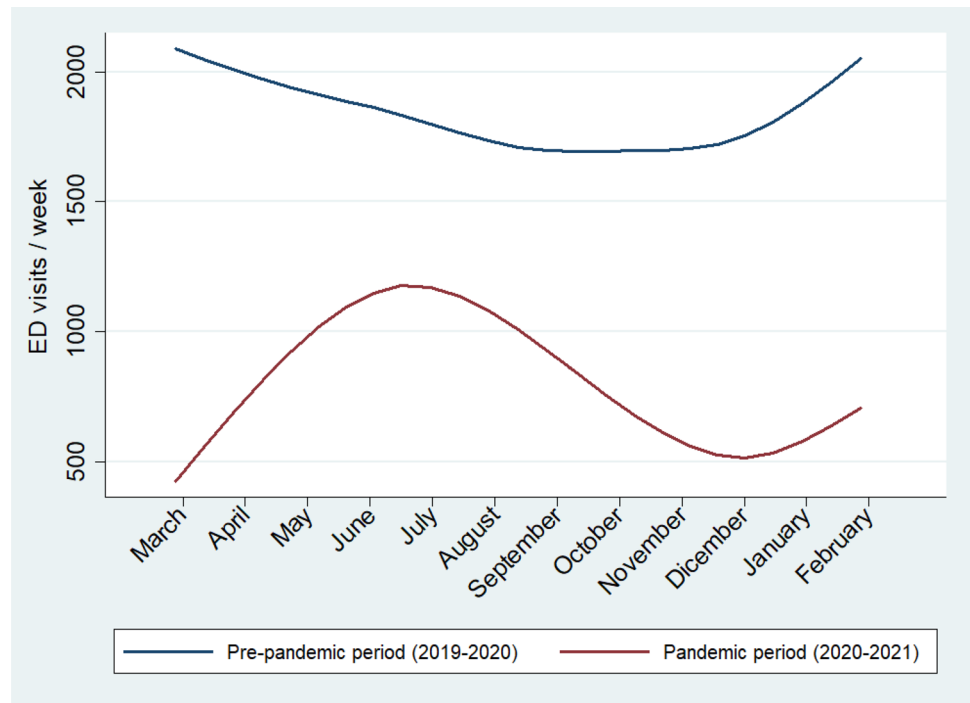
The study group was divided into the following two sub-groups:

1. pre-pandemic group: children admitted to the Pediatric ED from March 11th, 2019, to March 11th, 2020; and
2. pandemic group: children admitted to the pediatric ED from March 11th, 2020, to March 11th, 2021.
3. The overall pediatric emergency department admissions were calculated in both pandemic and pre-pandemic periods.

Statistical analysis

ED visits are expressed in absolute frequencies and percentage change between pandemic and pre-pandemic periods. Incidence rate ratios (IRR) were calculated using weekly ED access counts, modeled with a Poisson regression model. A COVID-19-related covariate assumed the value of 0 in the pre-pandemic year and the value of 1 in the same period of the pandemic year. Poisson regression model was also carried out using as offset all ED accesses per week in order to assess the change in pediatric somatic disorders adjusting by total ED accesses. All *p*-values were from 2-sided tests, and results were deemed statistically significant at $p < 0.05$. Data analysis was conducted using STATA version 13.1 (STATA Corp).

Fig. 1 Emergency department admissions in pre- and pandemic year



Results

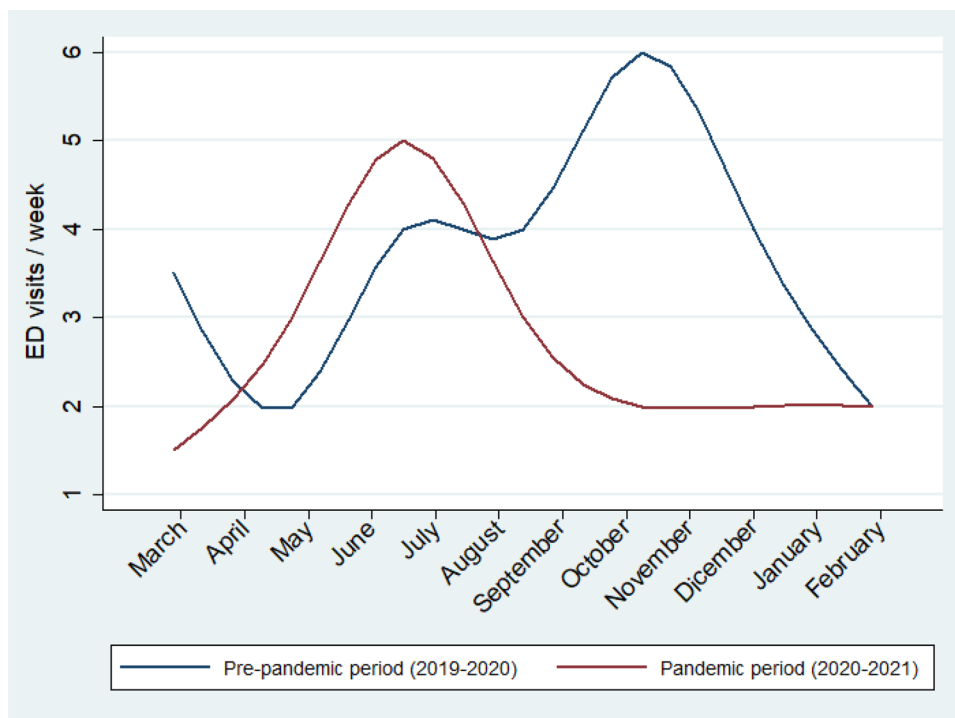
In this retrospective study, we identified a total of 95,744 admissions to our pediatric ED in the pre-pandemic year with respect to a total of 40,165 admissions in the pandemic year (Fig. 1). Concerning the admission for somatic

symptom disorders, we collected 205 children in the pre-pandemic group (0.21%) and 160 (0.39%) in the pandemic group. In particular, evaluating the admission pattern during the year, we observed a relative decrease in the access for somatic symptom disorders in the first quarter of the pandemic year (IRR 0.78; CI 0,64–0,96) with respect to the

Table 1 Incidence rates for emergency department admissions for somatic symptoms in pre-pandemic (11th March 2019–10th March 2020) and pandemic period (11th March 2020–11th March 2021)

	1 Mar–30 Jun	1 Jul–30 Oct	1 Nov–28 Feb	Total
Overall				
Pre-pandemic	63	84	58	205
Pandemic	42	72	46	160
IRR (95% CI)	0,67 (0,45–0,99)	0,86 (0,63–1,18)	0,79 (0,54–1,17)	0,78 (0,64–0,96)
Age < 12 years				
Pre-pandemic	41	60	41	142
Pandemic	34	50	39	123
IRR (95% CI)	0,83 (0,53–1,31)	0,83 (0,57–1,21)	0,95 (0,61–1,47)	0,87 (0,68–1,10)
Age 12–14 years				
Pre-pandemic	22	24	17	63
Pandemic	8	22	7	37
IRR (95% CI)	0,36 (0,16–0,82)	0,92 (0,51–1,63)	0,41 (0,17–0,99)	0,59 (0,39–0,88)
Female				
Pre-pandemic	33	45	33	111
Pandemic	19	35	19	73
IRR (95% CI)	0,58 (0,33–1,01)	0,78 (0,50–1,21)	0,58 (0,33–1,01)	0,66 (0,49–0,88)
Male				
Pre-pandemic	30	39	25	94
Pandemic	23	37	27	87
IRR (95% CI)	0,77 (0,44–1,31)	0,95 (0,61–1,49)	1,08 (0,63–1,86)	0,93 (0,69–1,24)

Fig. 2 Emergency department admissions among children with somatic disorders in the pandemic year compared to the pre-pandemic year



pre-pandemic year, while there were no differences for the rest of the study periods (Table 1; Fig. 2). Nevertheless, when we analyzed the ratio between the number of children admitted to the ED for somatic symptom disorders of both groups related to the total number of admission in ED in pandemic and pre-pandemic years, we found an incident rate ratio (IRR) of 1.86 (CI 1.51–2.29) in the pandemic group with respect to the pre-pandemic group ($p < 0.05$). The median age was 10.2 (4.2–13.11) years in the pre-pandemic group and 9.9 (4.10–13.9) years in the pandemic group ($p = 0.29$). In the pre-pandemic group, 54% of children were female with respect to the 45% in the pandemic group ($p = 0.66$). Considering the accesses for age, we observed

a relative decrease in the admissions for somatic symptom disorders over 12 years old between the pandemic and pre-pandemic groups (IRR 0.59, CI 0.39–0.88), while no differences were found for the other age groups (IRR 0.87; CI 0.68–1.10). Related to gender, females had a lower number of accesses for somatic symptom disorders to the ED in the pandemic group with respect to the pre-pandemic group (IRR 0.66, CI 0.49–0.88; $p < 0.05$).

When we adjusted the frequencies of somatic symptom disorders for the total number of access, we found a significant difference between pandemic and pre-pandemic groups for chest pain (IRR: 4.17, $p < 0.05$), breathing difficulties (IRR: 3.46; $p < 0.05$), anxiety (IRR: 2.12, $p < 0.05$),

Table 2 Type of somatic symptoms complained during the pandemic and pre-pandemic period

	Pre-pandemic year	Post-pandemic year	IRR (IC95%)	P value	IRR based on the total	P value based on the total
Total accesses	95,743	40,165				
Number of accesses for somatic symptom disorders	205	160	0,78 (0,64–0,96)	<0,05	1,86 (1,51–2,29)	<0,05
Dizziness	9	3	0,33 (0,09–1,23)	0,10	0,79 (0,22–2,94)	0,73
Abdominal pain	30	15	0,50 (0,27–0,93)	<0,05	1,19 (0,64–2,22)	0,78
Headache	11	8	0,73 (0,29–1,81)	0,50	1,73 (0,70–4,31)	0,24
Nausea	2	2	1,00 (0,14–7,12)	1	2,38 (0,34–16,92)	0,39
General discomfort	67	45	0,67 (0,46–0,98)	<0,05	1,60 (1,10–2,34)	<0,05
Breathing difficulties	31	45	1,46 (0,92–2,30)	0,11	3,46 (2,19–5,47)	<0,05
Chest pain	8	14	1,75 (0,74–4,18)	0,20	4,17 (1,75–9,94)	<0,05

Table 3 Differences of presentation of somatic symptoms divided into three subgroups according to DSM V into pre-pandemic and post-pandemic years, respectively

	Pre-pandemic year	Pandemic year	Variation (%)	Results adjusted for total pediatric ED accesses
Pain symptoms group	49	37	– 24	IRR 1.80 (1.17–2.76), $P < 0.01$
Gastrointestinal symptoms group	16	22	38	IRR 3.28 (1.72–6.24), $P < 0.01$
Pseudo-neurological group	170	130	– 24	IRR 1.82 (1.45–2.29), $P < 0.01$

general discomfort (IRR: 1.60; $p < 0.05$), anorexia (IRR: 3.34; $p < 0.05$), dysphagia (IRR: 2.68; $p < 0.5$), and tachycardia (IRR 2.19; $p < 0.05$). No differences between the two studied groups were found in constipation, abdominal pain, paraesthesia, dizziness, fainting/pre-syncope, asthenia, headache, nausea, and vomiting (Table 2). When classifying the somatic symptom disorders in the 3 subtypes (pain, gastrointestinal, and pseudo-neurological symptoms) and adjusting the data for the total number of accesses at the ED, we found that gastrointestinal symptom's presentation was more frequent in the pandemic group with respect to the pre-pandemic group (IRR 3.28) (Table 3). We observed that 14/205 (6.8%) children with somatic symptom disorders had repeated admissions compared to 13/160 (8%) in the pandemic period ($p < 0.2$).

A total of 15.6% of patients required neuropsychiatric consultation in ED in the pandemic group with respect to 9.7% in the pre-pandemic group (IRR: 2.98, $p < 0.05$).

Discussion

In this retrospective study, we demonstrated a relative increase in the admissions rate for somatic symptom disorders in the pandemic year with respect to the previous year. We observed these findings despite the massive decrease in pediatric admissions due to the COVID-19 pandemic in agreement with the data reported by other Italian centers [14], especially in the first 8 weeks of the COVID-19-induced social lockdown [15].

As well-renowned COVID-19 pandemic forced a reorganization of the ED, imposing a filter to accesses, which has reduced all admissions to the emergency rooms other than for COVID-19 infection. Moreover, this decreasing in ED admissions could be explained by the fear of possible infection by the COVID-19 virus, which was new at the time, which led families to avoid the clinic as much as possible at the beginning of the pandemic.

Hartnett et al. have already reported that the mean weekly number of ED visits for children < 14 years old reduced by approximately 70% during March 29–April 25, 2020, with respect to the corresponding period in 2019, for asthma, otitis, sprain, and strain-related injuries, while it increased

of 69% for psychosocial factors [16]. Moreover, Leeb et al. found that compared with 2019, the proportion of mental-health-related visits in ED for children aged 5–11 years old and 12–17 years old increased by approximately 24% and 31%, respectively [17]. In particular, analyzing the admission pattern for somatic symptom disorders during the pandemic and pre-pandemic year, we found that the admission rates were significantly lower in the first quarter of the pandemic period with respect to the corresponding period of the pre-pandemic year and similar in the rest of the year. Our results are consistent with other Italian data [15, 18, 19], where during the first two months of COVID-19 lockdown, no significant changes were found in hospitalization rate or in the prevalence distribution of the primary reason for the psychiatric ED visit [15], while a significant increase was recorded in the following months [18, 19]. This trend was partly due to a return to social life after months of isolation and, on the other hand, to the onset of neuropsychological issues that led parents conducting their children to pediatric ED.

Although children demonstrated to have milder clinical manifestations when infected by SARS-COV2 with respect to adults [20], they certainly experienced considerable discomfort. As a matter of fact, during the pandemic year, a spread of psychological problems in children with an increased prevalence of symptoms like anxiety, fearness, and breathing difficulties have been reported [21–25]. Singh et al., in a recent review on the impact of COVID-19 on the mental health of children, showed high levels of stress, insomnia, poor appetite, and inattentiveness [26]. Xie et al., moreover, found that 22.6% and 18.9% of children and pre-adolescents in Hubei reported symptoms of depression and anxiety independently of demographic characteristics [27]. Children presented to our ED complained, in particular, chest pain, breathing difficulties, anxiety, insomnia, fearness, anorexia, dysphagia, and tachycardia with a significant difference with respect to the pre-pandemic year, while we did not find any differences for other somatic disorders. It is well known that somatic symptom disorders are very common in the general pediatric population with major presentation symptoms such as abdominal pain, headache, and seizures [28]. Considering the somatic symptom disorders' subtypes, we found a major presentation of gastrointestinal

symptoms during the COVID-19 pandemic with respect to the other pattern presentations. This finding is in contrast with Solmi et al., who reported a higher prevalence of pain and pseudo-neurological subtypes. Further studies, however, are needed to understand if the general changing in routine, habits, and lifestyle due to the COVID-19 pandemic led to an overspread of the gastrointestinal somatic symptom disorders' pattern. The reason for this significant increase is still not completely understood. At the beginning of the pandemic, Sama et al. [29] conducted a systematic review of 3166 published articles on previous quarantine for SARS (11 studies), Ebola (five), the 2009 and 2010 H1N1 influenza pandemic (three), Middle East respiratory syndrome (two), and equine influenza (one) showing that lockdown may have negative psychological effect causing anxiety, anger, sleep disorder, depression, and post-traumatic stress disorder (PTSD) in the general population. Previously, Loades et al. [30] also described the negative effects of quarantine during the outbreak of H1N1 in 2009, showing a four times higher PTSD score among the children who lived under lockdown than those who did not. However, the level of psychological impacts of lockdown is related to various factors such as lifestyle, society, and culture [31, 32]. Certainly, children had to change their daily routines, suffering a lack of social interactions with the closure of schools and kindergartens. They also had to challenge new fears, potentially with a lot of unanswered questions like the possibility of losing or being separated from their parents. Changing behavior during the pandemic as the reduction in outdoor physical activity, diets' modifications, and increasing in time spending in front of screens may have contributed to the spreading of somatic disorders in children. Moreover, the number of children exposed to direct or indirect domestic violence and abuses seems to be increased [33–35]. In most studies, girls reported higher levels of worry, concern, and fear regarding COVID-19 [27, 35–37] compared with boys. Two different studies observed that girls exhibited equivalent changes in depressive symptoms related to the COVID-19 pandemic compared with boys [19, 39]. Differently, in our population, we did not find any difference with regard to gender, but evaluating the rate of somatic disorders admissions in ED for gender, we found that males had more admissions with respect to females under 12 years of age. This data was in line with Uccella et al. who demonstrated, in a recent survey on the behavioral changes related to COVID-19, that adolescents seemed less affected by behavioral problems than younger children [19].

The elevated number of admissions for somatic symptom disorders led to an increase in neuropsychiatric consultations with the need to improve the mental health assistance in our ED.

We acknowledge that our results have to be interpreted with caution, taking into account our study limitations. First,

our data are restricted to ED visits and, as such, may not be generalizable to the overall population outside and do not fully capture the incidence of somatic symptom disorders among children who did not present to a tertiary pediatric ED. Second, being a retrospective study, it is possible that some somatic disorders may have been lost. Third, in our study, we did not investigate the impact of COVID-19 infections on the children included in the analysis, which may have specifically contributed to some of the reported symptoms.

In conclusion, in our population, we observed an increased rate of somatic symptom disorders admissions in ED during the pandemic with respect to the corresponding previous year, highlighting the great impact of the COVID-19 infection also on pediatric behavior. The consequences of these phenomena on the pediatric population are unknown and undetectable, and further studies will be needed to monitor them and the correlation to the onset of new psychiatric disorders in the involved children.

Author contribution Rossella Turco, Marina Russo, and Vincenzo Tipò contributed to the study's conception and design. Material preparation, data collection, and analysis were performed by Alberto M Corona, Selvaggia Lenta, Andrea Apicella, Thaililjia Gagliardo, and Floriana De Fazio. The first draft of the manuscript was written by Rossella Turco, Marina Russo, Pia Bernardo, and Fabio Savoia, and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Declarations

Ethics approval and consent to participate This is an observational study. The Santobono-Pausilipon Research Ethics Committee has confirmed that no ethical approval is required.

Consent to participate Not applicable.

Consent for publication Not applicable.

Competing interests The authors declare no competing interests.

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