



RESEARCH ARTICLE

# The Impact of The Covid-19 Pandemic on Adolescent Neuropsychiatric Admissions for Anorexic Eating Disorders Throughout the 2013-2022 Decade

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## ABSTRACT

**Objective:** The purpose of this study is to evaluate the impact that Covid-19 pandemic and the related restrictive measures have had on minors diagnosed with eating disorders (EDs), in particular Anorexia nervosa (AN) and restrictive unspecified EDs, both on an epidemiological and on a clinical level.

**Methods:** We considered AN and restrictive unspecified EDs cases treated in the years 2013-2022 in Padua Hospital's Child Neuropsychiatry ward, the 97 patients were then divided into two groups, one dated before the pandemic's start and one dated after. We then analyzed the differences using data collected from medical records and from the Youth Self Report (YSR) tests performed.

**Results:** Our study confirms a large increase in the number of cases of AN and restrictive EDs during the pandemic/post-pandemic period, the clinical characteristics of these cases instead seem substantially unchanged compared to the pre-pandemic ones.

**Conclusions:** The pandemic has led to a large increase in the number of these EDs, underlining the need for attention to the topic and for new measures aimed at primary and secondary prevention.

**Keywords:** Covid-19, Anorexia Nervosa, Pandemic, Adolescents, Eating Disorders.

## Introduction

Anorexia nervosa (AN), among eating disorders (EDs) according to DSM-5, is characterized by a restriction of caloric intake that leads to a significantly low body weight, an intense fear of gaining weight or becoming fat, and disturbance in the way in which one's body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or denial of the seriousness of the current low body weight. AN is one of the most severe EDs, with a five times higher probability of death from any cause and an eighteen times higher probability of death from suicide than the general population<sup>1-2</sup>. EDs affect more than 10% of the female population of the Western world over the course of their lives, 2% of them just considering AN, with a male/female ratio of about 10:1. There's typically an adolescent onset, between 13 and 25 years old, with a peak between 15 and 17 years old. Comorbidities are common, the most frequent ones are other psychiatric pathologies (depression, anxiety and personality disorders, psychosis, etc.), endocrine pathologies, scratches and bruises (often due to self-injurious behaviours).

The Covid-19 pandemic has had a significant impact on mental health in the general population<sup>3</sup> and, according to scientific literature, also on epidemiology and characteristics of EDs, especially anorexia nervosa. Indeed, a common finding in recent studies is that there was a significant increase in the number of cases of EDs and in particular of restrictive EDs during the Covid-19 pandemic<sup>4-5-6-7-8-9</sup>. On the other hand, literature shows contradicting findings regarding possible modification of risk factors and clinical characteristics of EDs occurred during the pandemic: some studies show changes, such an increase in self-harming and in the use of social media,<sup>6,7,10</sup> others do not. An Israeli control case study<sup>10</sup> in patients already diagnosed with AN showed, during the pandemic, an increase in suicidal ideation, anxious symptoms, depression and post-traumatic stress disorder (PTSD) and an increase in the use of social media. Increased hospitalization for self-harming patients with AN during the pandemic period has also been shown in a multicentric French study<sup>7</sup>. Instead, a study on patients with EDs involving more specialized European units<sup>6</sup> found an increased use of electronic devices, social media and average time of hospitalization.

The role of social media also emerged in the study of Jarvers et al (2023),<sup>11</sup> where patients, both diagnosed with AN or in a control group, did not differ in their reports on increased social media consumption compared to the pre-pandemic period; patients with AN, however, reported suffering from loss of personal control and subsequent food restrictions in addition to more comparisons with others on social media. This study concludes that the pandemic period seems to have led, in patients with AN and other restrictive EDs, to a perceived loss of control, heightened alexithymia and anxiety symptoms, explaining a significant portion of variance in present depressive symptomatology, which in turn contributed to eating disorder symptomatology. A recent review<sup>4</sup> highlights an increase in ED symptoms, anxiety, depression, and changes to body mass index (BMI) in patients with EDs during the pandemic and suggests that individuals with EDs have experienced a deterioration in

their symptomatology due to decreased access to care and treatment, changes to routine and loss of structure, negative influence of the media, and social isolation. These patterns of change appeared to be related to the timing of lockdowns.

On the other hand, an Israeli retrospective monocentric study<sup>8</sup> found no variations in diagnostic and therapeutic characteristics of AN during the pandemic (in particular regarding BMI at the diagnosis and use of nasogastric tubes) despite the increased number of cases; furthermore, the authors highlighted that average time of hospitalization was reduced by 35% for patients with EDs.

A shorter median length of hospital stay during the pandemic emerged also in an Australian study<sup>12</sup> but this research highlight that the 28-day readmission rate was greater.

In accordance with these findings, a systematic review of Devoe and colleagues,<sup>4</sup> regarding the impact of the Covid-19 pandemic on EDs, observed that only 15% of the analysed studies found a change in BMI and weight at diagnosis during the pandemic period.

Focusing on clinical characteristic of EDs during the pandemic, an Italian study<sup>13</sup> found patients to have a higher rate of psychiatric comorbidities and to require more frequently psychotropic drugs, while also (from a medical point of view) having an increase of serum creatinine and/or a reduction of serum albumin. Nonetheless, no significant differences to the previous year were noted in terms of weight or BMI at admission, duration of weight or BMI loss in patients admitted during the pandemic; in this analysis the length of hospitalization was also found to be shorter compared to the pre-pandemic period: the multivariate analysis showed that a shorter hospitalization, a psychiatric comorbidity and an increased serum creatinine were significantly associated with admission for ED during the Covid-19 pandemic, even when adjusting for BMI and weight on admission, age and gender, thus confirming the association with these factors.

Finally an American retrospective study<sup>5</sup> that performed a chart review of patients aged 10 to 23 years admitted to a children's hospital for restrictive EDs from March 2017 through March 2021, showed that the total number of admissions during the first 12 months of the Covid-19 pandemic was more than double the mean number of admissions per year for the same time frame for the previous 3 years, and patient demographics were similar before and during the pandemic, with the exception that patients admitted during the Covid-19 pandemic were less likely than those admitted before the pandemic to have public insurance.

This research is intended to support recent literature on eating disorders during the Covid-19 pandemic, in order to expand scientific and clinical data on the pandemic impact on restrictive EDs. It aims at better understanding risk factors, psychopathological expression and clinical response to therapeutic approach in case of hospitalization, as these factors are known to be useful in

improving recognition and prompt intervention to the patients, and so affecting the prognosis of the disease.

## Purpose of the Study

The purpose of this study is to evaluate the impact that the Covid-19 pandemic and related infection containment measures had on minors with EDs, in particular on AN, from an epidemiological and clinical-assistential point of view.

## Methods

Our study considered patients admitted to the Child Neuropsychiatry Unit of the Padua University Hospital, regional hub centre of Northern Italy for treatment of neuropsychiatric pathologies of childhood. The paediatric department consists of 22 beds, 8 of them dedicated to youth with neuropsychic pathologies; it counts presence of medical, nursing and rehabilitation staff specialized in hospitalization, mostly through the Emergency Room, and in the following diagnostic and therapeutic path, characterized by a multidisciplinary approach to the patient and his family.

Alongside the clinical activity of the ward, there is also an outpatient activity, including a service dedicated to the management of children and adolescents with EDs. Both outpatient and inpatient activity involves close contact and connection with residential and semi-residential facilities for long-term treatment of young patients with EDs, as a part of post-discharge therapeutic planning.

### POPULATION OF THE STUDY

In this study we considered patients diagnosed with AN or ED not otherwise specified (EDNOS), admitted to our unit from January 2013 to June 2022. To standardize the sample, we excluded the only male patient that was present in the cohort. The 97 selected patients were divided into two groups: one with patients hospitalized before the start of the pandemic by Covid-19 (control group) and one with patients hospitalized between March 2020 (which marked the beginning of the pandemic in Italy) and June 2022.

### STUDY PROCEDURES, TOOLS AND VARIABLES

Patient data were collected from medical and discharge records.

The variables studied were:

- year in which the hospitalization took place,
- age at the time of hospitalization,
- access mode (Emergency Department, transfer from another hospital/neuropsychiatric consult, outpatient examination, scheduled admission)
- habits and lifestyles (use/abuse of alcohol, use/abuse of substances, tobacco habit, use of electronic devices),
- psychiatric familiarity,
- type of EDs diagnosed,
- psychiatric comorbidities,
- indicators of clinical severity (BMI, use of gastric-nose tube)
- psychopathological severity indicators (Youth Self-Report internalizing scales, self-harm, suicidal ideation),
- psychopharmacological treatment,

- psychotherapeutic treatment,
- duration of hospitalization,
- post-discharge services.

As mentioned above, we considered data collected from the compilation of the standardized questionnaire Youth Self-Report 11-18 (YSR<sup>14</sup>; Italian version<sup>15-16</sup>). This is among the scales most often used in clinical settings and research for the assessment of juvenile behaviour. It yields two profiles: one regarding competences (activities, social functioning, and school performance), while the other concerns behavioural and emotional problems. These can be classified as “normal,” “borderline,” or “clinical” on eight syndromic scales, which are anxiety/depression, withdrawal, somatization, social problems, thought-related problems, attention problems, and aggressive and rule-breaking behaviour. Such scales can be grouped into three broad-band scales: internalizing problems, externalizing problems, and total problems. For this study we considered and analysed just the internalising scales (anxiety, depressive and PTS symptoms) of the questionnaire, which was compiled by patients during the hospitalization from 2017 onwards. Regarding the internal consistency of the instrument, Frigerio and colleagues<sup>15</sup> found Cronbach’s  $\alpha$  values ranging from 0.83 to 0.91. In the present study, Cronbach’s alpha coefficients for each scale ranged from 0.77 to 0.93.

### STATISTICAL ANALYSES

Data analysis was conducted using the Jamovi statistical software<sup>17</sup>. First, descriptive analyses were carried out to outline the characteristics of the sample. Then the statistical comparison of the variables was conducted, in case of continuous variables, with the Mann-Whitney U test and with the  $\chi^2$  test for categorical variables. Statistical significance was set at  $p < 0.05$ .

Starting from the scientific literature on the subject matter we investigated:

- Whether there has been an increase in the number of restrictive AN and EDs cases since the pandemic began.
- If, since the beginning of the pandemic, there has been an increase in psychopathological severity indicators (self-harm and suicidal ideation, YSR anxious, depressive and PTSD symptoms).
- If there has been an increase in the use of devices and social media in patients with EDs within the pandemic.
- Whether there has been an increase in access of patients via the ER, an increase in the average hospitalization time and an increase in use of the nasogastric tube according to any changes in BMI at the time of diagnosis, compared both to the period before the pandemic and to any evidence of greater psychopathological severity.

## Results

### SOCIODEMOGRAPHIC AND CLINICAL CHARACTERISTICS OF THE SAMPLE

#### *Age, habits and lifestyles, access modality, psychopathological familiarity, diagnosis and psychiatric comorbidity*

Since the pandemic started, there has been a significant increase in the number of cases of AN and EDs, with 68

admissions during the pandemic period (of which 53 were first accesses) compared to 29 admissions during the pre-pandemic period (of which 25 were first accesses). This increase in number of cases is further confirmed by percentages of annual admissions: indeed 70% of our overall accesses for EDs took place during the period March 2020-June,2022.

Mean age of our sample at the time of hospitalization was 14.6 years, with a minimum of 10 and a maximum of 18 year; statistical difference was found regarding age at time of hospitalization between the two periods ( $p=0.044$ ), and in particular age increased during the pandemic period (average 14.8 years). (table 1).

**Table 1. Age at the time of hospitalization**

Period	N	Mean	Median	SD
Pre-pandemic	29	14.1	14.0	1.63
Post-pandemic	68	14.8	15.0	1.58

Evaluating modality access to hospitalization, we considered separately emergency access (from the emergency room or transfers from pediatric emergency department) and non-emergency access (from outpatient examination or scheduled admissions); in both periods

accesses in emergency were more frequent, with no statistically significant differences between the two periods ( $\chi^2=0.265$ , df 1,  $p=0.607$ ). (table 2).

**Table 2. Access via the Emergency Room**

Period	No	Yes	Total
Pre-pandemic	12 (41%)	17 (59%)	29
Post-pandemic	32 (47%)	36 (53%)	68
Total	44 (45%)	53 (55%)	97

Regarding habits and lifestyles: use of alcohol, substances or tobacco was absent in most cases (respectively 96.9%, 100% and 95.8%). Also, no statistical differences were observed regarding the frequency of use of technology and social devices between pre-pandemic and pandemic period ( $\chi^2=0.169$  df 1  $p=0.681$ ): in particular, during the pre-pandemic period use of technological devices for less and more than 4 h/day was respectively 15.6% and 9.4%, while during the pandemic period was respectively 40.6% and 34.4%.

statistical significance at the  $\chi^2$  test ( $\chi^2=2.56$  df 1  $p=0.110$ ).

**Anxiety, depressive and PTSD symptoms**

Analyzing data collected from the YSR 11-18 questionnaires, focusing on psychopathological areas of internalization, we found no statistically significant differences ( $p=0.334$ ,  $p=0.427$ ,  $p=0.727$ ) between the pre-pandemic period and the pandemic/post-pandemic period.

**Self-harm and suicidal ideation**

Regarding self-harm and suicidal ideation, we found no statistically significant variations in the number of cases of self-harm ( $\chi^2=1.12$  df 1  $p=0.290$ ), nor in the frequency of self-injurious actions ( $\chi^2=0.0144$  df 1  $p=0.905$ ) and in the presence of suicidal ideation ( $\chi^2=0.245$  df 1  $p=0.621$ ) between the two samples considered.

**Psychopharmacological and psychotherapeutic treatment**

Considering both periods together, on the topic of treatment underwent during hospitalization, 86.6% of patients were treated with psychopharmacological therapy and in 68.8% of cases a psychotherapy was also started.

Focusing on psychopharmacotherapy, in 63.1% of cases a polytherapy was prescribed with various drug combinations: Neuroleptics + Antidepressants (26.2% of cases) and Neuroleptics + Benzodiazepines + Antidepressants (15.5%). Antidepressants were mostly SSRIs, used in monotherapy in 16.7% of cases, (table 3).

Considering both periods united, 65.6% of patients had a family history of psychiatric pathology.

In terms of diagnosis, 52.6% of patients had diagnostic criteria for Anorexia nervosa -according to DSM-5, while 47.4% were discharged with a diagnosis of Eating Disorder Not Otherwise Specified (EDNOS). 74.2% of the subjects had psychiatric comorbidities, of which 50% depressive mood disorder and anxiety disorder, and 24% behavioural or personality disorders.

**INDICATORS OF CLINICAL AND PSYCHOPATHOLOGICAL SEVERITY**

**Body mass index and use of gastric-nose tube**

Body mass index (BMI) measured at access did not show statistically significant differences between the two groups, as evidenced by the Mann-Whitney U-test ( $p=0.789$ ).

Regarding the use of nasogastric tube -which is necessary to allow the feeding of patients in case of reluctance at increasing nutritional intake – our data show an increasing number of patients who needed to use it during the pandemic period, even without any significant



**Table 3. Drug therapies**

Drug therapies	Counts	% of Total	Cumulative %
Neuroleptics (NL)	9	10.7 %	10.7 %
NL+ Antidepressants+ Benzodiazepines (BDZ)+ Mood Stabilisers	2	2.4 %	13.1 %
Mood Stabilizers	1	1.2 %	14.3 %
Antidepressants	14	16.7 %	31.0 %
BDZ	7	8.3 %	39.3 %
BDZ+ NL	6	7.1 %	46.4 %
NL+ BDZ+ Mood Stabilizers	1	1.2 %	47.6 %
NL+ Antidepressants	22	26.2 %	73.8 %
NL+ BDZ+ Antidepressants	13	15.5 %	89.3 %
BDZ+ Antidepressants	6	7.1 %	96.4 %
NL+ Antidepressants+ Mood Stabilizers	3	3.6 %	100.0 %

**HOSPITALIZATION LENGTH AND POST-DISCHARGE PROJECTS**

Focusing on the duration of hospitalization (calculated in days), there was a statistically significant change ( $p=0.007$ ) with a reduction in hospitalization length during the pandemic (mean = 31.8 days). (table 4).

Pertaining to post-discharge projects, patients were mostly redirected to district outpatient services or day-care services provided by the regional EDs centre. Some cases were also redirected to residential services specialized in EDs. (table 5).

**Table 4. Hospitalization length**

Period	N	Mean (days)	Median
Pre-pandemic	29	44.5	45.0
Post-pandemic	68	31.8	27.0

**Table 5. Post-discharge projects**

Post-discharge projects	Pre/Post Pandemic	Counts	% of Total	Cumulative %
District outpatient services	Pre-pandemic	10	10.3 %	10.3 %
	Post-pandemic	26	26.8 %	37.1 %
Semi-residential structures or day-care centres	Pre-pandemic	1	1.0 %	38.1 %
	Post-pandemic	0	0.0 %	38.1 %
Residential multiprofessional structures	Pre-pandemic	1	1.0 %	39.2 %
	Post-pandemic	2	2.1 %	41.2 %
Private outpatient services	Pre-pandemic	4	4.1 %	45.4 %
	Post-pandemic	1	1.0 %	46.4 %
Specialized eating disorder residential facilities	Pre-pandemic	11	11.3 %	57.7 %
	Post-pandemic	23	23.7 %	81.4 %
Other	Pre-pandemic	2	2.0 %	83.5 %
	Post-pandemic	16	16.5 %	100.0 %

**Discussion**

Regarding the number of cases, we found a significant increase in the number of patients admitted with EDs, with number of annual cases increased by about five and a half times during the pandemic period. This was a common finding in national and international literature<sup>4-5-6-7-8-9</sup> showing how EDs patients appeared to be among the most vulnerable ones during the pandemic in terms of recurrence of symptoms<sup>18</sup> and negative implications caused by many of the restrictive measures taken by the government: for example distance education, implying use of webcams, focused youth's attention on their physical figure while removing comparison with peers or with adults outside their family; the same thing can be said about the overall use of social-media and other technologies, in fact social media use, and increase in social media consumption,<sup>10</sup> has been associated with

increased eating disorder risk in particular when time was spent on appearance-related behaviours<sup>19</sup>.

Despite that, the use of electronic devices has not shown significant variations between the two periods stressing that, beyond the "covid-phenomenon", use of technologies and social media is a significant feature in subjects with EDs. Jarvers et al has not highlighted an increased social medial consumption in adolescents with AN, but patients report that they felt more influenced by social media and compared themselves more often with others; therefore, the authors hypothesize that comparing oneself to others on social media is a consequence of appearance-related behaviours, not vice versa<sup>11</sup>.

Indeed, regarding the relationship between EDs and the use of social media, scientific literature documents a high use of social media among children and adolescents with

eating disorders, pointing out that individuals with a perceived negative effect of technologies on their self-esteem may show greater interaction with specific content<sup>20-21</sup>. On one hand, longitudinal research, especially with adolescents, is needed to learn more about how media content is attended to, interpreted, and incorporated into the healthy development; on the other hand it must be considered that while the media may contribute to the development of weight concerns and body dissatisfaction, we should also consider the fact that media can be used as an important tool for health promotion and prevention strategies<sup>22</sup>.

Despite the scientific literature on EDs describes a continuous decline in the age of onset, in our sample we found a statistically significant increase in age of hospitalization during the pandemic period, which stands around 14.5 years. Of course, this represents a moment of increased physiological vulnerability in everyone's life, due to several changes that happen during adolescence: for instance, we think about the physical, social and environmental changes related to the transition from middle to high school that take place right at this age. The pandemic was a further stress factor, that was inevitably added to those already present, resulting in conditions of insecurity and increased risk of emotional, relational and behavioural imbalance, with a possible psychopathological expression.

The access mode to our unit remains substantially unchanged, while the average length of hospitalization was reduced during the pandemic period; this reduction, in agreement with other studies of the scientific literature,<sup>6-8</sup> could be linked both to the need for a more rapid turnover of hospitalized patients due to the large increase in the number of admissions, and to a faster clinical recovery linked to an early onset disease, which was found in most of the patients that we admitted during the pandemic period.

We found no significant differences between pre-pandemic and pandemic period regarding indicators of clinical and psychopathological severity (BMI, self-harm, suicidal ideation, anxiety, isolation, depressive, and post-traumatic stress symptoms). These results stress out that, although the increased prevalence of hospitalizations, the medical and psychopathological state at presentation was not worse, perhaps since parents could monitor their child's behaviours more closely during the pandemic.

Consistently, the use of nasogastric tube remained unchanged between pre Covid period and pandemic period, confirming the resemblance of the clinical evolution of the disease.

As already mentioned, scientific literature regarding the impact of the Covid-19 pandemic on EDs is still limited and remains heterogeneous in the results. Indeed, there are some studies that observed significant differences for some of the sociodemographic and clinical features<sup>6-23-10-24</sup> while others,<sup>4-5-8</sup> like this study, did not report any substantial differences in Eds with a pandemic onset. Comparing these articles, it must be taken into account the heterogeneity of the samples considered in the various studies, as well as the treatment setting: adolescence or adulthood, diagnosis of AN or EDNOS or EDs, new onset-disease or relapse, inpatient or outpatient or residential treatment, monocentric or multicentric studies.

## Conclusions

Summing up, we can conclude that during the pandemic period there was a significant increase in the number of restrictive AN and EDs cases. We did not find any substantial differences in the medical history and in the diagnostic-therapeutic approach, apart from the age at the time of admission and the shorter length of hospitalization.

The limits of this study are related to the small number of the sample, the incompleteness of some information (questionnaires were compiled only from 2017 onwards), the geographical limitation and the monocentric origin of patients.

Despite these limitations, our study contributes to the clinical-epidemiological research in the field of AN and restrictive EDs at the time of Covid-19 pandemic, highlighting an increasing psychiatric and paediatric problem, which requires specialized and multidisciplinary management. With that being sad, we stress that more resources and skills will need to be allocated to manage this increasing problem, keeping in mind that, except for the number of cases, it does not seem to be significant clinical or psychopathological differences in patients admitted in the pandemic period compared to those of the pre-pandemic times.

## Conflicts of Interest and Data Availability Statement

The authors have no conflicts of interest to declare. The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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