

Deliberate self-poisoning in a tertiary pediatric hospital

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Abstract

Introduction and objectives: Deliberate self-poisoning (DSP) is a frequent cause of admission at the emergency department during adolescence. Since the beginning of the COVID-19 pandemic, a higher number of cases was reported. This retrospective study aimed to determine DSP prevalence, between 2018 and 2022, as well as the medication used and the method for obtaining it, within the catchment area of a Tertiary Pediatric Hospital Emergency Department (ED) in Portugal. **Methods:** Retrospective study, including patients aged 10 to 17 that lived in the catchment area of the ED and were admitted for DSP less than 7 days prior. By searching with the keywords “DSP” and “deliberate self-poisoning,” 2975 records were found, of which 1403 cases were included. Statistical analysis was performed in SPSS with a significance level of 0.01. **Results:** Out of 1403 cases, 87.9% were female, mostly in mid-adolescence and with a previous follow-up appointment with a child and adolescent psychiatrist. The patient’s own psychotropic medication were the most used drugs. Episodes with no suicidal intention were more frequent. After the ED, most cases were discharged with a referral for psychiatric follow-up. There was a higher number of DSP in 2021 ($p < 0.01$), with a prevalence of 123.8/100,000. **Discussion:** DSP is growing among adolescents. Cases increased significantly in 2021. We highlight the need for prevention campaigns and vigilance systems to monitor and modify this trend.

Keywords: Deliberate self-poisoning. Deliberate self-harm. COVID-19. Adolescence. Mental health. Attempted suicide.

Ingestão medicamentosa voluntária num hospital pediátrico terciário

Resumo

Introdução e objetivos: Na adolescência, as ingestões medicamentosas voluntárias (IMV) constituem uma causa frequente de admissão na urgência e desde o início da pandemia COVID-19 verificou-se um aumento do número de casos. O estudo teve como objetivo determinar a prevalência de IMV na área abrangida por um Serviço de Urgência Pediátrica Polivalente, entre 2018-2022, bem como caracterizar os fármacos utilizados e o acesso aos mesmos. **Métodos:** Estudo retrospectivo, que incluiu doentes dos 10 até aos 17 anos e 364 dias, residentes na área abrangida, com admissão na urgência por ingestão medicamentosa voluntária há menos de 7 dias. Através de pesquisa de palavras-chave “IMV” e “ingestão medicamentosa voluntária” nos processos, foram encontrados 2975 episódios, dos quais 1403 foram incluídos. Foi realizada análise estatística no SPSS, com significância para $p < 0,01$. **Resultados:** Dos 1403 episódios de IMV, 87,9% eram do sexo feminino, com idade mediana de 15 anos, sendo mais frequente na adolescência média (15-17 anos + 364 dias) e com seguimento prévio em

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pedopsiquiatria. Os psicofármacos da medicação habitual foram os fármacos mais utilizados. O destino mais frequente foi alta para consulta. Houve um maior número de ingestões medicamentosas em 2021 ($p < 0,01$), com uma prevalência de 123,8/100,000. **Discussão:** As IMV são causa crescente e preocupante de vinda ao SU nos jovens, verificando-se um aumento do número de casos em 2021. Realça-se a necessidade de investimento nesta temática, para promoção de iniciativas de apoio, prevenção e seguimento destes jovens, para reverter esta realidade.

Palavras-chave: Ingestão medicamentosa voluntária. COVID-19. Adolescência. Saúde mental. Tentativa de suicídio.

Keypoints

What is known

- Deliberate self-poisoning in adolescence is a common cause of emergency department admissions.

What is added

- There was a notable increase of deliberate self-poisoning in adolescence reported in 2021.
- In most cases, adolescents ingested prescribed psychotropic medication, suggesting inadequate supervision in access to these drugs.

Introduction

Deliberate self-poisoning (DSP) has been defined by the World Health Organization as the deliberate ingestion of a medication beyond the prescribed dose or recognized therapeutic dosage¹.

In children and adolescents, attempted suicide may represent a plea for help, exposing emotional vulnerability and restlessness. The younger the child, the more complex it becomes to assess the intent behind their actions. Suicidal intent is characterized by the presence of thoughts and/or the desire to die or to inflict one's own death. A suicide attempt comprises any non-fatal, self-inflicted, and self-destructive act with a clear intent to die. Notably, DSP stands out as the most common method employed by adolescents who have been hospitalized due to suicide attempts²⁻⁵.

Adolescence is a period marked by change, transformation, and growth, when acquiring social and emotional skills for adult life is vital^{6,7}. While some adolescents experience discovery and happiness, others face significant distress, apprehension, and anxiety. DSP has become a frequent cause of admission to the emergency department (ED) in adolescence, with an apparent increase since the beginning of the COVID-19 pandemic⁸⁻¹².

In fact, children and adolescents' mental health was deeply affected by the COVID-19 pandemic. This is a critical time in their lives, especially considering that this is when half of the psychopathology begins to manifest¹³⁻¹⁴. Due to the closure of schools and extra-curricular activities, children became isolated for long periods of time, affecting their routine, which is crucial, especially for those who already had mental health problems¹³.

Thus, this study aimed to determine the number of DSP cases and their prevalence in a Pediatric and Child and Adolescent ED between 2018 and 2022. It also sought to characterize the medications used, the methods of obtaining said medication, and the destination after the ED visit.

Methods

The study followed a retrospective design, analyzing cases of DSP admitted to the ED of a Portuguese Tertiary Pediatric Hospital that includes a Child and Adolescent Psychiatry ED between January 2018 and December 2022.

The inclusion criteria were adolescents aged between 10 and 17 years old, a DSP episode less than seven days prior to admission, and residence in the catchment area of the ED. Cases that did not meet these criteria were excluded.

By searching for the keywords "DSP" and "deliberate self-poisoning" in the records, cases were found and then reviewed by a pediatrician and/or child and adolescent psychiatrist (CAP).

The following parameters were analyzed: age, gender, date of admission, season of the year, area of residence, psychiatric family history, previous episode of DSP, previous follow-up by CAP, medications used, acquisition method, suicidal intent, and destination after the ED.

Regarding the patient's age, cases were divided into early and mid-adolescence (11-14 years old and 15-17 years plus 364 days old, respectively).

In terms of the seasons, winter was considered as running from January to March, spring from April to

June, summer from July to September, and autumn from October to December.

The categories for medications used in DSP and the methods of acquisition were established based on the expert opinions of pediatricians and CAP.

The medications used in DSP were divided into seven categories: psychotropic medications, paracetamol, psychotropic medications and paracetamol, psychotropic medications and others (without paracetamol), psychotropic medications and others (including paracetamol); paracetamol and others (without psychotropic medications), medications not including psychotropic medications or paracetamol, and unknown. For the crosstabulation analysis, four categories were created, namely psychotropic medications, paracetamol, a combination of drugs, and unknown.

The acquisition methods were divided into six categories: patient's usual medication, third-party medication, medications acquired with the intention of DSP, patient's usual medication plus third-party medication, usual medication plus others acquired for the purpose of DSP, third-party medication plus others acquired for this purpose, and unknown. For the crosstabulation analysis, five categories were created, namely the patient's usual medication, third-party medication, medications acquired with the intention of DSP, multiple sources, and unknown.

Upon discharge, the following destinations were considered: discharge with or without referral to CAP; hospital admission, or admission to the Pediatric Intensive Care Unit (PICU).

Descriptive statistical analysis and statistical tests, namely Chi-squared tests, were performed using the Statistical Package for the Social Sciences (SPSS). The significance level (Sig) was set at 1%, with a confidence level of 99%.

Estimates of the resident population in the catchment area, aged between 10 and 17 years plus 364 days old, were used to calculate prevalence. The National Institute of Statistics estimated the resident population between 2018 and 2020, based on the 2011 Census, whereas 2021 and 2022 were based on the 2021 Census. Therefore, is not possible to directly compare the estimates of the 2021 and 2022 ad hoc resident population with the estimates of the resident population between 2011 and 2020.

Results

In total, 2975 episodes were identified. 1572 were excluded, 8 for not belonging to the ED catchment area

and 1564 for not corresponding to active DSP episodes. Overall, 1403 episodes were included.

Of these 1403 cases, 87.9% (with a confidence interval (CI) of 85.5%-90.0%, $n = 1233$) were female adolescents. The median age was 15 years old. Upon subgroup analysis for early and mid-adolescence, it was more frequent in mid-adolescence (64.6%, with a CI of 61.2%-67.8%, $n = 906$), as detailed in [table 1](#).

In terms of the area of residence, most children and adolescents who engaged in DSP lived in the Metropolitan Area of Lisbon (73.4%, CI of 70.3% - 76.4%, $n = 1030$), followed by the Algarve (9.8%, CI of 7.8% - 12.0%, $n = 137$). The prevalence of DSP per 100,000 children, per year, per geographical area can be found in [table 2](#). In 2018, the highest prevalence was in Alentejo Central (81.5 per 100,000), while in 2019 and 2022, it was in the Metropolitan Area of Lisbon (73.4 per 100,000 and 92.9 per 100,000, respectively). In 2020, it was more frequent in the Algarve (85.1 per 100,000), and finally in 2021, in Alto Alentejo (188.7 per 100,000).

Analyzing [table 3](#), which shows the case frequency per year, 16.1% of cases occurred in 2018 ($n = 226$), 16.9% in 2019 ($n = 237$), 13.5% in 2020 ($n = 189$), 33.1% in 2021 ($n = 464$), and 20.5% in 2022 ($n = 287$). This difference was found to be statistically significant, indicating an increase in the number of cases in 2021 ($p < 0.01$).

Regarding the prevalence of DSP per 100,000 children aged between 11 and 17 years plus 364 days old from 2018 to 2022, the lowest identified prevalence was in 2020 at 46.3 per 100,000 children, when compared to 2018 and 2019. The prevalence registered in 2021 was 123.8 per 100,000 children, and in 2022, it was 72.0 per 100,000 children.

Considering the season of the year, DSP was more common in autumn (29.8%, CI of 26.7%-33.0%, $n = 418$), followed by winter (26.2%, CI of 23.2%-29.3%, $n = 367$), spring (25.8%, CI of 22.8% -28.9%, $n = 362$), and finally summer (18.2%, CI of 15.7%-21.0%, $n = 256$).

In 50.6% (CI of 47.1%-54.1%, $n = 710$) of the episodes, no previous history of DSP was found, so these were categorized as first episodes. These were more frequent than cases with a prior history of DSP (36.3%, CI of 33.0%-39.7%, $n = 509$). In 13.1% (CI of 10.9%-15.6%, $n = 184$) of cases, it was not possible determine whether there were any previous episodes via electronic medical records.

Regarding prior CAP follow-up, most cases were already under follow-up (64.7%, CI of 61.4%-68.0%, $n = 908$), while 34.8% (CI of 31.5%- 38.1%, $n = 488$) had no history of follow-up, and in 0.5% (CI of 0.1%-1.2%,

Table 1. Demographic characterization of the sample

Demographic characteristics		Frequency (%)		Confidence interval
Gender	Female	1233 (87.9%)		[85.5%-90.0%]
	Male	170 (12.1%)		[10.0%-14.5%]
Age	10	0 (0.0%)		
	Early adolescence		497 (35.4%)	[32.2%-38.8%]
	11	15 (1.1%)		
	12	47 (3.3%)		
	13	141 (10.0%)		
	14	294 (21.0%)		
	Mid-adolescence		906 (64.6%)	[61.2%-67.8%]
	15	338 (24.1%)		
	16	313 (22.3%)		
	17	255 (18.2%)		
Area of residence	Oeste	74 (5.3%)		[3.9%-7.0%]
	Médio Tejo	21 (1.5%)		[0.8%-2.5%]
	Metropolitan Area of Lisbon	1030 (73.4%)		[70.3%-76.4%]
	Lezíria do Tejo	66 (4.7%)		[3.4%-6.4%]
	Alto Alentejo	23 (1.6%)		[0.9%-2.7%]
	Alentejo Litoral	11 (0.8%)		[0.3%-1.6%]
	Alentejo Central	26 (1.9%)		[1.1%-3.0%]
	Baixo Alentejo	13 (0.9%)		[0.4%-1.8%]
	Algarve	137 (9.8%)		[7.8%-12.0%]
	Açores	2 (0.1%)		[0.07%-0.7%]

n = 7) it was unknown (Table 4). When specifically analyzing first DSP episodes, 50.7% (n = 360 of 710 first episodes) were already being followed by a CAP.

Concerning the family history of psychiatric disease, it was present in approximately 63.8% of cases (CI of 60.4%-67.1%, n = 895). In 16.7% of cases (CI of 14.2%-19.4%, n = 234), it was unknown whether there was a family background of psychiatric disease, as detailed in table 4.

Analyzing table 5, in terms of medications used for DSP, the exclusive use of psychotropic medication was significantly most prevalent (53.0%, CI of 49.5%- 56.4%, n = 743). In 8.0% (CI of 6.2%-10.0%, n = 112) of cases, psychotropic medications were taken with other medications, excluding paracetamol. Additionally, in 4.3% (CI of 3.0%-5.9%, n = 60) of cases, they were taken with other medications, including paracetamol, and in 1.9% (CI of 1.1%-3.1%, n = 27) of cases, they were taken exclusively with paracetamol. The exclusive use of paracetamol occurred in 7.3% (CI of 5.6%-9.2%, n = 102) of cases and was associated with other medications, excluding psychotropic drugs, in 6.3% (CI of 4.7%-8.1%, n = 88) of cases. In 13.6% (CI of 11.3%-16.1%, n = 191) of cases, medications other than paracetamol and psychotropic drugs were used. However, in 5.7% (CI of 4.2%-7.5%, n = 80) of cases, it was not possible to identify the medication used.

As regards the method of obtaining the medication, it was part of the child's usual medication in 43.3% of cases (CI of 39.8%-46.7%, n = 607) and in 20.8% (CI of 18.1%-23.7%, n = 292) it was part of a third-party's medication. It was acquired intentionally for DSP in 3.5% of cases (CI of 2.4%-7.5%, n = 49). The acquisition method was unknown in 25.4% of cases (CI of 22.4%-28.5%, n = 356).

The crosstabulation analysis of the ingested medication and the method of acquisition reveals that psychotropic medication included in the patient's usual medication was the most frequently used (37.5%, n = 526, p < 0.01). The method of acquisition could not be determined in most cases of DSP using paracetamol alone.

Concerning suicidal intent (Table 4), during observation, this was not identified in 66.6% of cases (CI of 63.2%-69.8%, n = 934) although it was present in 31.6% (CI of 28.4%-34.9%, n = 443) of cases, and was unknown in 1.8% (CI of 0.11%-0.3%, n = 26) of cases. Focusing on episodes with suicidal intent (Table 6), crosstabulation analysis was conducted, which concluded that there was no statistically significant difference between genders or between the presence/absence of a family history of psychiatric disease. Of the 443 cases with suicidal intent, 195 had a previous history of DSP and 311 had had prior follow-up in psychiatric appointments. Crosstabulation of suicide intent and DSP showed that episodes in which both suicide

Table 2. Prevalence per 100,000 children, categorized by geographical area and year

	2018	2019	2020	2021	2022
Oeste	40.4	47.6	23.8	82.7	57.5
Médio tejo	11.5	35.3	5.9	54.9	18.3
Metropolitan Area of Lisbon	71.5	73.4	50.6	135.9	92.9
Alentejo Litoral	0.0	0.0	46.0	105.0	14.6
Baixo Alentejo	11.5	11.5	57.9	59.0	11.7
Lezíria do Tejo	46.5	57.7	53.2	133.4	57.9
Alto Alentejo	54.9	27.8	14.1	188.7	26.9
Alentejo Central	81.5	0.0	27.9	109.0	18.0
Algarve	40.3	58.8	85.1	117.7	67.5
Açores	0.0	0.0	0.0	4.7	4.7

Table 3. Frequency and prevalence of deliberate self-poisoning episodes per 100,000 children in the ED catchment area, between 2018 and 2022

Year	DSP frequency (%)	Prevalence per 100,000 children	p-value
2018	226 (16.1%)	56.1	p < 0.01
2019	237 (16.9%)	58.6	
2020	189 (13.5%)	46.3	
2021	464 (33.1%)	123.8	
2022	287 (20.5%)	72.0	

ED: emergency department.

intent and previous DSP were absent were the most frequent (41.5%, n = 499, p < 0.01). Finally, crosstabulation of suicide intent and previous psychiatric follow-up demonstrated that episodes without suicide intent in patients with previous CAP follow-up were the most common (42.4%, n = 581, p < 0.01).

In regard to the destination after the ED, the most prevalent was discharge with referral for CAP follow-up (77.3%, CI of 74.3%-80.1%, n = 1084), followed by hospital admission (17.7%, CI of 15.2%-20.5%, n = 249), discharge with no referral (4.9%, CI of 3.6%-6.6%, n = 69), and lastly, admission to PICU (0.1%, CI of 0.0%-0.5%, n = 1).

Discussion

In recent years, the prevalence of DSP has been increasing, and is the most frequent method of attempted suicide in adolescence^{12,15}.

Table 4. Characterization of episodes according to personal history (previous DSP or follow-up in child and adolescent psychiatry), family history of psychiatric disease, and suicidal intent

Personal history	Frequency (%)	Confidence interval
Previous DSP		
Present	509 (36.3%)	[33.0%-39.7%]
Absent	710 (50.6%)	[47.1%-54.1%]
Unknown	184 (13.1%)	[10.9%-15.6%]
Previous follow-up in child and adolescent psychiatry		
Present	908 (64.7%)	[61.4%-68.0%]
Absent	488 (34.8%)	[31.5%-38.1%]
Unknown	7 (0.5%)	[0.1%-1.2%]
Family history of psychiatric disease	Frequency (%)	Confidence interval
Present	895 (63.8%)	[60.4%-67.1%]
Absent	274 (19.5%)	[16.9%-22.4%]
Unknown	234 (16.7%)	[14.2%-19.4%]
Suicidal intent	Frequency (%)	Confidence interval
Present	443 (21.8%)	[28.4%-34.9%]
Absent	934 (66.6%)	[63.2%-69.8%]
Unknown	26 (1.8%)	[0.11%-0.3%]

DSP: deliberate self-poisoning.

In a retrospective Australian study, the frequency of intentional poisoning showed an annual rise of 8.39% between 2006 and 2016, resulting in a total increase of 98% during this period⁷. However, a German longitudinal study revealed an increase in PICU admissions after suicide attempts among adolescents during the second lockdown in 2021, following an initial decline during the first lockdown in 2020⁹. Similar results were observed in our study, which showed a statistically significant increase in 2021 following a decrease in 2020, compared to previous years. In 2022, we observed a reduction of cases compared to 2021, although the frequency remained higher than in the preceding years (2018-2020).

There was a lower prevalence in 2020, compared to 2018 and 2019. In 2021, the prevalence was higher, however, it is not possible to accurately conclude that this represents an increase, since the resident population between 2018 and 2020 was estimated from the 2011 Census, while 2021-2022 data came from the provisional results of the 2021 Census, making it not comparable. This constitutes a significant limitation.

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Table 5. Medication used and respective acquisition method

Medication acquisition method (total % of episodes; CI)							
UM	3 rd PM	Acquired medication	UM + 3 rd PM	UM + acquired	3 rd PM + acquired	Unknown	Total
607 (43.3%, CI [39.8%-46.7%])	292 (20.8%, CI [18.1%- 23.7%])	49 (3.5%, CI [2.4%-5.0%])	80 (5.7%, CI [4.2%-7.5%])	16 (1.1%, CI [0.5%-2.1%])	3 (0.2%, CI [0.0%-0.1%])	356 (25.4%, CI [22.4%-28.5%])	1403 (100.0%)
Medication used (total % of episodes; CI)							
Psychotropic medication	Paracetamol	Paracetamol and psychotropic medication	Psychotropic and others (without paracetamol)	Paracetamol and others (including psychotropic)	Paracetamol and others (without psychotropic)	Others (without psychotropic or paracetamol)	Total
743 (53.0%, CI [49.5%-56.4%])	102 (7.3%, CI [5.6%-9.2%])	27 (1.9%, CI [1.1%-3.1%])	112 (8.0%, CI [6.2%-10.0%])	60 (4.3%, CI [3.0%-5.9%])	191 (13.6%, CI [11.3%-16.1%])	88 (6.3%, CI [4.7%-8.1%])	1403 (100.0%)
Medication used vs. respective acquisition method							
	UM	3 rd PM	Acquired medication	Several sources	Unknown	Total	p-value
Psychotropic medication	526 (37.5%)	121 (8.6%)	12 (0.9%)	25 (1.8%)	59 (4.2%)	743 (53.0%)	
Paracetamol	4 (0.3%)	27 (1.9%)	17 (1.2%)	1 (0.1%)	53 (3.8%)	102 (7.3%)	
Combinations of drugs	75 (5.3%)	139 (9.9%)	17 (1.2%)	70 (5.0%)	177 (12.6%)	478 (34.1%)	
Unknown	2 (0.1%)	5 (0.4%)	3 (0.2%)	3 (0.2%)	67 (4.8%)	80 (5.7%)	
Total	607 (43.3%)	292 (20.8%)	49 (3.5%)	99 (7.1%)	356 (25.4%)	1403 (100.0%)	
P-value							p < 0.01

UM: usual medication; 3rd PM: third-party medication.

Table 6. Crosstabulation of suicidal intent with gender, family history of psychiatric disease, previous DSP, and previous follow-up by child and adolescent psychiatry

	Suicidal intent		p-value
	Present	Absent	
Gender			p 0.22
Female	382 (27.7%)	827 (60.1%)	
Male	61 (4.4%)	107 (7.8%)	
	Suicidal intent		p-value
	Present	Absent	
Family history of psychiatric disease			p 0.57
Present	287 (24.9%)	596 (51.8%)	
Absent	92 (8.0%)	176 (15.3%)	
	Suicidal intent		p-value
	Present	Absent	
Previous DSP			p < 0.01
Present	195 (16.2%)	305 (25.4%)	
Absent	204 (17.0%)	499 (41.5%)	
	Suicidal intent		p-value
	Present	Absent	
Previous psychiatry follow-up			p < 0.01
Present	311 (22.7%)	581 (42.4%)	
Absent	130 (9.5%)	349 (25.5%)	

DSP: deliberate self-poisoning.

previous pandemics concluded that they cause stress, worry, and an increase in risky behaviors, such as substance abuse and suicide attempts. The review also reported that lifestyle changes during the COVID-19 pandemic, such as school closures, social distancing, isolation, and the fear of being infected, were associated with anxious and depressive symptoms, with the female adolescents' group at greater risk¹³. The decline in cases in 2020 may be attributed to a decrease in emergency care during that period, probably due to the population's heightened fear of infection and subsequent avoidance of hospitals. In 2021, we observed an increase, perhaps linked to the lockdowns and the aftermath of this stressful period. In 2022, a reduction was noted compared to 2021, possibly associated with the return to a normal routine. Nevertheless, it was still higher than the previous years, likely indicating a lingering impact on adolescents' mental health as a repercussion of the pandemic.

As regards the season of the year, in our study, cases of DSP were more frequent in autumn and less frequent

in summer. Similarly, an Australian study reported a reduction in the frequency of DSP during the summer season¹⁰.

In this study, most DSP episodes occurred in females and in mid-adolescence, with a median age of 15 years. This data is in line with the literature, in which suicide attempts are more common in females, during mid-adolescence^{4,12,15}. In our study, most cases occurred in the Metropolitan Area of Lisbon, an urban area. However, when analyzing demographics, the prevalence was not consistently higher in this region. The literature, however, suggests that most cases occur in urban areas^{11,16}. Further studies are needed to characterize the differences in demographic prevalence over the years in Portugal more accurately. It is also important to determine whether it is more common in urban or rural areas, which was not accessed and constitutes a limitation of the study.

There was a family history of psychiatric illness in 63.8% of episodes. A systematic review of parental characteristics and children's mental health concluded that there are genetic and environmental parental factors that are important predictors of mental illness in children. While genetic transmission appears to be the most significant factor in the development of depressive symptoms, educational level and substance abuse seem to have both genetic and environmental influence¹⁷.

First episodes of DSP occurred in 50.6% of cases, potentially indicating a decline in children and adolescents' mental health, possibly associated with the digital era and, more recently, the pandemic. With technological innovation, there has been an increase in screen-related activities, including the wider use of social networks. According to several studies, this surge aligns with an increase in the incidence of depressive disorders and suicide among adolescents¹⁸.

Another concerning factor is the occurrence of previous DSP episodes in 36.3% of cases. A study carried out in Singapore demonstrated that the presence of previous episodes of DSP served as a predictor of pre-existing psychiatric illness. The study also concluded that the combination of previous DSP episodes and psychopathology increased the risk of recurrent DSP¹². Similarly, an Australian study conducted in Melbourne identified a high incidence of pre-existing mental illness in the study population, with a quarter of patients having a prior history of DSP and 67% receiving a prior diagnosis of psychiatric illness¹⁹.

To reduce DSP episodes, the aforementioned study suggests that during any visit to the ED, children and adolescents should undergo screening for prior mental

illness and receive an assessment for psychiatric follow-up to ensure its regularity¹⁹. In our study, most DSP episodes occurred in adolescents who had undergone previous psychiatric follow-up. However, it was not possible to assess the frequency and format of the appointments (whether in-person or digital), especially during the COVID-19 pandemic, when sustained and constant follow-up would have been even more critical. Nevertheless, it is possible that the appointments were less frequent and predominantly digital, in line with widespread practice at the time, which was suboptimal during such a vulnerable period for mental health.

The drugs most used in DSP were psychotropic medication, accounting for 53.0% of cases, as observed in [table 5](#). This is in line with a study conducted at Coimbra's University Faculty of Medicine, which concluded that benzodiazepines were the most frequently used medications, comprising 41.8% of cases²⁰. Nonetheless, there is no consensus in the literature regarding the most frequently used medications or class of medications. An international study identifies painkillers as the most commonly used, while studies conducted in Israel and Romania specifically point to paracetamol^{15,16}.

In a more detailed analysis of the episodes in which psychotropic medications were used, it was observed that, in most cases, they were part of the person's regular medication. Consequently, one might infer that these individuals were dealing with mental illness and taking regular medication. An American study also notes that psychiatric comorbidities are present in the majority of DSP cases²¹.

Concerning paracetamol, which is highly relevant due to its hepatotoxicity and easy accessibility, this was used in approximately 19.8% of cases, either alone or in combination with other medications. This finding deviated from other studies, in which paracetamol holds primary significance in DSP. For instance, an Australian retrospective study spanning the period from 2006 to 2019, covering a population aged five to 19 years old, revealed that paracetamol (alone or in combination) was used in about 30.7% of DSP cases⁴. Similarly, a Romanian retrospective study that evaluated 219 cases of DSP concluded that paracetamol alone was the most frequently used medication, accounting for approximately 23.1% of cases²². Based on these findings, the authors of the aforementioned Australian study propose changes to paracetamol accessibility. They suggest measures such as restricting its purchase in pharmacies or other establishments, following the example of the United Kingdom, which in 1998, limited paracetamol purchases to 16 grams in

pharmacies and 8 grams elsewhere. This measure proved effective, leading to a subsequent reduction in overdoses, admissions to liver units, and deaths²³. A similar initiative could potentially be applied to the packaging of psychopharmaceutical drugs.

In approximately 5.7% of cases, it was not possible to determine the medications used, either because they were not mentioned on medical records or, for example, due to the adolescents' inability to identify them. Similarly, as shown in [table 5](#), the origin of the medications used in 25.4% of cases remained uncertain, possibly due to a lack of data in the records, a lack of cooperation from the adolescent, or even the inability of the patient to recall how they acquired the medication.

Children and adolescents' access to medication is always discussed with parents, whether during a follow-up appointment or at the ED. Parents and caregivers are required to store the medication in an inaccessible place and are responsible for administering it as prescribed. Despite these instructions, it was found that the most frequently used medications in DSP were the patient's regular medication in 43.3% of cases, namely psychotropic medications (37.5%, $p < 0.01$), indicating that the recommendations were not followed. Non-compliance with the recommendations needs to be identified and addressed by providing families with more information. Awareness campaigns, such as Safe Kids Worldwide®, assist families and communities in keeping children safe, particularly by educating them about the prevention of DSP²⁴.

Adolescent suicide is a growing public health concern and is the second leading cause of death in both male and female adolescents in Europe¹⁵. It is therefore crucial to identify risk factors. A better understanding of these factors could aid in preventing suicide²⁵. One of the strongest predictors of suicide risk is a previous suicide attempt. Following an attempt, the risk of suicide is 30 to 50 times higher. The heightened risk persists for the following 10 years, particularly in the first year^{4,26}. Other factors may also predict suicide attempts, such as demographic and social factors (female gender or urban environment), family-related factors (disturbed family structure, the death or absence of a parent, or substance abuse), psychological factors (personality traits or coping mechanisms), and school/work-related issues (poor school performance, absenteeism, or difficulties in relationships with peers)²⁷.

In our study, 66.6% of DSP cases did not exhibit suicidal intent. DSP in adolescents is frequently linked to impulsivity^{16,19,28}. However, these episodes should

not be underestimated, as they increase the risk of further suicide attempts^{16,26}.

Suicidal intent was, however, present in 31.6% of DSP cases, and nearly half of these cases had a previous DSP. Hence, there is a need for parental supervision regarding access to drugs to prevent new DSP episodes⁵. Moreover, of the 443 cases with suicidal intent, 311 had previously attended appointments with a CAP. As previously mentioned, the COVID-19 pandemic may have impacted the follow-up of these patients. Additionally, 130 of the 443 cases with suicidal intent had no follow up by CAP. DSP may represent the initial externalization of a pre-existing psychiatric illness. Therefore, one potential means of prevention is to inquire about the adolescent's mental health and track risk factors during every medical visit²².

Additionally, establishing a surveillance system for DSP in Portugal, similar to Ireland's Self-Harm Registry, could prove beneficial. In brief, this system records and reports information related to self-harm cases in hospital emergency departments nationwide, providing current national statistics and trend analyses on self-harm incidents. Such comprehensive data not only facilitates the identification of at-risk groups, but also enhances our understanding of self-harm, providing a solid foundation for the development and assessment of preventive strategies²⁹.

After medical examination at the ED, 73.3% of patients were discharged for CAP follow-up. This is consistent with the absence of suicidal intent in most cases^{19,28}. In 4.9% of cases, patients were discharged without a referral. In these cases, follow-up should be conducted by a General Practitioner or Psychologist. Additionally, 17.7% were hospitalized, and 0.1% were admitted to the PICU. It is essential to note that there are only four hospitals in Portugal with inpatient CAP, offering a total capacity of 42-44 beds, which are nearly always fully occupied³⁰.

This study has some limitations as a single-center study, which does not fully represent the reality in Portugal. Therefore, a multicenter national study is needed to verify whether there is a nationwide increase in DSP. Another limitation is that, as a retrospective study, data was collected from electronic records, which were sometimes incomplete, compromising, for example, the characterization of the method of obtaining the medication used in the DSP. It was also not possible, in some cases, to determine suicidal intent. Hence, prospective studies are needed to better characterize suicidal intent as well as the therapeutic approach.

Conclusion

DSP prevalence is higher in females during mid-adolescence and has been on the rise in recent years. According to several studies, the increasing incidence of depressive disorders and suicide among adolescents might be related to the wider use of social networks. This was further aggravated during the COVID-19 pandemic, as shown in our study. More DSP admissions were observed in 2021 and 2022 than in the previous years, possibly due to emotional distress during the pandemic. Additional studies and vigilance systems will be needed to monitor this trend.

The study did not explicitly address whether patients lived in urban or rural areas, which is crucial information to target prevention initiatives. Although most cases occurred in the Metropolitan Area of Lisbon, the prevalence of DSP varies across regions. As a result, and despite lacking data on the prevalence in the North and Centre regions of Portugal, we recommend the implementation of a comprehensive national prevention campaign.

For DSP, adolescents used mainly psychotropic drugs from their own regular medication. This suggests that these patients not only may suffer from psychiatric illness, but also that these medications lacked proper supervision. Appropriate medication management by caregivers is a crucial area of intervention to reduce DSP.

Identifying risk factors is essential, especially previous episodes of DSP, which is the most significant risk factor for recurrence. At any appointment or visit to the ED, children and adolescents should undergo screening for prior and current mental illness and receive adequate psychiatric follow-up.

In our study, suicidal intent was not found in the majority of cases of DSP and, accordingly, after examination in the ED, most patients were discharged with a referral for CAP follow-up. Preventive measures for DSP should be strengthened. It is vital to raise awareness about mental health issues and to promote educational strategies and support groups for children and families.

Finally, we highlight the need for multicenter prospective studies and the implementation of a national registry system, which may provide additional information and knowledge in this domain.

Previous awards and presentations

Presented as a Poster at the 22^o Congresso Nacional de Pediatria.

Authors' contribution

Vitoria Cadete, Ema Freitas, Inês Fontes, Manuel Almeida, António Marques, and Rita Machado: Conception and design of the study, report, review or other type of work or paper; Acquisition of data either from patients, research studies, or literature; Analysis or interpretation of data either from patients, research studies, or literature; Drafting the article; Critical review of the article for important intellectual content; Final approval of the version to be published; Agreement to be accountable for the accuracy or integrity of the work. Sandra Pires: Conception and design of the study, report, review or other type of work or paper; Analysis or interpretation of data either from patients, research studies, or literature; Drafting the article; Critical review of the article for important intellectual content; Final approval of the version to be published; Agreement to be accountable for the accuracy or integrity of the work. Fátima Rato: Critical review of the article for important intellectual content; Final approval of the version to be published; Agreement to be accountable for the accuracy or integrity of the work.

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Conflicts of interest

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Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that no patient data appear in this article. Furthermore, they have acknowledged and followed the recommendations as per the SAGER guidelines depending on the type and nature of the study.

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