Drug and Alcohol Dependence Reports 12 (2024) 100264

Contents lists available at ScienceDirect

Drug and Alcohol Dependence Reports

journal homepage: www.elsevier.com/locate/dadr

Short communication

Changing patterns of hospitalization for sedative misuse among youth aged 10–24 years in Quebec, Canada

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HIGHLIGHTS

- This study suggests that serious sedative misuse may be increasing in youth.
- Both sedative-related suicide attempts and sedative use disorders are increasing.
- The increase is seen in youth age 10 years or more and in both sexes.
- Youth with anxiety/attention disorders or social vulnerability seem to be most at risk.
- It is unclear if the increase is driven by prescription sedatives or illicit sources.

ARTICLE INFO

Keywords:
Adolescent health
Cross sectional studies
Hypnotics and sedatives
Substance use disorder
Suicide
Young adult

ABSTRACT

Purpose: To assess trends in hospitalization for sedative misuse among youth.
Methods: Using a serial cross-sectional design, we computed hospitalization rates for sedative-related suicide attempts, sedative use disorders, and other sedative poisonings within individuals aged 5–24 years in Quebec, Canada. We computed sedative-related hospitalization rates in 2006–2011, 2012–2017, and 2018–2023, and examined differences according to age, sex, polysubstance use, mental health comorbidity, and social vulnerability using rate ratios (RR) and 95 % confidence intervals (CI) comparing the last time period relative to the first.
Results: Sedative-related hospitalization rates more than doubled during the study. Suicide attempts using sedatives increased from 50.5 per 100,000 youth in 2006–2011, to 82.2 in 2012–2017 and 114.4 in 2018–2023 (RR 2.26, 95 % CI 1.63–3.15), while sedative use disorders increased from 13.1 to 21.8 and 60.5 per 100,000 in these same time periods (RR 4.62, 95 % CI 2.54–8.40). Rates increased for 10–24 year-olds and in both sexes, particularly among youth with polysubstance use, anxiety and attention disorders, and social vulnerability.
Discussion: Sedative misuse requiring hospitalization appears to be a growing issue among youth.

1. Introduction

Opioid and cannabis consumption among youth is a growing concern (Ford, 2018), but trends in sedative misuse are less clear. Prescription sedatives and hypnotics are central nervous system depressants used to treat a variety of conditions, including seizure, anxiety, and sleep disorders (Ford, 2018; Canadian Centre on Substance Use and Addiction., 2022). This class of drugs includes substances such as benzodiazepines and barbiturates that have elevated potential for misuse. These substances are currently the most frequent drugs used nonmedically after marijuana (Ford, 2018; Canadian Centre on Substance Use and Addiction, 2022; Carrasco-Garrido et al., 2018). Sedative-hypnotics are the second most commonly used medication in self-poisonings among 10–19 year olds (Pawer et al., 2021), and are one of the most common prescription drugs misused by 12–17 year olds (Roy et al., 2015).

Despite growing concern over this class of drug, there is limited information on the context of sedative misuse in youth over time. Several countries have reported that prescriptions for sedative pharmaceuticals

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https://doi.org/10.1016/j.dadr.2024.100264
Received 27 June 2024; Received in revised form 23 July 2024; Accepted 24 July 2024
Available online 28 July 2024

have increased among adolescents and young adults in the past decade (Cobo et al., 2022). Yet, it is unclear if serious sedative misuse has also increased, including misuse associated with suicide attempts, substance use disorders, or unintentional overdoses. Our objective was to determine if hospitalizations related to serious sedative misuse are increasing in youth and identify subgroups that may be more affected.

2. Materials and methods

We carried out a serial cross-sectional study of sedative-related hospitalizations among youth aged 5–24 years in Quebec, Canada. Hospital care is publicly funded in Quebec (Ministère de la Santé et des Services sociaux, 2020). We identified patients with a sedative-related hospitalization between April 1, 2006 and March 31, 2023 using diagnostic codes from the 10th revision of the International Classification of Diseases. Sedatives included benzodiazepines, barbiturates, and other unspecified sedative-hypnotics. We determined the context of serious sedative misuse (suicide attempt, sedative use disorder, other poisonings) and categorized sedative-related hospitalizations by age (5–9, 10–14, 15–19, 20–24 years), sex, and time period. We used three 6-year periods (2006–2011, 2012–2017, 2018–2023) to compare rates in equal time spans.

Using information at admission, we identified patient characteristics that could have influenced sedative misuse, including polysubstance use (opioids, cannabis, cocaine and stimulants, alcohol), mental health disorders (mood, anxiety, eating, attention, conduct, psychotic, and personality disorders), social vulnerability (homelessness, material deprivation, maltreatment, parental separation) (Grant et al., 2020; Schepis et al., 2018), and medical comorbidities commonly requiring sedative prescriptions (epilepsy, sleep disorder). Information on whether sedatives were prescribed or illicitly obtained was not available.

We calculated annual hospitalization rates per 100,000 youth and used rate ratios (RR) and 95 % confidence intervals (CI) to compare rates in 2018–2023 with rates in 2006–2011. The review board of our institution waived ethics review as this study involved anonymized data that did not require informed consent.

3. Results

Sedative-related hospitalization rates increased over time for all but the youngest age group (Fig. 1). Adolescents and young adults aged 15–19 and 20–24 years had the greatest increase. Hospitalization rates for suicide attempts with sedatives increased consistently until 2018 before stabilizing. Hospitalization rates for sedative use disorders began increasing in 2014 among patients aged 15–19 and 20–24 years. In contrast, hospitalization rates for other sedative poisonings were low the entire study period.

Comparison of rates in 2018–2023 with 2006–2011 indicated that hospitalizations for suicide attempt with sedatives and sedative use disorders more than doubled (Table 1). The increase was widespread, with sedative-related suicide attempts increasing from 50.5 per 100,000 in 2006–2011 to 82.2 in 2012–2017 and 114.4 in 2018–2023 (RR 2.26, 95 % CI 1.63–3.15). Sedative use disorders increased from 13.1 to 21.8 and 60.5 per 100,000 in these same time periods (RR 4.62, 95 % CI 2.54–8.40).

Rates for patients with polysubstance use, anxiety disorders, attention disorders, and social vulnerability increased even more. Comparison of 2018–2023 with 2006–2011 indicated that sedative-related suicide attempt rates increased the most among patients who also used opioids (RR 5.37; 95 % CI 1.13–25.63) or cannabis (RR 3.93; 95 % CI 1.62–9.58). Sedative use disorders followed a similar pattern. Patients

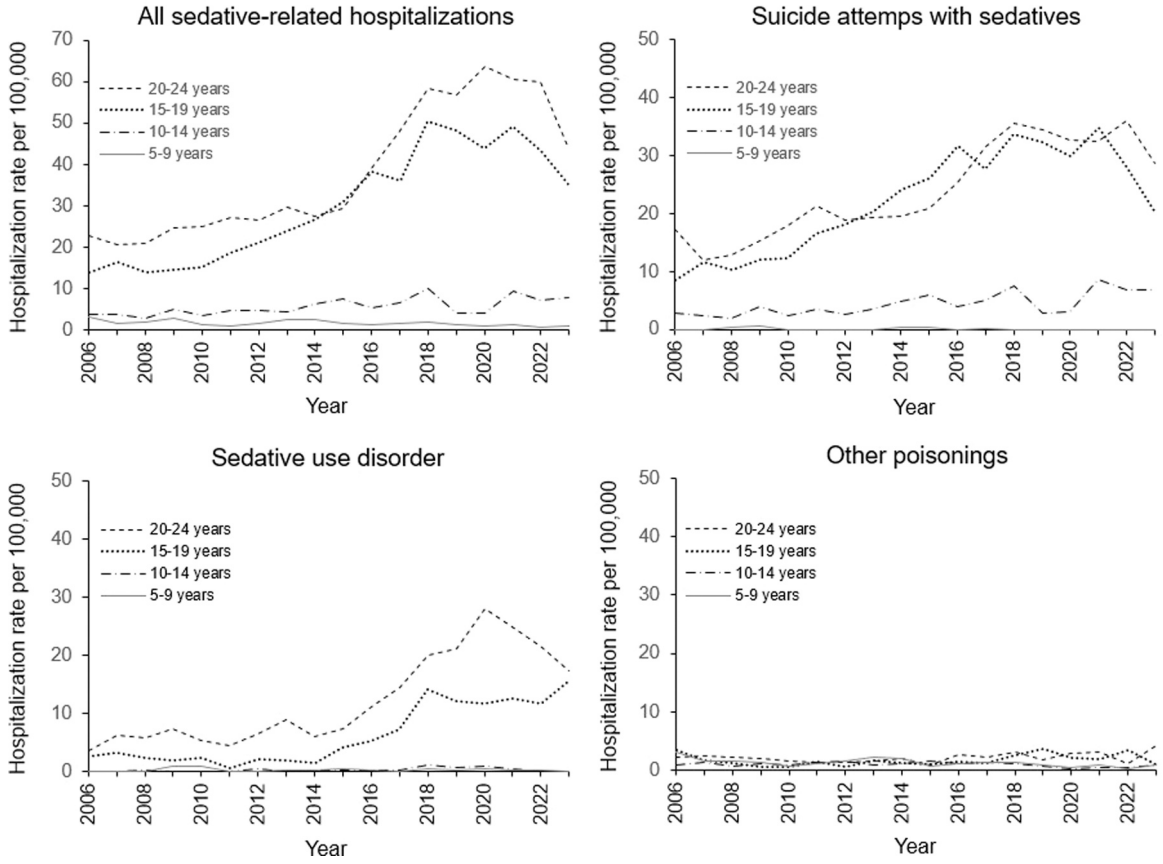

Fig. 1. Sedative-related hospitalization rates among youth, adolescents, and young adults 2006–2023. Rates for 2023 cover only the first quarter and should be interpreted with caution.

Table 1
Characteristics of patients with sedative-related hospitalizations[a].

	Suicide attempts with sedatives				Sedative use disorder			
	Hospitalization rate per 100,000[b]			Rate Ratio	Hospitalization rate per 100,000[b]			Rate Ratio
	2006–2011	2012–2017	2018–2023	2018–2023 vs. 2006–2011 (95 % CI)	2006–2011	2012–2017	2018–2023	2018–2023 vs. 2006–2011 (95 % CI)
Age, years								
5–9	0.8	0.7	-	-	0.8	0.5	0.9	1.10 (0.05–23.54)
10–14	16.8	25.7	34.6	2.05 (1.15–3.68)	0.1	0.6	1.7	13.92 (0.04–4709.74)
15–19	71.8	146.7	186.9	2.60 (1.98–3.42)	7.3	10.1	34.9	4.78 (2.15–10.61)
20–24	97.1	135.4	205.2	2.11 (1.66–2.69)	19.4	29.6	72.3	3.73 (2.26–6.16)
Sex								
Female	64.8	120.9	169.4	2.61 (1.96–3.48)	5.2	8.0	20.2	3.93 (1.49–10.33)
Male	37.3	46.5	63.9	1.72 (1.15–2.57)	7.9	13.9	40.2	5.07 (2.37–10.86)
Polysubstance use								
Any	22.1	36.7	60.9	2.75 (1.69–4.48)	11.3	19.8	57.5	5.06 (2.68–9.57)
Opioids	1.9	4.1	10.0	5.37 (1.13–25.63)	1.8	3.3	10.1	5.62 (1.15–27.51)
Cannabis	6.1	10.8	23.9	3.93 (1.62–9.58)	5.5	10.2	33.0	5.98 (2.43–14.71)
Cocaine and stimulants	6.2	11.9	22.8	3.66 (1.51–8.88)	5.2	11.0	31.5	6.03 (2.39–15.20)
Alcohol	8.4	15.2	25.1	3.01 (1.38–6.58)	4.3	7.1	22.8	5.26 (1.88–14.67)
No polysubstance use	28.7	46.1	54.3	1.89 (1.20–2.97)	6.7	7.1	10.6	1.59 (0.61–4.20)
Mental disorder								
Any	41.3	71.3	103.0	2.49 (1.74–3.57)	10.5	17.7	50.0	4.78 (2.46–9.31)
Mood	11.6	19.9	24.5	2.12 (1.05–4.27)	1.7	2.8	7.3	4.29 (0.80–22.90)
Stress and anxiety	15.5	33.5	56.2	3.63 (2.07–6.37)	2.7	5.8	20.4	7.41 (2.10–26.10)
Eating	2.1	5.5	8.0	3.72 (0.82–16.82)	0.2	0.3	0.5	3.24 (0.01–777.62)
Attention	2.9	11.5	24.2	8.30 (2.46–27.94)	1.0	4.0	14.8	14.17 (1.94–103.26)
Conduct	1.8	3.1	3.4	1.90 (0.31–11.76)	0.5	1.1	2.3	4.29 (0.23–81.68)
Psychotic	5.2	4.1	5.6	1.07 (0.32–3.52)	2.6	4.7	10.7	4.12 (1.06–15.95)
Personality	22.6	41.1	67.2	2.98 (1.85–4.80)	5.4	8.8	27.7	5.14 (2.04–12.94)
No mental disorder	9.5	11.6	12.2	1.29 (0.55–3.00)	7.6	9.1	18.0	2.39 (1.02–5.59)
Social vulnerability[c]								
Yes	6.9	14.3	26.4	3.84 (1.66–8.87)	4.3	7.8	22.7	5.23 (1.87–14.60)
No	43.9	68.6	88.7	2.02 (1.41–2.90)	13.7	19.0	45.4	3.32 (1.81–6.08)
Medical morbidity								
Epilepsy	1.3	2.0	2.2	1.68 (0.20–14.37)	0.9	1.4	2.6	2.88 (0.27–30.90)
Sleep disorder	0.3	0.8	1.9	5.77 (0.15–227.31)	0.1	0.5	1.2	10.00 (0.03–3383.48)
All hospitalizations	50.5	82.2	114.4	2.26 (1.63–3.15)	13.1	21.8	60.5	4.62 (2.54–8.40)

[a] Benzodiazepines, barbiturates, and other unspecified sedative-hypnotics
[b] Rates standardized using the age and sex distribution of 2013–2014
[c] Homelessness, material deprivation, maltreatment, parental separation

with attention disorders, anxiety disorders, and social vulnerability also had a considerably greater rates of hospitalization for sedative-related suicide attempts and sedative use disorder over time.

4. Discussion

This population-based study of children and youth in a large Canadian setting suggests that hospitalization rates related to serious sedative misuse have more than doubled in the past fifteen years. Both sedative-related suicide attempts and sedative use disorders increased. Children and youth with polysubstance use, anxiety and attention disorders, and social vulnerability experienced the greatest increase. While this study cannot confirm that sedative misuse has become more prevalent in youth, the results suggest that hospitalizations for sedative-related suicide attempts and substance use disorders have become more common over time.

Sedative use in young people is understudied, but earlier studies have hinted at potentially growing use over time (Carrasco-Garrido et al., 2018; Pawer et al., 2021; Roy et al., 2015; Palacios-Ceña et al., 2019; Hall et al., 2010). A survey of Spanish high school students found that illicit sedative use increased between 2004 and 2014 (Carrasco-Garrido et al., 2018). A separate analysis of the same survey found that combined use of sedatives and cannabis also increased (Palacios-Ceña et al., 2019). Cross-sectional reports suggest that sedative use may be prevalent among adolescents with a history of illicit substance use (Roy et al., 2015; Hall et al., 2010) or self-poisoning (Pawer et al., 2021). Recent data suggest that medical use of sedatives among individuals 15 years and older in Canada has remained stable since 2013, while non-medical use among students age 12–18 years increased between 2014 and 2019 (Canadian Centre on Substance Use and Addiction, 2022). However, these findings have received limited attention by the scientific community, and have been overshadowed by the opioid epidemic and cannabis legalization which have led to more calls for action.

Our data suggest that sedative-related hospitalizations increased in both sexes and all children and youth age 10 years and older. Children and youth with mental health disorders or polysubstance use were particularly at risk. Data from other studies suggest that rates of mood and anxiety disorders have grown in youth (Wiens et al., 2020), and that sedative prescriptions may be increasing among youth with mental health disorders (Hall et al., 2010; Sidorchuk et al., 2018; McCabe et al., 2017). In children with attention disorders, co-prescribing of stimulants and sedatives appears to be on the rise (Liou et al., 2023). While it is difficult to determine the extent to which sedatives are being used appropriately, hospitalizations for serious sedative misuse increased even among youth without mental disorders in our study.

It is also difficult to determine the extent to which the opioid epidemic and legalization of recreational cannabis could explain the increase in hospitalization for sedative misuse. Youth who use cannabis or opioids tend to consume more sedatives (Grant et al., 2020; Palacios-Ceña et al., 2019; Hall et al., 2010; McCabe et al., 2017). Benzodiazepine use is prevalent among young adults who overdose on opioids (Bushnell et al., 2021). Sedatives and opioids can have synergistic effects that increase the chance of hospitalization (Bushnell et al., 2021; Tori

et al., 2020), and benzodiazepines are increasingly found in illicit drug samples seized by Canadian law enforcement (Canadian Centre on Substance Use and Addiction., 2022). However, opioids and cannabis cannot be fully responsible, as sedative-related suicide attempts increased among youth without substance use disorders in our population. The Covid-19 pandemic also cannot explain our findings, as sedative hospitalization rates started increasing ahead of the pandemic.

We were limited to capturing the most severe cases of sedative misuse. While hospitalizations may have increased due to a generalized increase in sedative consumption in the population overall, it is also possible that only serious misuse has changed. We could not determine if changes in sedative use coincided with an underlying increase in the use of other substances as this information was not available. However, patients without known polysubstance use had more hospitalizations for sedative misuse over time. We did not know if patients obtained sedatives by prescription or illicitly. As the increase occurred in patients with and without anxiety disorders or other medical conditions where sedatives could be prescribed, it is likely that both prescribed and illicitly-obtained sedatives play a role. As with other administrative health data studies, coding errors may have led to misclassification and attenuated the difference between time periods.

5. Conclusions

This study suggests that sedative-related suicide attempts and use disorders may be increasing in youth in Quebec, Canada. More research is needed to determine the extent to which sedatives obtained by prescription versus illicitly contributed to the increase, as driving factors and routes of prevention may differ depending on the source. Future research should verify if milder forms of sedative misuse have also increased.

Role of funding sources

This study was funded by the Canadian Institutes of Health Research (WI2-179928) and Fonds de recherche du Québec-Santé (296785). The funders were not involved in the study design, collection, analysis, or interpretation of data, writing of the manuscript, and the decision to submit the manuscript for publication.

CRediT authorship contribution statement

Gabriel Côté-Corriveau: Conceptualization, Methodology, Writing – review & editing. **Nathalie Auger:** Conceptualization, Funding acquisition, Methodology, Project administration, Supervision, Writing – review & editing. **Jessica Healy-Profitós:** Conceptualization, Formal analysis, Methodology, Validation, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

All authors confirm that they have no interests to declare.

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