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An Evaluation of Psychoactive Substances that Bring Youth to the Emergency Department

Focus on Alcohol, Cannabis and Opioids

2022

Project partners

Centre intégré universitaire de santé et de services sociaux de l'Estrie – Centre hospitalier universitaire de Sherbrooke
Québec

DALHOUSIE UNIVERSITY

UNIVERSITY OF SASKATCHEWAN
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Conflict of Interest

Samantha King has no conflict of interest to declare.

Catherine Paradis has no conflict of interest to declare.

Jennifer Reynolds has no conflict of interest to declare.

Dr. Phil Davis has no conflict of interest to declare.

Dr. Mark Asbridge has no conflict of interest to declare.

Dr. Claude Cyr has no conflict of interest to declare.

Terminology Notes

This report includes several terms commonly used by physicians and those studying health administration data. To allow a broader audience to access this report, several key terms are defined below.

Blood alcohol concentration (BAC): The amount of alcohol in your blood. For example, if you have 50 millimoles of alcohol in 1 litre of blood, your BAC is .05% (Mothers Against Drunk Driving Canada, n.d.).

Canadian Triage and Acuity Scale (CTAS): This score is used in emergency departments (EDs) across Canada to reflect the level of care required for a patient arriving in the ED. It is assigned based on the primary complaint, as well as the nature and severity of the presenting symptoms (Murray, 2003; Gravel et al., 2009; Bullard et al., 2017).

Comorbidity: A disease or medical condition that is simultaneously present with another or others in a patient.

Detox: "Detox" and variations of this term can be used to describe both outcomes of hospital visits and as a place where a young person was discharged for withdrawal management. As a general rule, CCSA no longer uses the stigmatizing term "detox" because it suggests that an individual needs to be cleansed of their substance use; however, because this term is familiar to many audiences, we have used the term "withdrawal management ('detox')" as an acceptable alternative for the purpose of this report (Shatterproof, 2022). To preserve the integrity of the original data that was collected, the terms are left intact but included in quotation marks to indicate that we do not endorse them.

Glasgow Coma Scale (GCS): The GCS was designed to assess depth and duration of a coma or impaired consciousness. It uses motor responsiveness, verbal performance and eye opening to gauge the impact of injuries or other medical emergencies. A severe head injury is indicated by a score of less than or equal to 8; a moderate head injury by a score between 9 and 12; and a mild head injury by a score between 13 and 15.

International Classification of Diseases and Related Health Problems, 10th Revision, Canada (ICD-10-CA): This coding standard classifies diseases, injuries and causes of death, as well as external causes of injury and poisoning. It also includes conditions and situations that are not diseases but represent risk factors to health, such as occupational and environmental factors, and lifestyle and psychosocial circumstances.

Overdose emergency: This term refers to the fatal and nonfatal harms occurring among those using substances that may be toxic. It also refers to the immense and mounting illicit drug toxicity deaths occurring from opioids, opioid analogues and other substances (B.C. Centre for Disease Control, 2021).

Polysubstance use: This refers to the concurrent or simultaneous use of more than one substance.

Substance use: Substance use includes all legal and illegal drugs or psychoactive substances, including alcohol and tobacco.

Substance use disorder: This medical condition is a group of cognitive, behavioural and physiological symptoms related to the use of a psychoactive substance and is experienced by someone who continues to use the substance despite experiencing harms. These can include harm to the individual's physical or mental health; harm to others; adverse social consequences, such as failure to meet work, family or school obligations; interpersonal conflicts; or Legal problems (American Psychiatric Association, 2013). Some feel the term "disorder" is stigmatizing. It is included in this

report as it relates to clinical guidelines and treatment planning, and is not intended as a label to be placed on an individual.

Youth or adolescents: Broadly defined in this study as those between the ages of 12 and 17 years.

Young adults: Broadly defined in this study as those between the ages of 18 and 24 years.

Executive Summary

Key Findings

- In all communities that provided data, youth and young adults admitted to the emergency department (ED) due to substance use predominately reported or were identified as having used alcohol, followed by cannabis and opioids.
- The average blood alcohol concentrations (BACs) reported across regions were all above the toxic limit of 0.3%. Many alcohol-related cases involved spirits, either alone or in combination with other substances.
- More than one-quarter (28%) of young people visiting the ED were under the minimum legal drinking age (MLDA) to purchase and consume alcohol in their respective regions.
- In all communities, cannabis-related ED admissions were more common among males than females.
- Polysubstance use was present in nearly 40% of cases, with Saskatoon reporting the highest prevalence, followed by Sherbrooke and Greater Halifax.
- Among youth admitted to the ED for alcohol-, cannabis- or opioid-related emergencies, the most common were unintentional injuries (45.1%) followed by intentional injuries (13.9%).
- Time of presentation to the ED differed by substance, with alcohol-related cases arriving mainly at night and cannabis- and opioid-related cases arriving during the day.
- A large proportion of young people arriving in the ED had previously visited for a substance-related emergency. They had also seen a healthcare professional previously, most often a psychiatrist. Forty per cent of young people also had at least one known comorbidity.
- In many cases, a third party was not contacted in relation to the young person's visit to the ED.

Background

Our previous case study with the Sherbrooke Ville en santé, which assessed excessive alcohol consumption among youth in Sherbrooke, Que., found that visits to the emergency department (ED) for alcohol-related toxicity among adolescents and young adults were common. Occurring every two days, they were often severe and frequently involved drinks with high alcohol content consumed in bars, at parties or at local celebrations (Paradis, Goupil et al., 2018; Paradis, Cyr et al., 2018). In response to the study's findings, the community identified several preventive measures and successfully implemented some of them (Paradis et al., 2018). Legislation was also amended to ban the sale of certain high alcohol-content drinks at corner stores in Quebec (Quebec *Bill 170*).

Given the impact of that work, we sought to scale our study to include two additional communities: Saskatoon, Sask., and the Greater Halifax region, N.S. Additionally, with cannabis legalized in 2018 and Canada in an ongoing overdose emergency, we decided to capture ED visits related to cannabis

and opioids as well. This report describes the trends seen in visits to EDs by adolescents and young adults and the details surrounding their visits.

This report is aimed at policy makers, with the goal being to help their teams identify priorities for research initiatives and prevention programs. It also aims to provide ED clinicians with a better understanding of trends in their communities and the importance of such surveillance, so they can enhance their approach to caring for young people visiting the ED for a substance use related emergency.

Methods

The Canadian Centre on Substance Use and Addiction (CCSA) partnered with representatives from seven EDs across three communities in Canada to conduct this expanded study. We took a retrospective approach to collecting, extracting and analyzing data from each site. Our main objective was to capture and document all visits to each of the EDs from Jan. 1, 2016, to Dec. 31, 2019, for adolescents (12–17 years of age) and young adults (18–24 years of age) that involved at least one of the three in-scope psychoactive substances: alcohol, cannabis or opioids. Our secondary objective was to assess the severity of cases by using a variety of severity measures (e.g., GCS, Canadian Triage Acuity Scale, hospitalizations) along with details on the course of their ED visits and the context surrounding these visits.

Results

Throughout the four-year study period, 4,634 cases were identified among young people across the three communities. Some key findings include:

- Alcohol remains the principal contributor to ED visits among adolescents and young adults. This outnumbers visits relating to both cannabis and opioids; occurs across all communities; and most commonly involves high alcohol-content spirits (where type of alcohol was known).
- More than a quarter of young people presenting to the ED were under the minimum legal drinking age (MLDA) in their respective regions.
- Many young people presenting to the ED were experiencing life-threatening emergencies.
- Polysubstance use was reported in about a third of the sample. However, most cases reported the use of a single substance, which was overwhelmingly alcohol. The most frequently combined substances, of the three of interest, were alcohol and cannabis.
- Sherbrooke had significantly fewer alcohol- and cannabis-related cases presenting to the ED in 2019. In contrast, Saskatoon and the Greater Halifax region trended either upward or were stable, suggesting that the changes the Sherbrooke community made following the initial case study had an impact.

Conclusion and Implications

This study has demonstrated the importance of addressing the substantial role of alcohol in serious medical emergencies among young people. Alcohol remains the top contributor to such visits, particularly in cases where only one substance is involved.

When adolescents or young adults visit the ED because of substance use related emergencies, it is cause for concern. However, it is also an opportunity for screening, brief intervention and tailored education. When it comes to prevention and harm reduction, one size does not fit all. As this study

shows, the trends and characteristics of visits to EDs differ across communities. This points to the need for community-level data, as local trends do not always mirror what is happening nationally.

Efforts to prevent medical emergencies related to young people in Canada consuming alcohol, cannabis and opioids will be a pressing issue during the postpandemic recovery and beyond. To protect young people from severe harms related to substance use, including ED visits, numerous initiatives would be helpful, including:

- Facilitating knowledge sharing in each of the three communities to raise awareness of local trends and enhance ED practices from the time of arrival through to follow-up with the young person to ensure they receive adequate services and supports; and
- Increasing the breadth of data and efficiency of the surveillance of such cases at a community level to inform and help tailor local prevention and harm reduction programs, policies and practices.

Introduction

Overdose Emergency

The opioid overdose emergency continues to escalate across Canada, and youth have not been spared. From 2010–2016, opioid-related hospitalizations among youth 15–24 years old rapidly increased from 7.1 cases to 12.4 per 100,000 (Chief Public Health Officer, 2018). In Alberta, opioid-related emergency department (ED) visits among youth and young adults aged 18–29 years old increased more rapidly than visits for other age groups from 2011–2015 (Moe et al., 2018).

More recently (April 2020–May 2021), the Public Health Agency of Canada reported an 88% increase in opioid toxicity deaths among those aged 15 and older (Canadian Institute of Health Information [CIHI], 2021; Government of Canada, 2021). This is fuelled by an increase in drug toxicity and mental illness, and by a lack of availability and access to services and supports for substance use harms.

Legalization of Cannabis

Another newsworthy healthcare issue in recent years is the legalization of recreational cannabis, which has brought with it a greater need to monitor its use by youth in Canada. Available data show that youth are more likely to use cannabis than adults (Rottermann, 2021; Canadian Centre on Substance Use and Addiction [CCSA], 2022) and teenagers who use cannabis weekly or more often for a sustained period can increase their risk for substance use disorders or mental health problems later in life (DeWit et al., 2000; Patton, 2002; Hall, 2015; CCSA, 2022).

In the United States, legalizing cannabis in certain states has also brought significant risks of harmful public health outcomes. National ED sample data there indicate cannabis-related visits have increased 7% annually over the past decade, and adolescents are most likely to have these types of ED visits (Shen et al., 2018). In Canada, early findings from Ontario reflect this trend, showing that cannabis-related ED visits for those aged 18–29 increased by 56% in the six months post-legalization (Baraniecki et al., 2021). Analyses conducted by CIHI in 2017–2018 also showed that cannabis-related hospital stays were more common than stays for any other substance among males and females aged 10–24 (CIHI, 2019). Compared to 2015 estimates, those aged 15 or older using cannabis daily or near daily has increased, with 7.9% reporting this type of use in 2020 (Rottermann, 2021).

Dangers of Alcohol

When compared to opioids and cannabis, the risks associated with alcohol consumption are often downplayed. Yet, prior to the pandemic, there was an increasing number of young people in Canada being hospitalized for acute alcohol poisoning. The Institut national de santé publique du Québec reported that between 2014 and 2016, the rate of acute alcohol poisoning reached 365 cases per 100,000 among people ages 18–19 years, the highest rate across all ages from 12 to 25 years (April et al., 2018). Data collected in campus towns across Canada from 2012–2017 found that at least three youth are taken to the local hospital ED every week for an alcohol-related medical emergency, including at least 25% whose lives are in danger upon arrival (Paradis et al., 2018).

Despite these findings and the fact that alcohol use is highly common in youth and young adults, little data exist about how often they visit the ED for substance-related medical emergencies. Yet just one visit to the ED for acute alcohol intoxication is an important predictor of ongoing alcohol use

problems, with the mortality rate for those patients being 3.5 times higher within five years of the visit (Davidson et al., 1997).

Establishing Research Priorities

Data about ED visits are important not only for identifying populations most at risk of experiencing substance use harms but for determining priorities about research initiatives, prevention programs, regulations and policies. Within the Canadian context, data on this issue would complement:

- Existing consumption data, which indicate the risk of experiencing harm; and
- Hospitalization data, which represent severe harm but are rare.

Indeed, mobilizing the findings from our original Sherbrooke case study (*Youth Alcohol Use and Its Harms: Case Study in the Community of Sherbrooke*) led to the implementation of several measures both within the ED and outside of it (Paradis et al., 2018). These include ensuring contact with a family member or friend following a visit to the ED and changing legislation as was done with the amendment to Quebec *Bill 170*, which led to highly sweetened alcohol beverages being banned for sale at provincial corner stores.

This first case study looked at excessive alcohol consumption among youth in Sherbrooke. High alcohol-content drinks consumed at parties, in bars and at community celebrations were frequently involved in ED visits for alcohol-related toxicity, and often resulted in severe harms. Because of the findings and overall impact of the Sherbrooke study, we sought to work in additional communities across Canada and expand the scope include the three substances (alcohol, cannabis and opioids) that are key issues across the country as they relate to young people.

COVID-19 and Substance Use

The COVID-19 pandemic was declared in March 2020 and brought a series of orders for all people living in Canada. These varied by location and degree but included:

- Stay-at-home orders;
- Orders to not have social gatherings outside of one's own household; and
- The temporary closures of many public establishments.

While the data in this report represent the four years before COVID-19, the impact the pandemic had on ED visits among youth using substances is an important consideration and will be discussed at the end of the report.

Audience

This report is aimed at several audiences, particularly:

- Policy makers who can use this evidence to identify priorities for research initiatives, prevention programs, regulations and policies to help reduce the harms associated with psychoactive substance use among young people; and
- ED clinicians who could use this evidence to enhance their approach as they care for young people visiting the ED for a substance use related emergency, including counselling and follow-up they offer patients.

Study Objectives

1. Assess which psychoactive substances bring youth to the ED with the aim of documenting the magnitude and severity of these cases across communities.
2. Describe alcohol-, cannabis -or opioid-related ED consultations among adolescents and young adults. This includes:
    - Clinical presentation
    - Clinical and biological characteristics upon admission
    - Substance use context
    - Polysubstance use
    - Patient management
3. Inform priorities about alcohol, cannabis and opioid harm reduction and prevention programs within each community.

Methods

To assess which psychoactive substances are bringing youth to EDs, CCSA collaborated with a group of clinicians and epidemiologists to conduct a retrospective analysis of clinical data. For this multisite project, we collected, extracted and analyzed data from several medical centres in Sherbrooke, Saskatoon and the Greater Halifax region.

Our main objective was to capture and document all visits to each site's ED from Jan. 1, 2016, to Dec. 31, 2019. We examined visits by adolescents (12–17 years of age) and young adults (18–24 years of age) involving at least one of the three in-scope psychoactive substances: alcohol, cannabis and opioids. Our secondary objective was to assess the severity of cases by using several measures to do so (e.g., GCS, Canadian Triage Acuity Scale, hospitalizations). This type of data can be used to examine regional trends in substance use related emergencies, allowing harm reduction and prevention efforts to be grounded in the realities of each community.

Data Sources

Data were collected from medical charts compiled at each ED by a research assistant. Data from the National Ambulatory Care Reporting System were used, which contains:

- Basic visit information (i.e., date and time of visit, mode of arrival, severity)
- Patient demographics
- Care received in ED
- Outcomes

Any supplementary information found on the ED charts was also used. See Appendix A for the *International Classification of Diseases and Related Health Problems, 10th Revision, Canada* (ICD-10-CA) codes used for inclusion purposes (CIHI, 2009). Appendix B contains the case report form completed for each case, based on available data.

Our analyses included any consultation completed for an adolescent or young adult in the ED that met any of the following criteria:

- Alcohol-related visits were identified by:
    - Common diagnostic terms mapped onto ICD-10-CA codes related 100% to alcohol (e.g., alcohol poisoning); or
    - ICD-10-CA codes that could be partially attributed to alcohol and a blood alcohol concentration (BAC) > 0, or reports of drinking in the previous 24 hours.
- Cannabis-related visits were identified by:
    - Common diagnostic terms mapped onto ICD-10-CA codes relating to cannabis use (e.g., mental and behavioural disorders due to acute intoxication from use of cannabinoids), whether it was the main concern or occurring alongside another. This includes injuries such as from motor vehicle accidents where cannabis may have contributed.
    - Hospitalization and ED visits for mental and behavioural disorders due to polysubstance use were also included if cannabis was one of these drugs; or
    - Urine test positive for tetrahydrocannabinol (THC), the main psychoactive ingredient in cannabis.

- Opioid-related visits were identified by:
    - Common diagnostic terms mapped onto ICD-10-CA codes within the category "Mental and behavioural disorders due to the use of opioids"; or
    - Relevant codes within the category "Poisoning by narcotics and psychodysleptics."

In addition to compiling charts containing codes related to each in-scope substance, it was important to include the word "cannabis," "alcohol" or "opioid" during queries (e.g., "T439 cannabis"). If we only looked for charts containing F100 codes, many in-scope charts may be overlooked. For example, either psychosis or cannabis could be listed as the primary diagnosis. Searching by main diagnosis alone could result in missed information.

Ethics

At each site, internal research ethics boards approved the research in this report. A contribution agreement between CCSA and Health Canada's Substance Use and Addictions Program funded the research. Identifying information was removed from all data before researchers collected and analyzed it. Each record was also assigned a unique identifier.

Statistical Analyses

Data presented in this report are comprised mainly of descriptive analyses. Chi-square analyses were conducted for categorical variables and t-tests were performed to detect mean differences between groups for continuous variables. A *p*-value of less than 0.05 was used to determine statistical significance.

It is important to note that some pre-specified variables outlined in our case report form were not available from all sites. Different record-keeping practices and data sources resulted in researchers being unable to obtain complete information or run statistical analyses on all variables. This is noted throughout the report as applicable.

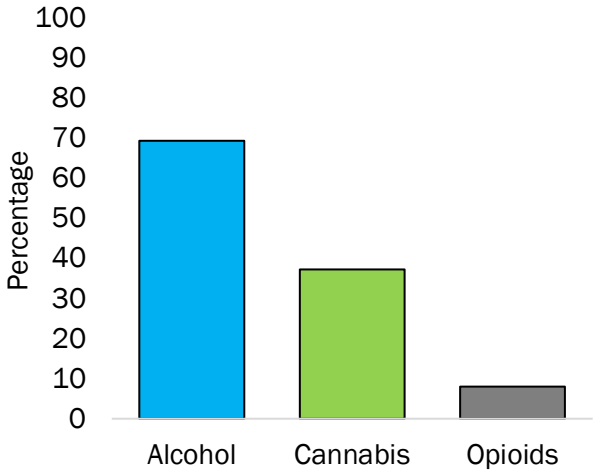
Results

Prevalence of ED Visits for Alcohol, Cannabis or Opioids

All In-Scope Cases

Figure 1 (*n* = 4,634) shows the percentage of cases reporting the involvement of each in-scope substance across all the EDs combined. Most cases involved alcohol (69.3%), followed by cannabis (37.2%) and opioids (8.0%).

Figure 1. Percentage of cases reporting the involvement of each in-scope substance

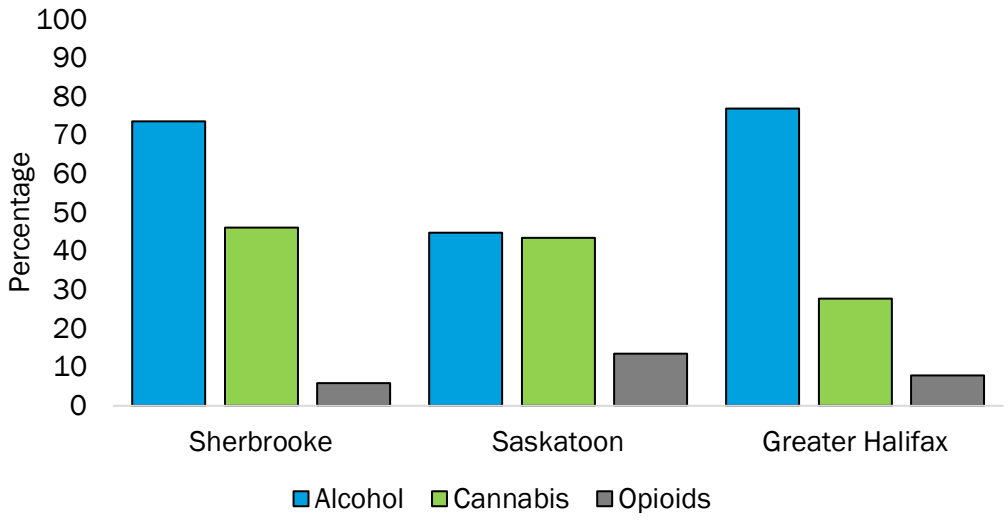


Note: The total equals more than 100% as each case may involve more than one in-scope substance.

Figure 2 shows the percentage of cases involving each in-scope substance by region. Overall trends were similar between regions:

- Alcohol was reported most frequently across all regions (73.5% in Sherbrooke, 44.8% in Saskatoon and 76.8% in Greater Halifax).
- Cannabis was the second-most reported substance (46.1% in Sherbrooke, 43.5% in Saskatoon and 27.7% in Greater Halifax); and
- Opioids were involved in the smallest proportion of cases (5.8% in Sherbrooke, 13.5% in Saskatoon and 7.8% in Greater Halifax).

Figure 2. Distribution of in-scope visits across communities



Note: The total equals more than 100% as each case may involve more than one in-scope substance.

All In-Scope Cases by Year and Region

Sherbrooke had 1,342 visits to the EDs of its two hospitals (Hôpital Fleurimont – Centre hospitalier universitaire de Sherbrooke [CHUS] and Hôpital Hôtel-Dieu – CHUS) that were related to alcohol, cannabis and opioids. Of these:

- 336 (25%) occurred in 2016
- 370 (27.6%) occurred in 2017
- 346 (25.8%) occurred in 2018
- 290 (21.6%) occurred in 2019

Royal University Hospital in Saskatoon had 728 ED visits related to alcohol, cannabis and opioids. Of these:

- 125 (17.2%) occurred in 2016
- 166 (22.8%) occurred in 2017
- 203 (27.9%) occurred in 2018
- 234 (32.1%) occurred in 2019

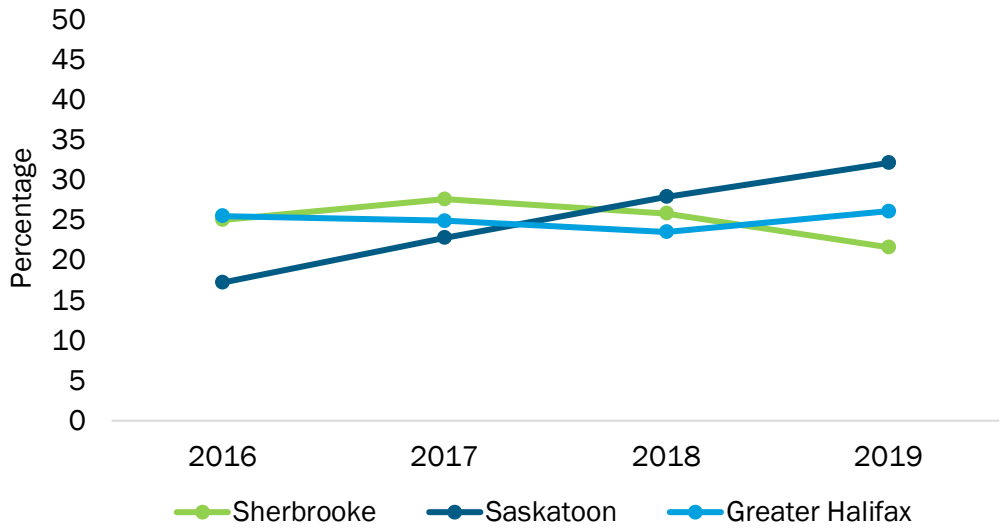
The four EDs in the Greater Halifax region (Queen Elizabeth II Health Sciences Centre, Halifax; Cobequid Community Health Centre, Sackville; Dartmouth General Hospital, Dartmouth; and IWK Health Centre, Halifax) saw a total of 2,564 visits related to alcohol, cannabis and opioids. Of these:

- 655 (25.5%) occurred in 2016
- 638 (24.9%) occurred in 2017
- 603 (23.5%) occurred in 2018
- 668 (26.1%) occurred in 2019

The distribution of cases over this period is shown in Figure 3, with the proportion differing significantly ($\chi^2_{(6)} = 47.526$, $p < .001$) in each region:

- Sherbrooke had fewer visits to EDs in 2019 compared to previous years;
- Saskatoon saw an upward trend after 2016 with the proportion of cases increasing steadily year over year; and
- Greater Halifax had a lower percentage of cases in 2017 and 2018 compared to 2016 and 2019.

Figure 3. Distribution of all in-scope cases in each community by year



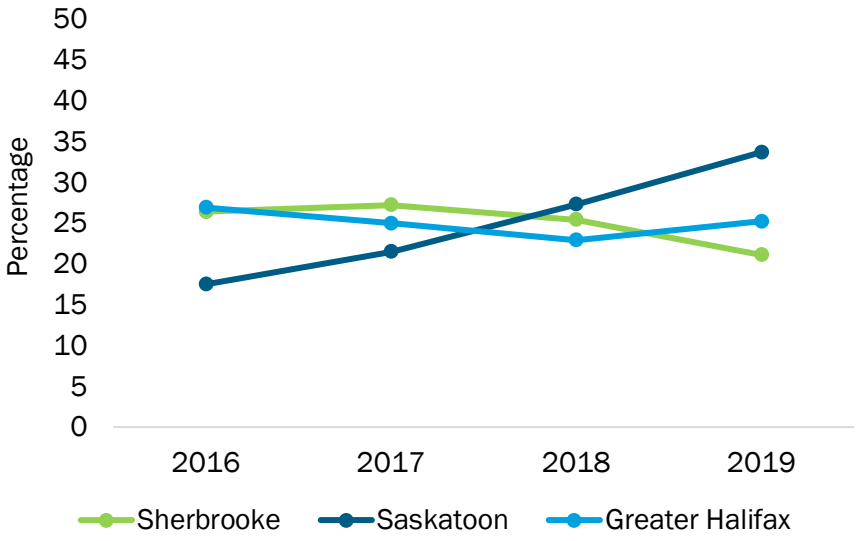
Prevalence of ED Visits by In-Scope Substance

Alcohol-Related Cases by Year and Region

The trend in alcohol-related cases during the study period differed between regions ($\chi^2_{(6)} = 32.42$, $p < .001$):

- In Sherbrooke, the proportion of cases was lower in 2019 than 2016–2018;
- In Saskatoon, the proportion of cases was not significantly higher in 2017 than in 2016 but were in 2018 and 2019; and
- In the Greater Halifax region, the proportion of cases was lower in 2018 than 2016, while 2018 was similar to 2017 and 2019 (see Figure 4).

Figure 4. Proportion of total alcohol-related cases in each community by year

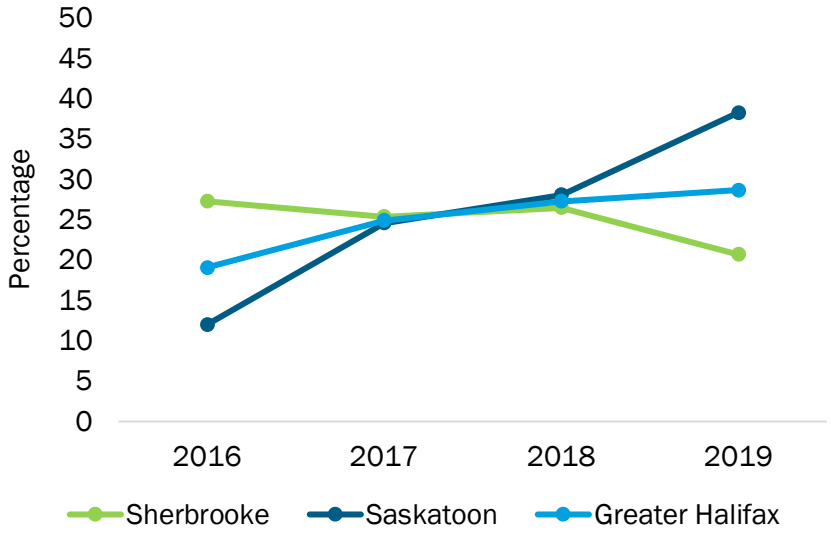


Cannabis-Related Cases by Year and Region

The trend in cannabis-related cases during the study period differed within regions ($\chi^2_{(6)} = 32.42$, $p < 0.001$):

- In Sherbrooke, the proportion of cases decreased year over year from 2016–2019;
- In Saskatoon, the proportion of cases increased year over year from 2016–2019; and
- In Greater Halifax, the proportion of cases remained stable across the study period (see Figure 5).

Figure 5. Proportion of total cannabis-related cases in each community by year

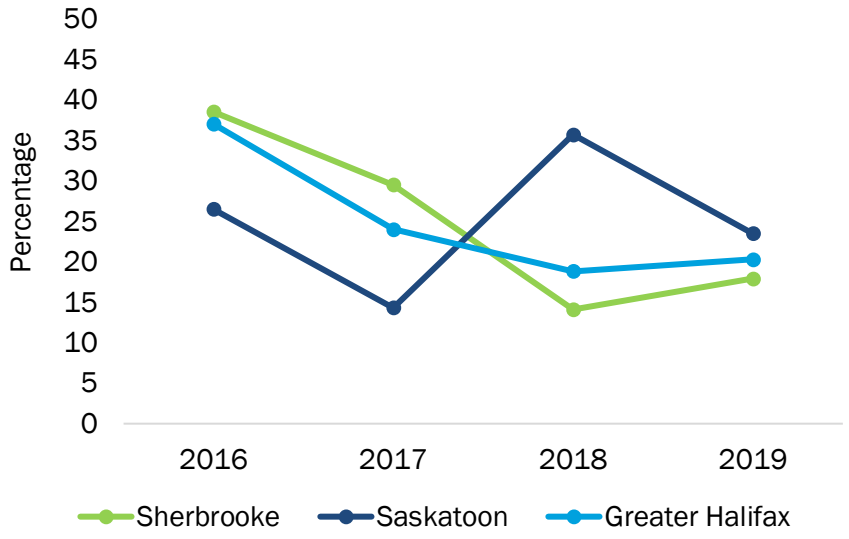


Opioid-Related Cases by Year and Region

The trend in opioid-related cases during the study period differed within regions ($\chi^2_{(6)} = 19.32$, $p = .004$):

- In Sherbrooke, the proportion of cases decreased significantly between 2017 and 2018, the only significant change noted;
- In Saskatoon, the proportion of cases increased between 2017 and 2018, while it also increased in 2019 compared to 2017; and
- In Greater Halifax, the proportion of cases was not significantly different across the study period (see Figure 6).

Figure 6. Proportion of total opioid-related cases in each community by year



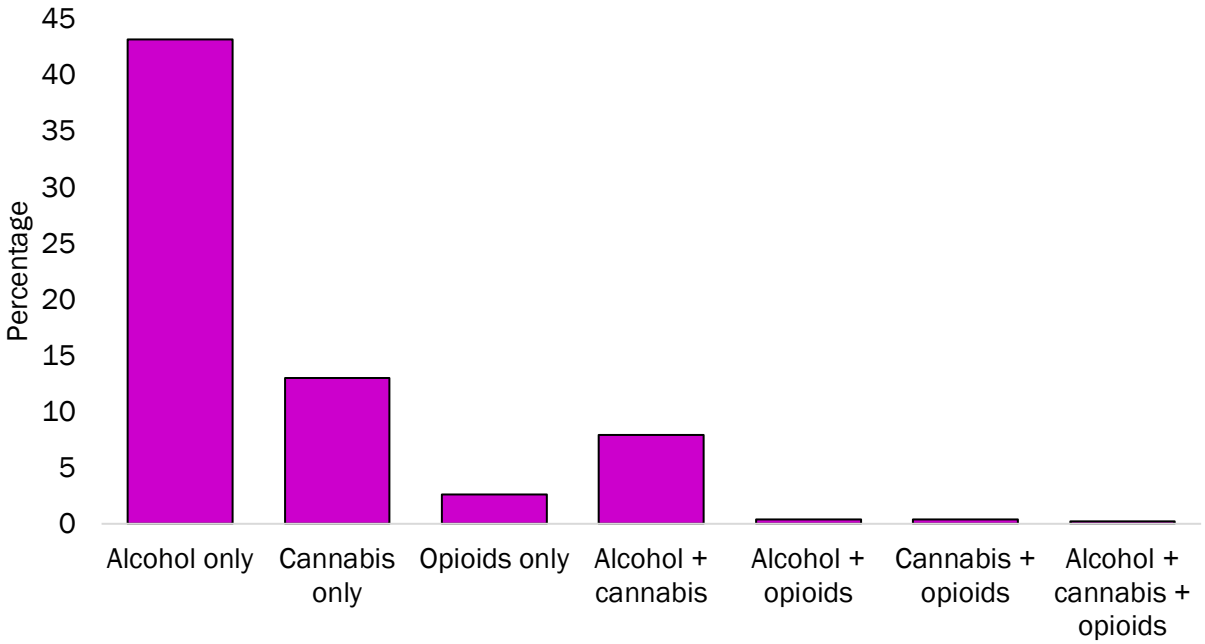
Polysubstance Use

In-Scope Substances and Their Combinations

The distribution of cases involving each in-scope substance, either alone or in combination, is illustrated in Figure 7. Most cases reporting the involvement of a single in-scope substance involved alcohol (43.2%), followed by cannabis (13.0%) and opioids (2.6%). Of the three in-scope substances,[1] the most frequently reported combination was alcohol and cannabis (7.9%), with other combinations representing less than 1% of the whole sample.

[1] Additional out-of-scope substances were reported often but are not presented in Figure 7 for ease of interpretation. Future reports will include further analyses of polysubstance use.

Figure 7. In-scope substances consumed alone or in combination



Across the sample, the involvement of more than one substance (where at least one was an in-scope substance) was common and was seen in 37% (*n* = 1,739) of cases. Based on available data, the remainder of cases appeared to involve one substance only (62.3%, *n* = 2,888), which was most commonly alcohol.

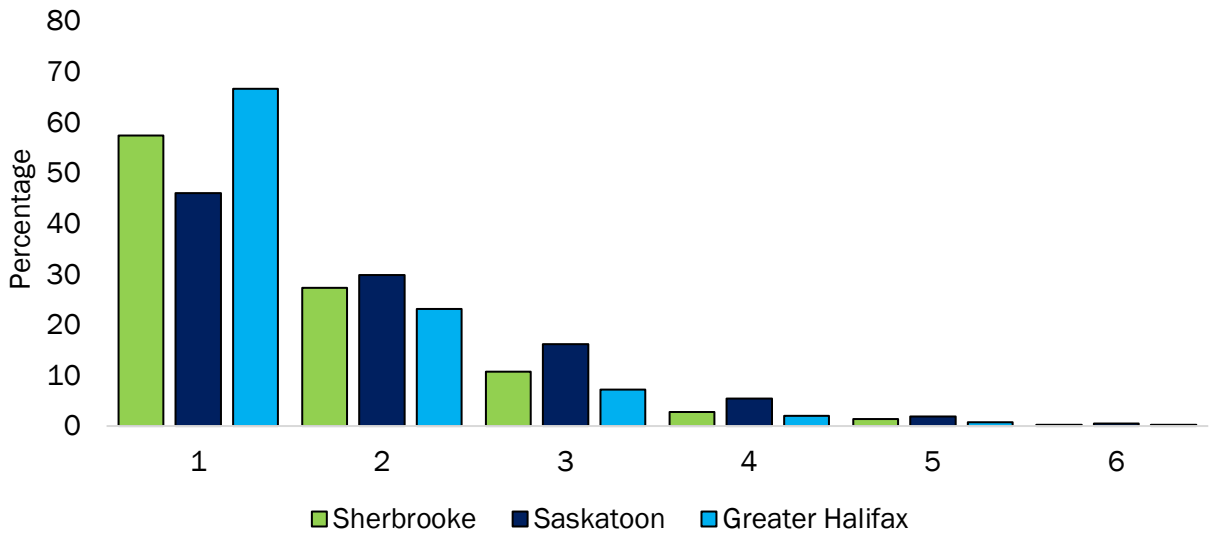
When examined by region, the percentage of cases that indicated the involvement of more than one substance varied:

- 42.5% of cases in Sherbrooke
- 54% of cases in Saskatoon
- 31.6% of cases in the Greater Halifax region

Just more than one-third of young people in our sample had multiple substances noted on their charts. For each region, most charts indicated the involvement of one substance,[2] with the largest proportion being seen in Greater Halifax followed by Sherbrooke and Saskatoon (see Figure 8).

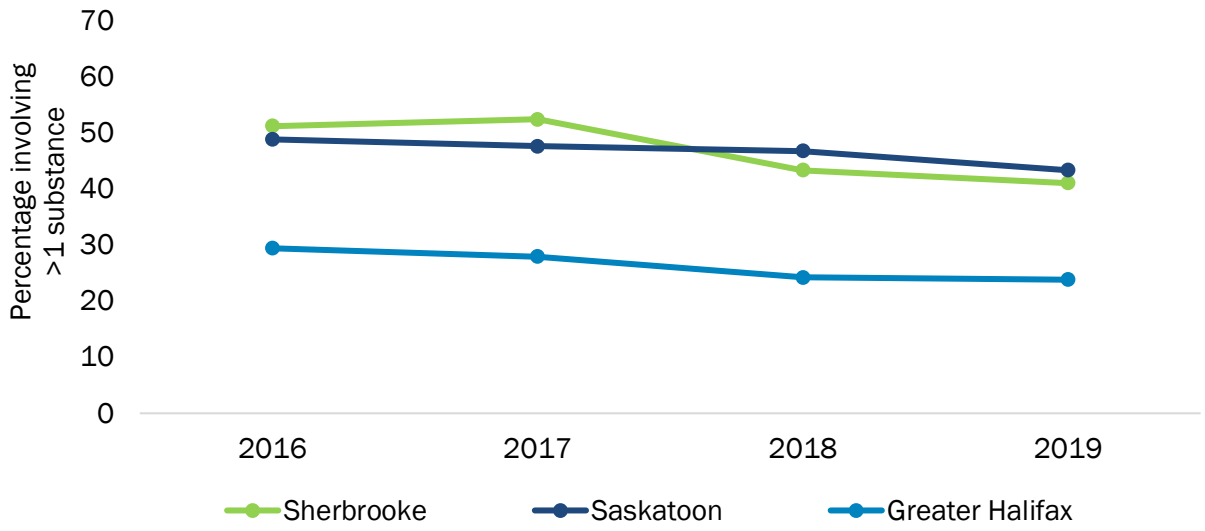
[2] These data may be an underestimate and should be interpreted with caution. A young person visiting the ED may not report all substances consumed or may not have been tested for either reported or unreported substances.

Figure 8. Total number of substances involved by region



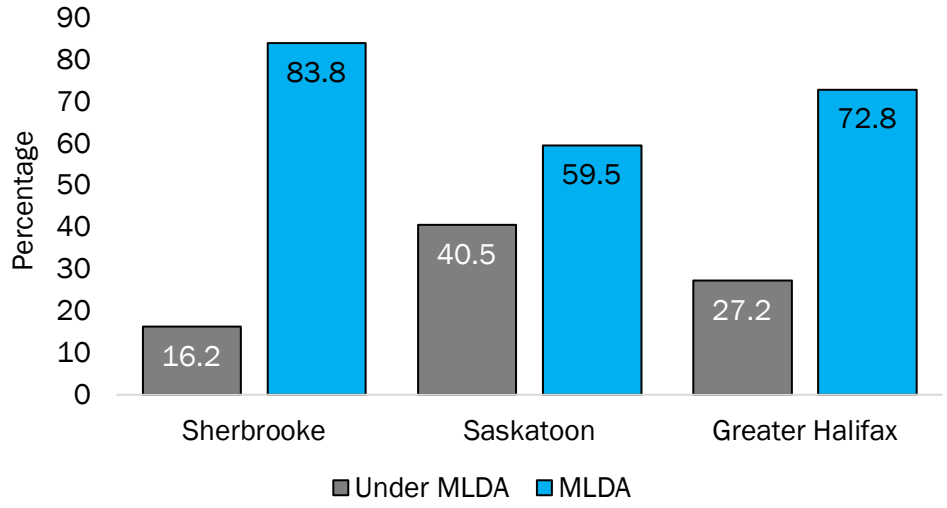
No significant trends were observed regarding the number of cases involving multiple substances in Sherbrooke ($\chi^2_{(3)} = 6.155$, $p = .104$), Saskatoon ($\chi^2_{(3)} = 7.011$, $p = .072$) or Greater Halifax ($\chi^2_{(3)} = 6.29$, $p = .101$) when examined over the four-year study period (see Figure 9).

Figure 9. Cases reporting the involvement of more than one substance by year and region



Those of MLDA were more likely to engage in polysubstance use than those who were underage across all regions (Figure 10).

Figure 10. Cases involving more than one substance by region and minimum legal drinking age (MLDA)



Contextual Information

Type of Alcohol Consumed[3]

Sherbrooke provided the most thorough data on the type of alcohol involved, with 73.5% of alcohol-related cases reporting a type. Of those reported, spirits were most frequently involved in ED visits (44.1%), followed by beer (32.5%), wine (10.2%) and flavoured purified alcohol beverages[4] (4.6%).

In Greater Halifax, data entries regarding type of alcohol were provided for 99.7% of all alcohol-related cases, though a substantial proportion of values were "unknown" (69.0%). Of the 31% of cases where the type was known, the most reported was spirits (73.2%), followed by beer (25.1%), wine (8.8%) and flavoured purified alcohol beverages (5.0%).

Type of Cannabis Product Consumed[5]

Across the sample, only 23.2% of cannabis-related cases reported the type of cannabis. Details for each region (where available) are reported below.

In Sherbrooke, the type of cannabis was reported in about 50% of cannabis-related cases. Of these cases, the most prevalent type was dried cannabis (84.4%), followed by edibles (9.1%), oil (3.2%) and other types such as dabs, extract and hashish (<2%).

[3] Because the type of alcohol consumed was not included for most cases in Saskatoon, we did not report on this variable for that region. Estimates are for the type of alcohol noted on the chart and whether it was consumed alone or with other types of alcohol.

[4] Flavoured purified alcohol beverages are made from alcohol purified through a process other than distillation. This removes the taste and smell typical of fermentation, and artificial flavours are added. An example of such a beverage is Four Loko™.

[5] Because the type of cannabis product consumed was not included for 98% of cases in Saskatoon, we did not report on this variable for that region.

In Greater Halifax, only 7.6% of cannabis-related cases reported a type of cannabis.[6] Of these cases, the majority reported consuming edibles (86.7%), followed by dabs (10%). Oil and other types of cannabis were reported in less than 2% of cases for which there was a value.

Type of Opioid Consumed

Of the sample, 81.3% of cases involving opioids reported a type. Details for each region (where available) are reported below.

In Sherbrooke, 62.8% of opioid-related cases contained information on which type was involved. Semi-synthetic opioids (e.g., hydromorphone and oxycodone) were most reported (59.2%), followed by natural opiates such as heroin, codeine and morphine (36.7%). Fully synthetic opioids such as fentanyl, carfentanil and methadone were the least reported of the three types (4.1%).

In Saskatoon, about 96% of opioid-related cases reported information on which type was involved. The most common type reported was natural opiates including heroin, codeine and morphine (50.0%), followed by fully synthetic opioids such as fentanyl (26.6%). Semi-synthetic opioids were slightly less common than fully synthetic opioids (23.4%)

In Greater Halifax, about 81% of opioid-related cases reported a type of opioid. Of these, the majority reported using semi-synthetic opioids (e.g., hydromorphone, oxycodone; 50.6%) followed by natural opiates (28.2%) and lastly by fully synthetic opioids (21.2%).

Where the Substance Was Consumed

Of the sample, only 6.2% provided information on where one or more of the in-scope substances was consumed.

In Sherbrooke, 13.6% of cases contained information on where the substance was consumed. Young people reported consuming substances at these locations:

- A bar, pub or nightclub (71.4%)
- Home (14.3%)
- A party or event (9.9%)
- School (4.4%)

In Saskatoon, 14.3% of cases provided information on where the substance was consumed. These locations were:

- Home (44.2%)
- A party or event (19.2%)
- A bar, pub or nightclub (10.5%)
- Other locations including a park, work or school (less than 3%)

In the Greater Halifax region, 35.4% of cases contained information on where the substance was consumed. These locations were:

- Home (31.5%)
- A bar, pub or nightclub (29.5%)

[6] In Greater Halifax it is possible that type of cannabis was reported only among cases that did not involve dried cannabis, but this cannot be confirmed with retrospective chart data.

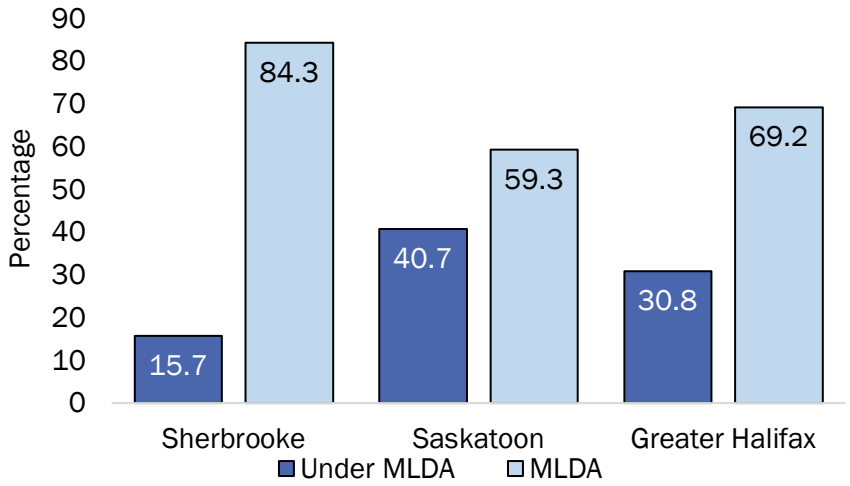
- Someone else's home (24.6%)
- Outdoor public spaces (5.2%)
- School (3.9%)
- A festival or event (1.5%)
- A shelter (1.7%)

Case Demographic Information

Age Distribution of Respondents

Of cases in selected EDs during the study, most were of MLDA to purchase and consume alcohol in their region (72%), compared to under (28%).[7] This trend was true for cases within each community studied, with more young people being of MLDA compared to under ($\chi^2(6) = 47.526$, $p < 0.001$; see Figure 11).

Figure 11. Emergency department presentations by minimum legal drinking age (MLDA) in each community



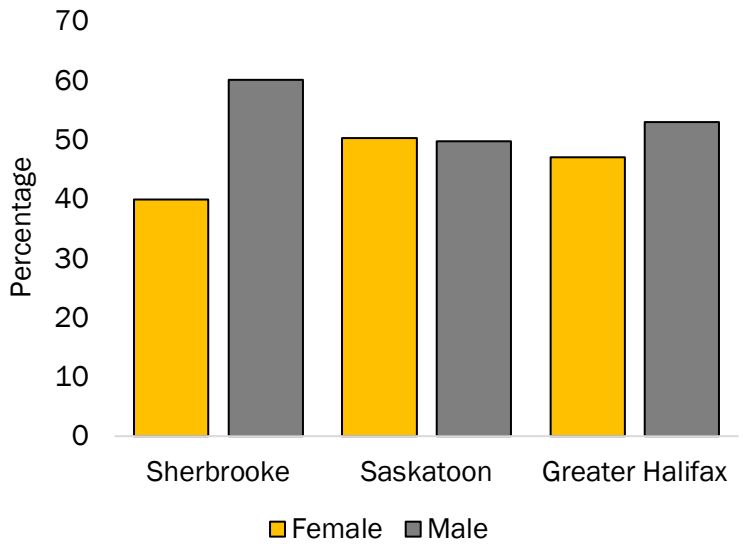
Sex Distribution of Respondents[8]

Of cases in the study, a slightly greater number of visits to EDs were by young males (54.5%) than young females (45.5%). In both Sherbrooke and Greater Halifax, there were significantly more males than females reporting to the EDs, whereas Saskatoon had slightly more females than males visiting the EDs (see Figure 12).

[7] In Quebec, the MLDA is 18 while the minimum age for cannabis use is 21. However, until December 21, 2019, the minimum age for both alcohol and cannabis use was 18. Because this report covers 2016–2019, Quebec data were analyzed according to whether patients were more or less than 18 years of age.

[8] The sex of the person presenting to the ED was noted on their chart. No alternatives to male and female were recorded. Further, information regarding gender and sexual orientation were not available on the charts.

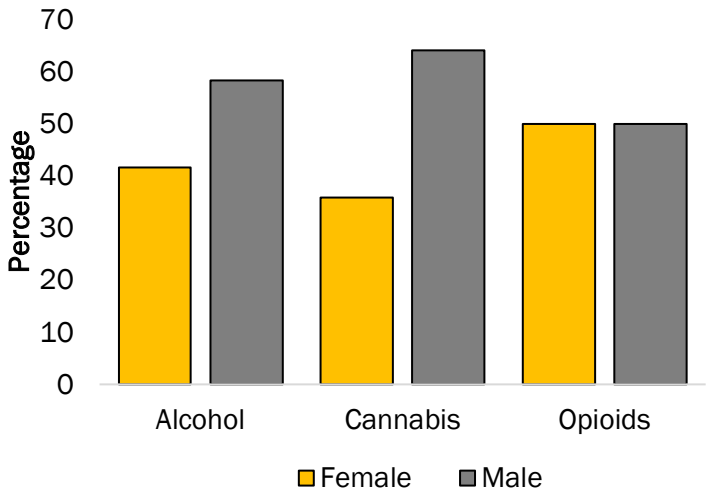
Figure 12. Emergency department presentations by sex and community



In-Scope Substance by Sex and Region

Of all alcohol-related cases visiting the ED in Sherbrooke, most patients were male (58.3%). Most cannabis-related cases also involved males (64.1%). There were no sex differences observed among opioid-related cases (see Figure 13).

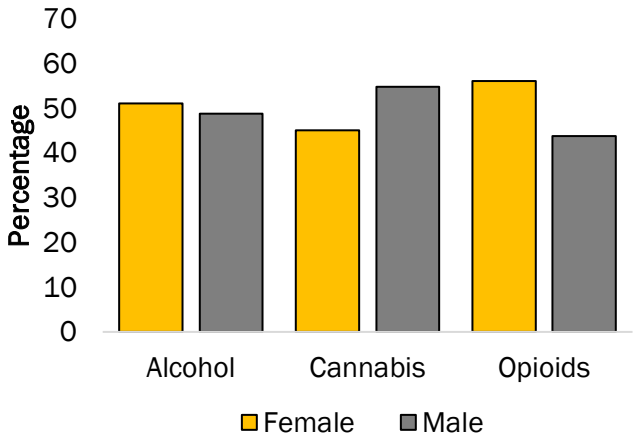
Figure 13. In-scope substance cases by sex, Sherbrooke



Note: Percentages may include the same individuals for more than one substance, as many young people reported consuming more than one in-scope substance (e.g., alcohol and cannabis).

In Saskatoon, more females presented with both alcohol- and opioid-related emergencies (51.2% and 56.1%, respectively), whereas more males presented with cannabis-related emergencies (54.9%; see Figure 14).

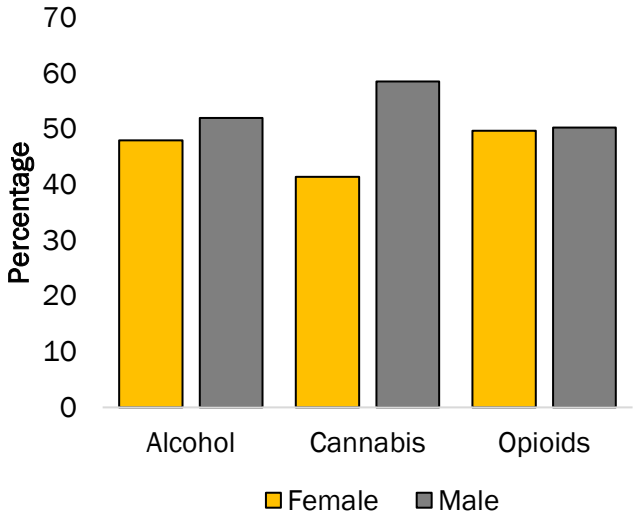
Figure 14. In-scope substance cases by sex, Saskatoon



Note: Percentages may include the same individuals for more than one substance, as many young people reported consuming more than one in-scope substance (e.g., alcohol and cannabis).

Greater Halifax saw a similar trend as Sherbrooke, with males more commonly reporting alcohol- and cannabis-related visits (52% and 58.6%, respectively). No sex differences were found for opioid-related cases (see Figure 15).

Figure 15. In-scope substance cases by sex, Greater Halifax



Note: Percentages may include the same individuals for more than one substance, as many young people reported having consumed more than one in-scope substance (e.g., alcohol and cannabis).

Polysubstance Use by Sex and Region

When examining polysubstance use, sex differences emerged and varied by region. In Sherbrooke, more males reported polysubstance use than females (58.7% vs. 41.3%, respectively); however, in Saskatoon more females reported polysubstance use than males (53.2% vs. 46.8%, respectively). There were no sex differences among cases involving polysubstance use in Greater Halifax.

Living Situation[9]

The patient's current living situation was reported in 61.5% (n = 1,274) of all cases in Sherbrooke and Saskatoon combined. For these two regions, the five most reported living situations were: with biological parent(s) (27.6%); with a partner or spouse (9.2%); living alone (5.9%); experiencing homelessness or having no fixed address (4.2%); and with other family (3.5%). However, the largest proportion of cases had an unknown living situation (34.9%).

When this variable was examined by MLDA for each region, differences were found between those under and those of legal age in both Sherbrooke ($\chi^2_{(12)}$ = 198.57, p < .001) and Saskatoon ($\chi^2_{(11)}$ = 54.407, p < .001). In Sherbrooke, young people under the MLDA were more likely to live with family, in a withdrawal management ("detox") centre or with a foster family. Those of legal age were more likely to live alone; in a group home, shelter or mental health housing; with a partner or spouse; with their children; or to be experiencing homelessness or having no fixed address (see Table 1).

In Saskatoon, those under the MLDA were more likely to live with family, their parent(s), at a withdrawal management ("detox") centre or with a foster family. Those of legal age were more likely to live alone, with a partner or spouse, with their children, or to be experiencing homelessness or having no fixed address (see Table 1).

Table 1. Living situation by minimum legal drinking age (MLDA)

Variable	Sherbrooke Under MLDA, %	Sherbrooke MLDA, %	Saskatoon Under MLDA, %	Saskatoon MLDA, %
With roommate(s)	10.5	89.5*	27.3	72.7
With family	61.0	39.0*	61.0	39.0*
Alone	0.0	100.0*	0.0	100.0*
With parent(s)	48.6	51.4*	53.2	43.8*
In a group home, shelter or mental health housing	48.1	51.9*	54.8	45.2
With partner or spouse	4.2	95.8*	11.1	88.9*
In a withdrawal management ("detox") centre	100.0	0.0*	100.0	0.0*
With children	0.0	100.0*	0.0	100.0*
In drug house or with dealer	50.0	50.0	50.0	50.0
With foster family	83.3	16.7*	100.0	0.0*
Experiencing homelessness or having no fixed address	12.7	87.3*	26.1	73.9*
Other	33.3	66.7	0.0	0.0
Unknown	36.4	63.6	36.4	63.6

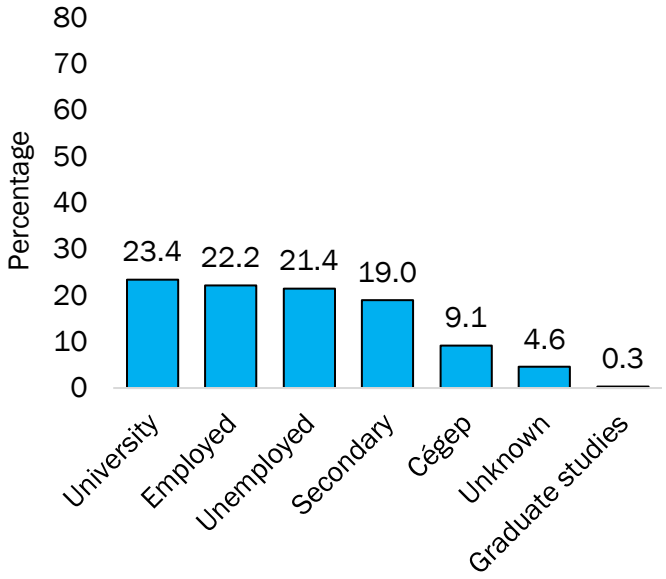
*Significantly different from alternate age group (p < .05).

[9] Data on living situation are not presented for Greater Halifax as this variable was not collected in three of the four hospitals examined.

School Enrolment Status[10]

In Sherbrooke, 49% of case charts indicated whether the young person was currently enrolled in school. Of the 64.1% who reported being in school, the majority were attending university, followed by secondary school and Cégep (see Figure 16).

Figure 16. School enrolment status, Sherbrooke

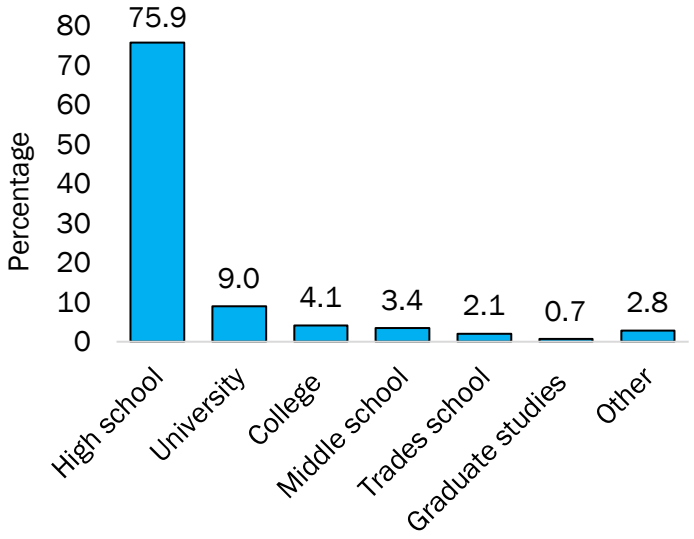


Note: This may be an under-representation of the number of students included in the Sherbrooke sample as these percentages reflect only those cases for which a value was reported for "current grade."

Although 99.8% of cases in Saskatoon included a value for current grade, a large percentage of these were "unknown" (79.9%). Of those who reported being in school (19.6%), most were attending high school. The second- and third-most reported were university and college (see Figure 17).

[10] Data on young people's school enrolment status are not presented for the Greater Halifax region as this variable was not collected in three out of the four EDs in that region. Additionally, descriptives are not provided for the overall sample as the school systems differ between Saskatchewan and Quebec.

Figure 17. Current grade, Saskatoon



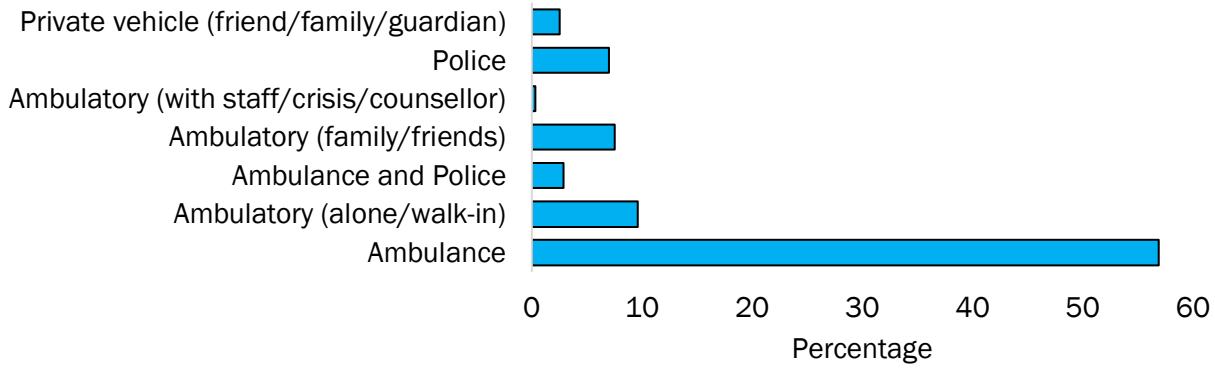
Note: This may be an under-representation of the number of students included in the Saskatoon sample as these percentages reflect only those cases for which a value was reported for "current grade."

Clinical Presentation

Mode of Transportation

Of the entire sample, most young people arrived at the ED by ambulance (56.9%), followed by walking in alone (9.6%) or walking in with family or friends (7.5%). See Figure 18.

Figure 18. Mode of transportation to the ED, whole sample



Triage Scores

Examining Canadian Triage and Acuity Scale (CTAS) scores by MLDA for the entire sample showed that 49% of young people below the MLDA in their region arrived with a potentially life-threatening condition (CTAS score of 2, Emergent) that requires immediate intervention. An additional 3.9% required resuscitation, which is a CTAS score of 1.

Young people of MLDA in their respective regions were most likely to be assigned a score of "3" (Urgent, 40.3 %), suggesting that if actions were not taken their condition could progress into a situation requiring more extensive emergency interventions. The full distribution of CTAS by MLDA can be found in Table 2.

Table 2. Canadian Triage and Acuity Scale (CTAS) scores by minimum legal drinking age (MLDA)

CTAS Score	Under MLDA, *n* (%)	MLDA, *n* (%)
Resuscitation (1)	3.9	4.7
Emergent (2)	49.0	38.4
Urgent (3)	34.7	40.3
Less urgent (4)	11.4	14.8
Non-urgent (5)	1.1	1.9

Note: There is some subjectivity in the CTAS score based on the discretion of the intake staff and the context in which the young person arrives at the ED.

Of the total sample, 77.6% (*n* = 3,594) had an initial Glasgow Coma Scale (GCS) value reported in their chart. In Sherbrooke and Saskatoon, both those under and of the MLDA had similar proportions in each GCS category (see Table 3). In Greater Halifax, those of legal age were more likely to report a mild GCS score rather than moderate or severe compared to those below the MLDA.

Table 3. Glasgow Coma Scale scores by minimum legal drinking age (MLDA)

Region and category	Under MLDA, *n* (%)	MLDA, *n* (%)
Sherbrooke, mild	118 (79.7)	635 (79.7)
Sherbrooke, moderate	14 (9.5)	89 (11.2)
Sherbrooke, severe	16 (10.8)	73 (9.2)
Saskatoon, mild	237 (89.8)	326 (84.7)
Saskatoon, moderate	6 (2.3)	11 (2.9)
Saskatoon, severe	21 (8.0)	48 (12.5)
Greater Halifax, mild	331 (80.0)	1,414 (89.2)*
Greater Halifax, moderate	53 (12.8)	108 (6.8)*
Greater Halifax, severe	30 (7.2)	64 (4.0)*

*Significantly different from alternate age group ($p < .05$).

Blood Alcohol Concentration

To determine how severe intoxication was for young people reporting recent alcohol use (or those suspected of consuming alcohol and tested for it), we examined the highest blood alcohol concentration (BAC) reported on their medical charts.

Of the entire sample:

- 37% (*n* = 1,713) of cases reported values from 0–108 millimoles per litre (mmol/l); and
- The average BAC for the entire sample was 37.88 mmol/l (SE ± .473).

For reference, 17 mmol/l is the approximate legal limit, > 33 mmol/l is the approximate toxic limit and > 90 mmol/l is the approximate lethal limit.

The highest BAC by MLDA for each of the regions was as follows:

In Sherbrooke:

- Under MLDA: 36.72 mmol/l (± 1.54)
- MLDA: 41.99 mmol/l (± 0.78)

Of note is the significant difference found in Sherbrooke, with those of legal age reporting significantly higher BACs than those under the MLDA. No further differences were found between age groups in the other regions.

In Saskatoon:

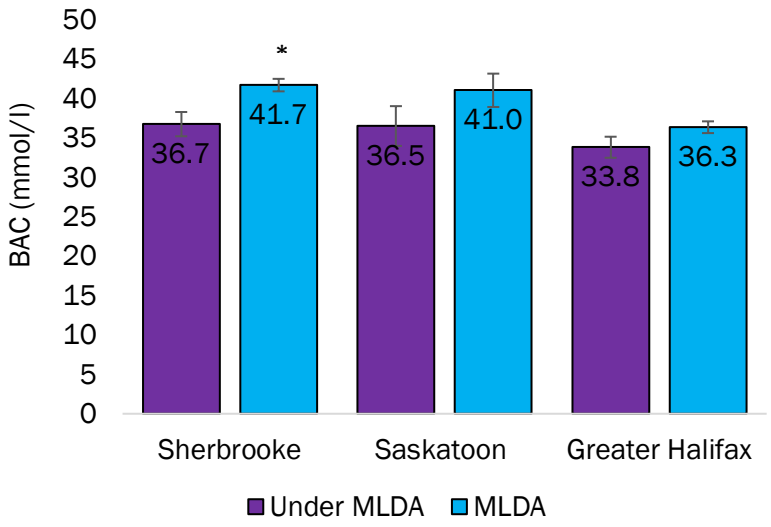
- Under MLDA: 37.95 mmol/l (± 2.50)
- MLDA: 41.21 mmol/l (± 2.16)

In Greater Halifax:

- Under MLDA: 38.07 mmol/l (± 1.37)
- MLDA: 36.49 mmol/l (± 0.75)

Average BACs for those both under MLDA and of MLDA were all above the approximate toxic limit of 33 mmol/l or 0.30% BAC. See Figure 19.

Figure 19. Highest average blood alcohol content (BAC) across regions by minimum legal drinking age (MLDA)



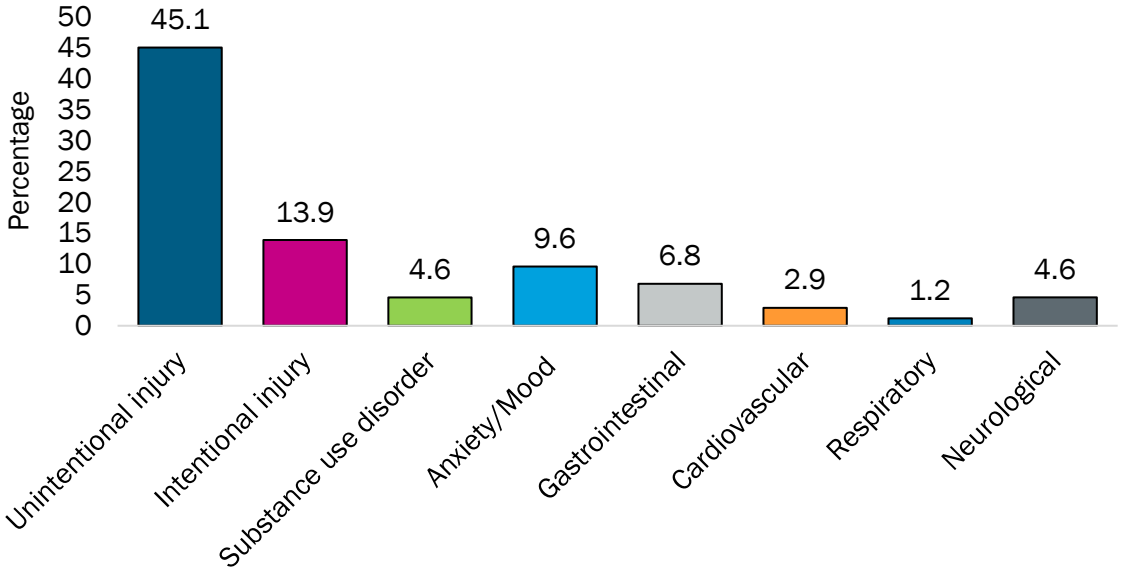
*Significantly different from alternate age group ($p < .05$).

Main Reason for Hospital Visit[11]

The most common reason patients visited the ED was for unintentional injuries related to one or more of alcohol, cannabis or opioids, which were reported in 45.1% of cases. Unintentional injuries include falls, motor vehicle accidents and those due to violence or assault.

The second-most common reason (13.9%) was intentional injury. This comprises self-harm behaviours of any nature, including suicide ideation and suicide attempts. The third-most common reason (9.6%) for ED visits was related to anxiety or mood disturbances (see Figure 20).

Figure 20. Main reason for visiting the emergency department, entire sample



Time of Presentation by Substance

The timing of visits to the ED was looked at to see if young people are more likely to have substance-related emergencies during the day or night, with 7 a.m. to 9:59 p.m. representing the day and 10 p.m. to 6:59 a.m. representing the night (Sherk et al., 2018).

Of the overall sample, more visits happened at night (55.3%) than during the day (44.7%). No differences between male and female patients were observed for time of arrival. However, those under the MLDA were more likely to come in during the day (53.4%) than at night (46.6%). The opposite was true for those of legal age, who were more likely to arrive at night (58.7%) than during the day (41.3%).

When looked at by region, night presentations were more common in Sherbrooke and Greater Halifax, while in Saskatoon more cases arrived during the day.

[11] The term "main reason" is used in place of "chief complaint" (the term used in the study itself) to improve accessibility in this report.

In all regions, time of presentation varied depending on the substance involved. Alcohol-related cases were more likely to arrive at night (see Figure 21), whereas cannabis- and opioid-related cases were more likely to arrive during the day (see Figure 22 and 23, respectively).

Figure 21. Time of presentation to the emergency department for cases involving alcohol

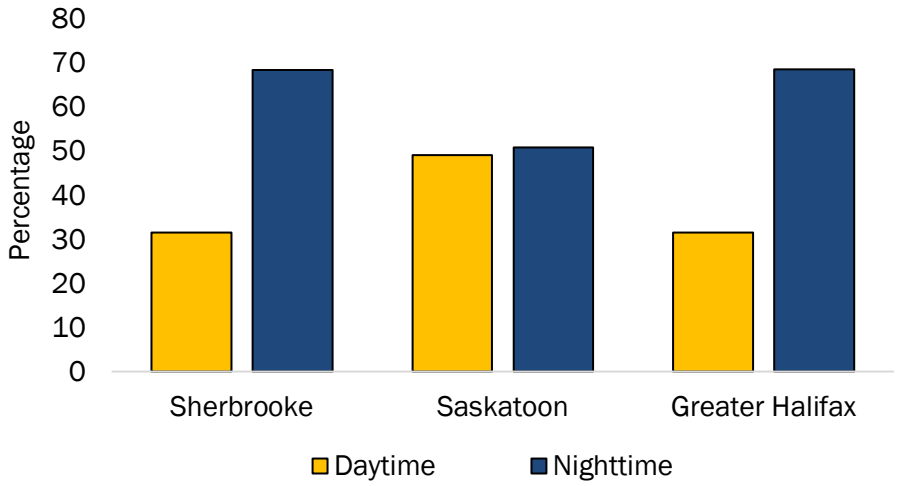


Figure 22. Time of presentation to the emergency department for cases involving cannabis

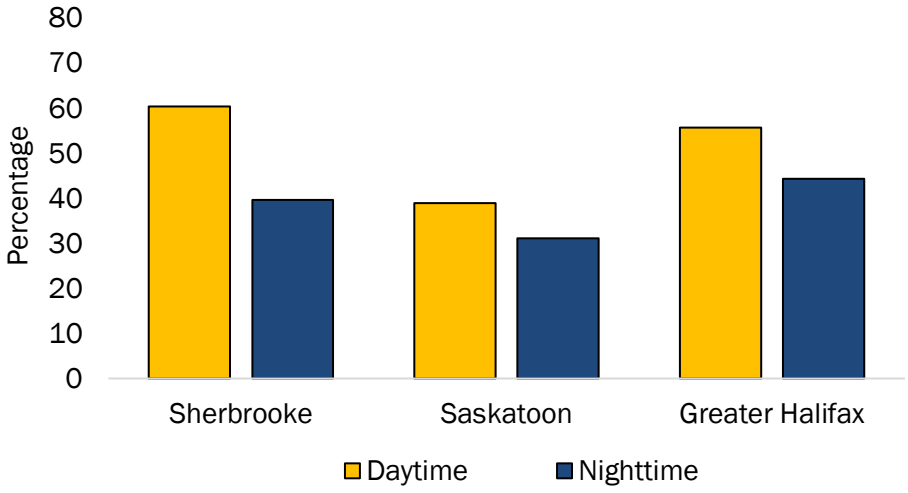
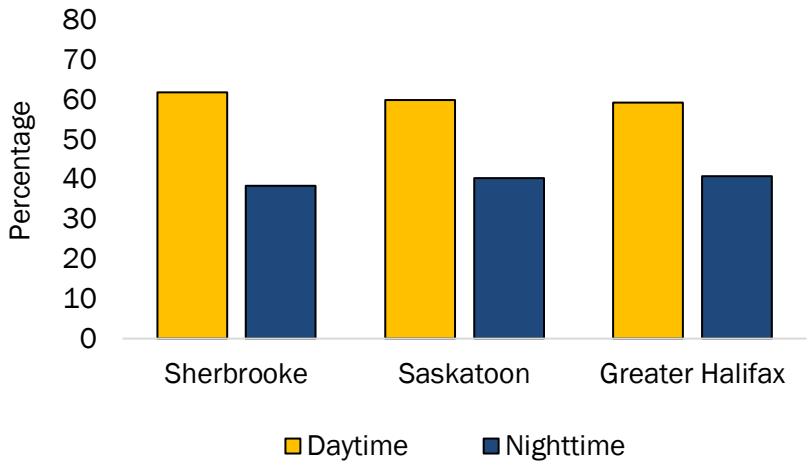


Figure 23. Time of presentation to the emergency department for cases involving opioids

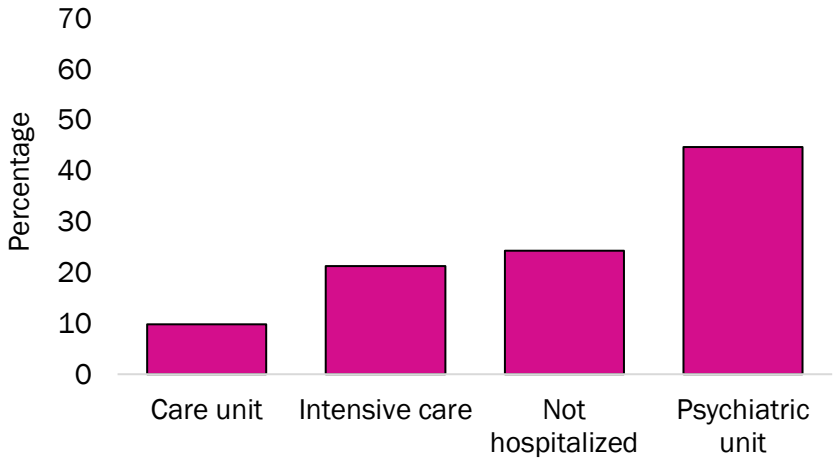


Course in Hospital

Outcomes[12]

In Sherbrooke, 27.3% (*n* = 367) of cases reported an outcome of the ED visit. Of these, 44.7% were transferred to a psychiatric unit, 24.2% were not hospitalized, 21.3% were placed in an intensive care unit and 9.8% were hospitalized in an alternate care unit (see Figure 24). It is possible that the remaining 72.7% of these young people were not hospitalized, but this cannot be stated with certainty.

Figure 24. Outcomes of emergency department visits in Sherbrooke

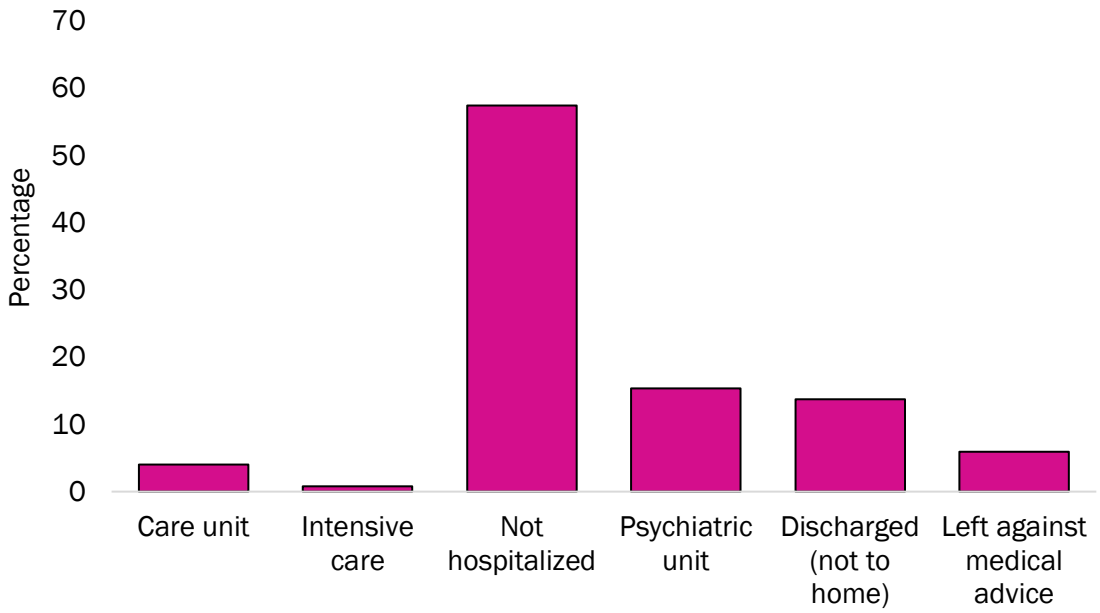


[12] In Greater Halifax, information as to whether an individual was hospitalized or where they were discharged to was not available for three of the four EDs. As a result, the data are not presented here.

In Saskatoon, 100% of cases (*n* = 726) reported an outcome of the ED visit (see Figure 25). Of these:

- 57.4% were not hospitalized;
- 15.4% were transferred to an inpatient psychiatric unit;
- 13.7% were discharged to a place other than home (e.g., to a group home, "detox" or police);
- Nearly 6% left against medical advice;
- Approximately 4% were admitted to a unit other than psychiatry;
- Less than 1% were admitted to the ICU/PICU; and
- 2.5% were referred to other mental health or community services.

Figure 25. Outcomes of emergency department visits in Saskatoon



Third Party Contacted[13]

Of the entire sample, only 28.3% of all cases noted if the ED contacted a third party in relation to the young person's visit.[14] In Sherbrooke, 44.8% of charts included information on who was contacted. Of these:

- 81.7% contacted a family member
- 17.2% contacted a friend
- 1.2% contacted someone "unknown"

In Saskatoon, 93.4% of charts noted who the ED contacted, but for many of these cases "no one" was contacted (41.5%) or the contacts were "unknown" (17.3%). Only 4.3% of cases documented an attempt at contacting a family member or friend.

[13] In Greater Halifax, information on who the ED contacted was not collected in any case report forms, therefore it is not included here.

[14] For Sherbrooke, it cannot be confirmed whether contact information for a third party was available for all cases. Fewer third parties may have been contacted due to a lack of contact information rather than to the practices of attending staff.

Past Medical History

Having a thorough understanding of a patient's past medical history is important both for treatment in an acute care setting such as the ED and for predicting future mental health and substance use related harms. This knowledge can also help in providing screening and brief interventions.

Past Care[15]

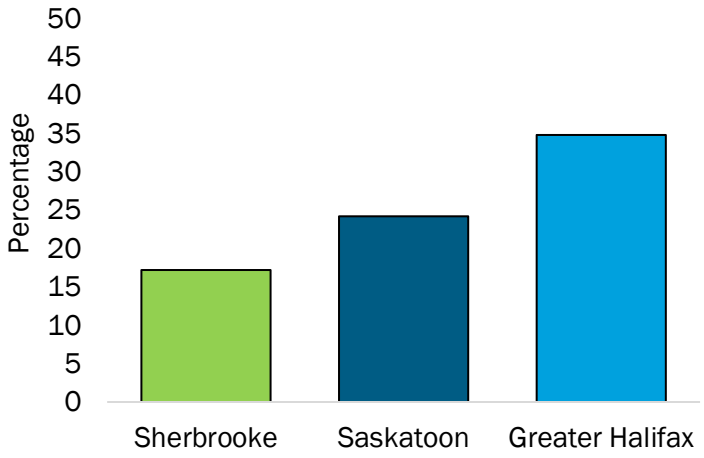
In Sherbrooke, 27.6% of all cases reported prior care from a family physician, pediatrician, psychiatrist or psychologist. Of those, the greatest proportion of cases reported having seen a psychiatrist (69.2%). In Saskatoon, just more than one-third (34.1%) of all cases reported having received prior care, with 90% of those reporting having been seen by a psychiatrist.

Prior ED Visits for Substance Use Related Issues[16]

Of the whole sample, only 32.6% of case reports contained information on whether the young person had visited the ED in the past for a substance use related emergency. Of these, 28.0% had visited the ED for a substance use related emergency in the past and 4.6% had not. The remaining 67.4% of cases did not indicate whether a prior visit had occurred.

Overall, the proportion of total cases varied between regions. Figure 26 shows, by region, the proportion of cases reporting at least one repeat visit. The highest percentage of repeat visits were in Greater Halifax (34.8%), followed by Saskatoon (24.2%) and Sherbrooke (17.2%; see Figure 26).

Figure 26. Cases reporting a prior visit to the emergency department for substance-related emergencies

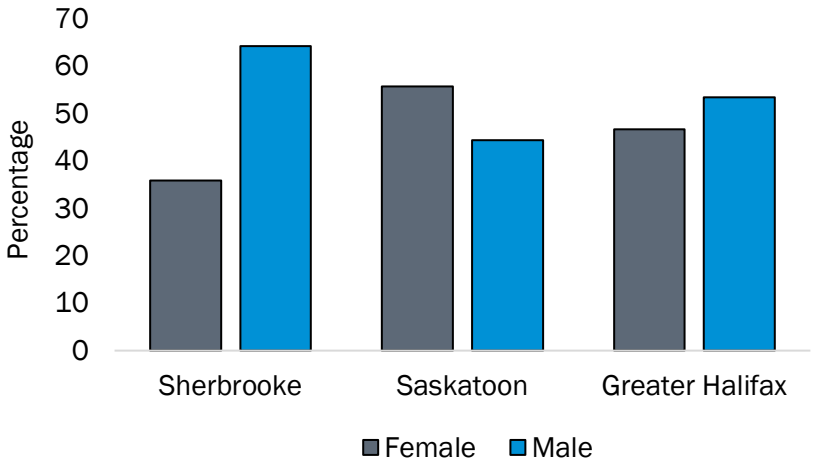


[15] Information on young people receiving care from alternate healthcare professionals before visiting the ED was not reported for any of the hospitals in the Greater Halifax region.

[16] In three of the four EDs in Greater Halifax, data on prior visits for a substance-related emergency were available only for visits relating to in-scope substances from 2011 on.

Analysis of the differences between males and females within each region showed that in Sherbrooke, a greater proportion of those reporting a previous substance use related visit were males (64.1%). The opposite was true in Saskatoon, with more females (55.7%) reporting a prior visit. No significant differences were found between sexes in Greater Halifax (see Figure 27).

Figure 27. Cases reporting a prior emergency department visit for substance-related emergencies, by sex



Known Comorbidities

Of the entire sample, 40% (*n* = 1,846) of young people visiting the ED had at least one known comorbidity:

- 34.1% of alcohol-related cases
- 51.2% of cannabis-related cases
- 53.0% of opioid-related cases

Common comorbidities included behavioural or psychiatric conditions (e.g., attention deficit hyperactivity disorder, anxiety, depression). Physical comorbidities (e.g., cardiac conditions, gastrointestinal disorders) were less common.

Discussion

Despite the continuously escalating opioid overdose emergency (Special Advisory Committee on the Epidemic of Opioid Overdoses, 2022) and stark warnings that cannabis legalization in 2018 would lead to a dramatic rise in use among young people (Kelsall, 2017), alcohol continues to be the top contributor to adolescents and young adults visiting EDs. Our data, collected from seven EDs in three communities, demonstrate this in all regions examined.

This also aligns with trends in past-year consumption of alcohol, cannabis and opioids among students in grades 7–12. Alcohol has had the highest prevalence (44.1%) with these students since 2016–2017 (Health Canada, 2020). Trends related to the use of these substances are found among postsecondary students as well, as reported in the *Canadian Postsecondary Education Alcohol and Drug Use Survey* (Health Canada, 2021). Finally, ED visits due to alcohol increased in Ontario by 175% between 2003 and 2016, showing how common harms related to alcohol have become (Myran et al., 2019).

More Investment is Needed

While it is important to monitor harms related to cannabis and opioids, significant investment is needed to reduce and prevent alcohol-related harms among young people. From a public health and security perspective, health professionals and policy makers must make alcohol use their main concern. In 2019 alone, of those reporting past-year consumption, a larger proportion of youth aged 15–19 years (38%) and young adults aged 20–24 years (40%) reported harms in relation to their alcohol use, compared with 18% of those 25 years and older (Statistics Canada, 2021).

Like previous studies on alcohol (Acker et al., 2019; Paradis et al., 2018a; Paradis et al., 2018b), this project showed that it — and more specifically, drinks high in alcohol content — is a significant contributor to young people visiting EDs. In Sherbrooke and Saskatoon, for example, medical charts specified the type of alcohol consumed and spirits were most often responsible for severe alcohol intoxication.

Males, Females and Cannabis

Overall, we found that a greater number of males arrived in the ED than did females, most consistently in relation to cannabis, which aligns with data showing that males are more likely to use cannabis frequently than females (Health Canada, 2021). Cannabis-related visits to the ED in other regions in Canada are also more likely to be by young males, as has been previously found (Moe et al., 2018; Bechard et al., 2022).

This finding suggests that education and prevention campaigns relating to cannabis harms should primarily be tailored to young males, as they are more likely to visit the ED for this issue. It is, however, recommended that surveillance of ED visits by sex as well as gender continue, particularly as some recent data show that females are consuming edibles to a greater extent than males (Government of Canada, 2021). Given the potential these products have for higher doses to be ingested (due to their delayed effects), this may lead to medical complications requiring emergency care (Monte et al., 2019).

Polysubstance Use and Supports

While findings from other studies indicated that polysubstance use has been rising among secondary students in Canada (Zuckermann et al., 2019), this was not the case in our sample. It remained

stable over the study period in all regions, though it was observed least among young people in Greater Halifax than in other regions. While it was indicated in more than one-third of our sample, most cases reported consumption of a single substance, which was overwhelmingly alcohol. When alcohol, cannabis or opioids were used together, the most frequent combination was alcohol and cannabis.

In general, young people tend to consume a greater number of substances as they age (Choi et al., 2018); however, there are few programs or policies addressing polysubstance use among young people in Canada specifically (Akbar et al., 2011; Butt et al., 2011; Das et al., 2016; Fischer et al., 2017; Xuan et al., 2015). Our results show that many young people experience harms related to using multiple substances; targeted supports should be offered to them following a visit to the ED. Little is currently known about transitioning from the ED to support services across Canada, but some research has recently been conducted in British Columbia (Glowacki et al., 2022).

Time of Presentation

Interestingly, the time of presentation to the ED differed by substance and patterns were consistent across regions. Alcohol-related cases were more likely to present at night (10 p.m. to 6:59 a.m.), while cannabis- and opioid-related cases were more likely to present during the day (7 a.m. to 9:59 p.m.). The increased likelihood of alcohol-related cases arriving late at night is consistent with findings from the previous study in Sherbrooke (Paradis et al., 2018).

The time of day in which young people present to the ED for a substance-related emergency is not often examined, and this context was mentioned anecdotally (and prior to data analysis) based on the experiences of ED physicians involved in this study. However, this type of data may have important implications for understanding the context around substance use. This, in turn, could help target harm reduction and preventive measures (e.g., for impaired driving among young people).

Groups Most at Risk of Severe Harms

Another worrying situation this study revealed is around the severity of harms that are bringing young people to the ED. Across all regions, many patients arrived by ambulance with BAC above the toxic limit. Those younger than the MLDA most frequently experienced potentially life-threatening situations requiring rapid medical intervention (CTAS score of 1 or 2), whereas those of legal age were most likely to receive a CTAS score of 3, indicating a slightly lower severity. So, while most visits involve those of legal age, underage people are more likely to arrive in worse condition. This points to the importance of educating underage youth about substances and of having open conversations around the harms associated with excessive drinking and high-risk use of other substances.

This further supports recommendations put forward in Sherbrooke (Paradis et al., 2018) around creating a support network for each youth. The objective is to ensure young people know they are not alone and to inform them and their other support people about services should they need them, including those related to substance use education and harm reduction/prevention.

Trends in Prior Care

Nearly one-third of all young people in our study had received prior care from a healthcare professional. In both Sherbrooke and Saskatoon this was most often a psychiatrist, indicating the high rates of comorbidity between mental illness or mental health challenges and substance use, resulting in harms (Rush et al., 2008). Many arriving in the ED during the study had already visited the ED for reasons related to substance use, suggesting these visits are not mere exceptions.

Indeed, recent studies have shown that 16.5%–21.9% of individuals who visit the ED frequently do so for the long term (Moe et al., 2021; Moe et al., 2022) and tend to exhibit more conditions related to mental health and substance use than those who visit frequently in the short term (Kanzaria et al., 2017; Chiu et al., 2020). Similar trends may also be seen in young people, so it is important they receive appropriate care following discharge to prevent such repeat visits.

More Services Needed for Mental Health and Addiction

While it may not be feasible at all sites due to capacity and funding restraints, it has been recommended that the establishment of rapid-access addiction clinics to support those who arrive in the ED with substance-related presentations would be greatly beneficial (Hann et al., 2020). Such tailored and, ideally, integrated support services for youth and young adults are key to preventing repeat substance-related medical emergencies.

In Alberta, an innovative model of a patient-centred approach to care is currently being piloted and evaluated (Freedman et al., 2020). It delivers the appropriate care and follow-up at the right time for children and youth brought to the ED for mental health and substance use reasons. The results will no doubt inform future recommendations.

As mentioned above, many young people presenting to the ED for substance use related issues also presented with comorbid mental health or psychiatric challenges. This is not surprising: recent data from young adults of postsecondary age show that of the 11% who reported medical use of cannabis, about 78% were using it for relief from a mental health condition (Smith et al., 2019). Additionally, of the 15% of young people in Ontario in 2019 who reported problematic[17] substance use on the Ontario Student Drug Use and Health Survey (OSDUHS), a mere 0.7% reported accessing a treatment program in the last 12 months (Boak et al., 2020). Greater awareness, availability and accessibility of outpatient services and supports in community settings are needed to help young people seek and receive support for their mental health and substance use challenges.

This problem is not new: ED visits for mental health and addiction among young people aged 10–24 years had already risen 33% from 2006–2011 (Gandhi et al., 2016). As such, a visit to the ED is an opportunity that needs to be leveraged as a starting point to provide appropriate support and harm reduction for young people.

The Importance of Making Contact

Establishing contact with family, caregivers or support networks after a young person has a substance-related ED visit is an important initiative that, in many cases, could prevent further harms. According to our findings, though, this is done infrequently (or is not consistently documented). The impact of this practice can be seen in the current Sherbrooke data, where, in cases containing information on who was contacted, nearly all involved contact with a family member or friend. This is a notable improvement over the 59% of cases that were contacted in relation to a visit during our previous case study (Paradis, Cyr & Cyr, 2018). This was likely achieved by the combination of enhanced ED practices, amended regulations and improved community awareness about young people and the harms of excessive alcohol consumption.

[17] "Problematic" is used in multiple surveys conducted in the context of monitoring substance use trends in Canada. It refers to patterns of use that are not medically recommended and may increase the likelihood of experiencing harms.

In addition, given the high proportion of young people suffering from self-harm or suicide ideation, it is essential that follow-up support is offered, and appropriate referrals are provided (Bennett et al., 2015). Although young people perceive less stigma related to mental health issues than the general population (Leger, 2021), it is very important that in-hospital care and other supports offered are free of stigma, as this has been identified as a major barrier to accessing and continuing care (Velasco et al, 2020).

Community Efforts

Since being made aware of the extent of harms related to spirits following the publication of our original case study, *Youth Alcohol Use and Its Harms: Case Study in the Community of Sherbrooke*, that community has made efforts to limit the consumption of high alcohol-content beverages (Paradis, Goupil, et al., 2018). A campaign was developed to inform parents and the greater community of the increased risks associated with these drinks, and efforts were also made to offer a selection of low-alcohol beverages at high-risk events such, as university orientation activities (Paradis, Cyr, et al., 2018; Paradis, Goupil, et al., 2018). Initiatives like these could be further developed by community leaders wanting to reduce alcohol-related harms among youth.

The COVID-19 Context

The type of enhanced ED surveillance conducted in the current study will be even more important going forward, given the COVID-19 pandemic context, as it will continue to have an impact on the mental health and substance use among young people living in Canada.

Our data show that intentional injuries are a significant contributor to ED visits among youth who have used substances. In the context of the pandemic, three-quarters of those experiencing mental health issues did not access support services (Leger, 2021). Serious considerations of suicide have also increased by 17% among youth during the pandemic, compared to a 9% increase among the general population (Leger, 2021).

Trends in substance use among youth have varied during the pandemic. Early on, 40% of young people who reported using alcohol or cannabis (alone or in combination) also indicated that they used them more often (Leger, 2021). Despite preliminary evidence suggesting that young people's use of cannabis since legalization has not increased to the extent predicted (Leyton, 2019; Haines-Saah & Fischer, 2021), it is still important to monitor ongoing trends throughout the pandemic and beyond to prevent harms such as ED visits.

By the end of the pandemic's first year, self-reported substance use among young people declined significantly (Boak et al., 2022). However, substance use disorders remained the fourth-most common reason for a hospital stay in Canada in 2020–2021 (CIHI, 2022). The decline in substance use toward the end of the first year of the pandemic also may not persist as public health restrictions continue to ease. Many young people may resume using alcohol or other substances in public settings and at social gatherings, which may cause a resurgence of ED visits or other harms. As such, monitoring should continue as young people, particularly young adults, resume socializing. As our data have shown, to achieve the most impact, alcohol, cannabis and opioids will be important to monitor at the community level.

Limitations

Pre-Pandemic Data

Perhaps the greatest limitation of this work was that our data was from before the pandemic. Data about substance use among youth during the COVID-19 pandemic in the United States (Johnston et al., 2022) show that the use of many substances has experienced the steepest decline in recorded history. There have also been some reports of reduced harms among young people in Canada, including fewer ED visits, though the impact on harms varies by region and by substance (CIHI, 2022). Young people may be consuming fewer substances because of reduced availability of substances, close proximity to guardians during stay-at-home orders and possibly less peer pressure. Whatever the reasons, it is worth exploring what aspect of the pandemic's preventive measures could keep harmful substance use among young people at this new level.

Conversely, the pandemic has also brought a substantially increased need for mental health services and supports, and these should be integrated with services and supports for substance use (e.g., Foundry and Youth Wellness Hubs Ontario; Halsall et al., 2019; Mathias et al., 2021). This increased demand for mental health services could result in a rebound in substance use (in an attempt to cope) as many young people who suffer from mental illness are unlikely to receive the supports they need and want. We must work to address the complex underpinnings of concurrent disorders and how best to address them, especially in young people.

Data Collection Practices

Data collection practices varied across regions and even within EDs in nearby communities. For example, one of this project's goals was to quantify and contextualize youth ED admissions for substance use. Our case report form included a question on where each substance was acquired (see Appendix B). Unfortunately, this data was inconsistently collected, particularly for cannabis and opioids. Because data on the context surrounding the events were sparsely available across locations, more thorough and prospective monitoring in this area could inform preventions and harm reduction efforts as it has in Sherbrooke (Paradis et al., 2018).

Additionally, some sites collected physical copies of patients' charts, which may lead to potential errors in data entry. This is less likely at sites where data were pulled from existing electronic data repositories.

Lack of Diversity Values in Data

There was also inconsistent collection or lack of data available for race, ethnicity and gender, which could help us better understand the experiences of various youth populations who may be accessing the ED for substance-related emergencies. Information on sex was included in our case report form; however, physicians may have documented gender rather than biological sex on medical charts. Going forward, best practices should be followed in relation to collecting patient information regarding sex and gender. Sex-, gender- and diversity-based analysis (SGBA+) should also be applied in all work relating to substance use and harms.

Information such as LGBTQ2+ status, disability and socioeconomic status (which is often associated with substance use harms and mental illness) were not available in our data set.

Unique Presentations Only

Overall, the data presented in this report represent the number of unique presentations to each ED examined across the study period but do not reflect the number of unique individuals who may have visited. A young person may have visited one ED multiple times throughout the study period, or the same individual may have gone to an alternate ED for a similar complaint. We were unable to capture that information here. Whether the young person visited an ED prior to their current visit for a substance use related issue is the best indicator we have for whether they experienced repeat visits. It is likely that the numbers reported here are an underestimate.

Conclusion

It is always alarming when adolescents or young adults arrive in an ED because of a substance use related emergency. However, it is also an opportunity to provide screening, tailored education, brief intervention and connection to additional support services.

Community-Driven Approaches are Needed

When it comes to prevention and harm reduction, one size does not fit all. As our study showed, the trends and characteristics of visits to EDs differed in many ways across communities. This reinforces the importance of collecting community-level data: what is happening nationally is not necessarily what is taking place locally. To reduce harms due to alcohol, cannabis and opioid use among young people, communities need to develop initiatives designed for their specific challenges.

In this regard, the Sherbrooke example is inspiring. After the publication of our first study on ED admissions (Paradis et al., 2018; Paradis et al., 2018), the community identified a variety of preventive measures and successfully implemented some of them. This has likely contributed to the downward trend in ED visits related to alcohol in Sherbrooke. The community has further changed its clinical approach to acute intoxication by systematically contacting parents and friends of young patients to ensure they are not alone, and that someone who cares about them is aware of their circumstances and can offer support.

Pandemic Recovery Brings Uncertainty

Efforts to prevent medical emergencies involving alcohol, cannabis and opioids among young people in Canada will be a pressing issue during the postpandemic recovery and beyond. Though ED visits involving alcohol among young people declined during the first year of the pandemic, hospitalizations increased. In addition, both ED visits and hospitalizations involving cannabis or opioids increased, with differing trends by gender (CIHI, 2021). In addition, mental health challenges among young people have increased during the pandemic (Leger, 2022) which may be associated with increased substance use and could have long-lasting implications. Together, this evidence points to a possible resurgence in alcohol and other substance use as public health restrictions continue to ease across the country.

It remains to be seen whether alcohol and other substance-related harms will return to pre-pandemic levels after the reopening of bars and nightclubs, as well as secondary and postsecondary campuses that often host large scale social events. Monitoring and surveillance at the national and local levels should continue as young people, particularly young adults, begin socializing again as we may see a rebound of medical emergencies involving substances. Given this, monitoring which substances and contextual factors are causing youth to require a trip to the ED will be more important than ever.

References

Acker, A., Norris, M. L., Coo, D., Santos, A., Allain, D., & Dow, K. (2019). Severe alcohol intoxication among Canadian youth: A 2- year surveillance study. *Paediatrics & Child Health,* e82–88. https://doi.org/10.1093/pch/pxz152

Acker, A., & Thomas, K. (2015). Severe alcohol intoxication in adolescents. In *2015 Results, Canadian Paediatric Surveillance Program* (pp. 30–32). Ottawa, Ont.: Canadian Paediatric Society. https://doi.org/10.1093/pch/20.5.e40

Adlaf, E. M., & Paglia-Boak, A. (2005). *Drug use among Ontario students: Detailed OSDUS findings, 1977–2005.* Toronto, Ont.: Centre for Addiction and Mental Health. https://www.camh.ca/-/media/files/pdf---osduhs/drugusereport_2019osduhs-pdf.pdf

Akbar, T., Baldacchino, A., Cecil, J., Riglietta, M, Sommer, B., & Humphris, G. (2011). Poly-substance use and related harms: A systematic review of harm reduction strategies implemented in recreational settings. *Neuroscience and Biobehavioural Reviews, 35*(5), 1186–1202. https://10.1016/j.neubiorev.2010.12.002

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, D. C.: Author.

April, N., Paradis, C., Maurice, A., Niquette, M., Cyr, C., & Morin, R. (2018). *Acute alcohol poisoning and sweetened alcoholic beverages.* www.inspq.qc.ca/sites/default/files/publications/2388_acute_alcohol_poisoning_sweetened_alcoholic_bevrages.pdf

Baraniecki, R., Pandhal, P., Malhotra, D. D., Aliferis, A., & Zia, A. (2021). Acute cannabis intoxication in the emergency department: The effect of legalization. *BMC Emergency Medicine*, *21*, Article 32. https://doi.org/10.1186/s12873-021-00428-0

B.C. Centre for Disease Control (2021). *Dual public health emergencies: Overdose in BC during COVID-19.* http://www.bccdc.ca/resource-gallery/Documents/Statistics%20and%20Research/Statistics%20and%20Reports/Overdose/2021.04.16_Infographic_OD%20Dashboard.pdf

Bechard, M., Cloutier, P., Lima, I., Salamatmanesh, M., Zemek, R., Bhatt, M., … Gardner, W. (2022). Cannabis-related emergency department visits by youths and their outcomes in Ontario: A trend analysis. *CMAJ Open, 10*(1,) E100-E108. https://doi.org/10.9778/cmajo.20210142

Bennett, K., Rhodes, A. E., Duda, S., Cheung, A. H., Manassis, K., Links, P. … Szatmari, P. (2015). A youth suicide prevention plan for Canada: A systematic review of reviews. *Canadian Journal of Psychiatry, 60*(6), 245–257. https://doi.org/10.1177/070674371506000603

Boak, A., Elton-Marshall, T., & Hamilton, H. A. (2022). *The Well-being of Ontario students: Findings from the 2021 Ontario Student Drug Use and Health Survey (OSDUHS).* Toronto, Ont.: Centre for Addiction and Mental Health. https://www.camh.ca/-/media/files/pdf---osduhs/2021-osduhs-report-pdf.pdf

Boak, A., Elton-Marshall, T., Mann, R. E., & Hamilton, H. A. (2020). *Drug use among Ontario students, 1977–2019: Detailed findings from the Ontario Student Drug Use and Health Survey (OSDUHS).* Toronto, Ont.: Centre for Addiction and Mental Health. https://www.camh.ca/-/media/files/pdf---osduhs/drugusereport_2019osduhs-pdf.pdf

Bullard, M. J., Musgrave, E., Warren., D., Unger, B., Skeldon, T., Greierson, R. ... Swain, J. (2017). Revisions to the Canadian Emergency Department Triage and Acuity Scale (CTAS) guidelines 2016. *CJEM, 19*(S2), S18–S27. https://doi.org/10.1017/cem.2017.365

Butt, P., Beirness, D., Gliksman, L., Paradis, C., & Stockwell, T. (2011). *Alcohol and health in Canada: A summary of evidence and guidelines for low-risk drinking. Ottawa*, Ont.: Canadian Centre on Substance Use and Addiction. https://www.uvic.ca/research/centres/cisur/assets/docs/report-alcohol-and-health-in-canada.pdf

Canadian Centre on Substance Use and Addiction. (2022). Clearing the smoke on cannabis: Highlights (May 2022 Update). Ottawa, Ont.: Author. https://www.ccsa.ca/sites/default/files/2022-05/CCSA-Clearing-the-Smoke-on-Cannabis-Highlights-2022-en_0.pdf

Canadian Institute for Health Information. (2009). *International Statistical Classification of diseases and Related Health Problems, 10th revision, Canada*. Ottawa, Ont.: Author.

Canadian Institute for Health Information. (2014). *Sources of potentially avoidable emergency department visits*. Ottawa, Ont.: Author. https://secure.cihi.ca/free_products/ED_Report_ForWeb_EN_Final.pdf

Canadian Institute for Health Information. (2019). *Hospital stays for harm caused by substance use among youth aged 10 to 14.* Ottawa, Ont.: Author. https://www.cihi.ca/sites/default/files/document/hsu-youth-report-2019-en-web.pdf

Canadian Institute for Health Information. (2021). *Unintended Consequences of COVID-19: Impact on Harms Caused by Substance Use*. Ottawa, Ont.: Author. https://secure.cihi.ca/free_products/unintended-consequences-covid-19-substance-use-report-en.pdf

Canadian Institute of Health Information. (2022). *Hospital Stays in Canada*. Ottawa, Ont.: Author. https://www.cihi.ca/en/hospital-stays-in-canada

Chief Public Health Officer. (2018). *The Chief Public Health Officer's report on the state of public health in Canada, 2018: preventing problematic substance use in youth*. www.canada.ca/en/public-health/corporate/publications/chief-public-health-officer-reports-state-public-health-canada/2018-preventing-problematic-substance-use-youth.html

Chiu, Y. M., Vanasse, A., Courteau, J., Chouinard, M-C., Dubois, M-F., Dubuc, N., ... Hudon, C. (2020). Persistent frequent emergency department users with chronic conditions: A population-based cohort study. *PLOS ONE*. https://doi.org/10.1371/journal.pone.0229022

Choi, H. J., Lu, M., Schulte, M., & Temple, J. R. (2018). Adolescent substance use: Latent class and transition analysis. *Addictive Behaviours, 77,* 160–165. https://doi.org/10.1016/j.addbeh.2017.09.022

Das, J. K., Salam, R. A., Arshad, A., Finkelstein, Y., & Bhutta, Z. A. (2016). Interventions for adolescent substance abuse: An overview of systematic reviews. *Journal of Adolescent Health, 59*(4), S61–S75. https://doi.org/10.1016/j.jadohealth.2016.06.021

Davidson, P., Koziol-McLain, J., Harrison, L., Timken, D., & Lowenstein, S. R. (1997). Intoxicated ED patients: A 5-year follow-up of morbidity and mortality. *Annals of Emergency Medicine, 30*(5), 593–597. https://doi.org/10.1016/s0196-0644(97)70074-x

DeWit, D. J., Hance, J., Offord, D. R., & Ogborne, A. (2000). The influence of early and frequent use of marijuana on the risk of desistance and of progression to marijuana-related harm. *Preventive Medicine*, *31* (5), 455–464. https://doi.org/10.1006/pmed.2000.0738

Fischer, B., Russell, C., Sabioni, P., van den Brink, W., Le Foll, B., Hall, W. … Room, R. (2017). Lower-risk cannabis use guidelines: A comprehensive update of evidence and recommendations. *American Journal of Public Health, 107*(8), E1–E12. https://doi.org/10.2105/AJPH.2017.303818

Freedman, S., Thull-Freedman, J., Lightbody, T., Prisnie, K., Wright, B., Coulombe, A. … Newton, A. (2020). Introducing an innovative model of acute pediatric mental health and addictions care to paediatric emergency departments: A protocol for a multicentre prospective cohort study. *BMJ Open Quality, 9*, Article e001106. https://doi.org/10.1136/bmjoq-2020-001106

Gandhi, S., Chiu, M., Lam, K., Cariney, J. C., Guttman, A., & Kurdyak, P. (2016). Mental health service use among children and youth in Ontario: Population-based trends over time. *Canadian Journal of Psychiatry*, *61*(2), 119–124. https://doi.org/10.1177/0706743715621254

Glowacki, K., Whyte, M., Weinstein, J., Marchand, K., Barbic, D., Scheuermeyer, F. … Barbic, S. (2022). Exploring how to enhance are pathways between the emergency department and integrated youth services for young people with mental health and substance use concerns. *BMC Health Serv Res, 22*(1), 615. https://doi.org/10.1186/s12913-022-07990-8

Government of Canada (2021). Canadian Cannabis Survey 2020: Summary. https://www.canada.ca/en/health-canada/services/drugs-medication/cannabis/research-data/canadian-cannabis-survey-2020-summary.html

Gravel, J., Manzano, S., & Arsenault, M. (2009). Validity of the Canadian Pediatric Triage and Acuity Scale in a tertiary care hospital. *CJEM, 11*(1), 23–28. https://doi.org/10.1017/s1481803500010885

Haider, A. H., Risucci, D. A., Omer, S. B., Sullivan, T., DiRusso, S. M., Savino, J. A., & Paidas, C. N. (2004). Injury prevention priority score: A new method for trauma centers to prioritize injury prevention initiatives. *Journal of the American College of Surgeons, 198*(6), 906–913. https://doi.org/10.1016/j.jamcollsurg.2004.02.013

Haines-Saah, R. J., & Fischer, B. (2021). Youth cannabis use and legalization in Canada - Reconsidering the fears, myths and facts three years in. *Journal of the Canadian Academy of Child and Adolescent Psychiatry, 30*(3), 191–196. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8315217/pdf/ccap30_p0191.pdf

Hall, W. (2015). What has research over the past two decades revealed about the adverse health effect of recreational cannabis use? *Addiction, 110*(1), 19–35. https://doi.org/10.1111/add.12703

Halsall, T., Manion, I., Iyer, S. N., Mathias, S., Purcell, R., & Henderson, J. (2019). Trends in mental health system transformation: Integrating youth services within the Canadian context. *Healthcare Management Forum, 32*(2), 51–55. https://doi.org/10.1177/0840470418808815

Hann, J., Wu, H., Gauri, A., Dong, K., Lam, N., Bakal, J. A., & Kirkham, A. (2020). Identification of emergency department patients for referral to rapid-access addiction services. *CJEM, 22*(2), 170–177. https://doi.org/10.1017/cem.2019.453

Health Canada. (2019). Canadian Postsecondary Education Alcohol and Drug Use Survey: 2019/2020 Supplementary tables. Ottawa, Ont.: Author. https://health-infobase.canada.ca/alcohol/cpads/data-tables.html

Health Canada. (2020). Canadian Student Tobacco, Alcohol and Drugs Survey: Detailed tables for 2018–19. Ottawa, Ont.: Author. https://www.canada.ca/en/health-canada/services/canadian-student-tobacco-alcohol-drugs-survey/2018-2019-detailed-tables.html

Health Canada. (2021). Canadian Cannabis Survey 2019 - Summary. Ottawa, Ont.: Author. https://www.canada.ca/en/health-canada/services/publications/drugs-health-products/canadian-cannabis-survey-2019-summary.html

Hingson, R. W., Heeren, T., & Winter, M. R. (2006). Age at drinking onset and alcohol dependence: Age at onset, duration, and severity. *Archives of Pediatrics & Adolescent Medicine.* https://doi.org/10.1001/archpedi.160.7.739

Jansen, A. C., van Aalst-Cohen, E. S., Hutten, B. A., Büller, H. R., Kastelein, J. J., & Prins, M. H. (2005). Guidelines were developed for data collection from medical records for use in retrospective analyses. *Journal of Clinical Epidemiology, 58*(3), 269–274. https://doi.org/10.1016/j.jclinepi.2004.07.006

Johnston, L. D., Miech, R. A., O'Malley, P. M., Bachman, J. G., Schulenberg, J. E., & Patrick, M. E. (2022). Monitoring the Future national survey results on drug use 1975-2021: Overview, key findings on adolescent drug use. Ann Arbor: Institute for Social Research, University of Michigan. http://www.monitoringthefuture.org//pubs/monographs/mtf-overview2021.pdf

Kanzaria, H. K., Niedzwiecki, M., Cawley, C. L., Chapman, C., Sabbagh, S. H., Riggs, E., ...Raven, M. C. (2019). Frequent emergency department users: Focusing solely on medical utilization misses the whole person. *Health Affairs, 38*(11), 1866–1875. https://doi.org/10.1377/hlthaff.2019.00082

Kelsall, D. (2017). Cannabis legalization fails to protect Canada's youth. *CMAJ*, *189(29),* E737–38. https://doi.org/10.1503/cmaj.170555

Kutcher, S. P., & Szumilas, M. (2008). Youth suicide prevention. *CMAJ, 178*(3), 282–285. https://doi.org/10.1503/cmaj.071315.

Leger. (2021). *Mental health and substance use during COVID-19: Summary report 4: Spotlight on youth, older adults & stigma.* Ottawa, Ont.: Canadian Centre on Substance Use and Addiction & Mental Health Commission of Canada. https://mentalhealthcommission.ca/wp-content/uploads/2021/12/leger_poll_spotlight_on_youth_older_adults_stigma.pdf

Leger. (2022). *Mental health and substance use during COVID 19: Summary report 5: Spotlight on suicidal ideation and substance use*. Ottawa, Ont.: Canadian Centre on Substance Use and Addiction & Mental Health Commission of Canada. https://mentalhealthcommission.ca/resource/mental-health-and-substance-use-during-covid-19-spotlight-on-suicidal-ideation-and-substance-use/

Leyton M. (2019). Cannabis legalization: Did we make a mistake? Update 2019. *Journal of Psychiatry & Neuroscience, 44*(5), 291–293. https://doi.org/10.1503/jpn.190136

Mathias, S. Tee, K., Helfrich, W., Gerty, K., Chan, G., & Barbic, S. P. (2021). Foundry: early learnings from the implementation of an integrated youth service network. *Early Intervention in Psychiatry, 16*(4), 410–418. https://doi.org/10.1111/eip.13181

Merrin, G. J., Thompson, K., & Leadbeater, B. J. (2018). Transitions in the use of multiple substances from adolescence to young adulthood. *Drug and Alcohol Dependence, 189*(1), 147–153. https://doi.org/10.1016/j.drugalcdep.2018.05.015

Moe, J., Camargo, C. A., Jelinski, S., Erdelyi, S., Brubacher, J., & Rowe, B. (2018). Epidemiologic trends in substance and opioid misuse-related emergency department visits in Alberta: A cross-sectional time-series analysis. *Canadian Journal of Public Health, 109*, 164–173. https://doi.org/10.17269/s41997-018-0053-6

Moe, J., O'Sullivan, F., McGregor, M. J., Schull, M. J., Dong, K., Holroyd, B. R., … McGrail, K. M. (2021). Characteristics of frequent emergency department users in British Columbia, Canada: A retrospective analysis. *CMAJ open, 9*(1), E134–E141. https://doi.org/10.9778/cmajo.20200168

Moe, J., Wang, E. Y., McGregor, M. J., Schull, M. J., Dong, K., Holroyd, B. R. … McGrail, K. M. (2022). People who make frequent emergency department visits based on persistence of frequent use in Ontario and Alberta: A retrospective cohort study. *CMAJ Open, 10*(1), E220–E231. https://doi.org/10.9778/cmajo.20210131

Monte, A. A., Shelton, S. K., Mills, E., Saben, J., Hopkinson, A., Sonn, B. … Abbott, D. (2019). Acute illness associated with cannabis use by route of exposure: An observational study. *Annals of Internal Medicine, 170*(8), 531–537. https://doi.org/10.7326/M18-2809

Mothers Against Drunk Driving (MADD) Canada (n.d.), Blood Alcohol Concentration (BAC). https://madd.ca/pages/impaired-driving/overview/blood-alcohol-concentration-bac/?gclid=Cj0KCQjwy5maBhDdARIsAMxrkw31k5XMlkQtbEAJtP1T2dOP2jmj8dZFyz0QisVDwcwj3IcXvkMXro0aAm2MEALw_wcB

Murray, M. J. (2003). The Canadian Triage and Acuity Scale: A Canadian perspective on emergency department triage. *Emergency Medicine, 15*(1), 6–10. https://doi.org/10.1046/j.1442-2026.2003.00400.x

Myran, D. T., Hsu, A. T., Smith, G., & Tanuseputro, P. (2019). Rates of emergency department visits attributable to alcohol use in Ontario from 2003 to 2016: A retrospective population-level study. *CMAJ, 191,* E804–10. https://doi.org/10.1503/cmaj.181575

Paradis, C., Cyr, L. O., & Cyr, C. (2018). Alcohol-related emergency department visits among adolescents and young adults in Sherbrooke, Canada. *Canadian Journal of Addiction, 9*(4), 25–31. https://doi.org/10.1097/CXA.0000000000000033

Paradis, C., Goupil, J. P., Cyr, C., & Proulx, C. (2018). *Youth alcohol use and its harms: Case study in the community of Sherbrooke*. Ottawa, Ont.: Canadian Centre on Substance Use and Addiction. https://www.ccsa.ca/sites/default/files/2019-04/PEP-AH-Youth-Alcohol-Use-Harms-Sherbrooke-Case-Study-Report-2018-en_0.pdf

Patton, G. C., Coffey, C., Carlin, J. B., Degenhardt, L., Lynskey, M., & Hall, W. (2002). Cannabis use and mental health in young people: Cohort study. *British Medical Journal, 325*(7374), 1195–1198. https://doi.org/10.1136/bmj.325.7374.1195

Rottermann, M. (2021). Looking back from 2020, How cannabis use and related behaviours changed in Canada. *Health Reports, 32*(4), 3–14. https://doi.org/10.25318/82-003-x202100400001-eng

Rush, B., Urbanoski, K., Bassani, D., Castel, S., Wild, T.C., Strike, C. … Somers, J. (2008). Prevalence of co-occurring substance use and other mental disorders in the Canadian population. *Canadian Journal of Psychiatry, 53*(12), 800–809. https://doi.org/10.1177/070674370805301206

Sarkar, S., & Seshadri, D. (2014). Conducting record review studies in clinical practice. *Journal of Clinical and Diagnostic Research, 8*(9), JG01–JG04. https://doi.org/10.7860/JCDR/2014/8301.4806

Shatterproof. (2022). *Addiction Language Guide. National Movement to End Addiction Stigma.* https://www.shatterproof.org/sites/default/files/2021-02/Stigma-AddictionLanguageGuide-v3.pdf

Shen, J. J., Shan, G., Kim, P. C., Yoo, J. W., Dodge-Francis, C., & Lee, Y. J. (2018). Trends and related factors of cannabis-associated emergency department visits in the United States: 2006–2014. *Journal of Addiction Medicine*. https://doi.org/10.1097/ADM.0000000000000479

Sherk, A., Stockwell, T., & Callaghan, R. C. (2018). The effect on emergency department visits of raised alcohol minimum prices in Saskatchewan, Canada. *Drug and Alcohol Review,* 37(Supp. 1), S357–S365. https://doi.org/10.1111/dar.12670

Simon, R., Snow, R., & Wakeman, S. (2020). Understanding why patients with substance use disorders leave the hospital against medical advice: A qualitative study. *Substance Abuse, 41,* 519–525. https://doi.org/10.1080/08897077.2019.1671942

Smith, J. M., Mader, J., Szeto, A. C., Arria, A. M., Winters, K. C., & Wilkes, T. C. (2019). Cannabis use for medicinal purposes among Canadian university students. *Canadian Journal of Psychiatry, 64*(5), 351–355. https://doi.org/10.1177/0706743718818420

Special Advisory Committee on the Epidemic of Opioid Overdoses. (2022). Opioid- and Stimulant-related Harms in Canada. Ottawa, Ont.: Public Health Agency of Canada. https://health-infobase.canada.ca/substance-related-harms/opioids-stimulants

Statistics Canada. (2021). 2019 Canadian Alcohol and Drugs Survey (CADS): 2019 detailed tables. Ottawa, Ont.: Health Canada. https://www.canada.ca/en/health-canada/services/canadian-alcohol-drugs-survey/2019-summary/detailed-tables.html

Velasco, A. A., Santa Cruz, I. S., Billings, J., Jimenez, M., & Rowe, S. (2020). What are the barriers, facilitators and interventions targeting help-seeking behaviours for common mental health problems in adolescents? A systematic review. *BMC Psychiatry, 20,* Article 293. https://doi.org/10.1186/s12888-020-02659-0

Xuan, Z., Blanchette, J. G., Nelson, T. F., Nguyen, T. H., Hadland, S. E., Oussayef, N. L. … Naimi, T. S. (2015). Youth drinking in the United States: Relationships with alcohol policies and adult drinking. *Pediatrics, 136(1)*, 18–27. https://doi.org/10.1542/peds.2015-0537

Zuckermann, A. M. E., Battista, K. V., Belanger, R. E., Haddad, S., Butler, A., Costello, M. J., & Leatherdale, S. T. (2021). Trends in youth cannabis use across cannabis legalization: Data from the COMPASS prospective cohort study. *Preventive Medicine Reports, 22*, Article 101351. https://doi.org/10.1016/j.pmedr.2021.101351

Zuckermann, A. M. E., Williams, G., Battista, K., de Groh, M., Jiang, Y., & Leatherdale, S. T. (2019). Trends of poly-substance use among Canadian youth. *Addictive Behaviours, 10,* Article 100189. https://doi.org/10.1016/j.abrep.2019.100189

Appendix A: Case Definition

Any consultation between January 1, 2016, and December 31, 2019, for adolescent and young adult (> 12 to < 25 years old) in your emergency department (ED) with the following criteria:

A) **Alcohol**-related ED visits will be identified with:

1. ICD-10 codes for acute and chronic causes 100% attributable to alcohol (see Table 1), whether it was the most responsible diagnosis, the main problem or comorbidity.
2. ICD-10 codes for i) assaults, ii) falls, iii) motor vehicle collisions and iv) the total of all alcohol-related injury visits (see Table 2)
   AND
   History of drinking 24 hours before the visit.
   OR
   Blood alcohol concentration (BAC) > 0.

Table 1

Acute Causes - 100% Alcohol Attributable	**ICD-10 Codes**
Alcohol poisoning	X45, Y15, T51.0, T51.1, T51.9
Suicide by and exposure to alcohol	X65
Excessive blood level of alcohol	R78.0
Chronic Causes - 100% Alcohol Attributable	**ICD-10 Codes**
Alcoholic psychosis	F10.3-F10.9
Alcohol abuse	F10.0, F10.1
Alcohol dependence syndrome	F10.2
Alcohol polyneuropathy	G62.1
Degeneration of nervous system due to alcohol	G31.2
Alcoholic myopathy	G72.1
Alcohol cardiomyopathy	I42.6
Alcoholic gastritis	K29.2
Alcoholic liver disease	K70-K70.4, K70.9
Alcohol-induced chronic pancreatitis	K86.0

Table 2

ED Visit Category	Subcategory	ICD-10 Codes
Assaults	Assaults	X85-Y09, Y87.1
Falls	Fall injuries	W00-W19
Motor vehicle collisions	Motor vehicle collisions (traffic)	V02(.1, .9), V03(.1, .9), V04(.1, .9), V09.2, V12-V14(.3-.9), V19.4-V19.6, V20-V28(.3-.9), V29.4-V29.9, V30-V39(.4-.9), V40-V49(.4-.9), V50-V59(.4-.9), V60-V69(.4-.9), V70-V79(.4-.9), V80.3-V80.5, V81.1, V82.1, V83-V86(.0-.3), V87.0-V87.8, V89.2
Total alcohol-related injury visits	Assaults + falls + motor vehicle collisions + all codes below	
Air	Air-space travel	V95-V97
Aspiration	Aspiration	W78-W79
Drown	Drowning injuries	W65-W74
Fire	Exposure to smoke, fire and flames	X00-X09
Firearm	Discharge from firearm	W32-W34
Hypothermia	Exposure to excessive natural cold	X31
MVC non-traffic	Motor vehicle collisions (traffic)	V02.0, V03.0, V04.0, V09.0, V12-V14(.0-.2), V19.0-V19.3, V20-V28(.0-.2), V29.0-V29.3, V30-V39(.0-.3), V40-V49(.0-.3), V50-V59(.0-.3), V60-V69(.0-.3), V70-V79(.0-.3), V81.0, V82.0, V83-V86(.4-.9), V88.0-V88.8, V89.0
Occupational	Occupational/machine injuries	W24-W31, W45
Other vehicle	Other road vehicle accidents	V01, V05-V06, V09.1, V09.3, V09.9, V10-V11, V15-V18, V19.3, V19.8-V19.9, V80.0-V80.2, V80.6-V80.9, V81.2-V81.9, V82.2-V82.9, V87.9, V88.9, V89.1, V89.3, V89.9
Water	Water transport accidents	V90-V94
Other poisoning	Poisoning (not alcohol)	X40-X49 (except X45)
Other self-harm	Intentional self-harm	X60-X84, (except X65) Y87.0

B) Cannabis-related ED visits will be identified with:

1. ICD-10 codes for poisoning attributable to cannabis or for mental and behavioural disorders due to use of cannabinoids, whether it was the most responsible diagnosis, the main problem or comorbidity (see Table 3).
   OR
2. Urine toxicology screen positive for tetrahydrocannabinol (THC).

Table 3

Cannabis-related ED Visit Category	ICD-10 Codes
Poisoning	T40.7
Mental and behavioural disorders due to use of cannabinoids	F12, F19 (if cannabis is one of the drugs)

C) Opioid misuse-related ED visits will be identified with:

1. ICD-10 codes for poisoning attributable to narcotics and psychodysleptics or for mental and behavioural disorders due to use of opioids, whether it was the most responsible diagnosis, the main problem or comorbidity (see Table 4).
   OR
2. Urine toxicology screen positive for opioids.

Table 4

Opioid-related ED Visit Category	ICD-10 Codes
Poisoning	T40,1, T40.2, T40.6
Mental and behavioural disorders due to use of opioids	F11, F19 (if opioids are one of the drugs)

Appendix B: Case Report Form

Section 1 – Case Demographic Information

Date of birth – MM DD YYYY: ____ /____ /_____

Sex:

Male

Female

Unknown

Postal code of home address; first three digits only: __ __ __

Ethnicity (check all that apply):

Indigenous/Métis

Asian

Black

Caucasian

Latin American

Middle Eastern

Other, specify: _____

Unknown

With whom does the patient live? (Check all that apply)

Biological parent(s)

Step-parent(s)

Foster care

Group home

University/college residence

With roommate(s)

With spouse/partner

With children

Alone

No fixed address

Other, specify: _____

Unknown

School grade currently enrolled in:

High school

Cégep/college

Undergrad

Graduate

Unknown

Institution enrolled in: _____

Unknown

Section 2 – Clinical Presentation

Moment of presentation:

Date of presentation – MM DD YYYY: ____ /____ /_____

Time of presentation – HH:MM: ___: _____

Date of discharge – MM DD YYYY: ____ /____ /_____

Time of discharge – HH:MM: ___: _____

Main concern for hospital visit (check most appropriate):

☐ Unintentional injury If yes: ☐ Motor-vehicle related

If yes: ☐ Car ☐ ATV ☐ Motorcycle ☐ Other, specify: _____

☐ Fall ☐ Cut ☐ Drowning or near-drowning

☐ Aggression/Violence ☐ Sexual assault

☐ Poisoning/Intoxication (alcohol related)

☐ Poisoning/Intoxication (cannabis related)

☐ Poisoning/Intoxication (opioid related)

☐ Other, specify: _____

☐ Intentional injury If yes: ☐ Attempted suicide ☐ Self-harm ☐ Uncertain

☐ Other, specify: _____

☐ Substance-related disorders (DSM-5) If yes: ☐ Alcohol intoxication ☐ Alcohol withdrawal

☐ Cannabis intoxication ☐ Cannabis withdrawal

☐ Opioid intoxication ☐ Opioid withdrawal

☐ Other, specify: _____

☐ Psychosis If yes: ☐ Drug-induced psychosis If yes: ☐ First episode ☐ Recurrent

☐ Schizophrenia

☐ Other, specify_____

☐ Affective/Anxiety disorder If yes: ☐ Depressive ☐ Bipolar ☐ Anxiety

☐ Other, specify_____

☐ Gastrointestinal problem If yes: ☐ Cannabis hyperemesis syndrome

☐ Other, specify: _____

☐ Respiratory problem If yes: ☐ Asthma attack (bronchospasm) ☐ Respiratory depression

☐ Other, specify: _____

☐ Cardiovascular problem If yes: ☐ Syncope ☐ Ischemia/Infarcts

☐ Other, specify: _____

☐ Neurologic problem If yes: ☐ Seizure

☐ Other, specify: _____

☐ Other, specify: _____

Mode of presentation:

Ambulatory (alone/walk in)

Ambulatory (by friends/family)

Ambulance

Police

Ambulance and police

CTAS Triage score

1

2

3

4

5

Highest Blood alcohol concentration: _____ g/l (if known)

Section 3 – Contextual Information

TYPE of substance consumed for this presentation (check all that apply):

Substance	Alcohol	Cannabis	Opioid
Spirits			
Spirits-based products			
Flavoured purified alcohol			
Beer			
Wine			
Cider			
Marijuana (shredded buds and leaves)			
Hashish			
Cannabis oil			
Hash oil (including butane hash oil, BHO)			
Dabs (shatter, wax, budder)			
Cannabis tincture/extract			
Cannabis edibles (in food or candy)			
Natural opiates			
Semi-synthetic/man-made opioids			
Fully synthetic/man-made			
Other, specify:			
Unknown			
Name of the product(s):			

Where was substance ACQUIRED?

	Alcohol	Cannabis	Opioid
Government store (NSLC, SAQ, SQDC, SLGA) including online store			NA
Private legal retail store (grocery store, dépanneur, cannabis store)			NA
Bar/Pub/Nightclub			NA
Festival/Event (incl. sport events, university events & party)		NA	NA
Legally home grown/produced	NA		NA
Pharmacy	NA		
Parent/caregiver			
Friends			
Family members Illegal sources			
Other, specify			
Unknown			

Where was substance CONSUMED?

	Alcohol	Cannabis	Opioid
Home			
Someone else's home			
Bar/Pub/Nightclub			
Festival/Event (ex: music, sport events)			
University/College/CÉGEP Campus Event/Party			
School related activity (ex: Graduation, sports tournament)			
Outdoor public places (ex: park, beaches, public trails)			
Other, specify:			
Unknown			

Section 4 – Course in Hospital

Outcomes attributed to the reported condition (check all that apply):

☐ Hospitalization If yes, (check all that apply): ☐ Inpatient bed ☐ ICU/PICU bed
☐ Psychiatric bed Specify: Length of stay: _____hr(s) or _____days

Glasgow Coma Scale on paramedic chart:

_____/15

Amnesia

Altered consciousness

Unknown

Test? (Check all that apply)

Investigation

Urine toxicology

Serum drug screen

EKG

Blood gas

CNS imaging

Other, specify: _____

Unknown

Any associated medical complication?

Injuries; specify: _____

Behavioural/psychiatric condition; specify: _____

Cardiac; specify: _____

Respiratory; specify: _____

Neurological; specify: _____

Metabolic; specify: _____

Gastrointestinal; specify: _____

Other condition; specify: _____

Unknown

The primary condition resulted from (check all that apply):

☐ Injury ☐ Fight ☐ Sexual abuse ☐ Unknown

Type of treatment or follow-up (check all that apply)?

Physical If yes, (check all that apply):

☐ Adolescent medicine consultation

☐ Ventilation assistance If yes: ☐ Intubation ☐ Noninvasive

Mental/psychosocial If yes: ☐ Psychiatric consultation ☐ Other mental health professional

If yes, (check all that apply): ☐ Psychologist ☐ Social worker ☐ Addiction worker ☐ Youth protection worker

Legal If yes, (check all that apply): ☐ Hospital security ☐ Police

Other, specify: _____

Unknown

Did the emergency department contact?

Family

Friends

Others, specify: _____

Unknown

Section 5 – Past History

In the past, the patient has received care from (check all that apply):

Family physician

Pediatrician

Psychologist

Psychiatrist

Unknown

Prior ER visits for alcohol or substance-related issues?

No

Yes

Unknown

Known comorbidities (physical or mental/psychosocial):

_____

Previous substance use (check all that apply):

None

Alcohol

Cannabis

Opioids

Cocaine

Methamphetamines

Ecstasy

LSD

GHB

Ketamine, other club drugs

Steroids

Prescription medications, specify: _____

Other, specify: _____

Unknown

Does the patient take any medications?

No

Yes, specify medications:

_____

Unknown