Pan-Canadian Poison Centres 2022 Annual Report

Canadian Association for **Poison Centres and Clinical Toxicology**

Association canadienne pour **centres antipoison et toxicologie clinique**

www.infopoison.ca

Pan-Canadian Poison Centres 2022 Annual Report

This report was developed in co-ordination with:

Health Canada Santé Canada

Parachute
PREVENTING INJURIES. SAVING LIVES.

Canadian Association for Poison Centres and Clinical Toxicology
Association canadienne pour centres antipoison et toxicologie clinique

PAD!S
Poison & Drug Information Service

Ontario Poison Centre Centre® antipoison de l'Ontario

Centre antipoison du Québec

ATLANTIC CANADA POISON CENTRE

"...a snapshot of exposures to Canadians..."

A message from the CAPCCT President

Poison centres exist to provide up-to-date expertise in caring for patients who have been exposed. Although poisonings are generally not reportable diseases in any jurisdiction in Canada, calls received by our five Canadian poison centres provide valuable insight on hazards to Canadians.

Of the hundreds of thousands of calls that are received collectively by poison centres, the majority are from the public. The majority of those exposed are offered treatment advice that allows them to stay home. This avoids an interaction with an overstretched health-care system and countless hours awaiting advice or care in a crowded waiting room.

Poison centres play a critical role in capturing the burden of poisonings in Canada. We have statistics for those who visit an Emergency Department, are admitted to a hospital or die from an exposure. However, among other things, Poison Centre data allow us to capture the "near-misses": those who are exposed outside of a health-care facility and who do not need to present to a health-care facility.

The 2022 Annual Report that follows gives us a snapshot of exposures to Canadians that were called through to poison centres across the country. As this is the third report produced with poison centre data, we can begin comparing trends (and specifically across COVID-19). Every year this data will become more valuable as we see new products introduced into the marketplace, new pharmaceuticals being approved, new chemicals available on the streets and through the internet.

The 2022 Annual Report also takes a detailed look at some of the interventions that have occurred because of a liaison among poison centres, the frontline care providers, regulators and Health Canada, to benefit Canadians. Having identified a risk, Canadian poison centres are now able to help reduce risks.

As in previous years, poison centres in Canada are indebted to Toxicovigilance Canada, Chemical Emergency Management and Toxicovigilance Division of Health Canada for their support and foresight in recognizing the importance of poisonings to Canadians as a major public health issue. We are also grateful to Parachute, Canada's national charity dedicated to injury prevention, for compiling and assessing our data, writing report drafts and for their involvement in poison prevention throughout the years.

Finally, the Canadian Association for Poison Centres and Clinical Toxicology is thankful to its members; the specialists who answer the calls, the support staff who make our centres run seamlessly, our volunteer mycologists, herpetologists, entomologists, botanists, clinical biochemists and our toxicologists. Their passion keeps our patients safe and receiving best care.

Thank you for taking the time to read this year's edition.

Dr. Margaret Thompson, MD, FRCPC

President, Canadian Association for Poison Centres and Clinical Toxicology

Medical Director, Ontario Poison Centre

“…fostering a healthier and safer environment for all people in Canada.”

A message from Health Canada

I would like to acknowledge the indispensable support and contributions provided by Canadian poison centres and our injury prevention partners in 2022. Their timely assistance and collaboration in managing inquiries relevant to chemical incidents and poisonous exposures have been vital to Health Canada’s work, as were their contributions to the collection and analysis of related data throughout the year.

With the support of these partners, in 2022, the Canadian Surveillance System for Poison Information (CSSPI), our country’s pan-Canadian poison centre surveillance system, contributed to Canada’s efforts to address a number of important issues. This included providing information on counterfeit COVID-19 antigen rapid test kits and on a series of aconitine poisonings in Ontario, and conducting enhanced surveillance on easy-to-swallow acetaminophen. CSSPI is a critical component of the Toxicovigilance Canada network, a collaborative network of various disciplines and jurisdictions that strengthens Canada’s capacity for the timely detection, analysis, and response to poisonings, substance-related harms, and toxic chemical exposures.

Despite the ongoing challenges posed by the COVID-19 pandemic, Canadian poison centres continued to provide treatment advice for toxic exposures and contributed to public health and other actions to prevent and reduce harms caused by poisonings. For instance, poison centres

detected emerging safety concerns associated with COVID-19 related exposures to bleach, cleaners, sanitizers and non-authorized health treatments, and the information they gathered helped inform actions to protect the health and safety of people in Canada.

Health Canada recognizes the engagement and partnership of Canadian poison centers and our other injury prevention partners in fostering a healthier and safer environment for all people in Canada. I look forward to continuing this important work together.

Matt Jones

Assistant Deputy Minister, Healthy Environments and Consumer Safety Branch

Health Canada, Government of Canada

"Prevention relies on data and evidence…"

A message from Parachute

Prevention relies on data and evidence to focus in on the causes and solutions of injuries and deaths. While there is an injury surveillance system in Canada, it has long lag times between collection and reporting (one to three years) and does not have detailed product or contextual information available.

For example, a child who has swallowed a button battery is registered in hospital administrative data as "ingestion of a foreign object". No details are available that it was a button battery, what product the battery was located in, or what the circumstances were when the incident occurred: All essential information if we are to identify how that injury could have been prevented. Thankfully, that is not the case with poisoning data from the poison centres in Canada. The data collected by each poison centre, and now nationally through Annual Reports such as this one, give us the important information we need.

Along with the health-system data on deaths, hospitalizations and Emergency Department visits, these data provide us with the picture of poisonings in Canada. At Parachute, and among our provincial/territorial injury prevention centres such as the BC Injury Research and Prevention Unit, Injury Prevention Centre in Alberta, and IWK Child Safety Link in Nova Scotia, we analyze these data and information to identify the most effective preventative solutions.

In this 2022 report, we see concerning increases in three of the top five substance categories: analgesics up 13.6 per cent; antidepressants up 8.2 per cent; and sedatives/hypnotics/antipsychotics up 7.2 per cent. In particular, compared to other age groups in 2022, the proportion of analgesic-related exposures – 31.5 per cent – is highest among the 13 to 19 age group. Annual reports such as this one allow us to compare and identify trends in poisonings in order to address these issues in a timely way.

Poisoning remains a significant issue in Canada and there is much more work to be done. Poison centres can and are handling the majority of poisoning calls without individuals going to the Emergency Department or being admitted to hospital. As our health-care system struggles under the volume of people seeking care, more recognition and resources should be given to these centres as an essential part of the health-care system.

Pamela Fuselli, MSc

President and CEO, Parachute

Poisoning is a significant public health and safety issue in Canada.

In 2018, unintentional poisonings resulted in 3,477 deaths, 10,772 hospitalizations and 79,231 emergency department visits. Poisoning is the third-leading cause of injury-related death for Canadians and the top cause of injury death for those aged 24 to 65. Poisoning incidents cost the Canadian economy $2.6 billion in a single year, including $456 million in direct health-care system costs (Parachute, 2021). Poison centres are essential in reducing direct health-care costs of poisonings as the majority of cases can be treated over the phone without a visit to a physician or hospital (Galvao et al., 2012).

Surveillance, information exchange and collaboration across a network of partners is key to reducing the morbidity, mortality and financial burden caused by poisonings. Poison centres are a source of specialized expertise and guidance and the data collected by centres are a critical source of information that can be used for public health purposes. This Pan-Canadian Poison Centres Annual Report provides an overview of the volume and nature of cases managed by poison centres and highlights the role of these centres in poisoning prevention efforts.

About Poison Centres in Canada

Poison centres are the key point of contact for the general public and health professionals seeking medical advice on poisonings*. Canada has five provincially and territorially funded poison centres, operating 24 hours a day, seven days a week:

- **Atlantic Canada Poison Centre** (ACPC) in Nova Scotia
- **Centre antipoison du Québec** (CAPQ)
- **Ontario Poison Centre** (OPC)
- **Poison and Drug Information Service** (PADIS) in Alberta
- **Drug and Poison Information Centre** (DPIC) in British Columbia

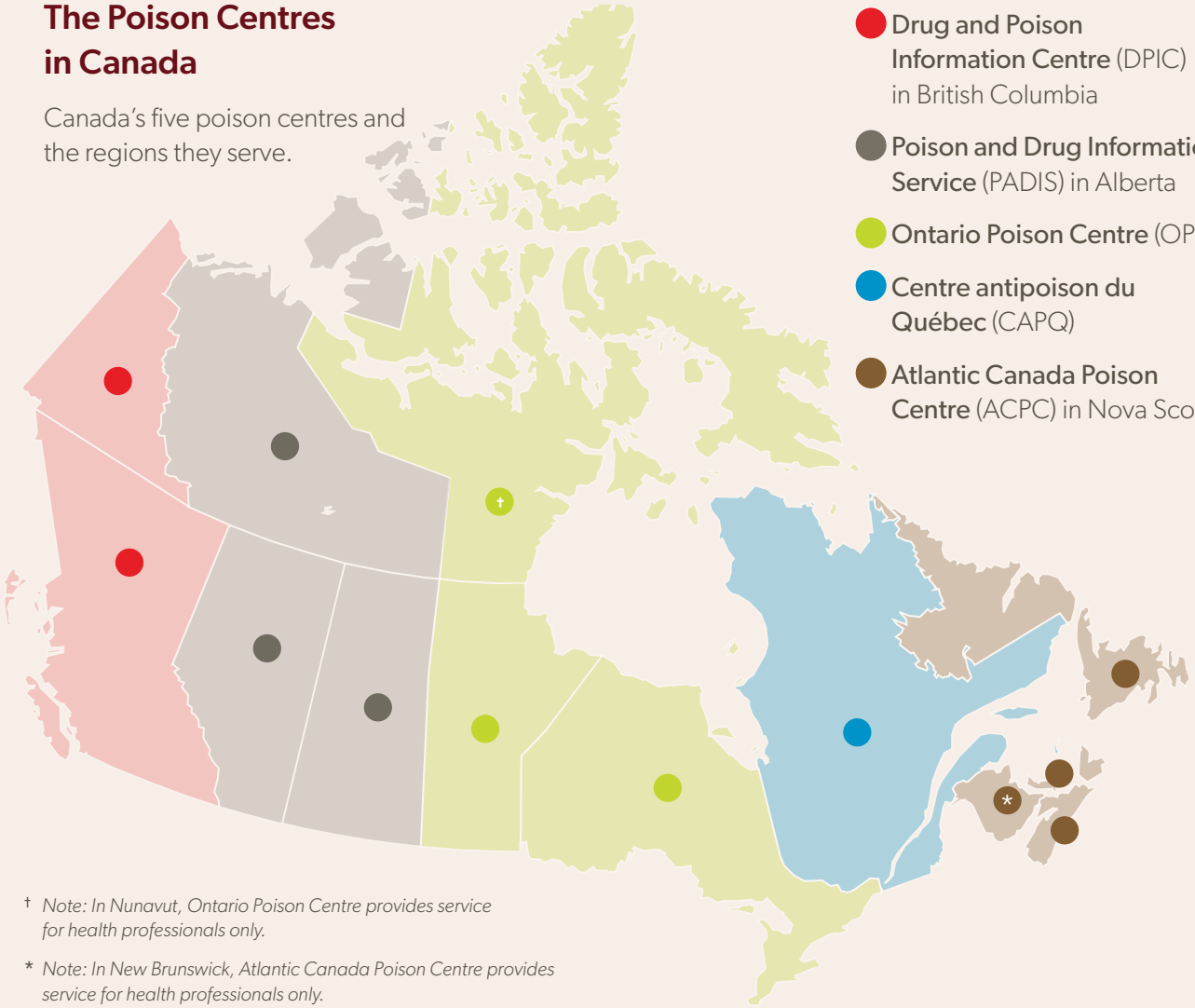
Each centre is staffed with medical toxicologists, registered nurses and/or pharmacists, with many holding certifications from America's Poison Centers (formerly, the American Association of Poison Control Centers) as Specialists in Poison Information. Staff become eligible for certification after approximately two years of full-time employment at a poison centre, handling 2,000 human exposure calls and logging 1,200 hours.

Canadian poison centres manage an average of 200,000 cases per year collectively.

* *Poison centres provide support to the general public in all provinces and territories with the exception of New Brunswick and Nunavut. In New Brunswick, Atlantic Canada Poison Centre provides service to health professionals only. The public receives support for poison-related concerns through the provincial health information line, Tele-Care. In Nunavut, the Ontario Poison Centre provides service to health professionals while the public accesses poison-related care through their local health units.*

The Poison Centres in Canada

Canada's five poison centres and the regions they serve.



- **Drug and Poison Information Centre** (DPIC) in British Columbia
- **Poison and Drug Information Service** (PADIS) in Alberta
- **Ontario Poison Centre** (OPC)
- **Centre antipoison du Québec** (CAPQ)
- **Atlantic Canada Poison Centre** (ACPC) in Nova Scotia

† *Note: In Nunavut, Ontario Poison Centre provides service for health professionals only.*

* *Note: In New Brunswick, Atlantic Canada Poison Centre provides service for health professionals only.*

The Canadian Surveillance System for Poison Information

The Canadian Surveillance System for Poison Information (CSSPI) initiative started in 2014 with Health Canada, in collaboration with Canadian poison centres and federal, provincial and territorial health partners to establish a pan-Canadian toxicovigilance system for poison information. CSSPI was created because all collaborators agreed that Canada required a national system to access poison centre information and expertise.

All partners worked together to identify requirements, analyze and pilot solutions for timely detection of safety concerns, data quality to inform health protection and development of tools to foster a strong collaboration among partners. This approach would inform poison prevention, treatment, harm reduction and risk management in Canada.

As a result, CSSPI implementation began in 2018 with the following goals:

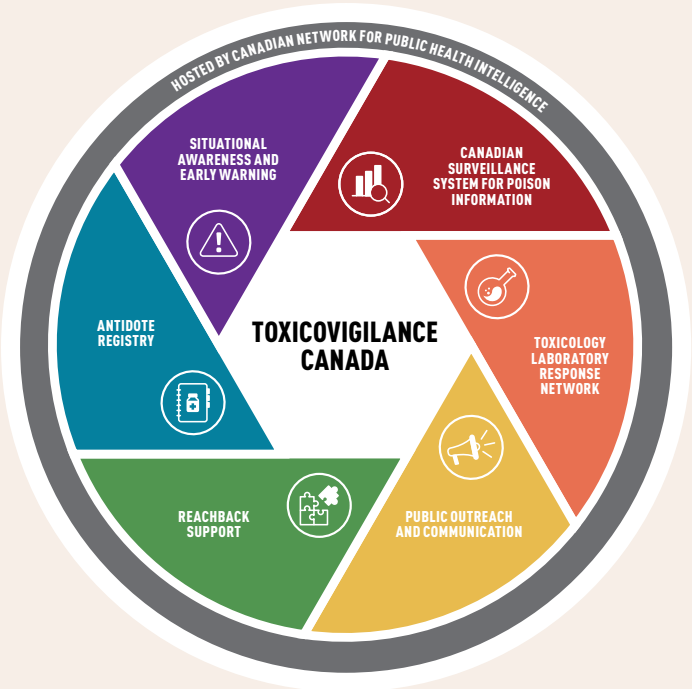
- Fostering collaboration across multiple agencies, sectors and jurisdictions, including the formation of a Toxicovigilance Canada network.
- Developing the CSSPI surveillance system to aggregate, analyze and interpret poison centre data as well as establishing a process for frontline poison centre specialists to provide timely notifications when they identify safety concerns.
- Managing pan-Canadian poison centre data requests for public health and regulatory partners to inform interventions that best protect Canadians from poisonings.

CSSPI provides detection of novel or ongoing poisoning trends and facilitates collaborative interventions based on real-world evidence to protect the health of Canadians.

Toxicovigilance Canada

According to the World Health Organization, toxicovigilance is "the active process of identifying and evaluating the toxic risks existing in a community and evaluating the measures taken to reduce or eliminate them" (2021). Risks of public health concern can include poisoning outbreaks due to contamination, emergence of novel drugs, mass chemical exposures and unusual patterns or trends. Toxicovigilance Canada is a pan-Canadian network aimed at enhancing capacity for the timely detection, analysis and response to poisonings and substance use that may lead to harms and toxic chemical exposures. The network has nearly 500 members from multiple sectors including poison centres, toxicology labs, public health agencies, health authorities and non-profit organizations.

The components of Toxicovigilance Canada



2022 Poison Centre Data

About the data in this report

Data collected by poison centres are entered into an electronic case management system based on the poisoning information reported by the caller and collected by a Specialist in Poison Information (SPI).

The caller may be the person who was exposed but may also be a family member or friend, or medical personnel caring for the exposed person. Sometimes the caller may have limited information about the incident, which impacts the data that can be collected. For example, the sex of the exposed person will be coded based on what is reported to the SPI and will generally reflect their presenting gender, unless the caller reports otherwise.

All Canadian poison centres follow the National Poison Data System (NPDS) coding guidelines, which are set by America's Poison Centers. These guidelines aim to ensure consistent data collection across regional poison centres by providing clear instructions on how to record information related to various poisoning incidents. This includes categorizing the medical outcomes of poisonings, such as no effect, minor or major effect, death, or potentially toxic exposure.

Generally, in Canada, it is not mandatory to report poisonings; therefore, calls made to a poison centre can only occur when public individuals or health-care practitioners have knowledge about their services and a willingness to call. Calls to poison centres are thus not fully representative of the burden of poisonings in the whole population but do reflect general patterns over time and across groups.

Data from each of the five Canadian poison centres for the year of 2022 were requested and aggregated to the national level to compile this report.

Data presented in this report have been compared where relevant to data from the previous year, 2021. The same methodology was used to collect 2021 poison centre data and the same data limitations apply. Refer to the Pan-Canadian Poison Centres 2021 Annual Report for the complete presentation of 2021 data.

In 2022, Canada's poison centres managed 206,586 cases

189,259
Human exposure cases
(confirmed or potential)

17,327
Non-exposures and other cases

While all poison centres handle human exposure cases, other services offered vary by centre. Non-exposures may include questions about: drug identification, drug information, environmental information, medical information, occupational information, poison information, information on the potential adverse effects from exposure to a substance during pregnancy (known as teratogenicity), caller referral to another service, prevention/safety, substance abuse, and other general information. The count for non-exposure cases may reflect administrative practices (e.g. one centre counts erroneously created cases in their non-exposure call count). Poison centres in Canada do not seek to manage animal exposure cases; however, they do receive such calls from the public.

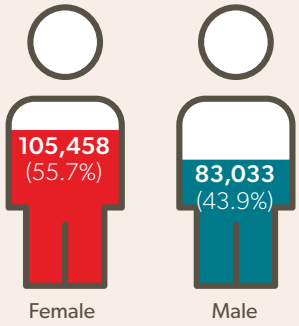
Total cases managed by poison centres decreased by 1.6 per cent, from 210,043 to 206,586 in 2022. Human exposure cases increased by 1.2 per cent, compared to the previous year. Non-exposure cases decreased by 24.6 per cent, primarily due to streamlining of information call services at one poison centre.

Who poison centres help

Poison centres manage exposure cases for Canadians of all ages. In 2022, 59,547 exposure cases – approximately one-third of confirmed exposure cases – involved a child aged 5 or under. For context, this age group has the highest rate of Emergency Department visits for unintentional poisoning in Canada (Parachute, 2021). In 2022, poison centres managed approximately 23,800 cases (12.6 per cent) for young adults aged 20 to 29 and approximately 40,300 cases (21.3 per cent) of adults aged 30 to 59. Adults in these age groups are at higher risk of poisoning-related death: Death rates due to poisoning increase at age 15 and peak between the ages of 25 and 59 in Canada (Statistics Canada, 2022).

Poison centres serve the public as well as health professionals seeking specialized advice for patient care. In 2022, 59.5 per cent of exposure cases involved a person calling a poison centre from their home. In 34.1 per cent of exposure cases, the caller was from a health-care facility.

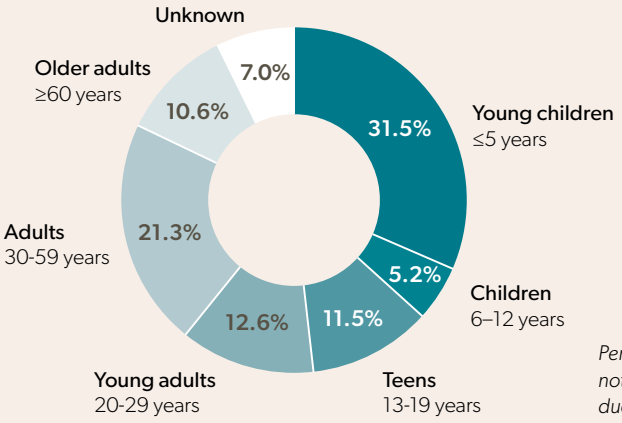
Exposure cases by sex,* 2022



Unknown/other: 768 (0.4%)

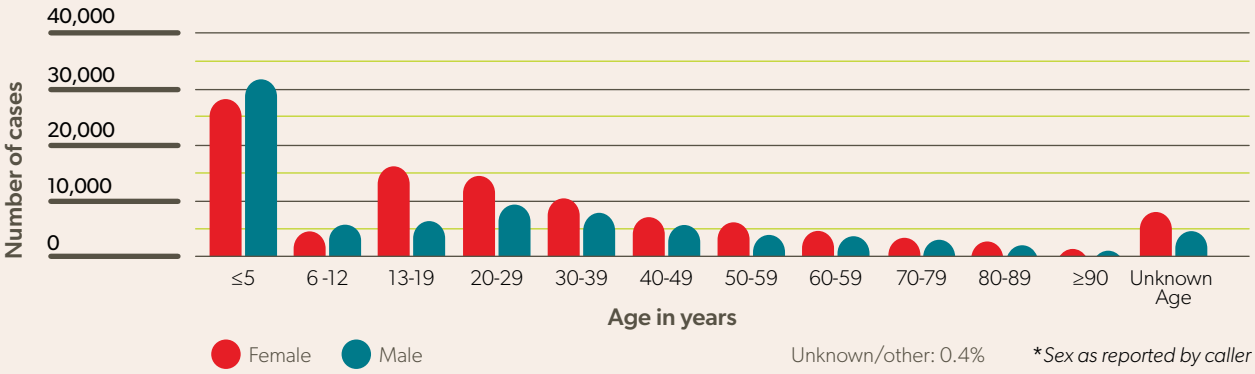
**Sex as reported by caller*

Exposure cases by age group, 2022



Percentages may not total 100 due to rounding.

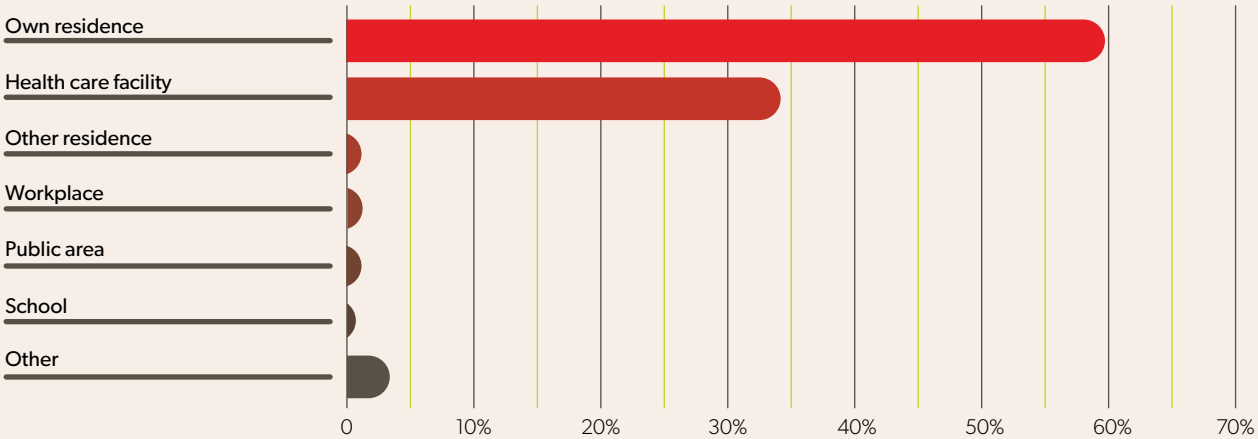
Exposure cases by age group and sex,* 2022



Unknown/other: 0.4%

**Sex as reported by caller*

Exposure cases by caller location*, 2022



Unknown: 0.3%

Public area *includes public locations such as parks, stores, restaurants, theatres and event spaces.*

Own residence *includes calls redirected to poison centres from 811 health lines.*

Other residence *refers to any home that is not the caller's home.*

Other *refers to any site not included in the other categories such as calls from an ambulance, nursing home, pharmacy, school nurse or correctional facility.*

* **Total percentage by caller location** *is representative of four out of the five poison centres in Canada. One poison centre does not collect caller location information.*

Why Canadians call poison centres

When managing a case, poison centre specialists collect information about the incident. This information is valuable for understanding how and why exposures occur, identifying concerning trends and public safety concerns and informing prevention efforts. Incidents are categorized as unintentional, intentional or other. Cases categorized as "other" include those where the reason for the incident was recorded as unknown, not available or other.

Types of incidents

126,996 (67.2%)
Unintentional

48,653 (25.7%)
Intentional

13,610 (7.2%)
Other

In 2022, most exposure cases were unintentional, including general unintentional incidents (73.6 per cent), therapeutic errors (20.4 per cent) and unintentional misuse of substances (4.0 per cent).

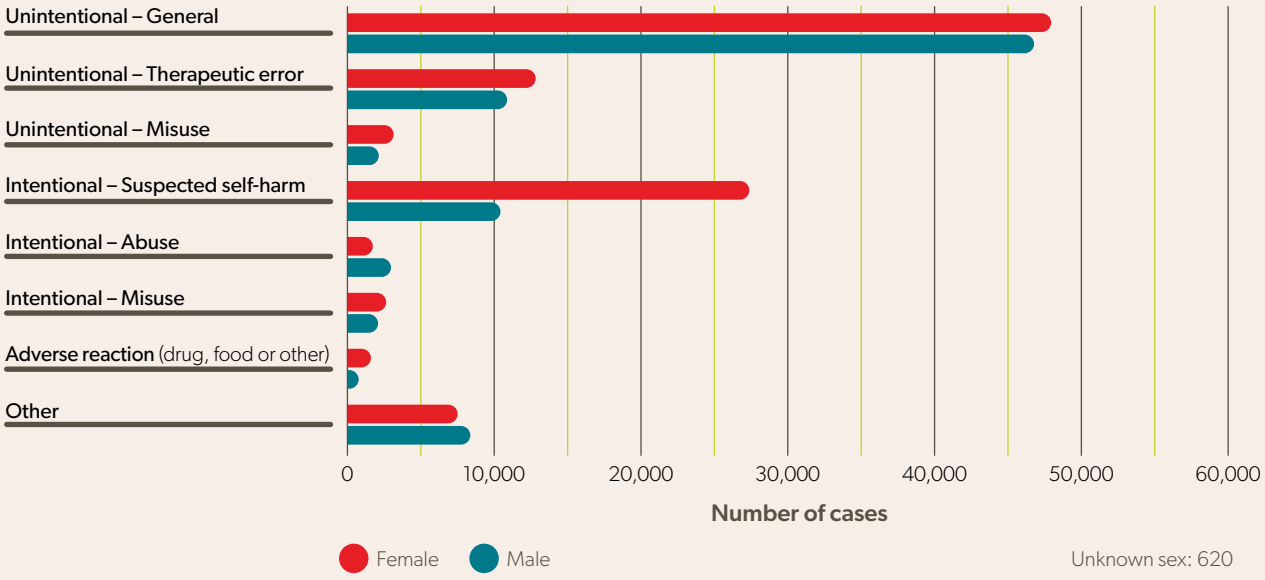
- **25,926 cases were related to therapeutic error.** For example, a person being given the wrong dose of a medication, medicine being administered to the wrong person or inadvertent double dosing.
- **5,035 cases were related to unintentional misuse of non-pharmaceutical substances.** For example, being exposed to toxic gas from mixing cleaning chemicals.
- **93,496 cases were general unintentional incidents.** These are incidents that don't fit other, specific definitions like the ones above and include most cases of young children getting into medications, cleaners or other substances stored in the home.

Intentional exposures are incidents resulting from a purposeful action. They include intentional misuse, abuse, suspected self-harm or suicide and unknown. Cases categorized as suspected self-harm or suicide include incidents where self-harm or self-injury with substances or medications was apparent or suicidal intent was suspected. In 2022:

- **37,402 cases were related to suspected substance- and toxin-related self-harm,** marking a roughly five-per-cent increase from the previous year.
- In 72.7 per cent of these self-harm calls, the person exposed was **female**. The same proportion of self-harm cases involving females was reported in 2021.

There continues to be a need to understand and address increases in intentional self-harm-associated poisonings. Poisoning is a leading mechanism of non-fatal self-harm attempts as well as self-harm/suicide deaths in Canada (Skinner et al., 2016). Poison centres capture a portion of the total cases of self-harm in Canada. Calls to poison centres demonstrate a need to better understand who is at risk, potential risk factors and the relationship between poisonings (both intentional and unintentional), mental health and substance use.

Exposure cases by reason of calling, 2022



Other reason *includes Contamination/Tampering; Malicious; Withdrawal; Unintentional - Environmental; Unintentional - Occupational; Unintentional - Bite/Sting; Unintentional - Food Poisoning; Unintentional - Unknown; Intentional - Unknown; Unknown reasons; N/A*

Types of substances

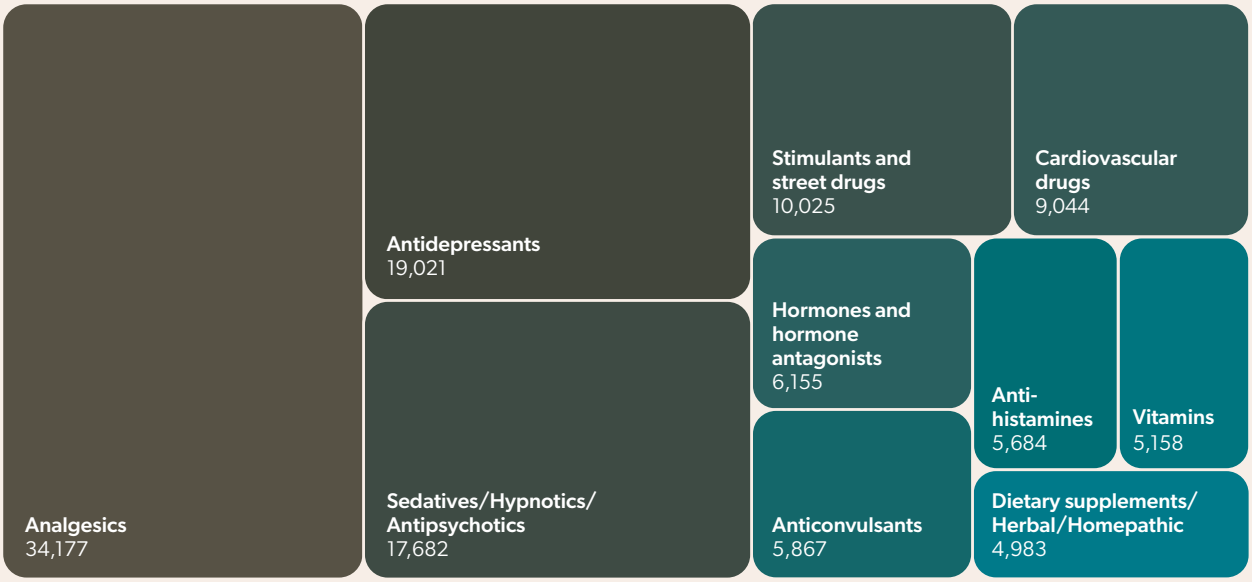
In 2022, the most common substances involved in exposure cases managed by poison centres were medications for pain relief (analgesics) and drugs commonly used to treat mental health conditions such as antidepressants. In 2021, the most commonly reported substances were analgesics and household cleaning substances. While cases involving exposure to analgesics increased by 13.6 per cent from 2021 (30,096) to 2022 (34,177), cases involving household cleaning substances decreased by 8.2 per cent from 2021 (18,382) to 2022 (16,868). Cases involving antidepressants increased by 8.2 per cent from 2021 (17,572) to 2022 (19,021).

** Data reflect top five substance categories from January 1, 2022 to December 31, 2022. The percent changes are calculated by comparing against the exposure counts from the previous year (January 1, 2021 to December 31, 2021). Please be aware that cases involving exposure to multiple substances were counted only once per relevant category.*

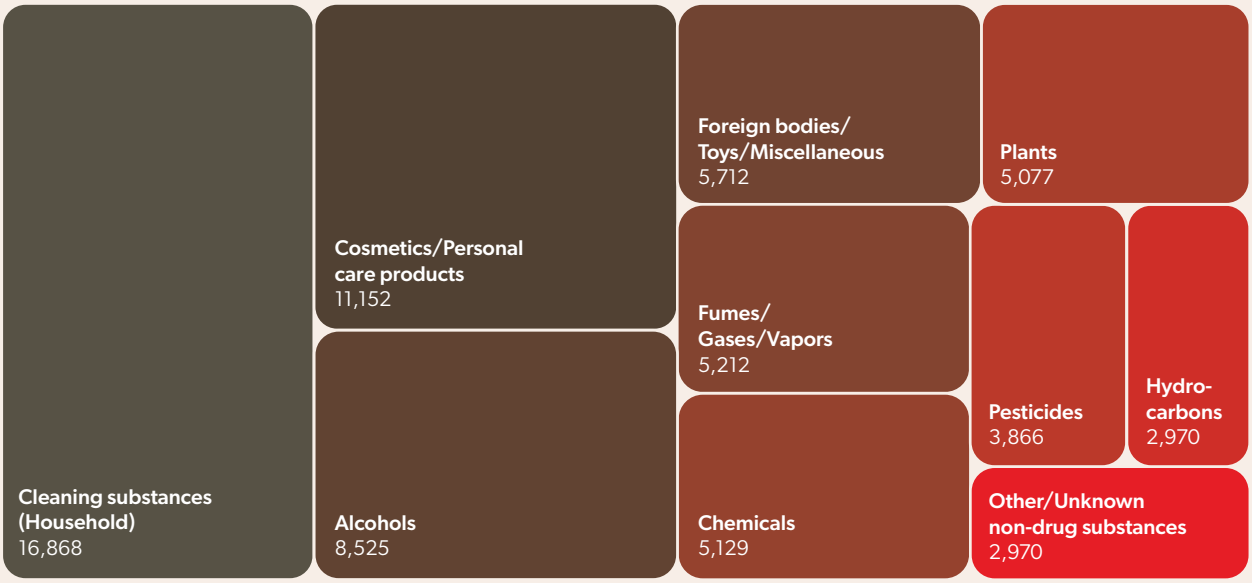
Exposures: Top 5 substance categories, 2022* (all ages)

1. **Analgesics**
   34,177 (18.1%) ↑ 13.6%
2. **Antidepressants**
   19,021 (10.1%) ↑ 8.2%
3. **Sedatives/hypnotics/antipsychotics**
   17,682 (9.4%) ↑ 7.3%
4. **Household cleaning substances**
   16,868 (8.9%) ↓ 8.2%
5. **Cosmetics/personal care products**
   11,152 (5.9%) ↓ 14.9%

Drug Exposures: All ages top 10 substance categories, 2022



Non-Drug Exposures: All ages top 10 substance categories, 2022



Note: *This report follows National Poison Data System (NPDS) substance coding, which does not align in full with other organisational coding. All NPDS substance categories are divided into to major categories of drugs or non-drugs. In NPDS coding, for example, vitamins are categorized as drugs. See Appendix for examples of top drug and non-drug products.*

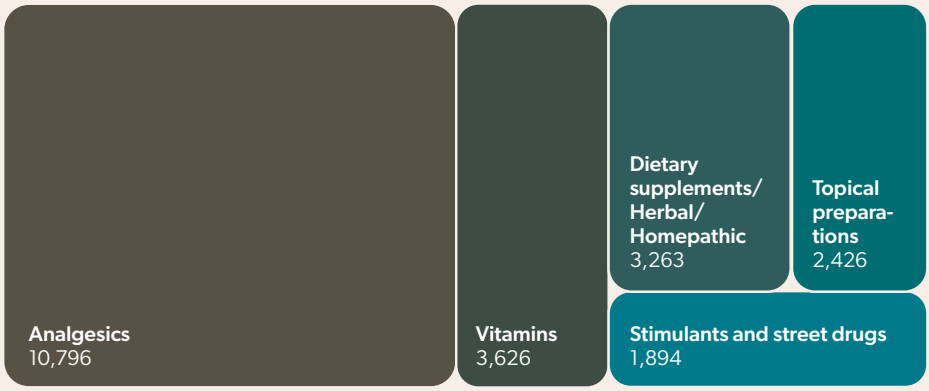
Types of substances:
0 to 12 years of age

Children – particularly young children, from birth to five years – are vulnerable to poisoning. In 2022, most calls to poison centres concerning children up to 12 years of age involved medications for pain relief (analgesics) and exposures to non-drug substances commonly found in homes, such as household cleaning substances, cosmetics and personal care products, toys and other objects, and vitamins.

Exposures: Top five substance categories, 2022 (0 to 12 age group)

1. **Analgesics**
   10,796 (15.5%) ↑ 28.7%
2. **Cleaning substances (Household)**
   8,374 (12.0%) ↓ 11.2%
3. **Cosmetics/personal care products**
   6,541 (9.4%) ↓ 18.4%
4. **Foreign bodies/Toys/Miscellaneous**
   4,253 (6.1%) ↑ 1.2%
5. **Vitamins**
   3,626 (5.2%) ↓ 5.5%

Drug Exposures: 0 to 12 age group top five substance categories, 2022



Non-Drug Exposures: 0 to 12 age group top five substance categories, 2022

Types of substances: 13 to 19 years of age

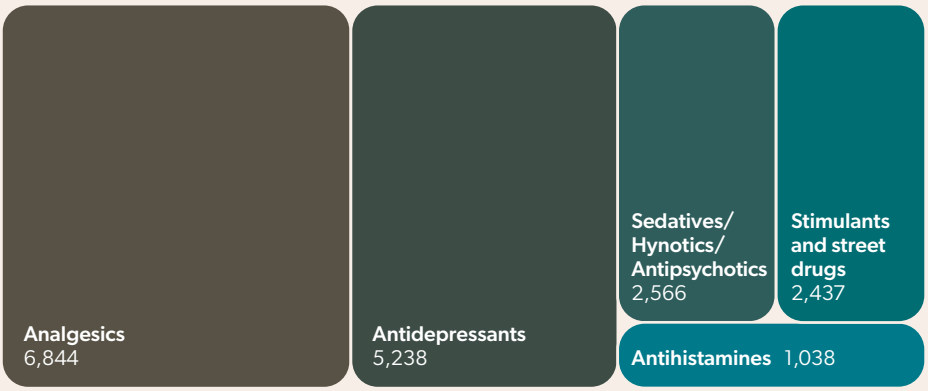
Youth and adolescents are also an at-risk group for poisonings. Periods of impulsivity, rebelliousness and risky behaviour as well as the influence of social media and peer pressure can result in exposures to poisonous substances and poison-related harm (Albert et al., 2013; Nawi et al., 2021; Purba et al., 2023). For many youths and adolescents, this is also a period of exploration where they are exposed to alcohol, cannabis or other substances for the first time. Poisoning is the most common form of self-harm among adolescents and is a growing issue for young people in Canada, particularly females ages 15 to 19 years (Campeau et al., 2022).

In 2022, top substance exposures in the 13 to 19 population primarily involved drugs including medications for pain relief (analgesics), drugs commonly used to treat mental health conditions such as antidepressants, antipsychotics, sedatives and hypnotics, as well as stimulants and street drugs. Compared to other age groups in 2022, the proportion of analgesic-related exposures – 31.5 per cent – is highest among the 13 to 19 age group.

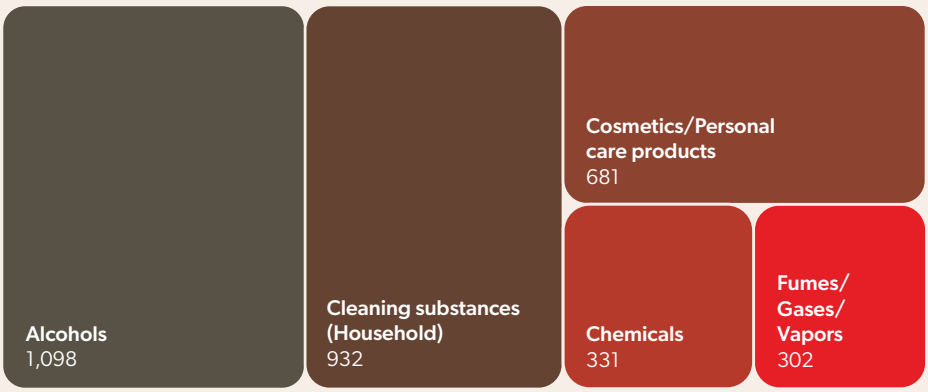
Exposures: Top five substance categories, 2022 (13 to 19 age group)

1. **Analgesics**
   6,844 (31.5%) ↑ 3.4%
2. **Antidepressants**
   5,238 (24.1%) ↑ 5.1%
3. **Sedatives/Hypnotics/Antipsychotics**
   2,566 (11.8%) ↑ 3.9%
4. **Stimulants and street drugs**
   2,437 (11.2%) ↑ 6.7%
5. **Alcohols**
   1,098 (5.1%) ↓ 10.4%

Drug Exposures: 13 to 19 age group top five substance categories, 2022



Non-Drug Exposures: 13 to 19 age group top five substance categories, 2022



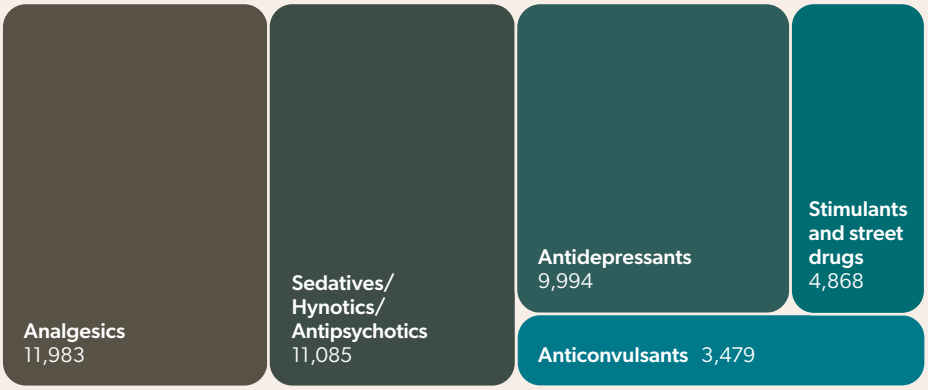
Types of substances:
20 to 59 age group

In 2022, the most common substances involved in exposure cases among adults (20 to 59 years of age) managed by poison centres were medications for pain relief (analgesics), drugs commonly used to treat mental health conditions, such as antipsychotics, sedatives/hypnotics and antidepressants, alcohols, as well as stimulants and street drugs.

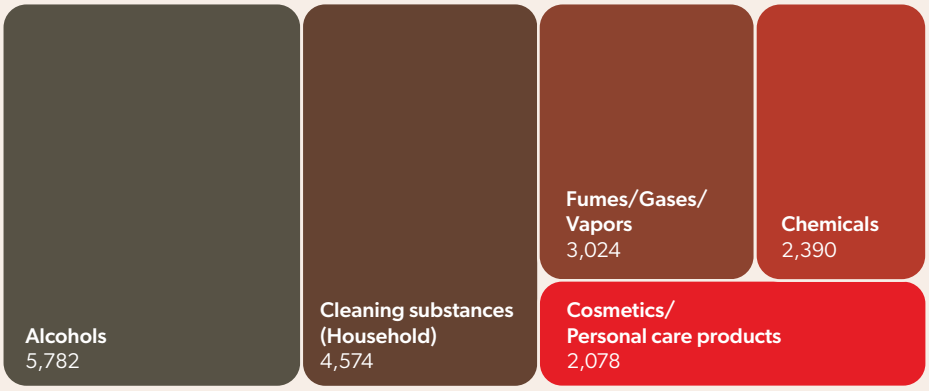
Exposures: Top five substance categories, 2022 (20 to 59 age group)

1. **Analgesics**
   11,983 (18.7%) ↑ 10.1%
2. **Sedatives/Hypnotics/Antipsychotics**
   11,085 (17.3%) ↑ 6.6%
2. **Antidepressants**
   9,994 (15.6%) ↑ 11.4%
4. **Alcohols**
   5,782 (9.0%) ↑ 0.2%
5. **Stimulants and street drugs**
   4,868 (7.6%) ↑ 0.8%

Drug Exposures: 20 to 59 age group top five substance categories, 2022



Non-Drug Exposures: 20 to 59 age group top five substance categories, 2022



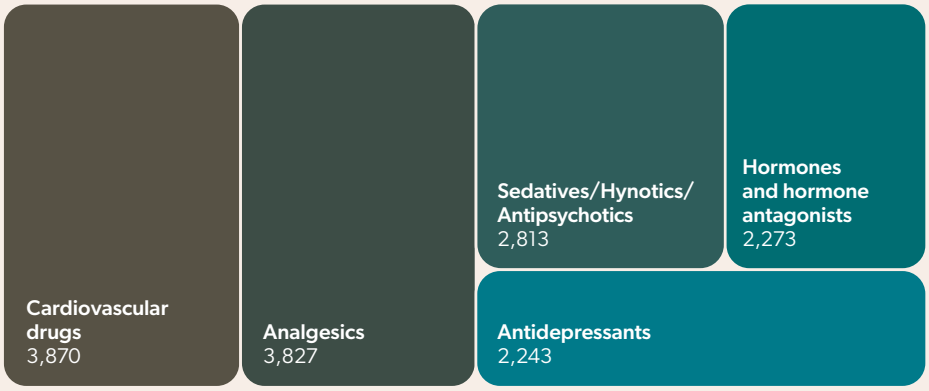
Types of substances:
60+ age group

Older adults are at risk for poisoning primarily due to using multiple medications or more than medically necessary (known as polypharmacy) and adverse drug events. In 2022, the top substances involved in calls to poison centres for older adults (60 years and older) were various medications.

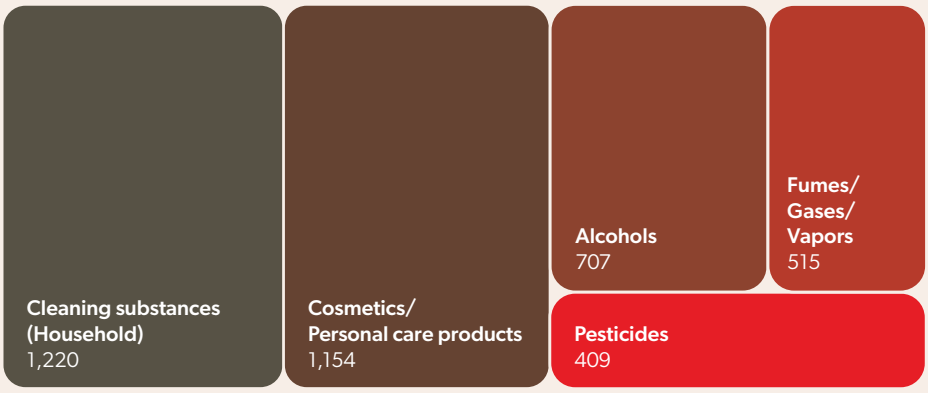
Exposures: Top five substance categories, 2022 (60+ age group)

1. **Cardiovascular drugs**
   3,870 (19.2%) ↑ 7.8%
2. **Analgesics**
   3,827 (19.0%) ↑ 9.7%
3. **Sedatives/Hypnotics/Antipsychotics**
   2,813 (14.0%) ↑ 19.2%
4. **Hormones and hormone antagonists**
   2,273 (11.3%) ↑ 10.9%
5. **Antidepressants**
   2,243 (11.2%) ↑ 11.6%

Drug Exposures: 60+ age group top five substance categories, 2022



Non-Drug Exposures: 60+ age group top five substance categories, 2022



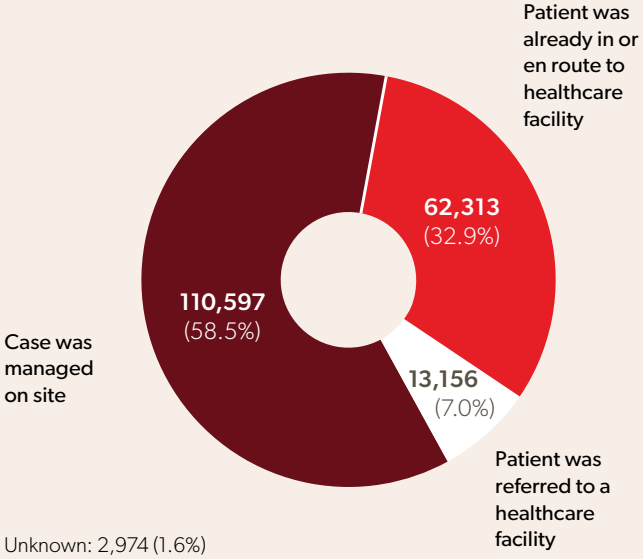
Outcomes after calls to Canadian poison centres

Following the guidance and recommendations provided by poison centre specialists, most poisoning exposure cases are managed at home without requiring medical attention at a hospital, clinic or doctor's office. Poison centre staff provide guidance and reassurance to Canadians while preventing unnecessary strain on health-care resources.

In 2022, 58.5 per cent of cases were managed at home. In these circumstances, a benign outcome is expected based on clinical assessment of known exposure information. Where possible, poison centre staff follow cases where the patient is in, en route to, or referred to a health-care facility until the patient's medical outcome is known. In 2022, outcomes were known for more than one-third of all exposure cases handled by poison centres. Of these exposures, 21.6 per cent led to no effects, 49.8 per cent resulted in minor effects, 23.6 per cent involved moderate effects and 4.9 per cent involved major effects.

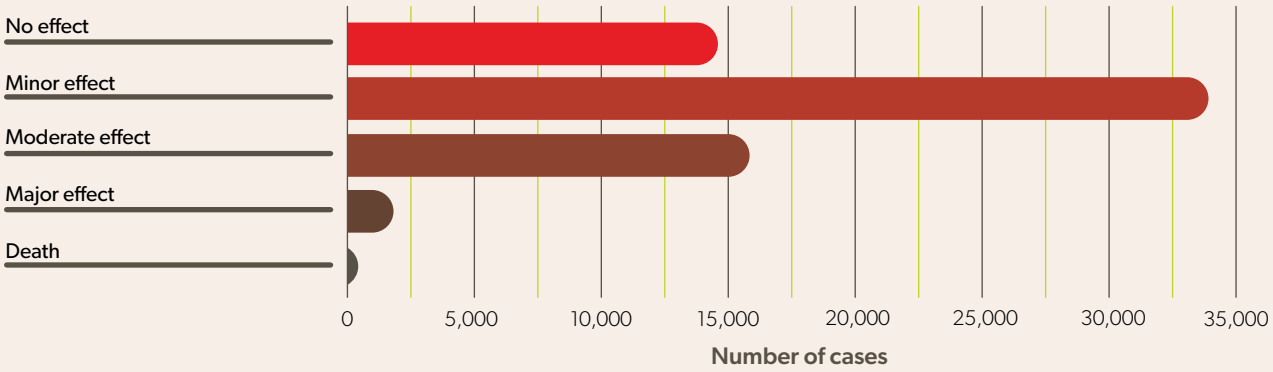
In 287 cases (0.4 per cent), the patient died because of the exposure or complications directly related to it. Importantly, these data reflect only a fraction of the full burden of poisoning and poison-related deaths in Canada, as calls to poison centres are not mandatory. For context, in 2018, unintentional poisoning resulted in 3,477 deaths in Canada, making unintentional poisoning the third-leading cause of injury-related death for Canadians and the top cause of injury death for those aged 24 to 65 (Parachute, 2021).

Exposure cases by patient flow, 2022



Unknown: 2,974 (1.6%)
Other: 219 (0.1%)

Exposure cases by medical outcome, 2022



This chart excludes instances where the case was not followed to a known medical outcome and minimal clinical effects were possible, not followed and judged as a non-toxic exposure and cases where the exposure was deemed probably not responsible for the effect(s). The total number of excluded cases is 121,523 (64.3 per cent of confirmed exposure cases).

Medical outcomes explained

Here are examples of potential clinical effects from poisoning exposures:

No effect
No symptoms developed due to the exposure.

Minor effect
Minor symptoms such as skin irritation, drowsiness or mild stomach upset.

Moderate effect
More pronounced symptoms such as high fever, low blood pressure or dehydration.

Major effect
Life-threatening symptoms such as seizures, cardiac arrest or coma.

Death
Cases where the patient dies as a direct result or direct complication of the exposure.

From information to impact:

Mobilizing poison centre data and expertise

Poison centre data and expertise provide critical information used to identify poisoning risks in the community, inform regulatory action, update professional knowledge and educate and protect the public.

In 2022, Canadian poison centres provided data and expertise to Health Canada on priority health issues, which guided policy work and regulatory action and led to early warnings and alerting of safety signals. This resulted in two public advisories, one public health notice from the Public Health Agency of Canada, and two updates to the Government of Canada website. The Canadian Association for Poison Centres and Clinical Toxicology (CAPCCT) also published one letter addressed to Health Canada and the Public Health Agency of Canada.

Rapid antigen test kits and potential exposure to hazardous substances

Health Canada released an advisory to inform Canadians about potential risks associated with COVID-19 rapid antigen test kit solutions when misused, accidentally ingested or spilled on the skin. The solutions contain chemical preservatives that may be poisonous and cause skin and eye irritation, particularly in small children and pets. Reports from poison centres indicate that health outcomes from this exposure are minor.

Children's ibuprofen/acetaminophen shortage: What you should know and do

The year 2022 saw an unprecedented demand for pediatric acetaminophen and ibuprofen, leading to a drug shortage. Poison centres reported an increase in cases of acetaminophen exposure among children due to dosing errors from administering adult formulations to children and errors in pharmacy compounding. Health Canada issued a public advisory to inform the public about the drug shortage and to outline steps parents can take to prevent acetaminophen poisoning. Health Canada published an Update on Supply of Children's Acetaminophen and Ibuprofen Products later in the year.

N-acetylcysteine (NAC) back-order

In late 2022, the Canadian Association for Poison Centres and Clinical Toxicology (CAPCCT) raised urgent concerns about a critical shortage of N-acetylcysteine (NAC), a vital antidote for acetaminophen poisoning. CAPCCT prepared a letter to senior Health Canada and Public Health Agency of Canada officials, emphasizing the frequency of acetaminophen poisonings. Health Canada organized an emergency meeting, which was attended by CAPCCT toxicologists, and escalated the shortage to the highest level of national significance. This resulted in co-ordination of appropriate interventions across relevant departments and with poison centres to ensure the continued availability of this crucial antidote.

Public Health Notice: Aconitine toxin found in galanga powder in Ontario with possible implications for other jurisdictions

After a mass aconitine poisoning event in Ontario, the Public Health Agency of Canada issued a public health notice, providing information on the signs and symptoms of exposure to the toxin and advice on how to prevent poisoning. A food recall warning was also issued to inform Canadians of the specific product affected: Mr. Right brand Keampferia Galanga Powder, a spice commonly used in Asian cuisines. At the recommendation of the Ontario Poison Centre, the alert was issued in both Simplified and Traditional Chinese as an additional effort to reach the affected community.

Carbon monoxide poisoning

In 2022, Canada's poison centres reported 2,218 cases related to carbon monoxide exposure. The Atlantic Canada Poison Centre and the Centre antipoison du Québec alerted Health Canada to an increased number of calls related to carbon monoxide exposures following the destruction and power outages caused by Hurricane Fiona across the Atlantic Canada and Eastern Québec regions. In response to this event, Health Canada released updated communication on carbon monoxide poisoning, highlighting the need for carbon monoxide alarms in homes and the risk of bringing generators, stoves and heaters inside.

Reduce your risk: Choose legal cannabis

Poison centres continue to monitor cases of poisoning related to illegal and legal cannabis products in co-operation with Health Canada. In 2022, Health Canada published new information on the risks associated with the use of illegal cannabis products and information on how to recognize illegal and legal cannabis products.

Sale of exotic pets, poisonous and venomous animals

In 2022, the Centre antipoison du Québec raised concerns regarding venomous exotic animals. This ultimately led to a collaborate effort among poison centres, Health Canada and other stakeholders to examine the issue and identify next steps to help protect the health and safety of people in Canada. For example, work has been initiated to explore mechanisms for accessing rare antidotes. The importation, sale, and possession of exotic venomous animals can pose serious health risks, especially as required anti-venoms may not be readily available. The CAPCCT and Parachute would like to encourage partners at all levels to work together to assess related measures that support public safety, including reducing access to exotic venomous animals.

Rapid response: Children's acetaminophen shortage

Health Canada issued a public advisory to inform the public about shortages of pediatric acetaminophen and ibuprofen caused by unprecedented demand. The advisory also outlined measures parents should take when administering medication and guidance on how to prevent acetaminophen poisoning. During this shortage period, poison centres in Canada reported an increase in cases of acetaminophen exposure among children. The exposures were due to dosing errors from administering adult formulations to infants or children, or attempting to convert infants' acetaminophen to children's or vice versa. Some pharmacy teams, in response to the shortage, began providing compounded formulations of acetaminophen and ibuprofen products. However, in some situations, compounds were prepared at concentrations that differed to those in commercially available products, leading to confusion among parents and caregivers on how much medication to administer and a heightened risk of unintentional dosing error.

In response to the drug shortage and the rise in pediatric exposures to acetaminophen, Health Canada provided an update to parents and caregivers in a second statement, Update on Supply of Children's Acetaminophen and Ibuprofen Products. To assess avenues to expand supply and identify and implement shortage mitigation measures, Health Canada was in direct contact with manufacturers of pediatric/infant and children's acetaminophen and ibuprofen products, provinces and territories, children's hospitals, the Canadian Pharmacists Association, the Canadian Pediatric Society and the Food, Health & Consumer Products of Canada.

During the shortage, the Canadian Surveillance System for Poison Information (CSSPI) and poison centres' timely reporting of acetaminophen safety signals and guidance was used to support public and professional outreach. Information about compounding errors was promptly shared with provincial colleges of pharmacy and the National Association of Pharmacy Regulatory Authorities (NAPRA). Poison centres reported multiple pediatric cases across Canada where dispensed concentrations and quantities represented a significant risk to the public. In response, poison centres put forward recommendations for safely compounding infants' and children's acetaminophen products, highlighting that pharmacists should look at the total volume dispensed and provide preferred ratios of compound components.

Timely detection and action likely saved lives and prevented serious exposures. We thank NAPRA and our provincial colleges of pharmacy for swiftly engaging their memberships during this time. The Alberta College of Pharmacy's Compounding infants' and children's acetaminophen is an example of clear guidance to pharmacists, which contributed to these prevention efforts.

Publications

Poison centres contributed data and expertise to support one publication in 2022.

The impact of COVID-19 on calls made to Canadian poison centres regarding cleaning products and disinfectants: A population based retrospective interrupted time-series study one year before and after the WHO's pandemic declaration was published in the peer-reviewed journal, Journal of Clinical Toxicology, in February 2022. The paper provides insight into the impact of the WHO's pandemic declaration and the resulting public health response on rates of calls to Canadian poison centres related to cleaning products and disinfectants.

Journal of Clinical Toxicology

OPEN ACCESS Freely available online

Research Article

The Impact of COVID-19 on Calls made to Canadian Poison Centres Regarding Cleaning Products and Disinfectants: A Population Based Retrospective Interrupted Time-Series Study One Year before and after the WHO's Pandemic Declaration

Abdool S Yasseen[1*], Nina Dobbin[1,2], Deborah Weiss[1], Chunli Gu[1,3], Sara Khan[1,4], Ashley Rowe[1,5], Victoria Wan[1], Bojana Bogeljic[1], Dennis Leong[1], Laurie Mosher[1], Guillaume Belair[6], Brooke Button[1], James Hardy[7], Shahid Perwaiz[8], Alwyn Smith[9], Shawn Lawless[10] Margaret Thompson[6], Richard Wootton[1]

[1]Environmental Health Science and Research Bureau, Health Canada, Ottawa, Ontario, Canada; [2]British Columbia Centre for Disease Control, Drug and Poison Information Centre, Vancouver, British Columbia, Canada; [3]Poison and Drug Information Service, Calgary, Alberta, Canada; [4]Ontario Poison Centre, Toronto, Ontario, Canada; [5]Izaak Walton Killam Poison Centre, Halifax, Nova Scotia, Canada; [6]Centre Antipoison Du Québec, Québec City, Québec, Canada; [7]Consumer and Hazardous Products Safety Directorate, Health Canada, Ottawa, Ontario, Canada; [8]Marketed Health Product Directorate, Health Canada, Ottawa, Ontario, Canada; [9]Natural and Nonprescription Health Products Directorate, Health Canada, Ottawa, Ontario, Canada; [10]Health Products Food Branch, Health Canada, Ottawa, Ontario, Canada

ABSTRACT

Objective: To determine the impact of the COVID-19 pandemic on the rates of exposure calls related to cleaning products and disinfectants made to Canadian poison centers, one year into the pandemic.

Methods: Using data obtained from Canadian poison centers between March 2019 and March 2021 regarding hand sanitizers, disinfectants, bleaches, chlorine gas, and chloramine gas, we applied an interrupted time series design to evaluate changes before and after the World Health Organization (WHO) declaration of COVID-19 as a pandemic. Call rates were estimated as the number of cleaning products and disinfectants calls divided by the total number of exposures at monthly time intervals, and changes were assessed at 6 and 12 months after the WHO's declaration. We additionally conducted a stratified analysis by patient age groups (≤ 19 years and >19 years).

Results: A total of 396,041 exposures were reported to the five Canadian poison centers, of which 5,669 (1.4%) were for hand sanitizers, 3375 (0.9%) for disinfectants, 7022 (1.8%) for bleaches, 2205 (0.6%) for chlorine gas, and 369 (0.1%) for chloramine gas exposures. Those most often exposed to hand sanitizers were ≤ 19 years of age, whereas those >19 years of age were more often exposed to bleaches, chlorine and chloramine gas. One year after the WHO declaration, exposures to hand sanitizers, chlorine gas, and chloramine gas have yet to return to pre-pandemic rates, showing an increase of 169% (95% Confidence Intervals (CI): 125, 214), 35% (95% Confidence Intervals (CI): 19, 51), and 108% (95% Confidence Intervals (CI): 26, 191) from prepandemic rates, respectively.

Conclusions: After an initial increase in calls related to cleaning products and disinfectants, calls related to the use of some products have returned to pre-pandemic levels, whereas others remain elevated. We identified a correlation between national public health response and reduction in calls made to poison centers, but further work is needed to determine why the numbers have not returned to baseline.

Keywords: Poison centers; Poison control centers; Cleaning products and disinfectants; COVID-19; Hand sanitizers; Disinfectants; Bleaches; Chlorine gas; Chloramine gas

Correspondence to: Abdool S Yasseen, Environmental Health Science and Research Bureau, Health Canada, Ottawa, Ontario, Canada, E-mail: abdool.yasseen@canada.ca

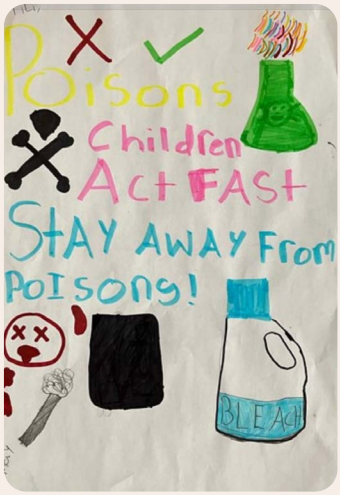
Received: 10-Jan-2022, Manuscript No. JCT-22-15449; **Editor assigned:** 12-Jan-2022, PreQC No. JCT-22-15449 (PQ); **Reviewed:** 24-Jan-2022, QC No. JCT-22-15449; **Revised:** 31-Jan-2022, Manuscript No. JCT-22-15449 (R); **Published:** 07-Feb-2022, DOI: 10.35248/2161-0495-22.12.501.

Citation: Yasseen AS, Dobbin N, Weiss D, Gu C, Khan S, Rowe A, et al. (2022) The Impact of COVID-19 on Calls made to Canadian Poison Centres Regarding Cleaning Products and Disinfectants: A Population Based Retrospective Interrupted Time-Series Study One Year before and after the WHO's Pandemic Declaration. J Clin Toxicol. 12:501.

The poison prevention community in action:
National Poison Prevention Week

National Poison Prevention Week (NPPW) takes place every year during the third week of March. In 2022, poison centres and poison prevention partners participated in this national campaign to draw attention to the causes of poisoning and prevention of these injuries. Under the theme "Check for Poisons", messaging focused on common sources of poisoning around the home and emphasized safe storage.

Poison centres, as well as provincial, territorial and national partners, conducted NPPW social media campaigns, created and disseminated resources, engaged traditional media and engaged their communities, including providing baby wellness visits and creating poster art with students. Poison centres and community partners collaborated with Parachute to distribute cabinet locks and lock bags to emphasize safe storage of potential poisons, such as medications and cannabis.



From left to right:

1. *A social media post from Centre Intégré Universitaire de Santé et de Services Sociaux (CIUSSS) de la Capitale-Nationale, featuring a video about carbon monoxide.*
2. *The Ontario Poison Centre invited students to create poster art for NPPW. This poster was created by an elementary school student from Mississauga, Ontario.*
3. *Laurie Mosher, Specialist in Poison Information from Atlantic Canada Poison Centre, on a local TV program during NPPW.*

Knowledge exchange

Webinar series

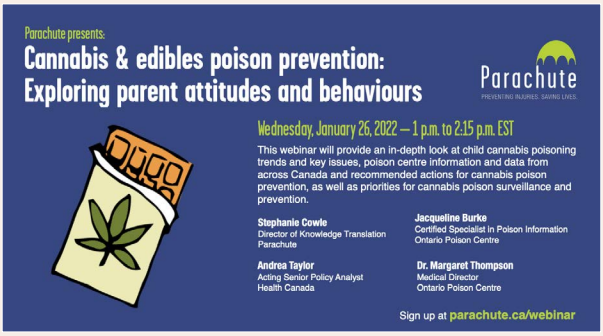
In 2022, Parachute hosted a three-part webinar series for multi-sector professionals on topics including parental attitudes and behaviours toward cannabis poison prevention, cannabis regulations and poisoning trends. Poison centre staff participated as expert speakers, sharing data and insights on various poison prevention topics and collaborative efforts. Expert speakers in the webinar series also included those from the Royal Canadian Mounted Police (RCMP), Institute for Safe Medication Practices (ISMP) Canada and Health Canada, as well as provincial injury prevention partners including BC Injury Research and Prevention Unit, IWK Health Centre (Atlantic Canada) and Child Safety Link (Maritimes).

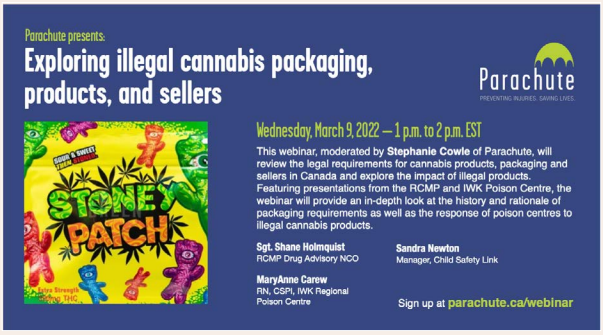
Cannabis & edibles poison prevention: Exploring parent attitudes and behaviours

Exploring illegal cannabis packaging, products and sellers

Notable poisonings trends: What you need to know

There were 449 participants across the three webinars and 701 subsequent views on Parachute's YouTube channel, where recordings of these webinars are hosted.





Conferences: North American Congress of Clinical Toxicology

The North American Congress of Clinical Toxicology (NACCT) Annual Meeting took place in San Francisco from September 14 to 18, 2022. Poison centres presented five abstracts at the conference, which were published in the journal Clinical Toxicology.

Conclusion

The data and stories of impact highlighted in this report demonstrate the continued value of poison centres to public health, public safety and the health-care system. For the public and health-care professionals, poison centres provide timely, specialized expertise and guidance.

Most poisoning exposure cases reported to poison centres are managed at home, without requiring more costly medical attention at a hospital, clinic or doctor's office. Poison centre staff provide expert guidance and reassurance to Canadians while preventing unnecessary strain on health-care resources.

Poison centres are critical resources for surveillance and data collection. The 2022 data presented here contribute to the broader understanding of poisoning in Canada, highlighting trends in unintentional and suspected self-harm incidents. Poison centres also function as early-warning "canaries in the coal mine" when it comes to emerging issues. New issues related to poisonings first show up in Canada when individuals call poison centres, seeking help. Alerts raised by poison centres about a new danger or shifting trend can then translate into preventive action rolling out across the country.

In 2022, poison centre data and expertise contributed to timely actions on poisonings related to aconitine, carbon monoxide, and cannabis, and also helped support a critical shortage of children's acetaminophen. Poison centres are effective instigators of public health action to educate and protect the pubic, inform regulatory action and enhance professional knowledge.

No doubt there will be fresh challenges ahead as new products, medications and trends emerge in Canada that have the capacity to poison. Poison centres and their partners are committed to reducing the burden of poisonings in Canada, both to the public and to our health-care system.

Acknowledgments

We would like to extend our sincere gratitude to the five poison centres who provided data and information, reviewed earlier versions of this report, and provided ongoing guidance and expertise:

- **Atlantic Canada Poison Centre,**
  Medical Director: Dr. Nancy Murphy
- **BC Drug and Poison Information Centre**,
  Medical Director: Dr. Roy Purssell
- **Centre antipoison du Québec,**
  Medical Director: Dr. Maude St-Onge;
  Assistant head nurse: Guillaume Bélair;
  Pharmacist: Audrée Elliott
- **Ontario Poison Centre,**
  Medical Director: Dr. Margaret Thompson;
  Senior Clinical Manager: Anna Leah Desembrana
- **Poison and Drug Information Service,**
  Medical Director: Dr. Mark Yarema

We thank the Specialists in Poison Information at each centre, without whom the systematic collection and reporting of poison centre data would not be possible.

This report has been made possible by funding provided by Health Canada. The Surveillance and Co-ordination Unit of the Chemical Emergency Management and Toxicovigilance Division supported the collection, aggregation and analysis of data presented in this report.

Our thanks to the staff at Parachute for co-ordinating the production of this report.

Finally, we would like to thank our partner non-governmental organizations and injury prevention organizations for their ongoing collaboration and commitment to raising awareness and reducing poisoning harms for Canadians.

Appendix

The following are examples of products included under the top 10 drug and non-drug substance categories in this report. These lists are not exhaustive.

Product examples for top substances: Drug exposures

Analgesics: acetaminophen, aspirin, codeine, ibuprofen, fentanyl, morphine, tramadol

Anticonvulsants: carbamazepine, gabapentin, levetiracetam, primidone, valproic acid

Antidepressants: citalopram, escitalopram, fluoxetine, lithium, sertraline

Antihistamines: cetirizine, diphenhydramine, fexofenadine, loratadine

Cardiovascular drugs: ACE inhibitors, beta blockers, calcium antagonists, diuretics, nitroglycerin

Dietary supplements/Herbal/Homeopathic: creatine, echinacea, energy drinks, ginkgo biloba, ginseng, melatonin, St. John's wort

Hormones and hormone antagonists: androgen, estrogen, insulin, hypoglycemic, oral contraceptive, progestin

Sedatives/ hypnotics/ antipsychotics: barbiturate, benzodiazepine, methaqualone, sleep aid (over the counter)

Stimulants and street drugs: caffeine, cannabis, cocaine, LSD, methamphetamine, synthetic street drugs

Vitamins: multi-vitamin tablets and liquids, niacin (B3), vitamins A, C, D and E

Product examples for top substances: Non-drug exposures

Alcohols: butanol, ethanol, methanol, rubbing alcohol

Chemicals: ammonia (excluding cleaners), boric acid, cyanide, formaldehyde, hydrochloric acid

Cleaning substances (household): automatic dishwasher detergent, bleach, disinfectant, cleaners (drain, glass, oven or floor), rust remover

Cosmetics/Personal care products: baby oil, depilatory, lipstick, mouthwash, nail polish remover, peroxide, soap, sunscreen

Foreign bodies/Toys/Miscellaneous: ash, charcoal, coin, glow product, soil, thermometer

Fumes/Gases/Vapours: carbon dioxide, carbon monoxide, chlorine gas, methane and natural gas, propane

Hydrocarbons: benzene, diesel fuel, gasoline, kerosene, motor oil, turpentine, industrial cleaners

Other/Unknown non-drug substances: other non-drug substance, unknown substances unlikely to be drug products

Pesticides: fumigants, fungicides, herbicides, insect repellent, insecticides, rodenticides

Plants: anticholinergic plants, plants causing gastrointestinal or skin irritation, nicotine, non-toxic plants

References

Albert, D., Chein, J., & Steinberg, L. (2013). Peer Influences on Adolescent Decision Making. *Current directions in psychological science, 22*(2), 114–120. https://doi.org/10.1177/0963721412471347

Campeau, A., Champagne, A. S., & McFaull, S. R. (2022). Sentinel surveillance of substance-related self-harm in Canadian emergency departments, 2011-19. *BMC public health, 22*(1), 974. https://doi.org/10.1186/s12889-022-13287-6

Galvao, T. F., Silva, E. N., Silva, M. T., Bronstein, A. C., & Pereira, M. G. (2012). Economic evaluation of poison centers: a systematic review. *International journal of technology assessment in health care, 28*(2), 86–92. https://doi.org/10.1017/S0266462312000116

Nawi, A. M., Ismail, R., Ibrahim, F., Hassan, M. R., Manaf, M. R. A., Amit, N., Ibrahim, N., & Shafurdin, N. S. (2021). Risk and protective factors of drug abuse among adolescents: a systematic review. *BMC public health, 21*(1), 2088. https://doi.org/10.1186/s12889-021-11906-2

Parachute. (2021). Potential lost, potential for change: The Cost of Injury in Canada. www.parachute.ca/costofinjury

Purba, A. K., Thomson, R. M., Henery, P. M., Pearce, A., Henderson, M., & Katikireddi, S. V. (2023). Social media use and health risk behaviours in young people: systematic review and meta-analysis. *BMJ (Clinical research ed.), 383*, e073552. https://doi.org/10.1136/bmj-2022-073552

Skinner, R., McFaull, S., Draca, J., Frechette, M., Kaur, J., Pearson, C., Thompson, W. (2016). Suicide and self-inflicted injury hospitalizations in Canada (1979 to 2014/15). *Health Promotion and Chronic Disease Prevention in Canada. 36*(11); 243-51. https://doi.org/10.24095/hpcdp.36.11.02

Statistics Canada. (2022). Table 13-10-0156-01 Deaths, by cause, Chapter XX: External causes of morbidity and mortality (V01 to Y89) [data set]. https://doi.org/10.25318/1310015601-eng

World Health Organization. (2021, January 14). *Guidelines for establishing a poison centre.* https://www.who.int/publications/i/item/9789240009523

Canadian Association for Poison Centres and Clinical Toxicology

Association canadienne pour centres antipoison et toxicologie clinique

www.infopoison.ca