In-depth Analysis on Opioid Addiction in Canada

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Introduction and Background

Opioids, sometimes called narcotics, are a type of drug that include strong prescription pain relievers, such as oxycodone, hydrocodone, fentanyl, and tramadol and heroin. Opioids affect the part of the brain that regulates breathing especially when a high dose of it is taken which can lead to prolonged addiction and sometimes death.

The Canadian opioid crisis is a complex, multifaceted problem involving prescribed, diverted and illicitly manufactured opioids. News networks and medical organizations believe that there is an opioid crisis mainly via the drug fentanyl. A report published by the Public Health Agency of Canada in June 2018 suggests 3,987 people died in 2017 from opioids. That comes to about 11 deaths per day. The report also suggests that there was a 34% increase in death via overdoses.

But what most people don't understand is that fentanyl is only linked to five known drugs while dozens of drugs are linked to the opioid crisis based on the data provided. And there are many overdoses linked to additional drugs that the hospital system can't even identify.

So we will have to ask the question of whether or not there is really an opioid crisis as suggested by the Canadian Institute for Health Information's Hospital Morbidity Database. Or is the institute merely grouping a number of drugs together and calling them all opioids?

This may be the case as classic drugs like heroin and methadone are included in the findings for opioid overdoses leading to death or hospitalization.

This research and analysis considers the impact of opioid combining which has led to much of the death toll from 2008-2018.

The so-called opioid crisis in Canada is worsening quarterly and yearly according to data from the Canadian Institute for Health Information's Hospital Morbidity Database and the Government of Canada's Public Health Agency.

The Hospital Morbidity Database covers mainly the number of hospitalizations from 2007-2017 bi-yearly by diagnosis, age group, per 100,000 (metropolitan areas), province/territory, and by opioid type.

There is special focus on Alberta (23% increase in hospitalizations) and Ontario (73% increase in hospitalizations) where the opioid crisis is worsening. Nearly double the number of men compared to women were hospitalized from opioid-related poisoning in 2017 in Ontario.

But what is the incidence of combining drugs (co-poisoning) in opioid-related hospitalization or death?

Over 46% of hospitalizations from 2007-2017 are a result of co-poisoning (one who takes opioids with non-opioid substances). But were the deaths really from the main drug known as fentanyl?

The Government of Canada's Public Health Agency reports in March, June, and December 2018 deals primarily with the number of deaths from opioid use per sex, province/territory, per 100,000 and more.

The opioid crisis is due to both legal opioids obtained via prescription and illegal synthetic opioids obtained elsewhere.

One worry is that the number of deaths involving fentanyl or fentanyl analogues (oftentimes legal) increased from 50% in 2016 to 68% in 2017. The other worry is that the strength of synthetic opioids are increasing (mostly illegal) which is difficult for those managing the opioid crisis. If doctors stop prescribing opioids some of the time will more people look for opioids illegally?

If people look for opioids illegally it could have an impact on the unknown hospitalizations and deaths. But will this also cause more hospitalizations and deaths with already identifiable opioids?

Drug information is as follows:

Fentanyl and fentanyl analogues include:
3- methylfentanyl, acetylfentanyl, butyrylfentanyl, carfentanil, despropionyl-fentanyl, fentanyl, furanyl-fentanyl, norfentanyl

Non-fentanyl-related opioids include and are not limited to:
Buprenorphine metabolites, codeine, dihydrocodeine, heroin, hydrocodone, hydromorphone, loperamide, meperidine, methadone, monoacetylmorphine, morphine, normeperidine, oxycodone, tapentadol, tramadol, U-47700

Non-opioid substances include, but are not limited to:
Alcohol, benzodiazepines, cocaine, methamphetamine, W-18.

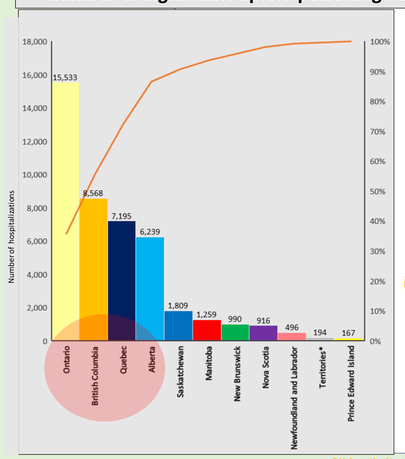
Image source: https://www.princeedwardisland.ca/en/information/health-and-wellness/preventing-opioid-related-overdoses

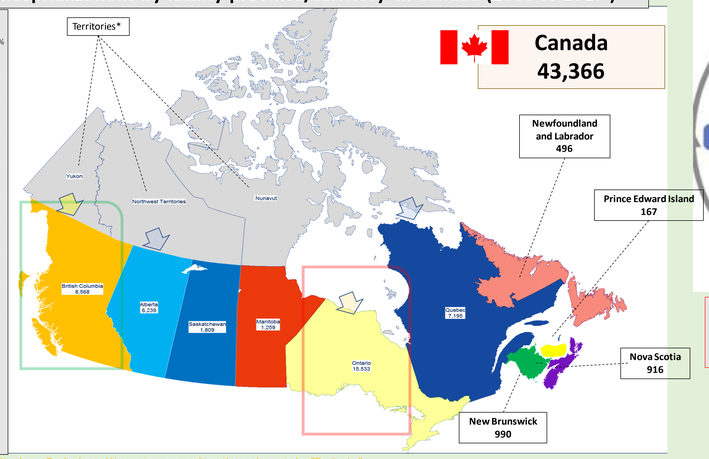
Analysis Questions

- What is the ratio of hospitalizations compared to deaths?
- How much is unknown about the opioid crisis?
- What is the future forecast for opioid-related deaths?
- What age groups are most affected?
- Is the opioid crisis slowing down or speeding up?
- As doctors are prescribing less opioids, are people turning towards different drugs?
- Is fentanyl really the major cause of death in the opioid crisis?
- Will Ontario surpass British Columbia in the most opioid-related deaths in 2019?
- Will the unknown category of hospitalizations be debunked by new ways to identify other strains of opioids?
- Are people experimenting with opioids more or are they trying to commit suicide?

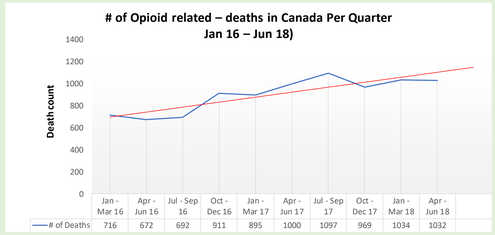
Analysis and Visualization

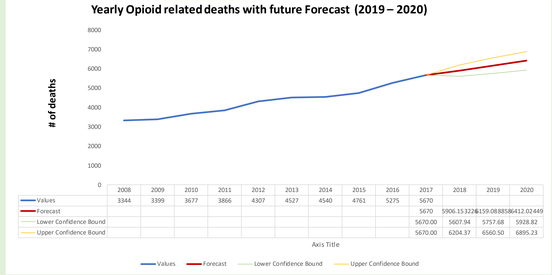
Number of significant opioid poisoning hospitalizations by facility province/territory in Canada (2008 to 2017)



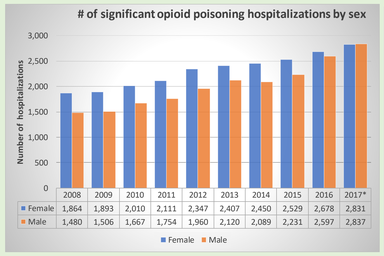


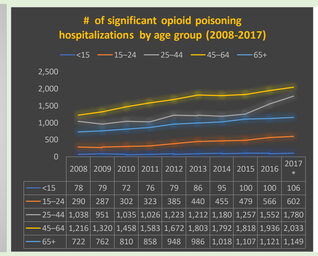
** Yukon, the Northwest Territories and Nunavut are grouped together and reported as "Territories"*

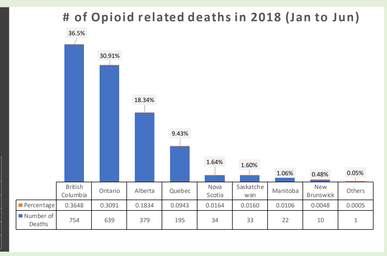


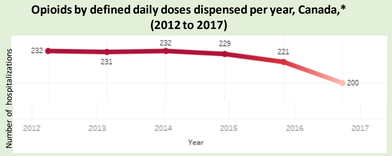


These counts do not include data from Newfoundland and Labrador, Prince Edward Island, and Nunavut. Data from British Columbia and available data from Quebec for 2017 (July to December) and 2018 include deaths related to all illicit drugs including, but not limited to, opioids.

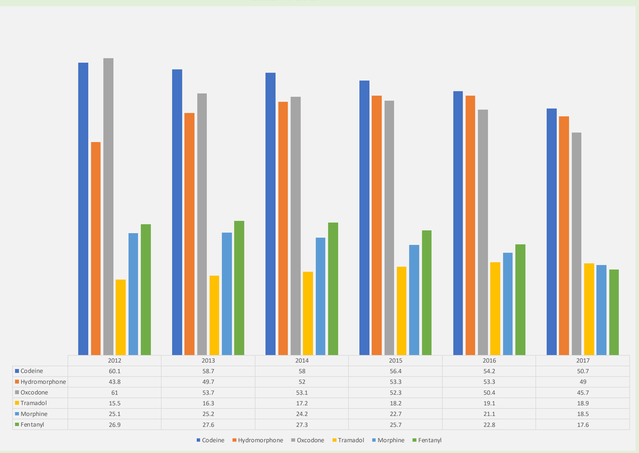


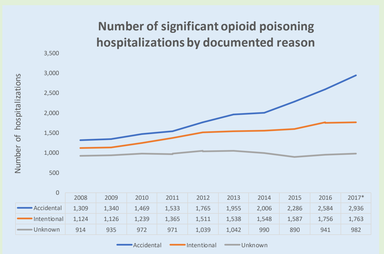






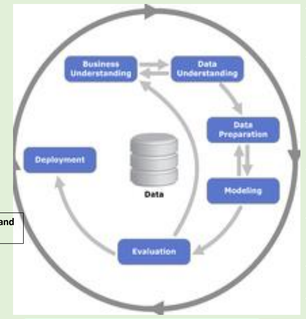
Notes
** Data was not available for the territories.*
Defined daily doses in millions.





** Quebec and Nunavut data is from 2015–2016 (the most recent year of data available)*

Quick Facts



- From January 2016 to June 2018, there were more than 9,000 apparent opioid-related deaths; 2,000 occurred between January and June 2018.
- Most accidental apparent opioid-related deaths were among young and middle aged adults; 20% were individuals between the ages of 20 and 29, 27% were between the ages of 30 and 39 and 21% were between the ages of 40-49.
- The Canadian Institute for Health Information found that an average of 17 Canadians were hospitalized every day due to opioid poisoning in 2017 — an increase from 16 per day in 2016.
- between 2016 and 2017, rates of emergency department visits due to opioid poisoning rose in Ontario and Alberta by 73% and 23%, respectively.
- Based on available emergency medical services data between January and June 2018, 71% of suspected opioid-related overdoses occurred among men.
- Suspected **opioid-related overdoses** were most common among individuals between the ages of 20 and 29.
- Opioid poisonings result in an average of 16 hospitalizations a day in Canada, as well as 11 emergency department visits a day in Alberta and 13 emergency department visits a day in Ontario
- Most of the increases in both hospitalizations and emergency department visits due to opioid poisoning have occurred over the past three years.

More than 9000 lives were lost between Jan. 2016 – Jun 2018

2016 (Jan – Dec.)	2,991 apparent opioid – related deaths which is a death rate of 8.3% per 100,000 population
2017 (Jan – Dec.)	3,903 apparent opioid – related deaths which is a death rate of 10.9% per 100,000 population
2018 (Jan – Jun)	2,066 apparent opioid – related deaths which is a death rate of 11.2% per 100,000 population

Recommendations

- Focus resources on provinces with highest frequencies of opioid hospitalizations and deaths, namely Ontario and British Columbia, as well as smaller communities which have the highest rate of opioid poisoning.
- Establish marketing strategies focused on prevention targeting the 45-64 and 65+ age groups (which from the data are more impacted than other age groups)
- Launch promotional campaigns to inform public on cocaine co-poisoning risks (high accidental co-poisoning incidence as compared to other drugs).
- The ratio of female hospitalizations due to accidental reasons has been going down while the one due to intentional reasons has remained high. Further analysis is necessary to understand the reasons of this trend and find solutions to address this situation.
- Training Health professionals should be trained regularly on how to clinically respond to the addiction epidemic and building systems that enable effective care.
- In 2017 males in Ontario had double the number of hospitalizations versus females. The province needs to address this issue with a potential "task force" in understanding the reasons behind this.
- About a quarter of opioid-related deaths were still determined to be unknown by the end of 2017. Canada at the federal health level needs to learn about new synthetic strains.
- Two hospitals in Maryland managed to increase the number of synthetic drugs identifiable from 26 to 46. Canada needs to follow suit to debunk some of the unknown hospitalizations and deaths that have occurred.
- Launch culturally safe programs and services in collaboration with First Nations and Intuit leadership to reduce the high rate of opioid addiction in the Northern Territories.
- Combat illegal opioids by reducing opportunities of importation, through a cooperation of the CBSA, the RCMP and the authorities of provinces.
- Considering the addictive nature of opioid, focus should be on prevention through public education on opioid misuse, training of physicians to prevent overprescribing practices, and removing easy access to illegal opioid.

References

Canadian Institute for Health Information (CIHI). (2018, Dec.). Latest data on the opioid crisis. Retrieved March 2019, from https://www.cihi.ca/en/latest-data-on-the-opioid-crisis

Canadian Institute of Health Information (CIHI). (2018, June). Pan-Canadian Trends in the Prescribing of Opioids and Benzodiazepines, 2012 to 2017. Retrieved March 2019, from https://www.cihi.ca/sites/default/files/document/opioid- prescribing-june2018-en-web.pdf

CBC News. (2017, Oct.). How do you solve Canada's opioid crisis? Retrieved March 2019, from https://www.cbc.ca/news/thenational/how-do-you-solve-canada-s-opioid-crisis-sunday-panel-1.4378057

Government of Canada. (2018, Dec.). Opioid-related harms in Canada – December 2018. Retrieved March 2019, from https://www.canada.ca/en/health-canada/services/publications/healthy-living/infographic-opioid-related-harms-december-2018.html

Government of Prince Edward Island. (2019, March). Preventing Opioid-Related Overdoses. Retrieved March 2019, from https://www.princeedwardisland.ca/en/information/health-and-wellness/preventing-opioid-related-overdoses

Healthline. (2018, Aug.). New Synthetic Drug Strains Making It Difficult to Diagnose Overdoses. Retrieved March 2019, from https://www.healthline.com/health- news/synthetic-drug-strains-making-it-difficult-to-diagnose-overdoses#1

House of Common Canada. (2016, Dec.). Report And Recommendations On The Opioid Crisis In Canada. Retrieved march 2019, from https://www.ourcommons.ca/DocumentViewer/en/42-1/HESA/report-6/response-8512-421-134

MedlinePlus. (2018, Dec). Opioid Overdose. Retrieved March 2019, from https://medlineplus.gov/opioidoverdose.html

Opioid-related harms in Canada. (2018, Dec.). Retrieved March 2019, from https://www.canada.ca/content/dam/hc-sc/documents/services/publications/healthy-living/infographic-opioid-related-harms-december-2018/infographic-opioid-related-harms-december-2018.pdf

portage. (2018, Aug.). Overdose crisis in Canada. Retrieved March 2019, from https://portage.ca/en/blog/overdose-crisis-in-canada/

ScienceDirect. (2018, Oct.). Drug and Alcohol Dependence. Retrieved March 2019, from https://www.sciencedirect.com/science/article/pii/S0376871618303922