

Survey of Coroners and Medical Examiners on Toxicovigilance



SUMMARY

June 2018

A survey was conducted among coroners and medical examiners to assess the usefulness of developing a toxicovigilance program. They are in favour of setting up a toxicovigilance program based on medicolegal toxicological data from ongoing investigations. Toxicovigilance activities in the Nova Scotia Medical Examiner Service are also presented.

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Context and objectives of the survey

Ministère de la Santé et des Services sociaux, in collaboration with Institut national de santé publique du Québec and Bureau du coroner du Québec, wishes to set up a province-wide toxicovigilance program. To assess the feasibility of such a program, a review of the grey and scientific literature was conducted. The review was carried out in summer 2017 to identify examples of toxicovigilance activities based on toxicological analysis data collected by coroners and medical examiners on deceased persons before formal determination of the cause of death. The results of the literature review are presented in a related publication (Vachon, 2018).¹

To identify unpublished toxicovigilance activities, the study directly surveyed coroners and chief medical examiners in Canada, as well as coroners' offices and public health organizations around the world. The survey also collected information on the opinions and perspectives of coroners and chief medical examiners on the value of using toxicological analysis data on deceased persons for toxicovigilance purposes.

¹ Vachon, J. (2018). *Value of Data Collected by Coroners and Medical Examiners as a Data Source for Toxicovigilance* Québec City: Institut national de santé publique du Québec.

Methodology

Questionnaire

An online questionnaire was developed using the Voxco survey platform (www.voxco.com). Respondents were asked questions about toxicovigilance activities they were aware of and about whether they thought toxicological analysis data from ongoing investigations on deceased persons was useful for toxicovigilance purposes. Respondents were also asked about the advantages and disadvantages of using this type of data, and about the substances and circumstances of death that should be covered by this type of vigilance.

Recruitment and data collection

Coroners and chief medical examiners in Canada as well as coroner's offices and public health organizations around the world² were invited by email to complete the questionnaire. The data was collected from September 21 to October 13, 2017.

Respondents who were aware of ongoing toxicovigilance activities could also indicate whether they would like to provide further information on these activities. If so, they were contacted first by email and then by phone.

Results

Participation

A total of 13 completed questionnaires were returned and included in the analysis. The respondents were from several countries, including Canada, the United States, and the United Kingdom. Five of them indicated that they knew of ongoing toxicovigilance activities, but only two agreed to be contacted directly to provide more information.

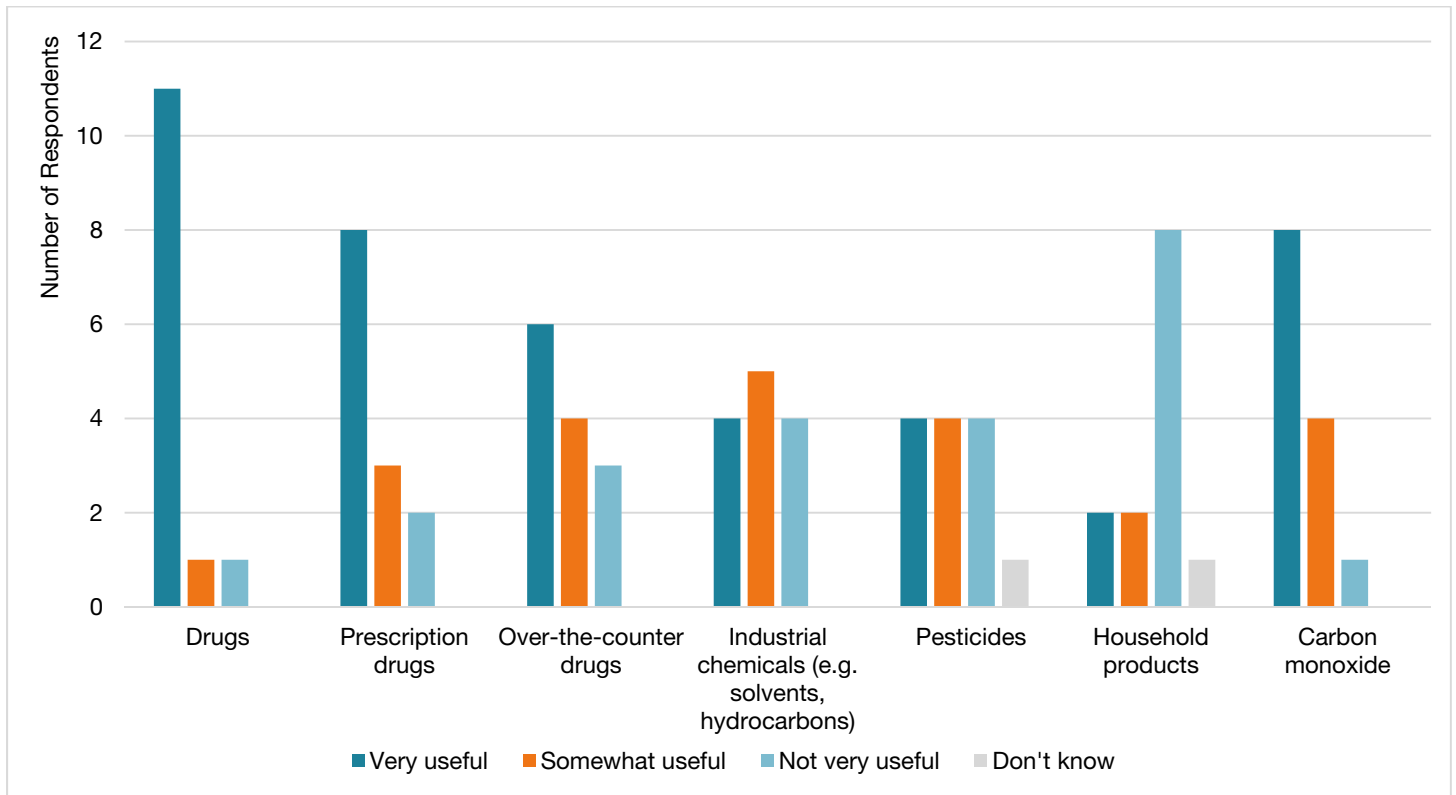
Opinion of coroners and medical examiners on the usefulness of data from toxicological analyses on deceased persons for toxicovigilance purposes

SUBSTANCES

Figure 1 below summarizes the results on the opinions of coroners and chief medical examiners regarding the usefulness of toxicological analysis data from ongoing investigations for toxicovigilance activities targeting specific substance categories. Respondents considered this type of data to be useful for the surveillance of poisonings involving illicit drugs, prescription and over-the-counter drugs, and carbon monoxide. However, the respondents considered such data of moderate to little use for detecting poisonings by industrial chemicals, pesticides, and household products. They added that it was important to understand that for financial reasons, substances other than drugs and medications are often excluded from routine toxicological analyses requested by coroners or medical examiners. Respondents also felt that this reduces the ability of toxicovigilance programs to detect unusual cases of poisoning by industrial and household products if the circumstances of death do not lead the coroner or medical examiner to request more specific toxicological analyses.

² Apart from coroners and chief medical examiners in Canada, the following organizations were invited to answer the questionnaire: *The Australian National Coronial Information System, the Coronial Services of New Zealand, the U.K. Office of the Chief Coroner, Public Health England, the U.S. Centers for Disease Control and Prevention, the International Association of Coroners and Medical Examiners, the County of Los Angeles Department of Medical Examiner-Coroner, the Chemical Emergency Preparedness and Response Unit – Environmental Health Science and Research Bureau, Health Canada, the National Collaborating Centre for Environmental Health, Public Health Ontario, the BC Centre for Disease Control, and the BC Provincial Toxicology Centre.*

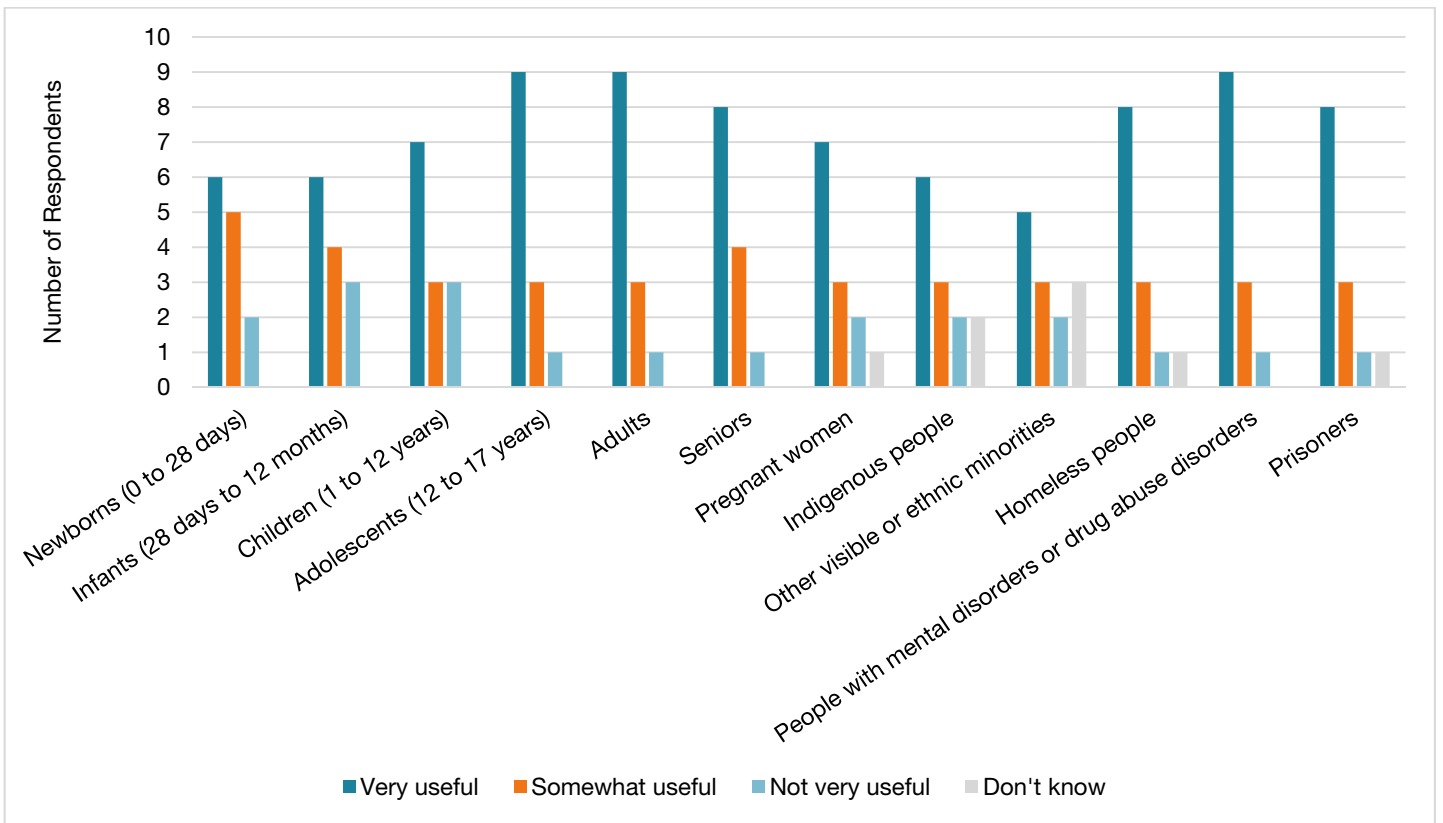
Figure 1 Respondents' opinions on the usefulness of toxicological analysis data from open files for toxicovigilance by substance category



POPULATIONS

Figure 2 below presents the results on the opinions of coroners and chief medical examiners on the usefulness of toxicological analysis data from ongoing investigations for toxicovigilance activities targeting specific populations. Although most respondents considered the data useful for all proposed populations, the coroners and chief medical examiners considered it moderately or not very useful for newborns, infants, and visible or ethnic minorities (other than Indigenous people).

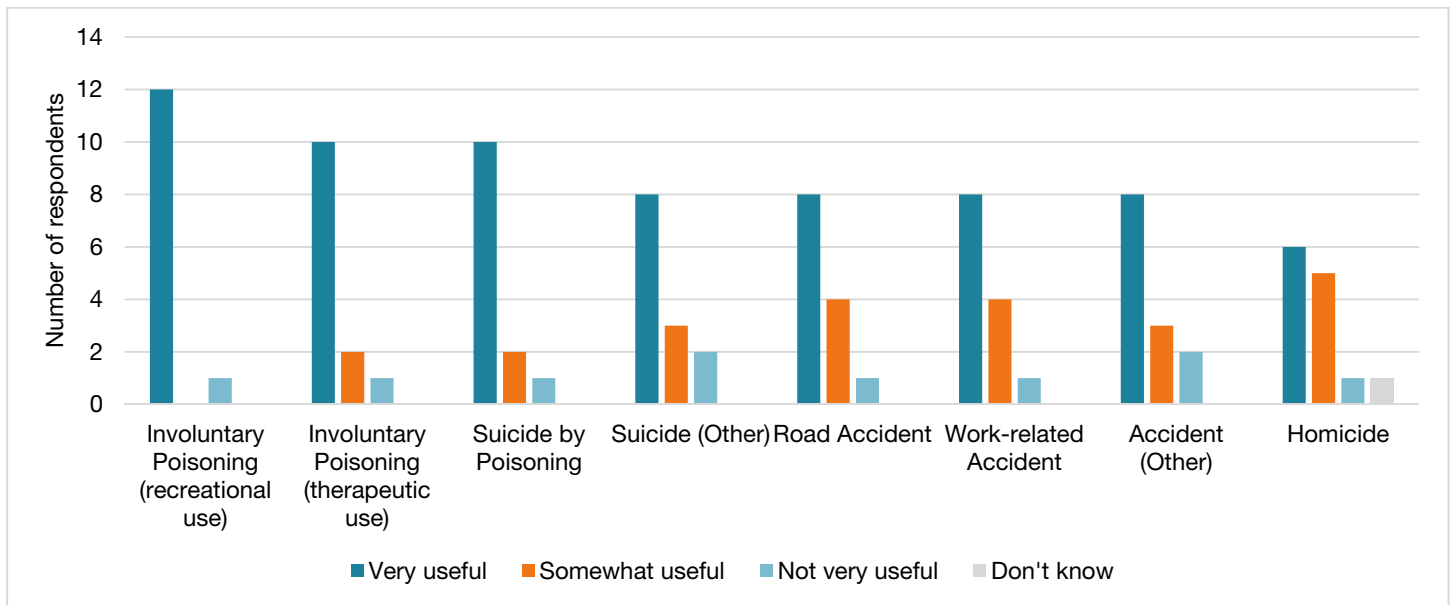
Figure 2 Respondents' opinions on the usefulness of toxicological analysis data from open files for toxicovigilance activities targeting specific populations



CIRCUMSTANCES OF DEATH

Figure 3 below presents the results on the opinions of coroners and chief medical examiners on the usefulness of toxicological analysis data from ongoing investigations for toxicovigilance activities targeting specific circumstances of death. This data was considered very useful for all proposed circumstances of death except homicides. However, one respondent wrote that toxicological analysis data is only moderately useful for toxicovigilance with respect to homicides because homicides by poisoning are relatively rare these days.

Figure 3 Respondents' opinions on the usefulness of toxicological analysis data from open files for toxicovigilance activities targeting specific circumstances of death



ADVANTAGES AND DISADVANTAGES

Table 1 below summarizes the main advantages and disadvantages, according to surveyed coroners and chief medical examiners, of using toxicological analysis data collected on deceased persons before formal determination of the cause of death.

Tableau 1 Main advantages and disadvantages of using toxicological analysis data collected on deceased persons before formal determination of the cause of death

Advantages	Disadvantages
<ul style="list-style-type: none"> ■ Provides data and trends quickly ■ Enables a quick response to worrisome or urgent situations ■ Enables preventive action ■ Provides an overall picture of exposure to chemicals regardless of the cause of death ■ Detects emerging substances or combinations of substances 	<ul style="list-style-type: none"> ■ Hard to interpret toxicological data without other investigative information ■ Hard to establish a causal link between the death and the substances detected ■ Difficulty in interpreting the results may lead to inappropriate corrective measures ■ Detected substances may have no relation to the cause of death ■ Number of toxicological analyses conducted is limited ■ Toxicological analyses are expensive ■ Quality of the results of the analyses depends on sampling

SUBSTANCES AND CIRCUMSTANCES OF DEATH TO INCLUDE IN TOXICOVIGILANCE ACTIVITIES

Respondents were also asked to suggest substances and circumstances of death, alone or in combination, that should be covered by toxicovigilance activities using toxicological analysis data from ongoing investigations of coroners and medical examiners. Since the toxicological analyses requested by coroners and medical examiners generally target medications and drugs, the substances or combinations of substances mentioned by the respondents were mainly from these two categories. None of the respondents suggested other substance combinations or circumstances of death.

Suggested substances:

- Alcohol
- Antidepressants
- Benzodiazepines
- Synthetic cannabinoids
- Synthetic cathinone derivatives (“bath salts”)
- Carbon monoxide
- Emerging substances
- Emerging street drugs
- Emerging synthetic substances

Suggested substance combinations

- Combinations of stimulants, depressants, or disruptors (combination of benzodiazepines, methamphetamine, and cocaine)
- Alcohol in combination with other substances

Toxicovigilance activities in Canada

This section presents details on ongoing toxicovigilance activities in Canada on which surveyed coroners agreed to provide information. At the time this summary was written, only Nova Scotia submitted information on its toxicovigilance activities.

NOVA SCOTIA

Where who & since when

At the office of the Nova Scotia Medical Examiner Service (NSMES), an epidemiologist is responsible for toxicovigilance of opioids in the province. The toxicovigilance program started in mid-2016 and is still operating today.

Substances covered

The epidemiologist is mainly concerned with opioids, but she also keeps an eye out for new substances and cases of combined poisoning by opioids and benzodiazepines, which are detected in 50% of opioid poisoning cases.

Case definition

The following case definitions are used by NSMES:

- Confirmed death by acute drug poisoning:
 - Death occurred in Nova Scotia and cause of death determined as an acute poisoning caused by drug³
- Probable cause of death was acute drug poisoning:
 - Death occurred in Nova Scotia AND
 - Positive toxicological results for the specified drug AND
 - Cause of death undetermined
- Suspected case (monitored by NSMES, but not reported except in the case of a significant increase):
 - Death occurred in Nova Scotia AND
 - Cause of death undetermined AND

- The circumstances of death are classified as “drug-related” (this variable reflects the investigator’s initial impression of the cause of death)
- Illegal fentanyl suspected in a death by acute drug poisoning (the definition includes only fentanyl and not analogues reported separately):
 - The toxicological results include fentanyl AND
 - The investigation into the person’s history or the situation indicates that illegal fentanyl powder or tablets were used AND
 - There was no trace of a fentanyl patch at the site or of the administration of fentanyl at the hospital during care prior to death
- Specific opioids (new opioids added as they are detected):
 - Hydromorphone, methadone, oxycodone, oxymorphone, hydrocodone, fentanyl, heroin, morphine, codeine, tramadol, meperidine, buprenorphine, tapentadol, pentazocine, furanylfentanyl, U-47700, despropionyl fentanyl
- Combinations of nonpharmaceutical opioids:
 - Heroin, furanylfentanyl, despropionylfentanyl, illegal fentanyl suspected, U-47700
- Combinations of benzodiazepines:
 - “Zepam” or “zolam” or “benzo” are tested for as a cause of death
- Other drugs:
 - Cocaine, MDMA/methamphetamine/ecstasy, new stimulants as they are detected

Indicators and calculation methods

Several indicators are used for opioid toxicovigilance and surveillance, including:

- Monthly death rates by acute poisoning (not including alcohol) per 100,000 inhabitants

³ Formal cause of death established by the medical examiner following the investigation.

- Proportion of deaths by suicide due to opioids compared to other causes of death
- Number of cases of acute poisoning (not including alcohol) over 12 months and the number of cases per 100,000 inhabitants over the preceding 12 months, compared to other provinces and territories
- Proportion of cases of acute poisoning involving opioids over the preceding 12 months
- Number of confirmed and probable cases over the preceding 12 months per 100,000 inhabitants for Nova Scotia's four health regions
- "Heatmaps" of confirmed cases of opioid poisoning by geographical distribution
- Number of cases per year of the five main opioids involved in deaths by opioid poisoning
- Number of cases per year of nonpharmaceutical opioid poisoning (individually and collectively) involved in opioid poisonings
- Number of cases of death per year involving nonpharmaceutical drugs or medications
- Description of deaths due to nonpharmaceutical opioids in 2016 and 2017 by age group, gender, and geographical distribution (by health region)

The epidemiologist responsible for these toxicovigilance activities reports that the indicators are interpreted based on call data from the IWK Regional Poison Centre and police seizures.

Conclusion

Most of the coroners and chief medical examiners surveyed considered toxicological analysis data from ongoing investigations useful for toxicovigilance purposes. However, the technical and financial constraints that affect the choice of toxicological analyses conducted following a death may limit the ability of toxicovigilance activities to detect certain cases or phenomena involving pesticides or industrial or household chemicals. The respondents also cautioned against interpreting the cause of death too quickly based on toxicological results in the absence of all investigative data because this could lead to useless or inappropriate preventive or corrective measures. Despite these disadvantages, coroners and chief medical examiners surveyed recognized that this type of program helps detect emerging substances and develop preventive measures more quickly.

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