

# Carbon Monoxide Poisoning

On average, each month close to 150 people are seen in an emergency department for carbon monoxide poisoning.

## Results

During the 2007/08 fiscal year, there were a total of 1,782 emergency department visits and 102 hospitalizations for carbon monoxide (CO) poisoning (See Methods Section for Data Sources). These numbers translate into provincial rates of 14.5 per 100,000 population for emergency department visits and 0.8 per 100,000 for hospitalizations (Table 1).

Males represented close to 60% of emergency department visits and close to 70% of hospitalizations. For emergency department visits and hospitalizations, peaks in the number of CO poisoning cases were seen in adults 20 to 49 years of age (Figure 1).

Over 90% of emergency department visits were a result of unintentional poisoning (Figure 2), whereas, for hospitalized cases, approximately 75% were a result of unintentional poisoning and approximately 20% were a result of intentional poisoning (Figure 3).

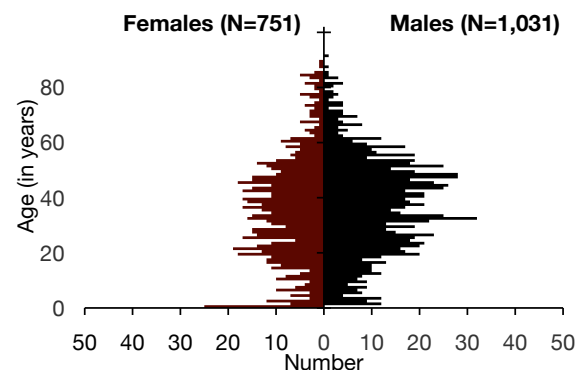
For emergency department visits, the peak months in terms of numbers of cases, are November through March. For hospitalized cases, peaks in numbers were seen in the months of May, June, and July. November and January were also high in the numbers of poisoning.

Rates of CO poisoning varied by region, with the highest overall rates reported in the northern region of the province (Table 1).

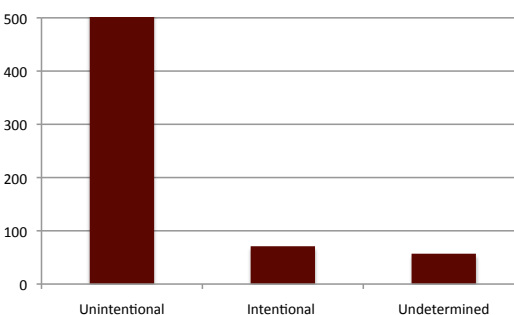
For each region, adults 20 to 49 years of age represented the highest rates of emergency department visits (Table 2).

Of the 1,782 individuals who visited an emergency department for CO poisoning, close to 90% were discharged to their place of residence. Approximately 5% were admitted as an in-patient directly from ambulatory care. For hospitalized cases, approximately 10% were transferred to a long term care facility, which includes personal care homes, auxiliary care, nursing homes, and extended care. Another 10% were discharged to a home setting with support services (seniors' lodge, attendant care, home care). Fewer than 1% of individuals died after arrival in the emergency department and

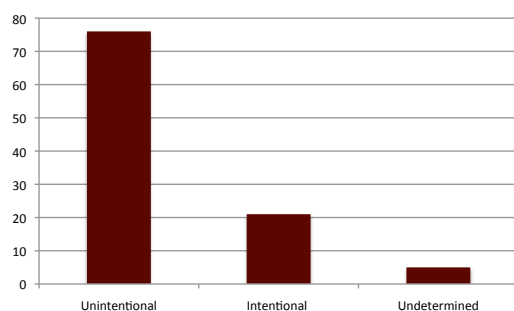
**FIGURE 1. Emergency department visits for carbon monoxide poisoning by age and sex (Ontario, 2007/2008)**



**FIGURE 2. Emergency department visits for carbon monoxide poisoning by intent (Ontario, 2007/08)**



**FIGURE 3. Hospitalizations for carbon monoxide poisoning by intent (Ontario, 2007/08)**



**TABLE 1. Regional comparison of carbon monoxide poisoning (Ontario, 2007/08)**

	South West	Central South	Central West	Central East	Toronto	East	North	Ontario
<b>Emergency Department Visits</b>								
Number	266	209	254	300	272	214	243	1,782
Rate per 100,000 <sup>a</sup>	17.8	18.2	10.9	14.1	10.3	13.3	29.9	14.5
<b>Hospitalizations</b>								
Number	16	13	11	13	16	11	19	102
Rate per 100,000 <sup>a</sup>	1.0	1.0	0.5	0.6	0.6	0.6	2.1	0.8

a. Age-standardized rate per 100,000 population. Note: Region of residence unknown/outside of Ontario for 24 emergency department visits and <5 hospitalizations.



Ontario Injury Prevention Resource Centre

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**TABLE 2. Regional comparison of ER visits for carbon monoxide poisoning in the adult population by age group (Ontario, 2007/08)**

	South West	Central South	Central West	Central East	Toronto	East	North	Ontario
<b>Emergency Department Visits- Rate per 100,000<sup>a</sup></b>								
20-24 years	19.8 (22)	21.1 (17)	15.9 (26)	17.5 (25)	11.7 (21)	15.4 (17)	45.3 (26)	18.6 (157)
25-29 years	24.2 (24)	23.6 (17)	11.7 (19)	21.7 (27)	12.1 (27)	17 (18)	37.7 (17)	18.3 (152)
30-34 years	31.5 (32)	19.8 (15)	15.6 (28)	22.8 (33)	7.2 (17)	16.9 (19)	46.4 (24)	19.3 (174)
35-39 years	31.3 (35)	16 (14)	12.4 (25)	14.8 (26)	11.9 (26)	15.2 (19)	38.5 (23)	17.3 (170)
40-44 years	19.3 (25)	26 (26)	12.2 (26)	15.7 (32)	9.6 (21)	17.3 (25)	27 (20)	16.3 (177)
45-49 years	24 (29)	21.6 (20)	13.3 (24)	19 (34)	16.3 (31)	13.7 (18)	23.8 (17)	18 (174)

a. Age-specific rate per 100,000 population. Note: Region of residence unknown/outside of Ontario for 24 emergency department visits and <5 hospitalizations.

approximately 5% died after hospital admission. The 1,782 hospitalized cases accounted for more than 7,305 days in acute care hospitals with an average length of stay of 4.10 days.

## Discussion

Carbon monoxide is a colourless, odourless gas, which is formed whenever fuel is burned (e.g., propane, natural gas, gasoline, coal, wood, and oil). It reduces the amount of oxygen in the blood. Low levels over long periods of time are dangerous as are high levels, which can cause dizziness, unconsciousness, and can even be fatal.

During the cold winter season in Canada, many households use space heaters, gas furnaces, and other heating appliances, which can cause dangerous levels of CO to be released, if not installed or maintained properly. CO can also be produced by fireplaces, gas stoves, water heaters, blocked chimneys, barbecues, grills, and tobacco smoke. (Health Canada) Not only do people require hospitalization or visits to the emergency department as a result of CO each year, as illustrated in this Compass, but many die as a result of CO poisoning.

Many people are aware of the importance of smoke detectors in the home, but a smaller proportion of people are as vigilant when it comes to purchasing CO detectors (at a cost of approximately \$30) for use in the home, which are especially valuable during the cold winter months. CO detectors can detect levels of CO before life threatening levels are reached.

According to Safe Kids Worldwide, half of all CO poisoning deaths could be prevented by CO detectors.<sup>1</sup>

At low levels, symptoms include headaches, tiredness, shortness of breath, and impaired motor functions, similar to flu symptoms.

At high levels (or exposure to low levels for a long period of time), symptoms include dizziness, chest pain, tiredness, poor vision, and difficulty thinking.

At very high levels, individuals can experience convulsions, coma, and potentially death.

The following managing the risk section illustrates ways to protect yourself which can be used by public health to educate the public.

## References

1. Safe Kids USA. Seasonal Safety. Carbon Monoxide: Invisible Winter Hazard
2. Transport Canada. Carbon Monoxide. Office of Boating Safety.
3. Health Canada. Health Canada Reminds Canadians of the Dangers of CO. 2009. Advisory.
4. Health Canada. Environmental and Workplace Health. Carbon Monoxide.

## Managing the risk<sup>1,2,3,4</sup>

- ❖ Have all fuel burning appliances installed, regularly inspected and serviced by qualified professionals.
- ❖ Ensure all appliances are used only in well-ventilated areas.
- ❖ Install a CO detector 15 feet from all fuel burning appliances as well as outside every sleeping area. Do not allow it to be covered by draperies or furniture.
- ❖ Familiarize yourself with the instruction manual and ensure you can hear and recognize the sound of the alarm.
- ❖ Replace your detector every five years or earlier, depending on the model (manufacturers instruction).
- ❖ Ensure that the detector bears the certification mark of an organization that is accredited by the Canadian Standards Association (CSA).
- ❖ Check the batteries each month (in addition to the smoke alarm batteries) and test your detector regularly.
- ❖ Never let vehicles idle in your garage. Move the car out of the garage before warming it up.
- ❖ Keep the door between the garage and the house closed.
- ❖ Never run gas powered lawn mowers, trimmers, or snow blowers in the garage.
- ❖ Never use barbecues indoors.
- ❖ When boating, never idle the engine, cook, or heat unless well ventilated and use a CO detector designed for a vessel. Check batteries prior to each excursion.
- ❖ If CO detector alarms:
  - Have everyone leave the building immediately.
  - Do not try to locate the source of the CO.
  - Call for aid - EMS, fire department - 911.
  - Only return home when CO source is identified by a professional and the issue is dealt with.
  - If you can't leave the building, open all windows & doors.
  - Shut off any fossil fuel burning appliances.
  - Watch for symptoms of poisoning.

### ❖ For Further Information:

Health Canada  
[www.hc.sc.gc.ca](http://www.hc.sc.gc.ca)  
Transport Canada  
[www.tc.gc.ca](http://www.tc.gc.ca)  
Safe Kids USA  
[www.usa.safekids.org](http://www.usa.safekids.org)

## Methods

Emergency department data were obtained from the National Ambulatory Care Reporting System and acute care hospitalization data were obtained from the Discharge Abstract Database at the Canadian Institute for Health Information for the 2007/08 fiscal year. ICD-10 coding (X47, X67, Y17) was used to isolate all emergency department visits and hospitalizations for CO poisoning. Note that some persons were seen in an emergency department and then admitted to hospital; however, persons can be admitted to hospital without visiting an emergency department. Regions were defined according to place of residence using the Ontario Ministry of Health Region Codes. Deaths occurring outside of the hospital setting were not included in this analysis.

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