

In order to inform the public about the dangers of carbon monoxide, the U.S. Consumer Product Safety Commission developed a list carbon monoxide clues people can and cannot see.

Can See	Can't See
Rusting or water streaking on vents or a chimney	Internal appliance damage
Loose or missing furnace panel	Malfunctioning of internal appliance components
Sooting	Improper burner adjustments
Debris or soot falling from chimneys, fireplaces, or appliances	Hidden blockage in chimneys
Loose or disconnected vent/chimney, fireplace, or appliances	Hidden damage in chimneys
Loose masonry on chimneys	Carbon monoxide poisoning symptoms that one experiences while at home, but they seem to lessen or disappear when the victim is away from home.
Moisture on inside of windows	

While carbon monoxide poisoning can affect anyone who comes in contact with the toxin, the following populations are more susceptible to its negative effects than others:

- Children
- The elderly
- Anyone suffering from heart disease
- Pregnant women
- People with an increased demand for oxygen
- Populations with a decreased oxygen-carrying capacity, such as individuals with anemia or cancers of the blood
- Smokers
- People who have chronic cases of respiratory insufficiency
- Firefighters
- **Carbon Monoxide Poisoning Deaths on the Rise**

- According to an article on the EMS World website, www.emsworld.com, carbon monoxide poisonings are on the rise nationwide, and the majority of cases stem from portable generators and faulty home heating systems.
- A report from the U.S. Consumer Product Safety Commission stated that carbon monoxide deaths have increased in the past decade. 40% of these carbon monoxide-related deaths resulted from portable generators, and 35% were from faulty heating systems.
- *Coppernoll, Carrie. (2010). EMS World. "Carbon Monoxide Deaths Increasing Nationwide." Retrieved from: <http://www.emsworld.com/online/article.jsp?siteSection=1&id=11595>.*

Symptoms

Misdiagnosis of carbon monoxide poisoning commonly occurs because its symptoms can be vague. In fact, they are often attributed to the flu, migraines, or acute coronary syndrome. Symptoms of carbon monoxide poisoning include the following and can vary depending on the percentage and duration of the patient's exposure.

• Headache	• Fatigue	• Dyspnea
• Dizziness	• Chest pain	• Palpitations
• Confusion	• Agitation	• Nausea
• Vomiting	• Hypotension with tachycardia	• Cardiac dysrhythmias
• Myocardial ischemia	• Pulmonary edema	• Syncope
• Seizures	• Fecal incontinence	• Urinary incontinence
• Visual impairment	• Coma	• Memory loss
• Pale skin	• Pale lip color	•

Carbon monoxide levels are measured in ppms.

400 ppm	Exposure becomes life-threatening when it occurs for 3 hours and beyond
800 ppm	Results in death within 2-3 hours
1,600 ppm	Results in death within 1 hour of exposure
6,400 ppm	Results in death in just 30 minutes
12,800 ppm	Results in death within 1-3 minutes

CPAP

Continuous positive airway pressure (CPAP) uses ventilation equipment that increases pressure during both inspiration and expiration. This keeps the airway open during more of the respiratory cycle.

Responders Save Over 50 Motel Guests

EMS responders in North Carolina were called to a scene for a 10-year old with a severe headache at 3 a.m. When they arrived they found the victim and his entire family sitting in their SUV. All five were suffering from the same ailments: headache, vomiting, nausea, confusion, and tingling skin.

The family explained to the responders that they had been staying at a local motel when they all woke up in the middle of the night with the symptoms. They were on their way to the hospital when the confusion set in, so the driver pulled over and called 9-1-1.

Responders realized that the entire family had carbon monoxide poisoning. They requested that the local fire department be dispatched to the motel to check on the other guests. The fire department arrived to the motel and found that the entire building had dangerously high levels of carbon monoxide, and several other guests had elevated levels and required immediate treatment.

The entire building was evacuated and each guest assessed with a CO-Oximetry device and treated if required.

Firefighters determined that a malfunctioning central HVAC unit had been circulating CO throughout the motel.

JEMS: Emergency Medical Services. (2010). CO Close Calls: MCI Averted. Retrieved from: <http://www.jems.com/article/patient-care/co-close-calls>

Residential Carbon Monoxide Alarms

Emergency responders need to be familiar with the different kinds of residential carbon monoxide alarms and how they function. Residential carbon monoxide detectors can aid emergency responders in evaluating the level of past or ongoing exposure or danger of carbon monoxide poisoning.



Residents may call for help in the event that their carbon monoxide detectors go off, even if they do not present with any of the classic symptoms. Carbon monoxide alarms should never be ignored, so you may be faced with the task of examining a patient's residence and assessing the carbon monoxide levels using your department's detector to confirm the alarming levels.

Carbon monoxide detectors are designed to activate at exposure levels below those at which symptoms usually occur (usually below 30 ppm). Because alarms sound before levels become dangerous, it allows residents to take the proper actions necessary to protect themselves.

Immediate evacuation is necessary when a carbon monoxide alarm sounds, even if the levels have not yet been confirmed. Always get the victims out of the home upon arrival and donning the proper PPE.

Things to keep in mind when assessing a residential carbon monoxide detector:

- ppm = parts per million
- Batteries need to be replaced every 2-3 years and the chemical pads should be replaced every 10 years.
- The diagnostic tools that a reader inside the detector uses to detect the presence of carbon monoxide can wear out after 7 years.
- Typically, they can display both the current reading and a peak reading from memory of the highest level measured over a period of time.
- Some can observe levels that are below the alarm threshold and levels that may have occurred during an absence.
- Some models can assess the degree of hazard if the alarm sounds.

When do carbon monoxide detectors sound?

- Most carbon monoxide detectors will go off if the residence has a sustained ppm of 100 over the span of 60-240 minutes.
- A ppm of 400 or greater will set off an alarm after a few minutes of an exposure (4-15 minutes).
- A ppm of 150 tends to set the alarm off within 10-50 minutes.
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EMTs Endure Carbon Monoxide Poisoning While on Duty

In August 2010, four Texas EMS responders were exposed to dangerous amounts of carbon monoxide while on the job. The source of this carbon monoxide was a generator left running on one of the department's ambulances. The apparatus was parked in the bay, and all the doors of the building were closed.

The four victims were found unconscious during a shift change and rushed to the hospital. One of these victims, a 33-year-old mother of four, was airlifted to a nearby hospital where she was pronounced dead upon arrival. The other EMTs were taken to the same hospital via ground ambulance where they were given oxygen treatment in a hyperbaric chamber and made recoveries.

During the investigation, it was found that this particular EMS station did not have carbon monoxide detectors, and several other stations across East Texas do not as well. However, because of this tragedy, detectors were installed in 22 different EMS stations.

The Associated Press. (August 13, 2010). EMS1.com. Texas EMT Trainee Dies from Carbon Monoxide Poisoning. Retrieved from: <http://www.ems1.com/ems-news/866205-texas-emt-dead-from-carbon-monoxide-poisoning/>.

Thank you and stay safe,