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Carbon Monoxide Poisoning  
2019 Case Definition  
Carbon Monoxide Poisoning  
2019 Case Definition  
NOTE:  
A surveillance case definition is a set of uniform criteria used to define a disease for public health surveillance. Surveillance case definitions enable public health officials to classify and count cases consistently across reporting jurisdictions. Surveillance case definitions are not intended to be used by healthcare providers for making a clinical diagnosis or determining how to meet an individual patient’s health needs.  
CSTE Position Statement(s)  
18-EH-01  
Background  
Carbon monoxide (CO) is a colorless, odorless, nonirritating gas that is produced through the incomplete combustion of carbon-containing substances. Sources of CO include: boilers: furnaces, cars and trucks, generators and other gasoline or diesel-powered engines, gas and propane heaters, woodstoves, gas stoves, fireplaces, tobacco smoke, forklifts, and fires. The most common location of exposures causing CO poisoning are in homes and less commonly in workplaces. CO poisoning occurs from breathing in elevated air levels of carbon monoxide. Unusual sources include exposure to methylene chloride, which is metabolized to CO and hemolysis, with increased metabolism of hemoglobin. Symptoms are generally non-specific and commonly include headache, dizziness, weakness, vomiting, chest pain and confusion. Large exposures can result in loss of consciousness, arrhythmias, seizures, or death. Unintentional, non-fire related CO poisoning is responsible for approximately 450 deaths and 21,000 emergency department (ED) visits each year.  
1,2,3  
CO poisoning is a leading cause of unintentional poisoning deaths in the United States.  
2  
Outbreaks of CO poisoning associated with equipment used during natural disasters have been well documented.  
4-8  
For surveillance purposes,  
Tier 1  
reporting refers to the process of healthcare providers or institutions (e.g., clinicians, clinical laboratories, hospitals, poison control centers) submitting basic information to governmental public health agencies about cases of carbon monoxide poisoning that meet certain reporting requirements or criteria. Cases of carbon monoxide poisoning may also be ascertained by the secondary analysis of administrative data or through syndromic surveillance algorithms where individual information is available for follow-up case investigation.  
Tier 2  
surveillance for carbon monoxide poisoning is based upon secondary analysis of administrative data without access to personal identifiers.  
Clinical Criteria  
Tier 1 (Criteria using clinical, laboratory, epidemiologic, and exposure data from traditional public health surveillance practice based on case identification and follow-up investigation):  
Presumptive clinical evidence:  
Loss of consciousness  
OR  
Death  
Supportive clinical evidence:  
A person with signs or symptoms consistent with carbon monoxide poisoning, which may include elevated pulse Carbon Monoxide (CO)-oximetry measurement and/or non-specific symptoms such as nausea, vomiting, confusion, shortness of breath, and chest pain.  
Laboratory Criteria For Diagnosis  
Tier 1 (Criteria using clinical, laboratory, epidemiologic, and exposure data from traditional public health surveillance practice based on case identification and follow-up investigation):  
Confirmatory laboratory evidence:  
A person who does not smoke, or a child (age < 14 years) whose smoking status is unknown, and has a carboxyhemoglobin (COHb) level of ≥ 5.0% as measured in a blood sample  
9-11  
OR  
A person who smokes, or a person (age ≥ 14 years) whose smoking status is unknown, with a carboxyhemoglobin (COHb) level of > 12.0% as measured in a blood sample  
10-11  
Presumptive laboratory evidence:  
A person who smokes, or whose smoking status is unknown (age ≥ 14 years), and has a carboxyhemoglobin (COHb) level of ≥ 9.0% and ≤ 12.0% as measured in a blood sample  
Supportive laboratory evidence:  
A person who does not smoke, or a child (age < 14 years) whose smoking status is unknown, and has a carboxyhemoglobin (COHb) level of ≥ 2.5% and < 5.0% as measured in a blood sample  
12  
OR  
A person who smokes, or whose smoking status is unknown (age ≥ 14 years), and has a carboxyhemoglobin (COHb) level of ≥ 7.0% and < 9.0% as measured in a blood sample  
11  
Epidemiologic Linkage  
Tier 1 (Criteria using clinical, laboratory, epidemiologic, and exposure data from traditional public health surveillance practice based on case identification and follow-up investigation):  
A person who was present and exposed in the same CO exposure event as that of a confirmed CO poisoning case.  
Criteria to Distinguish a New Case from an Existing Case  
Tier 1 (Criteria using clinical, laboratory, epidemiologic, and exposure data from traditional public health surveillance practice based on case identification and follow-up investigation):  
A case should be categorized as a new (incident) case when there is either:  
New exposure to CO from different exposure source  
OR  
Repeated exposure as defined by having the same exposure source as previous occurrence where the criteria used to designate a case has been resolved prior to repeat exposure  
A case is categorized as a prevalent case when there are multiple reports for the same person for the same episode, such as when there are multiple COHb lab test results or when a patient receives multiple hyperbaric treatments following a single poisoning event.  
Exposure  
Tier 1 (Criteria using clinical, laboratory, epidemiologic, and exposure data from traditional public health surveillance practice based on case identification and follow-up investigation):  
Confirmatory exposure evidence\*:  
A person who had an exposure to an elevated level of CO based on a dedicated or multi-gas meter/instrument (e.g., fire department notation) for a known duration that is consistent with CO poisoning.  
Possible exposure evidence\*:  
A person who was in a location where a CO detector's alarm sounded,  
OR  
A person who had onset of CO-related symptoms associated physically and temporally with a CO-emitting source (e.g., gasoline-powered generator, power washer, malfunctioning furnace, and fire)  
\*Note: Exposure evidence that is provided by the patient is sufficient for meeting exposure evidence criteria.  
Case Classification  
Suspected  
A person with supportive laboratory evidence  
OR  
A person with supportive clinical criteria  
AND  
possible exposure evidence  
Probable  
A person with presumptive laboratory evidence\*  
OR  
A person with presumptive clinical evidence  
AND  
possible exposure evidence,  
OR  
A person with presumptive or supportive clinical evidence  
AND  
epidemiologic linkage  
\*Other plausible clinical explanations should be considered, including chronic obstructive lung disease and hemolysis.  
Confirmed  
A person with confirmatory laboratory evidence\*  
OR  
A person with presumptive or supportive clinical evidence  
AND  
with confirmatory exposure evidence  
\* Other plausible clinical explanations should be considered, including chronic obstructive lung disease and hemolysis.  
Other Criteria  
Tier 2 (Using secondary analysis of administrative data without access to personal identifiers):  
Suspected:  
Poison Control Center Records:  
A person whose poison control center record indicates an exposure to carbon monoxide  
AND  
a minor medical outcome (see  
Appendix 3  
)  
Workers compensation records:  
A person whose workers compensation submitted claim contains a finding, problem, diagnosis, or other indication of exposure to carbon monoxide or carbon monoxide poisoning (see  
Appendix 4  
).  
Healthcare records, including hospital discharge and emergency department records:  
A person whose healthcare record contains a diagnosis that is inclusive of carbon monoxide poisoning by sources other than motor vehicle exhaust (see  
Appendix 2  
).  
A person whose emergency department record mentions exposure to carbon monoxide in the chief complaint.  
Death Certificates:  
A person whose death certificate lists a cause of death that is inclusive of carbon monoxide poisoning, toxic effect of carbon monoxide, or carbon monoxide exposure as a cause of death or a significant condition contributing to death (see  
Appendix 5  
) .  
Probable:  
Healthcare records, including hospital discharge and emergency department records:  
A person whose healthcare record contains a diagnosis of carbon monoxide poisoning by motor vehicle exhaust (see  
Appendix 2  
)  
Poison Control Center Records:  
A person whose poison control center record indicates an exposure to carbon monoxide  
AND  
a moderate medical outcome, major medical outcome, or death (see  
Appendix 3  
)  
Workers compensation records:  
A person whose workers compensation paid claim contains a finding, problem, diagnosis, or other indication of exposure to carbon monoxide or carbon monoxide poisoning (see  
Appendix 4  
).  
Confirmed:  
Healthcare records, including hospital discharge and emergency department records:  
A person whose healthcare record contains an explicit diagnosis of carbon monoxide poisoning (see  
Appendix 2  
)  
Death Certificates:  
A person whose death certificate explicitly lists carbon monoxide poisoning, toxic effect of carbon monoxide, or carbon monoxide exposure as a cause of death or a significant condition contributing to death (see  
Appendix 5  
).  
Case Classification Comments  
The Case Classification section above refers to Tier 1 (Criteria using clinical, laboratory, epidemiologic, and exposure data from traditional public health surveillance practice based on case identification and follow-up investigation).  
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