

SMOKE/TOXIC INHALATION

In the event a civilian, firefighter, police officer, EMT, Paramedic or other First Responder/Medical Professional comes into contact with smoke or another toxic inhalation, it is important to make sure that he/she is immediately evaluated by medical personnel, even if they themselves are medical personnel. Some toxins, either in smoke or alone, present the potential for significant damage, even if signs or symptoms (S/S) are not immediately seen/felt. Others will cause signs or symptoms very rapidly – even after one or two breaths. Always err on the side of caution.

At a fire scene, the Incident Commander, Safety Officer, Medical Officer, or other designated person should, by pre-determined policy/protocol, attempt to identify what items (in general) are on fire or at risk of combusting. This should also include noting the color(s) of the smoke, if there are signs of immediate vegetation or animal deaths without direct flame or high heat contact, or if any humans in the area are showing signs of illness. Remember that plastics and treated wood emit cyanide when burning.

If someone comes out of a smoke-filled or burning building, early assessment is essential. The person may display several different sets of signs/symptoms (S/S), depending on the mechanism of injury/illness such as burns (skin or respiratory tract), smoke and/or toxic inhalation. The patient should be quickly assessed for surface burns as well as an exam of the mouth and nose for singeing, soot, redness, swelling, etc. Obvious airway burns will usually meet Trauma Center Criteria (TCC), but individual policies and protocols should include how to manage and transport these individuals. Anyone seen coming out of a fire building, particularly those with AMS, should be closely examined for trauma (the fire could be a cover-up for assault, could have started with an explosion, or escape could have resulted in injury). All transport decisions should be based on local policies and procedures with medical consultation, when indicated.

It is more difficult to assess for smoke and toxic inhalation. S/S may be subtle or delayed. If a patient (or firefighter) does have any S/S after being in smoke or fire, this person should be treated aggressively with 100% O₂, respiratory and cardiac monitoring including CO and EtCO₂ continuous readings, with consideration of early positive pressure/intubation as well as any other appropriate treatment protocol such as bronchodilators, Cyanokit(s), and/or CPAP (if it can deliver 100% O₂ and bronchodilators, if indicated).

S/S from smoke and/or toxins may include: headache, dizziness, AMS, nausea, vomiting, coughing, hoarseness, stridor, wheezing, rales, difficulty or rapid breathing, etc. CO monitoring, if available, may be normal or elevated, depending on the toxin and dose. EtCO₂ may be normal, high or low, depending on respiratory status (effectiveness of breathing and if there is actual gas exchange), pulse ox (SaO₂) may be normal even if carbon monoxide or cyanide have been inhaled, so consider the least reliable assessment tool for this type of patient. Toxins from the materials burning can cause a variety of S/S including cardiac, respiratory, and CNS changes. Remember that those affected by smoke may not realize that they are at risk or not feeling/acting right. This includes firefighters. There must be frequent assessments to monitor for changing presentations. Transport of patients should be to the closest **capable** facility; hyperbaric capable hospitals may be a consideration. A thorough scene description and patient presentation should be made to medical oversight for specific assessment, treatment, and transport decisions. Toxicologists, at Poison Control Centers or those on staff, may be willing to consult. It is helpful if this is worked into policy or protocol ahead of an actual real-life scenario. Toxicologists have been known to come to the bedside at the hospital, incorporate the types of materials burning, the color of smoke, and the patient's presentation and consult on appropriate evaluation, labs and treatments. An unconscious patient from a fire or hazardous scene needs a thorough secondary survey looking for trauma, burns, and other signs. Pupils and a glucose check as well as medical alert identifiers should also be part of this exam, if not already done. Cyanide antidotes and early intubation should be priorities, when indicated.