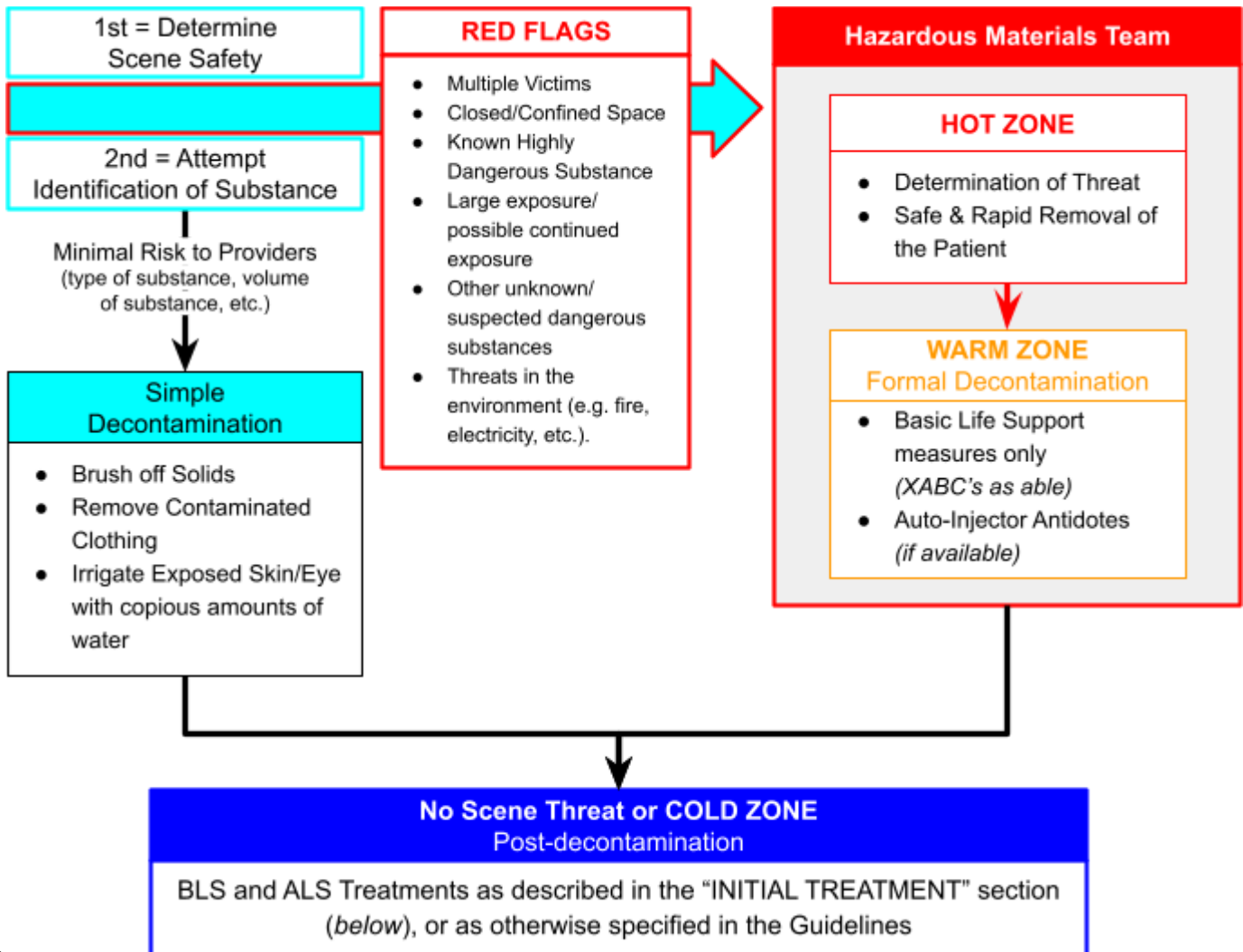


**INITIAL APPROACH TO AN EXPOSED PATIENT**



## SCENE SAFETY

### 1st = Hazard Determination/Risk Assessment

- Responder self-protection is of paramount importance when dealing with hazardous materials, and any attempts to rescue a victim from a hazardous environment needs to be based upon a risk/benefit analysis.
- The size-up of the scene, likelihood of victim survival, likelihood of success and the protective abilities of the responder's personal protective equipment (PPE) all must be assessed prior to implementing any such rescue attempts.
- If any question, must be made by qualified hazardous materials technicians.

## RED FLAGS

- **If there is ANY QUESTION of the safety of the EMS providers and other first responders, a HazMat Team should be requested to perform a well developed risk assessment and plan.**
- Red Flags *include*:
  - Multiple Victims
  - Large exposure/possible continued exposure
  - Unknown substance
  - Closed/confined space (poor ventilation)
  - Other suspected dangerous substances or threats in the environment (e.g. fire, electricity, etc.)

## SUBSTANCE

### 2nd = Attempt to Identify the Substance Involved

- If labeled containers are noted (i.e. substance is known)
  - Follow any relevant clinical guidelines.
  - Review and follow the recommendations of the North American Emergency Response Guide Book (NAERG), if available.
  - Contact Poison Control at 1-800-222-1222.
- If the substance is unknown:
  - Determine if the patient has symptoms consistent with a specific **Toxidrome** (*below*).
  - Contact the Hazardous Materials Team, if any question.

## SELF-PROTECTION

- Basic “Droplet-Precaution” PPE (gloves, mask, gown, and eye protection) should generally protect against most simple (i.e. small) exposures, but are likely inadequate with larger exposures or with dangerous/corrosive substances.
- Protection against gasses and most vapors requires the use of a Self-Contained Breathing Apparatus (SCBA) in addition to a specific suit (e.g. Class A or B, *below*). No routine mask (surgical, N95, etc.) will protect the provider against possible exposure.

### Classes of PPE

- Class A = “All-Hazards”/maximum protection
  - Full body protection against direct contact and vapors/gasses with a *fully-encapsulated chemical-resistant suit, and*
  - Complete respiratory protection with *SCBA*.
- Class B
  - Splash protection (liquids), but not against skin contact of vapors/gasses with a *hooded chemical-resistant suit, and*
  - Complete respiratory protection with *SCBA*.
- Class C (not used in initial emergency response)
  - Splash protection (liquids) with a *hooded chemical-resistant suit* (same as Class B), but
  - Limited protection against breathing (lung exposure) of vapors/gasses with an *air purifying respiratory* (not SCBA).
- Class D:
  - No respiratory protection and minimal skin protection
  - Typical daily PPE (gloves & mask for EMS, firesuit, etc.)

## DECONTAMINATION

Responders need to value the difference between “exposure” and “contamination”. Not all exposures result in a contaminate patient. Physical state of the product, location of the patient with regards to the release and direct contact with the product all play in determining the possibility of contamination. In addition to the patient care discussed below, protection of downstream medical facilities from contamination must be considered. Early notification of receiving facilities and field decontamination are essential. Any large volume or continued exposures should be formally decontaminated by a Hazardous Materials Team.

### Basic Decontamination Procedure (For “Simple” Exposures):

- **Contaminated clothing should be removed.**
  - Care should be taken to not contaminate any unexposed areas of the patient (or other first responders).
  - Clothing should be placed in an appropriate container (generally a plastic or paper bag).
- Solids
  - Any solid material still on the patient should be gently brushed off prior to irrigation.
- Liquids
  - For all liquids (unless there is a known contraindication to irrigation), **copious amounts of water should be used to irrigate any exposed skin or eyes.**
    - Tap water is ideal and acceptable in almost every case.
    - Sterile water or saline may be used as well.
  - Take care to not cross-contaminate unexposed areas.
  - For non-water soluble liquids (e.g. oils):
    - *Irrigation with large volumes of water should be attempted.*
    - Any remaining liquids/solids should be provided additional decontamination in the field by a HazMat Specialist utilizing mineral oil, polyethylene glycol or other appropriate solvent.
- Vapors/Gasses
  - Victims exposed only to gasses and vapors present little risk of secondary contamination/exposure once removed from the environment and clothing is removed (i.e. “off-gassing”)
  - If exposed to corrosive vapors/gasses (Chlorine, ammonia, HCL, ect.) then flush the skin (and eyes) with copious amounts of water/irrigant.

## HAZMAT OVERVIEW

### HOT ZONE (Scene)

- Area of exposure
- Only trained Fire/Rescue personnel with appropriate PPE (generally Class A or Class B) should enter this area to extricate patients to the warm zone.
- *No medical treatments are rendered.*

### WARM ZONE (Decontamination)

- Dedicated decontamination area, as close as reasonably (i.e. safely) possible to the Hot Zone.
- Only trained Fire/Rescue personnel with appropriate PPE (generally one class below that used in the Hot Zone) should be actively decontaminating patients.
- *Only basic life support measures* and autoinjector antidotes should be administered in the Warm Zone. This includes:
  - Basic airway maneuvers
  - Bag-valve mask ventilation
  - Placement of a BIAD (iGel or KingLT) if BVM is inadequate
  - Chest Compressions

### COLD ZONE (Post-decontamination)

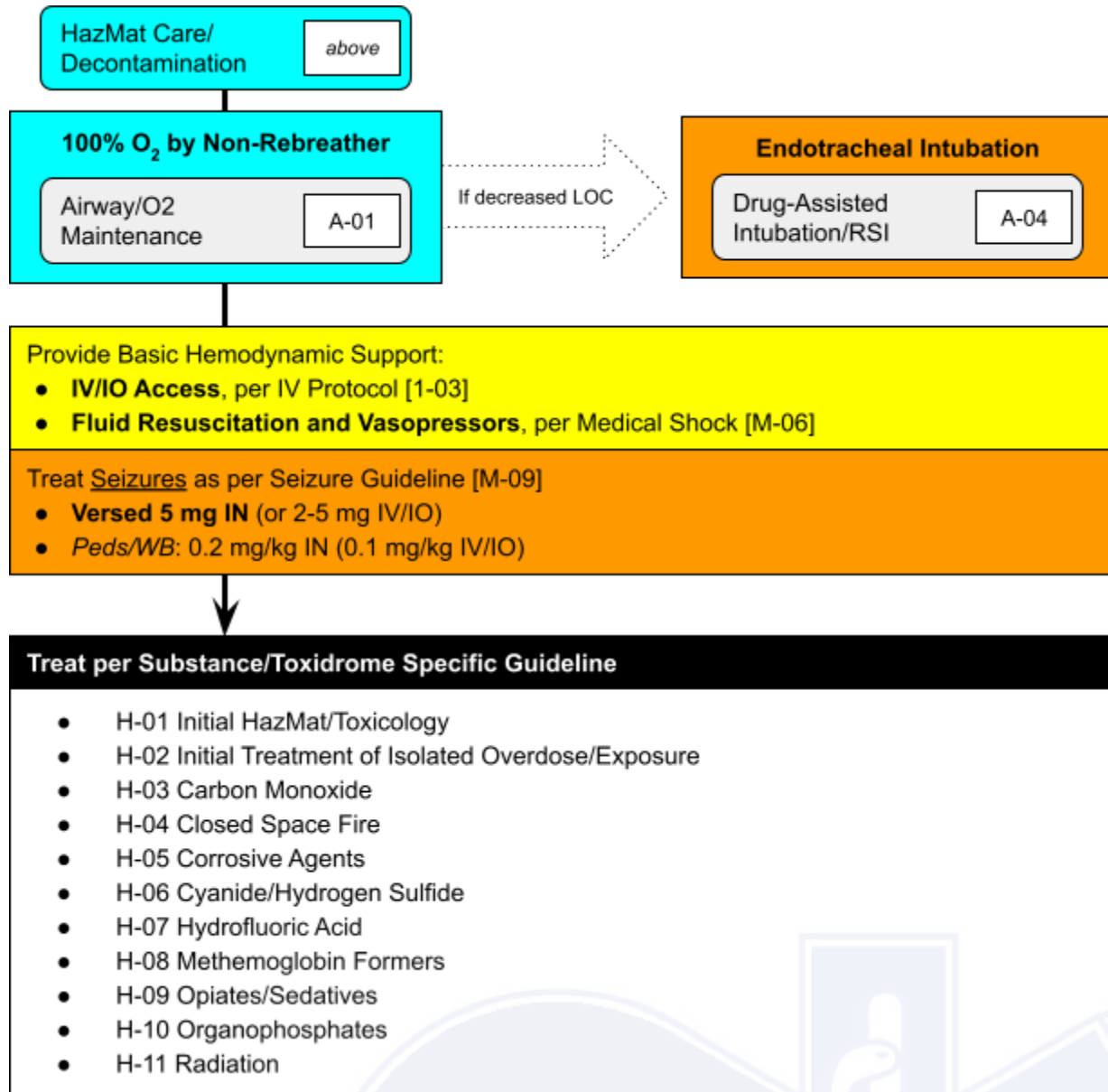
- Immediately outside of the Warm Zone (decontamination area).
- This will include additional Fire/Rescue personnel, transport EMS personnel as well as additional “officers” associated with an MCI event (Triage Officer, Transport Officer, etc.).
- *The full scope of ALS interventions are available*, including advanced HazMat Medic treatments and resources as outlined in these guidelines.
  - These will be initiated based on the number of patients needing treatment and resources available, based on standard MCI protocols.
  - Initial stabilizing treatments should generally be performed on scene unless there are additional safety issues limiting scene time.

### **Always request Hazardous Material Team/HazMat Medic assistance early if there is:**

- **Any question on the scene or the substance, or**
- **The potential need for medications/equipment not normally carried by the EMS provider.**

## INITIAL TREATMENT OF PATIENTS

For patients with isolated overdose, refer to Initial Treatment of Isolated Overdose/Exposure [H-02]



## TREATMENT PEARLS

- Once the patient is decontaminated, most toxic exposures only require basic supportive measures in the prehospital setting.
- Airway/Breathing
  - Basic airway management and support of respirations should be ensured on all patients. This is one of the few interventions that should be attempted during decontamination (i.e. in the Warm Zone).
  - Pulse-oximetry should be monitored closely, and a device capable of measuring carboxyhemoglobin and methemoglobin levels should be used (if available) in any patient with potential exposure or in cases of unknown exposure.
  - The early initiation of CPAP/Bipap or endotracheal intubation is encouraged in inhalation injuries, patients with unstable hemodynamics or with severe decrease in mental status.
- Basic fluid resuscitation and vasopressor use, as well as appropriate use of defibrillation/antiarrhythmics are indicated to support cardiovascular status.
- *Seizures* should be treated in the usual approach, generally starting with intranasal (IN) Versed (midazolam) and escalating as needed.
- Specific treatment of exposure (as noted in these guidelines) is generally only needed for patients with persistent cardiovascular dysfunction despite maximizing supportive care.

## PRIMARY TOXIDROMES

Toxidromes are constellations of clinical signs and symptoms that are essential for the successful recognition of chemical exposure.

Examples of Agents	Examination Findings (most common in <b>bold</b> )	Treatment Overview (see referenced guidelines for specifics)
<b>Cholinergic = Drowning in Secretions + Bradycardia + Pinpoint Pupils (miosis)</b>		
<b>Insecticides</b> (organophosphates and carbamates)  <b>Chemical warfare agents</b> (sarin, VX)	<i>Muscarinic</i> = "DUMBELS" (or "SLUDGE") <ul style="list-style-type: none"> <li>• Defecation/<b>Diaphoresis</b></li> <li>• Urination</li> <li>• Miosis (pinpoint pupils)</li> <li>• Bradycardia &amp; <b>bronchorrhea</b>/ bronchospasm</li> <li>• Emesis</li> <li>• Lacrimation</li> <li>• <b>Salivation</b>/Seizures</li> </ul> <i>Nicotinic</i> = <b>Muscle fasciculations &amp; weakness</b>	See <i>Organophosphates [E-XX]</i> <b>Atropine</b> <b>2-PAM</b> (pralidoxime)
<b>Anticholinergic = Altered LOC + Tachycardic + Dilated Pupils (mydriasis) + DRY Skin</b>		
Atropine <b>Antihistamines</b> Antipsychotics	Altered mental status, mydriasis (dilated pupils), Dry/flushed skin and mucous membranes, Tachycardia, Hyperthermia, Seizures, Urinary retention	Supportive
<b>Sympathomimetic = Altered LOC + Tachycardic + Dilated Pupils (mydriasis) + WET Skin (diaphoresis)</b>		
<b>Amphetamines</b> <b>Cocaine</b> Cathinones (Bath Salts) Hallucinogens (LSD, PCP, etc.)	Altered mental status (anxiety, agitation, hallucinations, etc.), Mydriasis (dilated pupils), Diaphoresis, Tachycardia, Hypertension, Hyperthermia,, Seizures	<b>Sedation</b> (generally with benzodiazepines), as per [RX-03]
<b>Sedative/Hypnotic = CNS Depression/Respiratory Depression</b>		
<b>Benzodiazepines</b> Barbiturates <b>Opiates</b> <b>Alcohols</b>	<b>CNS depression</b> (confusion, ataxia, dysarthria, etc.), Bradycardia, <b>Respiratory depression</b> <i>Pupils → Opiates = pinpoint; Others = variable</i>	See <i>Opiates/Sedatives [E-XX]</i> <b>Respiratory support</b>



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**OTHER TOXIDROMES**

Examples of Agents	Examination Findings (most common in <b>bold</b> )	Treatment Overview (see referenced guidelines for specifics)
<b>Corrosive Agents</b>		
<p><b>Acids or Alkalis</b> (Bases) Irritant Gases (<b>chlorine, ammonia,</b> mustard gas, etc.) Phosgene (delayed pulmonary edema)</p>	<p><i>Skin:</i> <b>burning</b> (with or without visible burns), blistering; <i>Eye:</i> <b>pain/burning</b>, redness, tearing; <i>Inhalation:</i> nasal drainage, burning, <b>coughing, bronchospasm/wheezing</b>, rales/pulmonary edema</p>	<p>See <i>Corrosive Agents [E-XX]</i> <b>Copious Irrigation</b> &amp; Wound Care <b>Respiratory Support</b> (bronchodilators, CPAP, RSI/Intubation, etc.)</p>
<b>Asphyxiants (Simple or Chemical)</b>		
<p><i>Simple Asphyxiant</i> = any gas that displaces oxygen (<b>nitrogen</b>, carbon dioxide, etc.)</p> <p><i>Chemical Asphyxiant</i> = prevents normal oxygen transport (e.g. <b>carbon monoxide</b>, nitrates/methemoglobin formers) or cellular metabolism (oxygen utilization, e.g. <b>cyanide or hydrogen sulfide</b>)</p>	<p>Hypoxemia, <b>CNS depression</b> (and eventual respiratory depression), <b>Cardiovascular Instability</b> (initially tachycardia, then progressing to hypotension and bradycardia).</p>	<p><b>Remove from the environment</b> <b>100% Oxygen</b> Respiratory &amp; hemodynamic support</p> <p>See <i>Carbon Monoxide [E-XX]</i> See <i>Cyanide/Hydrogen Sulfide [E-XX]</i> See <i>Methemoglobin Formers [E-XX]</i></p>
<b>Hydrocarbons (and Halogenated Hydrocarbons)</b>		
<p>Methane, Butane, Hexane Turpentine, Toluene, Chloroform</p>	<p><b>Simple asphyxia</b>/hypoxemia, <b>CNS depression</b> (from direct effect on the nerves), respiratory depression</p>	<p>Respiratory &amp; Hemodynamic Support</p> <p>NOTE: Inhalation sensitizes the myocardium to the effects of catecholamines. <b>Epinephrine should generally be AVOIDED.</b></p>

### Other Medication Reactions

Reaction	Examples of Agents	Examination Findings (most common in <b>bold</b> )
Extrapyramidal	Antipsychotics (risperidone, haloperidol, phenothiazines, etc.)	<b>Dystonia</b> , torticollis, muscle rigidity, hyperreflexia, akathisia (feeling of restlessness).
Neuromuscular Malignant Syndrome	Antipsychotics	<b>Lead-pipe muscle rigidity, hyperpyrexia</b> , altered mental status, autonomic instability, diaphoresis
Serotonin Syndrome	Antidepressants (SSRIs, MAOIs, St. John's wort, etc.) Tricyclic antidepressants	<b>Altered mental status</b> , hyperreflexia and hypertonia (>lower limbs), <b>tachycardia, diaphoresis, hypertension</b> , flushing, tremor

**Treatment** for the above reactions is **mostly supportive**, this includes:

- Fluid resuscitation, hemodynamic support and the treatment of arrhythmias.
- *Passive and active cooling measures* should be utilized for hyperthermia (hyperpyrexia).
- Seizures should be treated as per usual.
- **Online Medical Control should be contacted for:**
  - Concerns over **significant neuromuscular hyperactivity (dystonias, rigidity, etc.)** as sedation (i.e. benzodiazepines) may be considered with severe symptoms.
  - Diphenhydramine (Benadryl) use for moderate to severe extrapyramidal symptoms.