

ENVIRONMENTAL EMERGENCIES PROTOCOLS



MEMORIAL EMS SYSTEM
ADULT PREHOSPITAL CARE MANUAL

**Hazardous Materials
Exposure Protocol**

Injuries from hazardous materials incidents vary depending on the *manner* of exposure (inhalation, ingestion, injection or absorption), the *type* of material involved (acids, ammonia, chlorine, hydrocarbon solvents, sulfides, organophosphates) and the *amount* of exposure (time & concentration).

Harmful products are widely used in home gardening and cleaning, commercial agriculture and cleaning & industrial operations. Civil defense agencies have indicated the increasing threat concerning the use of *Weapons of Mass Destruction* (WMD) as a foreign and domestic terrorist tool. WMD represent an **intentional** hazardous materials, biological agent, or radiological event incident.

Due to the magnitude and multiplicity of hazardous materials, this protocol focuses on a general approach to the patient involved in a hazardous materials incident. The substance container may have vital information for resuscitation of an exposed patient. Communication with Medical Control is the best way to obtain rapid and accurate advice on treatment guidelines for specific materials.

Emergency Medical Responder Care

Emergency Medical Responder Care should be focused on assessing the situation and initiating routine patient care to assure that the patient has a patent airway, is breathing and has a perfusing pulse as well as beginning treatment for shock. Remain uphill, upwind, and upstream and upgradient of the incident. Stay out of the “Hot Zone” unless trained, equipped and authorized to enter.

1. Render initial care in accordance with the *Routine Patient Care Protocol*.
2. Look for possible scene and patient contamination. Follow agency safety procedures.
3. Notify IEMA if needed at 1-800-782-7860.
4. The patient's clothing should be completely removed to prevent continued exposure and the patient decontaminated **prior to** being placed in the ambulance for transport.
5. **Oxygen:** If respiratory distress noted, 15 LPM via NRM or 6 LPM via nasal cannula.
 - a. If no obvious respiratory distress, apply pulse ox. If $\geq 94\%$ and no signs/symptoms of respiratory distress, no Oxygen is required. If $\leq 89\%$ apply nasal cannula at 2-6 LPM. If unable to increase $\geq 94\%$ move to 15 LPM via NRM.

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**Hazardous Materials
Exposure Protocol**

BLS Care

BLS Care should be directed at conducting a thorough patient assessment, initiating routine patient care to assure that the patient has a patent airway, is breathing and has a perfusing pulse as well as beginning treatment for shock and preparing the patient for or providing transport. Remain uphill, upwind, upstream and upgrade of the incident. Stay out of the “Hot Zone” unless trained, equipped and authorized to enter.

1. BLS Care includes all components of *Emergency Medical Responder Care*.
2. **Proventil (Albuterol)**: 2.5mg in 3mL of normal saline via nebulizer over 15 minutes if the patient has been exposed to an irritant gas (acids, ammonia, chlorine, carbon monoxide). May repeat Albuterol 2.5mg every **15 minutes** as needed.
3. Apply **waveform capnography** (if equipped).
4. Initiate ALS intercept if needed and transport as soon as possible. Be alert for suspected organophosphate poisoning (OPP). Signs & symptoms include “SLUDGE” (salivation, lacrimation, urination, defecation, gastroenteritis & emesis). Early indications of OPP include: headache, dizziness, weakness & nausea.
5. **Contact Medical Control** and make sure the receiving hospital is aware of (**prior to arrival at the facility**) the patient’s exposure to hazardous materials and what decontamination procedures were followed at the scene.

ILS Care

TEMS Care

ILS Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient’s perfusion and preparing for or providing patient transport.

1. ILS Care includes all components of *BLS Care*.
2. **Proventil (Albuterol)**: 2.5mg in 3mL normal saline **mixed with Ipratropium (Atrovent)**: 0.5mg via nebulizer over 15 minutes if the patient has been exposed to an irritant gas (acids, ammonia, chlorine, carbon monoxide). Repeat Albuterol 2.5mg with Atrovent 0.5mg every **15 minutes** as needed
3. **Atropine**: 2mg IV/IO or IM (if suspected organophosphate poisoning (OPP) and signs & symptoms of “SLUDGE” are present (salivation, lacrimation, urination, defecation, gastroenteritis & emesis). Early indications of OPP include: headache, dizziness, weakness & nausea. Repeat Atropine 2mg IV or IM every **5 minutes** or until signs & symptoms of “SLUDGE” subside.

Hazardous Materials Exposure Protocol

ALS Care

ALS Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion and preparing for or providing patient transport.

1. ALS Care includes all components of *ILS Care*.

PEARLS

- **If at all possible decontaminate patients on scene prior to transport. If contaminated patient is transported, the ambulance and its crew are removed from service until appropriate decontamination can be completed.**
- **If transporting a contaminated patient to an Emergency Department, information about the need for decontamination, suspected substance and total number of victims should be communicated immediately to receiving facility.**
- **Contaminated patient and crew should offload only when given direction by Emergency Department/ hospital decontamination staff.**
- **If suspected large group exposure, notify receiving Emergency Departments immediately to discuss the potential need to forward additional medications to the scene (CHEMPACK).**

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Hypothermic Emergencies Protocol

Injury and illness from environmental exposure varies depending on the *manner* of exposure (wet or dry) and the *amount* of exposure (time, temperature, wind chill factor, and ambient air). Cold weather emergencies range from localized frostbite to severe hypothermia with unresponsiveness and unconsciousness.

The patient's health and predisposing factors may increase the likelihood of environmental illness and injury. Patients suffering from trauma, shock, hypoglycemia and stroke are at greater risk of developing hypothermia. Newborns, infants, drug & alcohol abuse patients and the elderly have increased predisposition to hypothermia. The primary goal in the treatment of the patient at risk for hypothermia is to insulate the patient and prevent further heat loss.

Emergency Medical Responder Care

Emergency Medical Responder Care should be focused on assessing the situation and initiating routine patient care to assure that the patient has a patent airway, is breathing and has a perfusing pulse as well as beginning treatment for shock.

1. Render initial care in accordance with the *Routine Patient Care Protocol*.
2. Handle the patient as *gently* as possible.
3. **Create a warm environment for the patient.** Remove wet or frozen clothing and cover the patient with warm blankets. Prevent re-exposure to cold. Warm packs may be utilized for the neck (posterior), armpits, groin and along the thorax.
4. **Oxygen:** If respiratory distress noted, 15 LPM via NRM or 6 LPM via nasal cannula.
 - a. If no obvious respiratory distress, apply pulse ox. If $\geq 94\%$ and no signs/symptoms of respiratory distress, no Oxygen is required. If $\leq 89\%$ apply nasal cannula at 2-6 LPM. If unable to increase $\geq 94\%$ move to 15 LPM via NRM.
5. Do not rub frostbitten or frozen body parts. Protect injured parts (*e.g.* blisters) with light, sterile dressings and avoid pressure to the area. Do not allow patient to walk on affected extremities.

BLS Care

BLS Care should be directed at conducting a thorough patient assessment, initiating routine patient care to assure that the patient has a patent airway, is breathing and has a perfusing pulse as well as beginning treatment for shock and preparing the patient for or providing transport.

1. BLS Care includes all components of *Emergency Medical Responder Care*.
2. Apply **waveform capnography** (if equipped).
3. Treat other symptoms per the appropriate protocol.
4. Initiate ALS intercept if needed and transport as soon as possible.

Hypothermic Emergencies Protocol

ILS Care

ILS Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion and preparing for or providing patient transport.

1. ILS Care includes all components of *BLS Care*.
2. **IV Fluid Therapy:** 500mL fluid bolus only if needed to maintain $BP \geq 90$ mmHG
3. Treat other symptoms per the appropriate protocol. Be on alert for the development for cardiac arrhythmias.

ALS Care

ALS Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion and preparing for or providing patient transport.

1. ALS Care includes all components of *ILS Care*.
2. Transport as soon as possible.

Critical Thinking Elements

- **Warmed IV fluid should be achieved only with device designed for the purpose of warming intravenous fluids to a maximum temperature of 45°C (113°F). Only fluids with protective outer bags should be used for warming- bags must remain in place. Fluids can be warmed for a maximum of fourteen (14) days and then must be removed from warmer, marked so as not to be returned to warmer.**
- **If the hypothermic patient presents as a **cardiac arrest**, high quality CPR and airway management are the absolute priority. Limit medications to the 1st dose only. Defibrillation is limited to 1 shock as well.**
- **Patients with hypothermia should be considered at high risk for ventricular fibrillation. It is imperative that these patients be handled gently and not re-warmed aggressively.**
- **The presence of delirium, bradycardia, hypotension and/or cyanosis is usually indicative of severe hypothermia (core body temperature of less than 90 degrees Fahrenheit).**

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Heat-Related Emergencies Protocol

Injury and illness from heat exposure varies depending on the *manner* of exposure (sun, humidity, exertion) and the *amount* of exposure (time, temperature & ambient air). Heat exposure emergencies range from localized cramping to severe hyperthermia (heat stroke) with unresponsiveness and unconsciousness. The patient's health, predisposing factors and medications may increase the likelihood of heat-related illness. The primary goal in the treatment of the patient at risk for hyperthermia is to cool the patient and restore body fluids.

Emergency Medical Responder Care

Emergency Medical Responder Care should be focused on assessing the situation and initiating routine patient care to assure that the patient has a patent airway, is breathing and has a perfusing pulse as well as beginning treatment for shock.

1. Render initial care in accordance with the *Routine Patient Care Protocol*.
2. Move the patient to a cool environment. Remove clothing as necessary to make the patient comfortable. Cold packs may be utilized for the neck (posterior), armpits, groin and along the thorax. Rapid cooling is a priority. If possible, full-body ice-water submersion is a preferred method used by many hot-weather sporting events. If full-body submersion is being performed let them continue.
3. **Oxygen**: If respiratory distress noted, 15 LPM via NRM or 6 LPM via nasal cannula.
 - a. If no obvious respiratory distress, apply pulse ox. If $\geq 94\%$ and no signs/symptoms of respiratory distress, no Oxygen is required. If $\leq 89\%$ apply nasal cannula at 2-6 LPM. If unable to increase $\geq 94\%$ move to 15 LPM via NRM.

BLS Care

BLS Care should be directed at conducting a thorough patient assessment, initiating routine patient care to assure that the patient has a patent airway, is breathing and has a perfusing pulse as well as beginning treatment for shock and preparing the patient for or providing transport.

1. BLS Care includes all components of *Emergency Medical Responder Care*.
2. Apply **waveform capnography** (if equipped).
3. Treat other symptoms per the appropriate protocol.
4. Initiate ALS intercept if needed and transport as soon as possible.

ILS Care

ILS Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion and preparing for or providing patient transport.

1. ILS Care includes all components of *BLS Care*.

Heat-Related Emergencies Protocol

ILS Care {Continued}

2. **IV Fluid Therapy:** 500mL fluid bolus if the patient is hypotensive to achieve a systolic BP of at least 90mmHg.
3. Treat other symptoms per the appropriate protocol.

ALS Care

ALS Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion and preparing for or providing patient transport.

1. ALS Care includes all components of *ILS Care*.

Heat Disorders

Heat (Muscle) Cramps – Heat cramps are muscle cramps caused by overexertion and dehydration in the presence of high temperatures. Signs & symptoms include: *Normal or slightly elevated body temperature; generalized weakness; dizziness; warm, moist skin and cramps in the fingers, arms, legs or abdominal muscles.*

Heat Exhaustion – Heat exhaustion is an acute reaction to heat exposure and the most common heat-related illness a prehospital provider will encounter. Signs & symptoms include: *Increased body temperature; generalized weakness; cool, diaphoretic skin; rapid, shallow breathing; weak pulse; diarrhea; anxiety; headache and possible loss of consciousness .*

Heatstroke – Heatstroke occurs when the body's hypothalamic temperature regulation is lost. Cell death and damage to the brain, liver and kidneys can occur. Signs & symptoms include: *Cessation of sweating; very high core body temperature; hot, usually dry skin; deep, rapid, shallow respirations (which later slow); rapid, full pulse (which later slows); hypotension; neurologic compromise (confusion, disorientation or unconsciousness and possible seizure). Heat Stroke is a serious emergency associated with a high mortality rate.*

Fever (Pyrexia) – A fever is the elevation of the body temperature above the normal temperature for that person (~ 98.6° F +/- 2 degrees). Fever is sometimes difficult to differentiate from heatstroke; however, there is usually a history of infection or illness with a fever.

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Burn Protocol

Burn injuries vary depending on the *type* of burn (thermal, electrical, chemical) and the *amount* of exposure (time and depth). Burn injuries range from localized redness to deep tissue destruction and airway compromise. Signs of burn injury include: blisters, pain, tissue destruction, charred tissue and singed hair.

The primary goal in the treatment of the burn patient is to stop the acute burning process by removing the patient from direct contact with the source of the burn and maintaining the patient's body fluids. Special attention should be given to limit further pain and damage of the burn to the patient. However, burn care should not interfere with lifesaving measures.

Emergency Medical Responder Care

Emergency Medical Responder Care should be focused on assessing the situation and initiating routine patient care to assure that the patient has a patent airway, is breathing and has a perfusing pulse as well as beginning treatment for shock.

1. Render initial care in accordance with the *Routine Patient Care Protocol*.
2. Make sure the scene is safe to enter.
3. **Oxygen:** If respiratory distress noted, 15 LPM via NRM or 6 LPM via nasal cannula.
 - a) If no obvious respiratory distress, apply pulse ox. If $\geq 94\%$ and no signs/symptoms of respiratory distress, no Oxygen is required. If $\leq 89\%$ apply nasal cannula at 2-6 LPM. If unable to increase $\geq 94\%$ move to 15 LPM via NRM.
4. **THERMAL BURN TREATMENT:**
 - a) If the burn occurred within the last 20 minutes, reverse the burning process and cool the area by flushing the area with **1 Liter of sterile saline** (or sterile water if sterile saline is not available). The goal of cooling is to extinguish the burning process – not to systemically cool the patient. Fluid application should be held to a minimum and discontinued if the patient begins shivering.
 - b) Remove jewelry and loose clothing. Do not pull away clothing or jewelry that is stuck to the burn.
 - c) Cover the wound with sterile dressings***
 - d) Place a sterile burn sheet on the stretcher. If the patient's posterior is burned, place a sterile burn pad on top of the sheet with the absorbent side toward the patient.
 - e) Place patient on the stretcher.
 - f) Cover the patient with additional sterile burn sheets and blanket to conserve body heat.
5. **ELECTRICAL BURN and LIGHTNING STRIKE TREATMENT:**
 - a) Assure that the power service has been cut off and remove the patient from the source of electricity. Be alert of EKG changes.
 - b) Immobilize based on *Field Immobilization Decision Scheme*. Consider forces of electrical current and possible injuries.
 - c) Assess for entry and exit wounds. No cooling or flushing is necessary due to the type of burn.

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Burn Protocol

Emergency Medical Responder Care (continued)

- d) Cover the burn with dry, sterile dressings.
 - e) Closely monitor the patient.
6. **CHEMICAL BURN TREATMENT:**
- a) Consider possible scene and patient contamination and follow agency safety procedures.
 - b) Note which chemical agent caused the burn and obtain the SDS (safety data sheet) for that chemical (if possible).
 - c) The patient's clothing should be completely removed to prevent continued exposure and the patient decontaminated **prior to** being placed in the ambulance for transport.
 - d) **Dry chemical powder** should be brushed off before applying water.
 - e) Irrigate the patient with sterile water and if the SDS indicates use of water will not cause an adverse reaction. Body parts should be flushed for at least 1-2 minutes. Do not use sterile saline on chemical burns.
 - f) Irrigate burns to the eye with sterile water for at least 20 minutes. Alkaline burns should receive continuous irrigation throughout transport.

BLS Care

BLS Care should be directed at conducting a thorough patient assessment, initiating routine patient care to assure that the patient has a patent airway, is breathing and has a perfusing pulse as well as beginning treatment for shock and preparing the patient for or providing transport.

- 1. Includes all components of *Emergency Medical Responder Care*. Be alert for events that create multiple types of injuries as well as internal injuries and treat accordingly.
 - 1. Apply **waveform capnography** (if equipped).
 - 2. Initiate ALS intercept and transport as soon as possible.

Transporting Units

- 1. Destination decisions must be informed decisions based on local and regional destination capabilities, time since onset and transportation distances.
 - a. See *EMS Triage Destination Plan*.
 - b. Include **Medical Control** in the decision making

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Burn Protocol

ILS Care

ILS Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion and preparing for or providing patient transport.

2. Includes all components of *BLS Care*.
3. **IV Fluid Therapy**: 500mL fluid bolus. Repeat if necessary to maintain $BP \geq 90$ mmHg

ALS Care

ALS Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion and preparing for or providing patient transport.

1. Includes all components of *ILS Care*.
2. Be prepared to intubate if necessary refer to MAI Protocol is needed.
3. **Treat pain** based on *Pain Control Protocol*.
4. Transport and **Contact Medical Control** as soon as possible for significant burns.

Critical Thinking Elements

- **Treat other symptoms or trauma per the appropriate protocol (e.g. if someone suffers from smoke inhalation along with being burned, refer to the *Smoke Inhalation Protocol*).**
- **IV access should not be obtained through burned tissue unless no other site is available.**
- **Closely monitor the patient's response to IV fluids and assess for pulmonary edema.**
- **Closely monitor the patient's airway – have BVM, suction and/or intubation equipment readily available.**
- **Do not delay transport of a "Load and Go" trauma patient to care for burns.**
- **For chemical/powder burns, be aware of inhalation hazards and closely monitor for changes in respiratory status.**

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Smoke Inhalation Protocol

Smoke inhalation injury is the result of various inhaled components of combustion and direct thermal injury to the airway. Signs and symptoms include: evidence of exposure to fire, stridor, wheezing, acute upper airway obstruction, chemical pneumonia and non-cardiac pulmonary edema. Effects of the exposure may be immediate or delayed several hours.

Carbon monoxide (CO) poisoning is a common secondary complication to smoke inhalation. Direct exposure to the gas is also common (especially in winter months). Signs and symptoms include: evidence of exposure to fire or natural gases produced by incomplete combustion, headache, dizziness, tinnitus, nausea, weakness, chest pain and ALOC.

Emergency Medical Responder Care

Emergency Medical Responder Care should be focused on assessing the situation and initiating routine patient care to assure that the patient has a patent airway, is breathing and has a perfusing pulse as well as beginning treatment for shock.

1. Render initial care in accordance with the *Routine Patient Care Protocol*.
2. **Oxygen**: If there is any suspicion of smoke inhalation or carbon monoxide poisoning apply O2 15 LPM via NRM.

BLS Care

BLS Care should be directed at conducting a thorough patient assessment, initiating routine patient care to assure that the patient has a patent airway, is breathing and has a perfusing pulse as well as beginning treatment for shock and preparing the patient for or providing transport.

1. BLS Care includes all components of *Emergency Medical Responder Care*.
2. Initiate ALS intercept and transport as soon as possible.
3. **Proventil (Albuterol)**: 2.5mg in 3mL of normal saline via nebulizer over 15 minutes. May repeat Albuterol 2.5mg every **15 minutes** as needed.
4. Apply **waveform capnography** (if equipped).

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Smoke Inhalation Protocol

ILS Care

ILS Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion and preparing for or providing patient transport.

1. ILS Care includes all components of *BLS Care*.
2. **Proventil (Albuterol)**: 2.5mg in 3mL of normal saline **mixed with**
3. **Ipratropium (Atrovent)**: 0.5mg via nebulizer over **15 minutes**.via nebulizer over 15 minutes. May repeat Albuterol 2.5mg with Atrovent 0.5mg every 15 minutes.
4. **In-line nebulizer** may be utilized if patient is unresponsive/in respiratory arrest.
5. **CyanoKit**: 5g in 200 mL of Normal Saline if available.

ALS Care

ALS Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion and preparing for or providing patient transport.

1. ALS Care includes all components of *ILS Care*.
2. See **MAI Protocol** if needed.
3. Contact the receiving hospital as soon as possible.

PEARLS

- **The symptoms of carbon monoxide poisoning and cyanide poisoning are very similar. Many patients with carbon monoxide poisoning also could be suffering from cyanide poisoning. Be alert for altered LOC in setting of industrial or residential fire with normal CO levels. Elevated Cyanide (CN) levels could be present even if CO levels are normal or elevated.**
- **Agencies with the capabilities to monitor carbon monoxide levels via total hemoglobin concentration should ensure equipment is maintained and calibrated based on manufacturer's specifications. Patients and providers with readings of 10-15% CO or higher should be strongly encouraged to seek transport and treatment in Emergency Department. Smokers can have a residual CO level of 5-8%.**
- **Cyanide poisoning is often found in patients pulled from structure fires. Symptoms of cyanide poisoning include weakness, confusion, headache, dizziness, vomiting, abdominal pain, sleepiness- coma and seizures. Agencies wishing to stock Cyanokits will be trained to do so, but will be required to assist in transport of patient to receiving facility.**

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Near Drowning Protocol

Near drowning results from submersion in water or other liquid for a period of time that does not result in irreversible death. The time interval of submersion that causes irreversible death is dependent on several factors such as: temperature of the water, the health of the victim and any trauma suffered during the event. All persons submerged **1 hour or less** should be vigorously resuscitated in spite of apparent death. Initial care of the near drowning victim should begin in the water.

Emergency Medical Responder Care

Emergency Medical Responder Care should be focused on assessing the situation and initiating routine patient care to assure that the patient has a patent airway, is breathing and has a perfusing pulse as well as beginning treatment for shock.

1. Render initial care in accordance with the *Routine Patient Care Protocol* and *Routine Trauma Care Protocol*.
2. Make sure the scene is safe. Use appropriate personnel and equipment for rescue.
3. Immobilize based on *Field Immobilization Decision Scheme*.
4. **Oxygen**: If respiratory distress noted, 15 LPM via NRM or 6 LPM via nasal cannula.
 - a. If no obvious respiratory distress, apply pulse ox. If $\geq 94\%$ and no signs/symptoms of respiratory distress, no Oxygen is required. If $\leq 89\%$ apply nasal cannula at 2-6 LPM. If unable to increase $\geq 94\%$ move to 15 LPM via NRM.
5. Be prepared to support with BVM if necessary.
6. Initiate **CPR** if indicated.
7. Treat respiratory and/or cardiac symptoms per the appropriate protocol.

BLS Care

BLS Care should be directed at conducting a thorough patient assessment, initiating routine patient care to assure that the patient has a patent airway, is breathing and has a perfusing pulse as well as beginning treatment for shock and preparing the patient for or providing transport.

1. Includes all components of *Emergency Medical Responder Care*.
2. Apply **waveform capnography** (if equipped).
3. **Initiate ALS intercept** and transport as soon as possible.

Near Drowning Protocol

ILS Care

ILS Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion and preparing for or providing patient transport.

1. Includes all components of *BLS Care*.
2. Obtain **IV access**.
3. For ongoing respiratory distress, the provider may initiate **CPAP** (see CPAP protocol 13.I.1)
4. If BVM ventilations are performed, providers may add a **PEEP valve** at 5-10 cm of H₂O to the BVM (regardless of mechanism: OA/NA, supraglottic airway or endotracheal tube) to increase or improve oxygenation. ***Patient must have a pulse for PEEP valve usage.**

ALS Care

ALS Care should be directed at continuing or establishing care, conducting a thorough patient assessment, stabilizing the patient's perfusion and preparing for or providing patient transport.

1. Includes all components of *ILS Care*.
2. Contact the receiving hospital as soon as possible.

Critical Thinking Elements

- Near drowning patients should be strongly encouraged to accept transport despite possibly showing only minimal signs/symptoms following a water subversion event. These patients can rapidly deteriorate.
- Contact Medical Control for advice and/or a high-risk refusal.