



Overdose / Toxic Ingestion

History

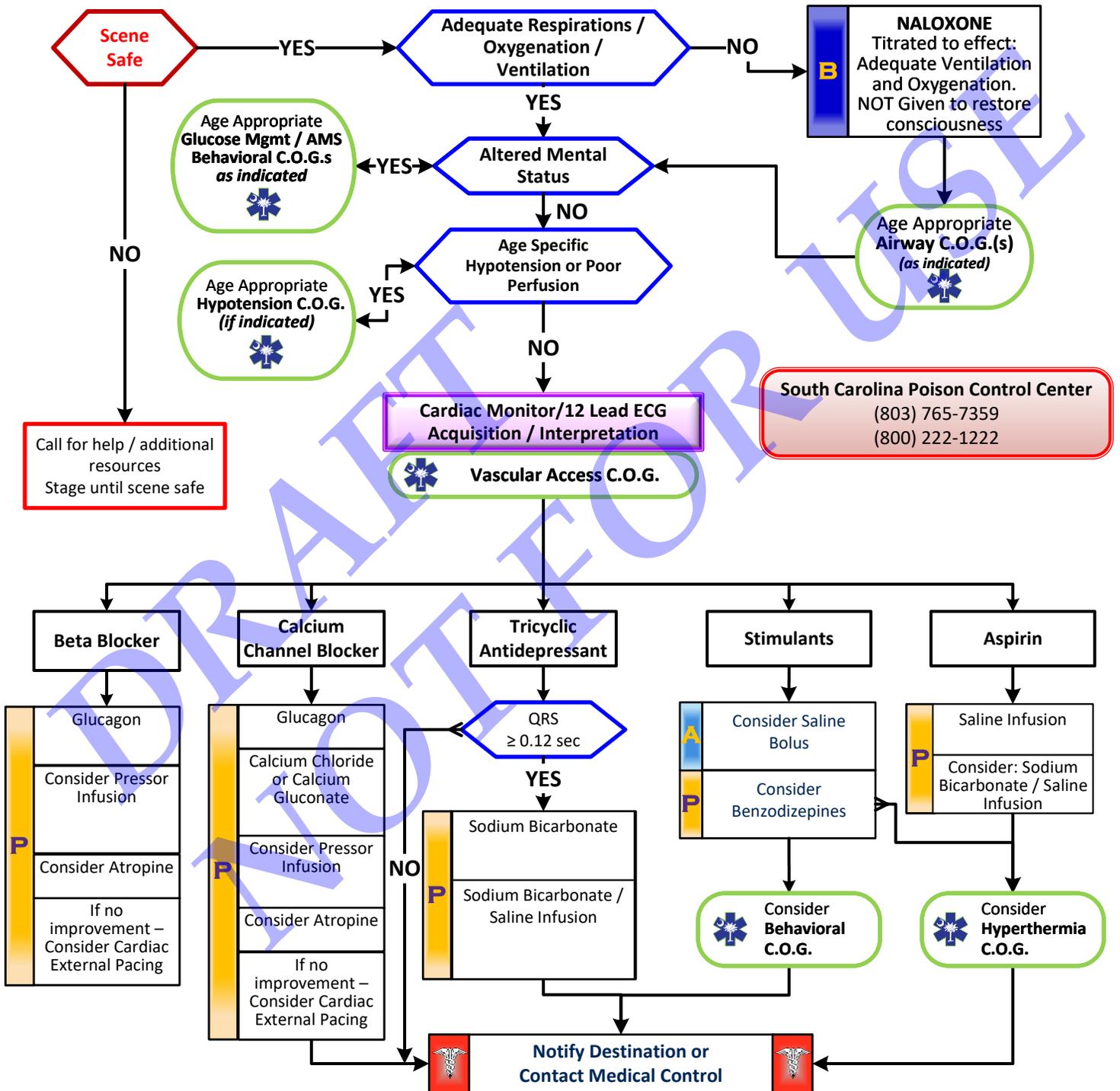
- Ingestion or suspected exposure/ ingestion of a potentially toxic substance
- Substance exposed to, route, quantity
- Time of exposure/ingestion
- Reason (suicidal, accidental, criminal)
- Available medications in home
- Past medical history, medications

Signs and Symptoms

- Mental status changes
- Hypotension / hypertension
- Decreased respiratory rate
- Cardiac dysrhythmias
- Seizures
- **S.L.U.D.G.E.**
- **D.U.M.B.B.E.L.S**

Differential

- Tricyclic antidepressants (TCAs)
- Acetaminophen (Tylenol)
- Aspirin
- Depressants
- Stimulants
- Anticholinergic
- Cardiac medications
- Solvents, Alcohols, Cleaning agents
- Insecticides (organophosphates)

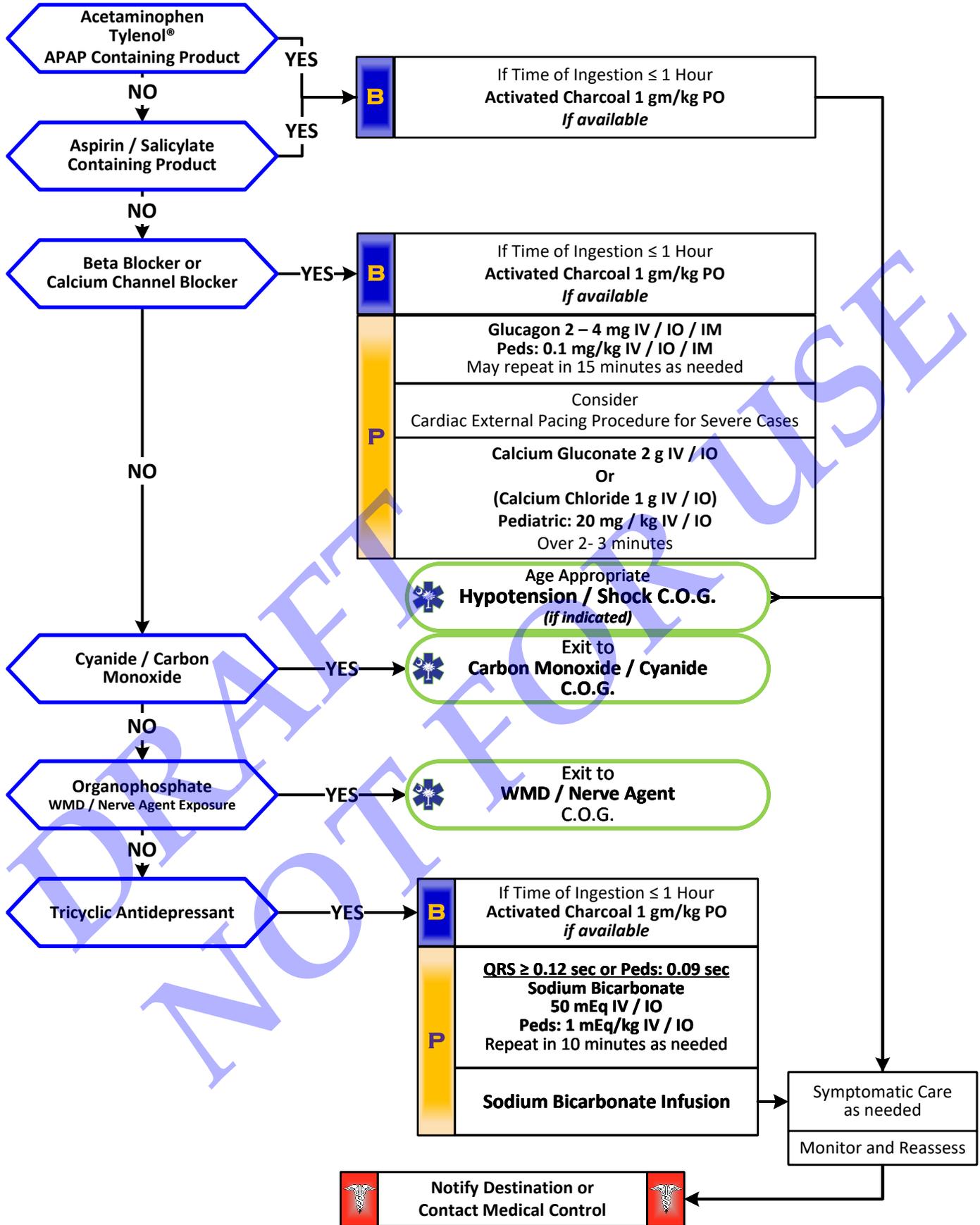


South Carolina Poison Control Center
 (803) 765-7359
 (800) 222-1222

ENVIRONMENTAL / TOXIC



Overdose / Toxic Ingestion



ENVIRONMENTAL / TOXIC



Overdose / Toxic Ingestion

PEARLS

- **Recommended Exam: Mental Status, Skin, HEENT, Heart, Lungs, Abdomen, Extremities, Neuro**
- **In Suicide Attempts – ALWAYS consider multiagent ingestion – e.g. Tylenol AND Aspirin; Sleeping Pills AND Alcohol; etc.**
- **Opioids and opiates may require higher doses of Naloxone to improve respiration, in certain circumstances up to 10 mg.**
- **Time of Ingestion:**
 - Most important aspect is the **TIME OF INGESTION** and the substance and amount ingested and any co-ingestants.
 - Every effort should be made to elicit this information before leaving the scene.
- **Charcoal Administration:**
 - ❖ The American Academy of Clinical Toxicology **DOES NOT** recommend the routine use of charcoal in poisonings.
 - ❖ Consider Charcoal within the **FIRST HOUR** after ingestion. If a potentially life threatening substance is ingested or extended release agent(s) are involved and \geq one hour from ingestion contact medical control or Poison Center for direction.
 - ❖ If NG is necessary to administer Charcoal then **DO NOT** administer unless agent is known to be adsorbed, **and** airway secured by intubation **and** ingestion is less than **ONE HOUR** confirmed and potentially lethal.
 - ❖ Charcoal in general should only be given to a patient who is alert and awake such that they can self-administer the medication.
- **Do not rely on patient history of ingestion, especially in suicide attempts. Make sure patient is still not carrying other medications or has any weapons.**
- **Bring bottles, contents, emesis to ED.**
- **S.L.U.D.G.E:** Salivation, Lacrimation, Urination, Defecation, GI distress, Emesis
- **D.U.M.B.E.L.S:** Diarrhea, Urination, Miosis, Bradycardia, Bronchorrhea, Emesis, Lacrimation, Salivation.
- **Tricyclic:** 4 major areas of toxicity: seizures, dysrhythmias, hypotension, decreased mental status or coma; rapid progression from alert mental status to death.
- **Acetaminophen:** initially normal or nausea/vomiting. If not detected and treated, causes irreversible liver failure
- **Aspirin:** Early signs consist of abdominal pain and vomiting. Tachypnea and altered mental status may occur later. Renal dysfunction, liver failure, and or cerebral edema among other problems may develop later.
- **Depressants:** decreased HR, decreased BP, decreased temperature, decreased respirations, non-specific pupils
- **Stimulants:** increased HR, increased BP, increased temperature, dilated pupils, seizures
- **Anticholinergic:** increased HR, increased temperature, dilated pupils, mental status changes
- **Cardiac Medications:** dysrhythmias and mental status changes
- **Solvents:** nausea, coughing, vomiting, and mental status changes
- **Insecticides:** increased or decreased HR, increased secretions, nausea, vomiting, diarrhea, pinpoint pupils
- Consider restraints if necessary for patient's and/or personnel's protection per the Restraint Procedure.
- **Nerve Agent Antidote kits** contain 2 mg of Atropine and 600 mg of pralidoxime in an autoinjector for self administration or patient care. These kits may be available as part of the domestic preparedness for Weapons of Mass Destruction.
- **When appropriate contact Online Medical Control and/or the Palmetto Poison Control Center for guidance.**
- **KEY DOCUMENTATION ELEMENTS:**
 - Repeat evaluation and documentation of signs and symptoms – patient clinical condition may deteriorate rapidly
 - Identification of possible etiology of poisoning
 - Initiation of measures on scene to prevent exposure of EMS or bystanders when appropriate/indicated.
 - Time of symptom onset and time of initiation of exposure specific treatment
 - Time of exposure/ingestion and Route of exposure/ingestion.
 - Quantity of medication or toxin taken.
 - Where possible, safely collect all possible medications and/or agents and document



Nerve Agent Protocol (Organophosphate)

History

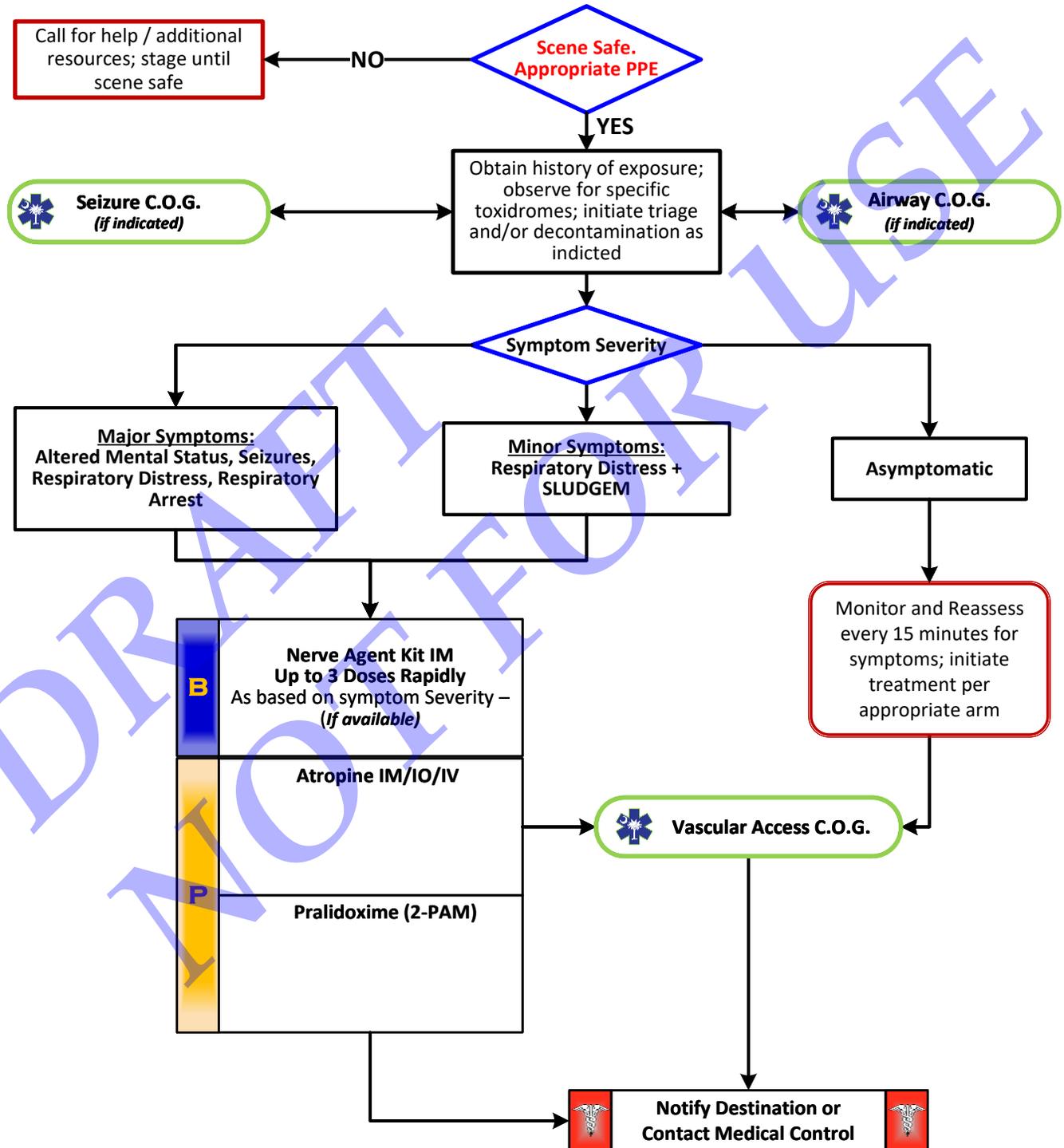
- Exposure to chemical, biologic, radiologic, or nuclear hazard
- Potential exposure to unknown substance/hazard

Signs and Symptoms

- Salivation
- Lacrimation
- Urination; increased, loss of control
- Defecation / Diarrhea
- GI Upset/abdominal pain/cramping
- Emesis
- Muscle Twitching
- Seizure Activity
- Respiratory Arrest

Differential

- Nerve agent exposure (e.g. VX, Sarin, Soman, etc.)
- Organophosphate exposure (pesticide)
- Vesicant exposure (e.g. Mustard Gas, etc.)
- Respiratory Irritant Exposure (e.g. Hydrogen Sulfide, Ammonia, Chlorine, etc.)



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Nerve Agent Protocol (Organophosphate)

ENVIRONMENTAL / TOXIC

DRAFT FOR USE

PEARLS

- **Recommended Exam: Mental Status, Skin, HEENT, Heart, Lungs, Abdomen, Neuro**
- **Follow local HAZMAT protocols for decontamination and use of personal protective equipment.**
- **In the face of a bona fide attack, begin with 1 Nerve Agent Kit for patients less than 7 years of age, 2 Nerve Agent Kits from 8 to 14 years of age, and 3 Nerve Agent Kits for patients 15 years of age and over.**
- **If Triage/MCI issues exhaust supply of Nerve Agent Kits, use pediatric atropines (if available). Use the 0.5 mg dose if patient is less than 40 pounds (18 kg), 1 mg dose if patient weighs between 40 to 90 pounds (18 to 40 kg), and 2 mg dose for patients greater than 90 pounds (>40 kg).**
- **Each Nerve Agent Kit contains 600 mg of Pralidoxime (2-PAM) and 2 mg of Atropine.**
- **Seizure Activity: Any benzodiazepine by any route is acceptable.**
- For patients with major symptoms, there is **no limit** for atropine dosing.
- Carefully evaluate patients to ensure their symptoms are not from exposure to another agent (e.g., narcotics, vesicants, etc.)
- The main symptom that the atropine addresses is excessive secretions so atropine should be given until salivation improves.
- EMS personnel, public safety officers and EMT-B may carry, self-administer or administer to a patient atropine / pralidoxime by C.O.G.. Agency medical director may require Contact of Medical Control prior to administration.
- **KEY DOCUMENTATION:**
 - Time to recognize initial signs and symptoms
 - Dosage and Number of repeated doses of atropine required for the secretions to diminish and respirations to improve
 - Patient reassessments
 - Patient response to therapeutic interventions
 - Measures taken to Decontaminate the patient
 - Measures taken to protect clean environments from contamination.
 - Availability of additional and adequate antidote assets if necessary



Stimulant Overdose

History

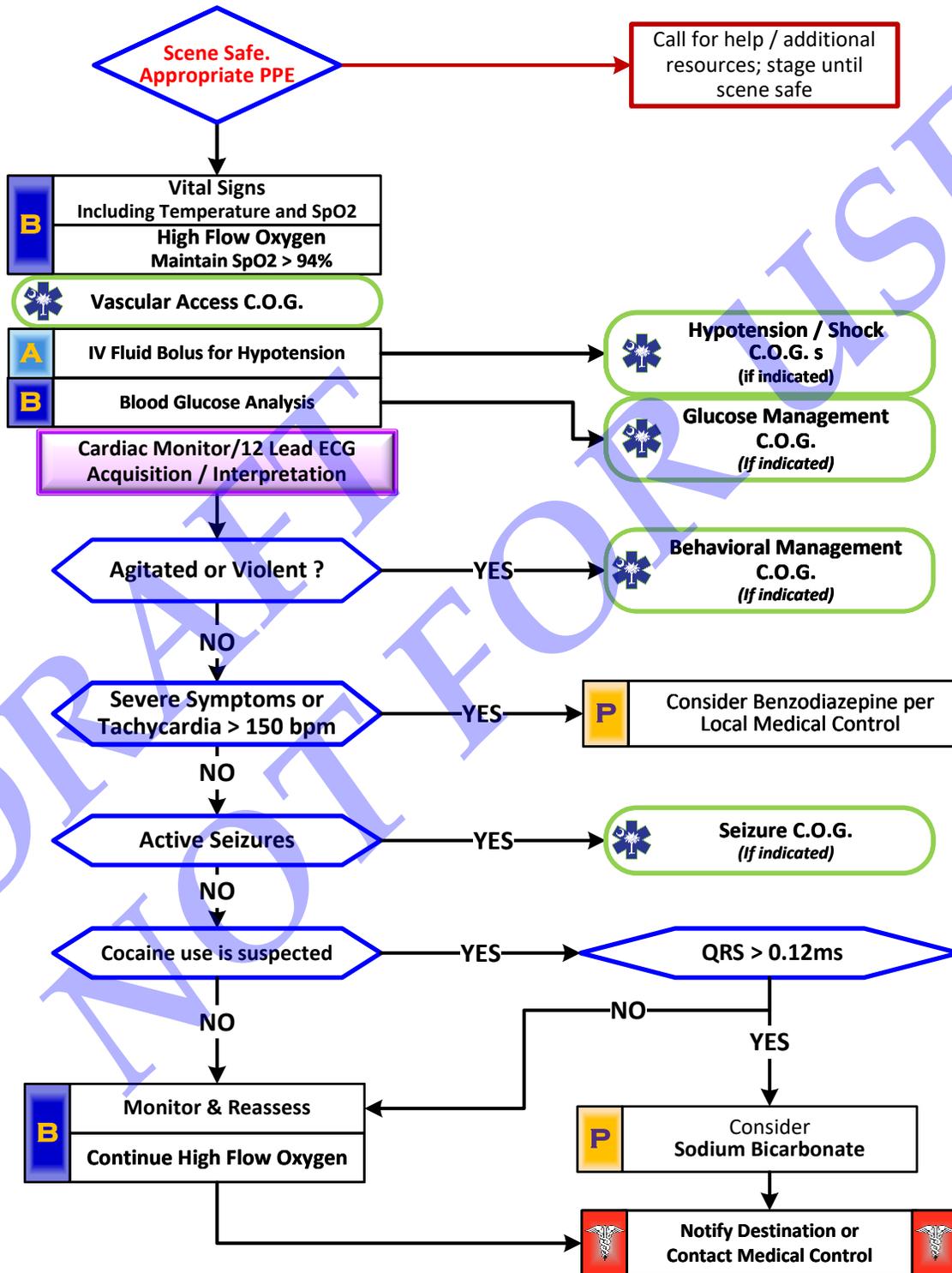
- Past Medical History
- Ingestion or suspected ingestion
- Substance ingested/route/quantity
- Time of ingestion
- Prescribed Medications

Signs and Symptoms

- Hypertension
- Tachycardia
- Hallucinations
- Anxiety
- Chest Pain
- Respiratory Distress
- Seizures
- Hyperthermia
- Delusion/paranoia

Differential

- AMS Differentials
- Depressants
- Anticholinergics
- Alcohol Intoxication
- Schizophrenia
- Bipolar (Manic-depressive)
- Medication Effect/overdose



ENVIRONMENTAL / TOXIC



Stimulant Overdose

ENVIRONMENTAL / TOXIC

DRAFT FOR USE

PEARLS

- **Recommended exam: Neuro, Skin, Heart, Lungs, Abdomen, Extremities**
 - Examination should include Heart Rate, Respiratory Rate, SpO2, and Temperature.
- **Scene safety is priority.**
- **History is as important as Physical Examination**
- If the patient is found naked, this may elevate the suspicion for stimulant use or abuse. These substances increase the risk for sudden death secondary to delirium with agitated behavior.
- Neuroleptic malignant syndrome or serotonin syndrome can present with similar signs and symptoms
- If the patient is on psychiatric medication, but has failed to be compliant, this fact alone puts the patient at higher risk for the adverse outcome of delirium with agitated behavior
- If polypharmacy is suspected, hypertension and tachycardia are expected hemodynamic findings secondary to increased dopamine release. Stimulus reduction from benzodiazepines, anti-psychotics, and ketamine will improve patient's vital signs and behavior
- Be prepared for the potential of cardiovascular collapse as well as respiratory arrest
- **If a vasopressor is needed, epinephrine or norepinephrine is recommended over dopamine**
- **KEY DOCUMENTATION ELEMENTS:**
 - Repeat evaluation and documentation of signs and symptoms. Patient's clinical condition may deteriorate rapidly.
 - Identification of possible etiology of poisoning/overdose
 - Time of ingestion/exposure.
 - Time of symptom onset and time of initiation of exposure specific treatments.
 - Therapy and response to therapy.
 - Reason for Psychologic and Physical management procedures used and neurologic/circulatory exams with device use.
 - Reasons for medications selected for use
 - Documentation of QT Interval when antiemetic medications, haloperidol, or droperidol is used and result conveyed to ED Staff.



Cyanide Exposure

History

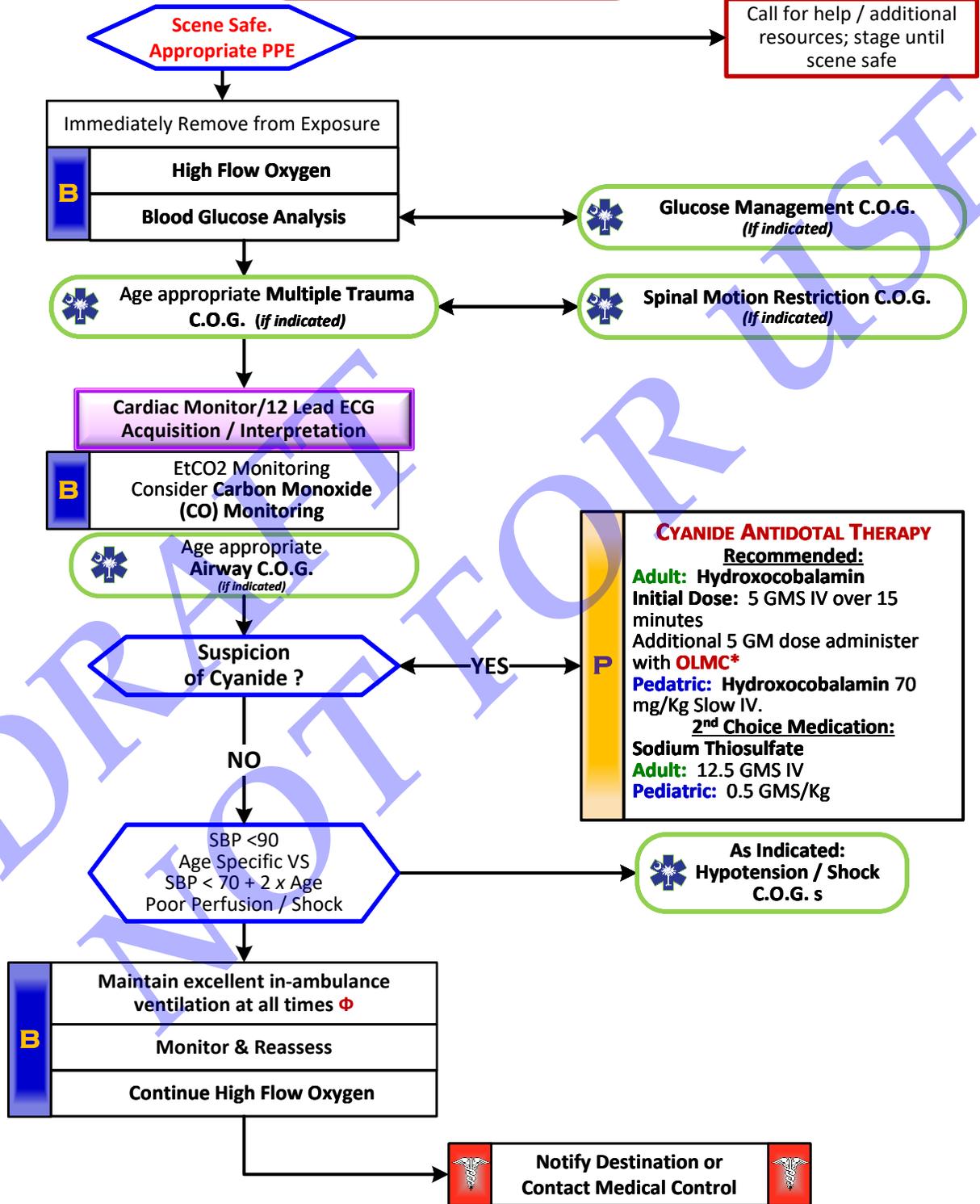
- Smoke inhalation
- Ingestion of cyanide
- Eating large quantity of fruit pits
- Industrial exposure
- Trauma
- Reason: Suicide, criminal, accidental
- Past Medical History
- Time / Duration of exposure

Signs and Symptoms

- AMS
- Malaise, weakness, flu like illness
- Headache
- Dyspnea
- GI Symptoms; N/V; cramping
- Dizziness
- Seizures
- Syncope
- Reddened skin
- Chest pain

Differential

- Diabetic related
- Infection
- MI
- Anaphylaxis
- Renal failure / dialysis problem
- Head injury / trauma
- Co-ingestant or exposures
- Consider Carbon Moxoxide co-exposure with Cyanide



ENVIRONMENTAL / TOXIC



Cyanide Exposure

CONSIDER CYANIDE POISONING FOR:

- Patients on **NITROPRUSSIDE** infusions
- Smoke Exposure: Burning wools, silk, plastics, furniture
- Industrial / Laboratory Settings.
- Metal Processing, Jewelry Manufacturing, Photographic Processing, Dyeing, Plastics Manufacturing
- Agriculture / Mining

- ❖ **Φ If cyanide exposure is suspected – and particularly if there is risk that cyanide has been ingested – excellent, high flow ventilation through the transporting vehicle is critical. Ingested cyanide, in the presence of stomach acid may off-gas hydrogen cyanide gas.**

ENVIRONMENTAL / TOXIC

PEARLS

- **Recommended exam: Neuro, Skin, Heart, Lungs, Abdomen, Extremities**
- **Scene safety is priority.**
- **Don PPE and consider Self Contained Breathing Apparatus (SCBA) prior to entering contaminated area.**
- If there is some form of suicide signage, hoses, or buckets of substances visible as you arrive at the vehicle or residence, immediately retreat to well ventilated area and don self-contained breathing apparatus (SCBA) before opening the vehicle or making entry as these gases may be highly concentrated and potentially lethal to EMS responders
- Consider Carbon Monoxide (CO) and Cyanide with any product of combustion
- Normal environmental Carbon Monoxide (CO) level does not exclude Carbon Monoxide (CO) poisoning.
- Symptoms present with lower Carbon Monoxide (CO) levels in pregnancy, children and the elderly.
- Continue high flow oxygen regardless of pulse ox readings.
- **Pulse Oximetry Readings may read FALSELY HIGH with Carbon Monoxide Poisoning**
- **KEY DOCUMENTATION ELEMENTS:**
 - Repeat evaluation and documentation of signs and symptoms. Patient's clinical condition may deteriorate rapidly.
 - Identification of possible etiology of poisoning
 - Time of ingestion/exposure.
 - Time of symptom onset and time of initiation of exposure specific treatments.
 - Therapy and response to therapy.



Carbon Monoxide/Smoke Exposure

History

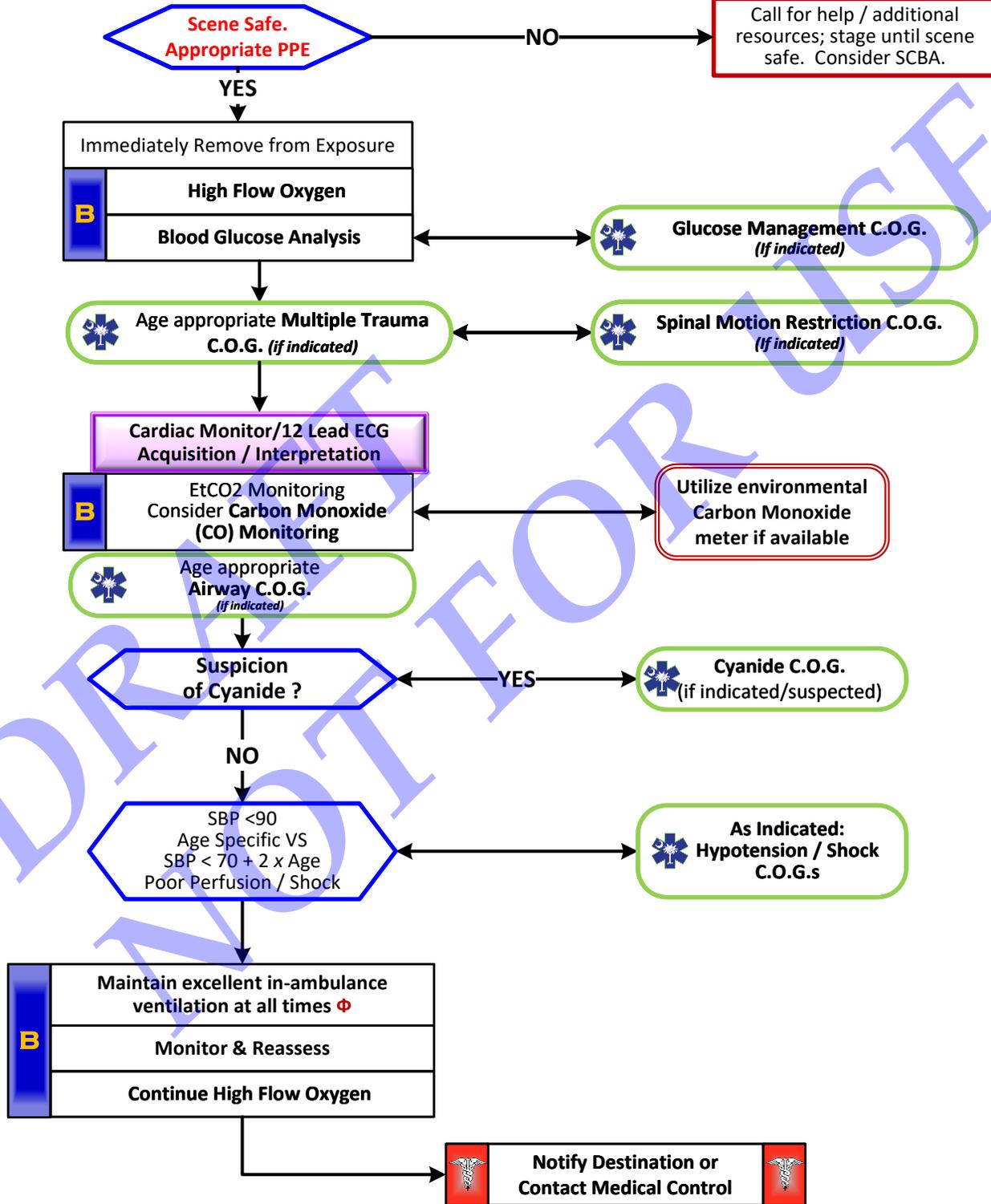
- Smoke inhalation
- Industrial exposure
- Trauma
- Reason: Suicide, criminal, accidental
- Past Medical History
- Time / Duration of exposure

Signs and Symptoms

- Headache
- AMS
- Seizures
- Dizziness
- Syncope
- Malaise, weakness, flu like illness
- Dyspnea
- Chest pain
- GI Symptoms; N/V; cramping
- Reddened skin

Differential

- Diabetic related
- Infection
- MI
- Anaphylaxis
- Renal failure / dialysis problem
- Head injury / trauma
- Co-ingestant or exposures
- Consider Carbon Moxoxide co-exposure with Cyanide





Carbon Monoxide/Smoke Exposure

Hyperbaric Oxygen Facilities

Dr. Robinson to locate and get phone numbers.

PEARLS

- **Recommended exam: Neuro, Skin, Heart, Lungs, Abdomen, Extremities**
- **Scene safety is priority.**
- **Don PPE and consider Self Contained Breathing Apparatus (SCBA) prior to entering contaminated area.**
- If there is some form of suicide signage, hoses, or buckets of substances visible as you arrive at the vehicle or residence, immediately retreat to well ventilated area and don self-contained breathing apparatus (SCBA) before opening the vehicle or making entry as these gases may be highly concentrated and potentially lethal to EMS responders
- Consider CO and Cyanide with any product of combustion
- Normal environmental Carbon Monoxide (CO) level does not exclude Carbon Monoxide (CO) poisoning.
- Symptoms present with lower Carbon Monoxide (CO) levels in pregnancy, children and the elderly.
- Continue high flow oxygen regardless of pulse ox readings.
- **Pulse Oximetry Readings may read FALSELY HIGH with Carbon Monoxide Poisoning**
- **KEY DOCUMENTATION ELEMENTS:**
 - Repeat evaluation and documentation of signs and symptoms. Patient's clinical condition may deteriorate rapidly.
 - Identification of possible etiology of poisoning
 - Time of exposure.
 - Environmental Carbon Monoxide (CO) detector reading/level – if available.
 - Evidence of soot or burns around the face, nares, or pharynx.
 - Signs & Symptoms of other patients encountered at the same location – if present.
 - Therapy and response to therapy.
 - Early and repeat assessment of patient's mental status and motor function for determination of response to therapy and need for hyperbaric oxygen therapy.
 - Early airway management/intervention in rapidly deteriorating patients.



Respiratory Irritants

History

- Onset and location / Exposure
- Time & Duration of Exposure
- Chronic Lung Disease
- Past medical history
- Medication history

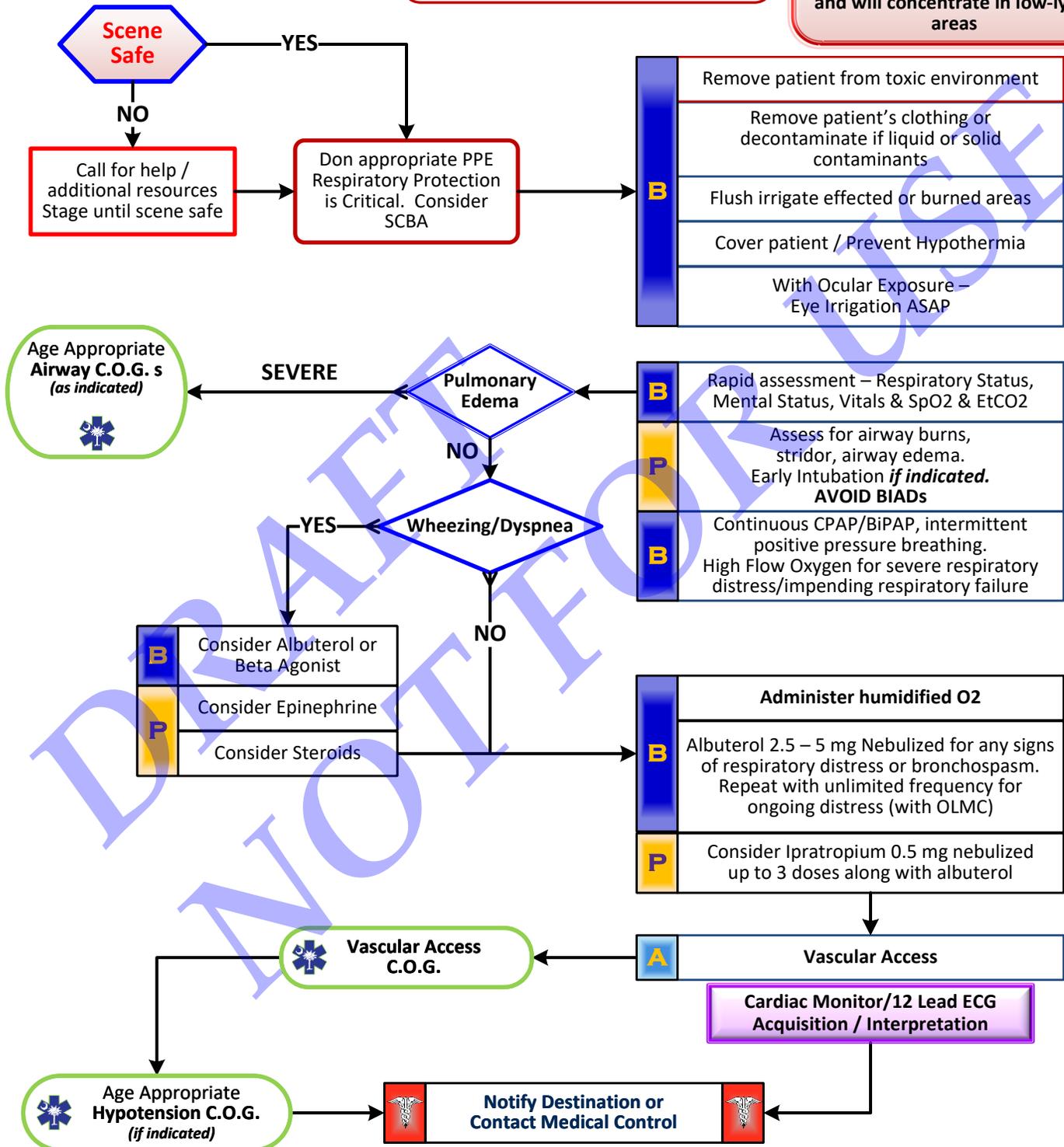
Signs and Symptoms

- Itching or hives
- Sneezing / Rhinorrhea
- Coughing / wheezing / Stridor
- Respiratory distress / Hypoxia
- Burning / Pain
- Chest Pain
- Chest or throat constriction / Voice Change
- Difficulty swallowing
- Edema

Differential

- **Environmental – Dusts / Powders**
- **Chemicals:**
 - Household / Industrial
 - Riot Control Agents
 - WMD
 - Inhalants of Abuse

BEWARE:
Many gases are heavier than air and will concentrate in low-lying areas



ENVIRONMENTAL / TOXIC



Respiratory Irritants

- **PEARLS**
- **Recommended Exam: Mental Status, Skin, Heart, Lungs, HEENT**
- **BEWARE: Many gases are heavier than air and will concentrate in low-lying areas**
- **Don PPE and consider Self Contained Breathing Apparatus (SCBA) prior to entering contaminated area.**
- If there is some form of suicide signage, hoses, or buckets of substances visible as you arrive at the vehicle or residence, immediately retreat to well ventilated area and don self-contained breathing apparatus (SCBA) before opening the vehicle or making entry as these gases may be highly concentrated and potentially lethal to EMS responders
- **Symptom Severity Classification:**
 - **Mild symptoms:**
 - Flushing, hives, itching, erythema with normal blood pressure and perfusion.
 - **Moderate symptoms:**
 - Flushing, hives, itching, erythema plus symptomatic respiratory (wheezing, dyspnea, hypoxia) or gastrointestinal symptoms (nausea, vomiting, abdominal pain) with normal blood pressure and perfusion.
 - **Severe symptoms:**
 - Flushing, hives, itching, erythema plus symptomatic respiratory (wheezing, dyspnea, hypoxia) or gastrointestinal symptoms (nausea, vomiting, abdominal pain) with hypotension and poor perfusion.
- **Patients with moderate and severe reactions should receive a 12 lead ECG and should be continually monitored, but this should NOT delay evacuation from potentially dangerous scene, decontamination, supplemental oxygen therapy.**
- Airway respiratory irritants can exacerbate underlying reactive airway diseases (e.g., asthma, chronic obstructive pulmonary disease (COPD)) and precipitate or exacerbate bronchospasm, respiratory distress, and hypoxia
- Patients may be off gassing (particularly hydrogen sulfide and hydrogen cyanide) in the back of the transport vehicle, it is important to have **EXCELLENT** through ventilation of the patient compartment
- Removal from the toxic environment, oxygen (humidified if available), general supportive therapy, bronchodilators, respiratory support, and rapid transport are core elements of care as there are no specific antidotes for any of these inhaled agents in the prehospital setting.
- Household bathroom, kitchen, and oven cleaners when mixed can generate various airway respiratory irritants (ammonia, chloramine, and chlorine gas releases are particularly common). A very common exposure is to chloramine, a gas liberated when bleach (hypochlorite) and ammonia are combined. Chloramine then hydrolyzes in the distal airways and alveoli to ammonia and hypochlorous acid
- **Suggested:** Patients who have ventricular arrhythmias after inhalant abuse should receive amiodarone or lidocaine rather than epinephrine. Amiodarone has been successfully used to treat butane-induced ventricular fibrillation. Patients who have inhaled halogenated hydrocarbons may develop ventricular arrhythmias in response to parenterally administered epinephrine or other catecholamines (e.g., norepinephrine) because these treatments can (theoretically) precipitate or worsen arrhythmias in the irritable myocardium.
- **KEY DOCUMENTATION ELEMENTS:**
 - Document key aspects of the exam to assess for a change after each intervention:
 - Respiratory rate
 - Oxygen saturation
 - Use of accessory muscles or tracheal tugging
 - Breath sounds
 - Air entry/stridor
 - Mental status
 - Color
 - Reduction of burning sensation in airway/pharynx
- **KEY PERFORMANCE MEASURES:**
 - Clinical improvement in patient and response to therapy
 - Survival rates of victims
 - Long term sequelae of the victims
 - No EMS clinicians injured while managing these incidents



Riot Control Agents

History

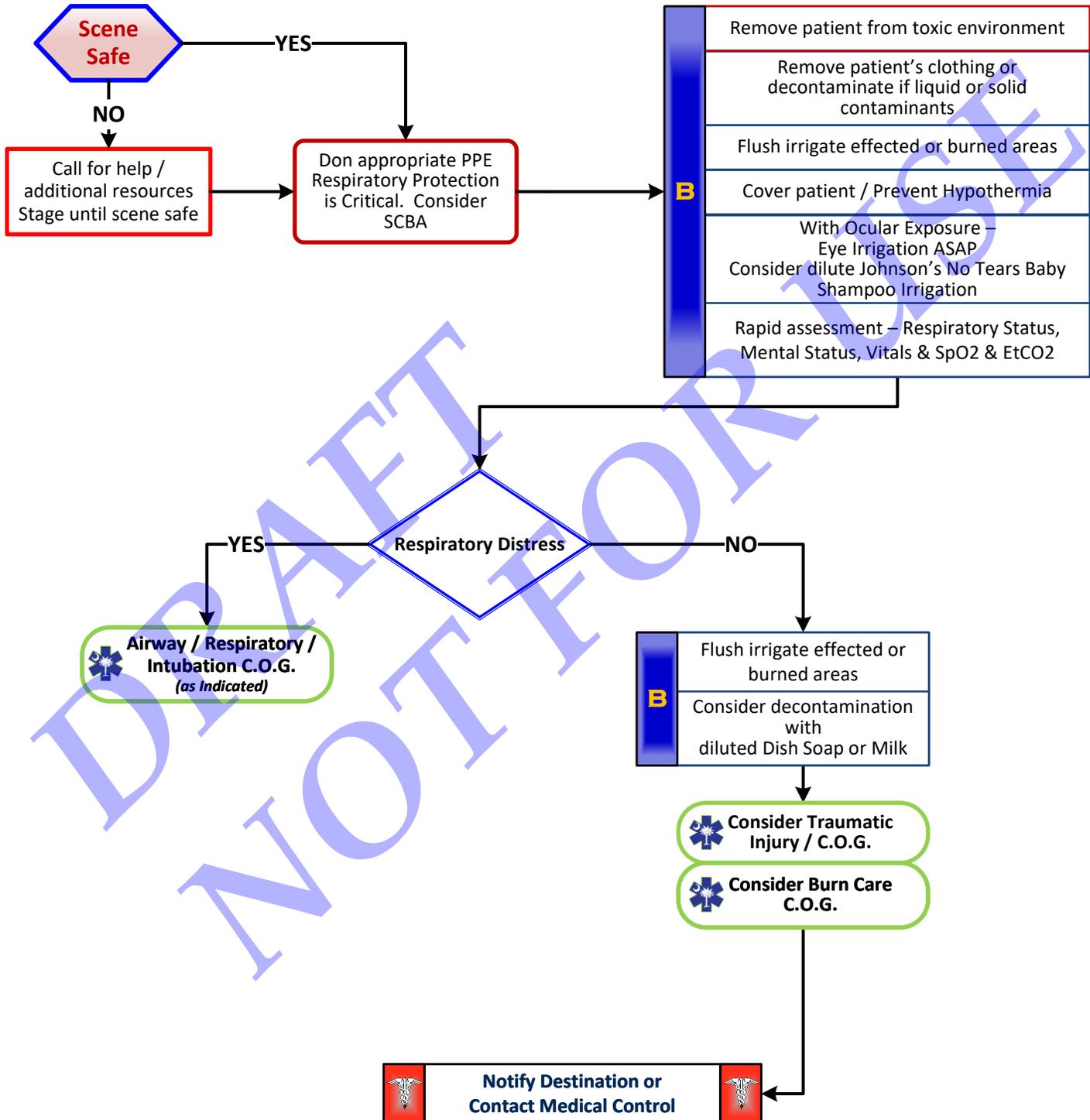
- Exposure
- PMH
- Decontamination

Signs and Symptoms

- Itching or hives
- Coughing / wheezing or stridor
- Respiratory distress / SOB
- Chest or throat constriction
- Chest Tightness / Cough
- Difficulty swallowing / Choking
- Lacrimation
- Pain / Burning

Differential

- Oleoresin Capsicum (OC)
- Mace (CN) (CS)



ENVIRONMENTAL / TOXIC



Riot Control Agents

ENVIRONMENTAL / TOXIC

- **PEARLS**
- **Recommended Exam: Mental Status, Skin, Heart, Lungs, HEENT**
- **BEWARE:** Many gases are heavier than air and will concentrate in low-lying areas
- **Don PPE and consider Self Contained Breathing Apparatus (SCBA) prior to entering contaminated area.**
- **Symptom Severity Classification:**
 - **Mild symptoms:**
 - Flushing, hives, itching, erythema with normal blood pressure and perfusion.
 - **Moderate symptoms:**
 - Flushing, hives, itching, erythema plus symptomatic respiratory (wheezing, dyspnea, hypoxia) or gastrointestinal symptoms (nausea, vomiting, abdominal pain) with normal blood pressure and perfusion.
 - **Severe symptoms:**
 - Flushing, hives, itching, erythema plus symptomatic respiratory (wheezing, dyspnea, hypoxia) or gastrointestinal symptoms (nausea, vomiting, abdominal pain) with hypotension and poor perfusion.
- **Patients with moderate and severe reactions should receive a 12 lead ECG and should be continually monitored, but this should NOT delay evacuation from potentially dangerous scene, decontamination, supplemental oxygen therapy.**
- Airway respiratory irritants can exacerbate underlying reactive airway diseases (e.g., asthma, chronic obstructive pulmonary disease (COPD)) and precipitate or exacerbate bronchospasm, respiratory distress, and hypoxia
- Patients may be off gassing (particularly hydrogen sulfide and hydrogen cyanide) in the back of the transport vehicle, it is important to have adequate ventilation of the patient compartment
- Removal from the toxic environment, oxygen (humidified if available), general supportive therapy, bronchodilators, respiratory support, and rapid transport are core elements of care as there are no specific antidotes for any of these inhaled agents in the prehospital setting.
- **KEY DOCUMENTATION ELEMENTS:**
 - Type of riot control agent if known
 - Symptoms being treated
 - Treatment provided
 - Response to treatment
- **KEY PERFORMANCE MEASURES:**
 - Riot control agent identified before making patient contact and providing treatment
 - PPE used by responders
 - Affected individuals removed from ongoing exposure
 - Contaminated clothing and contact lenses removed as able



Topical Chemical Burn

History

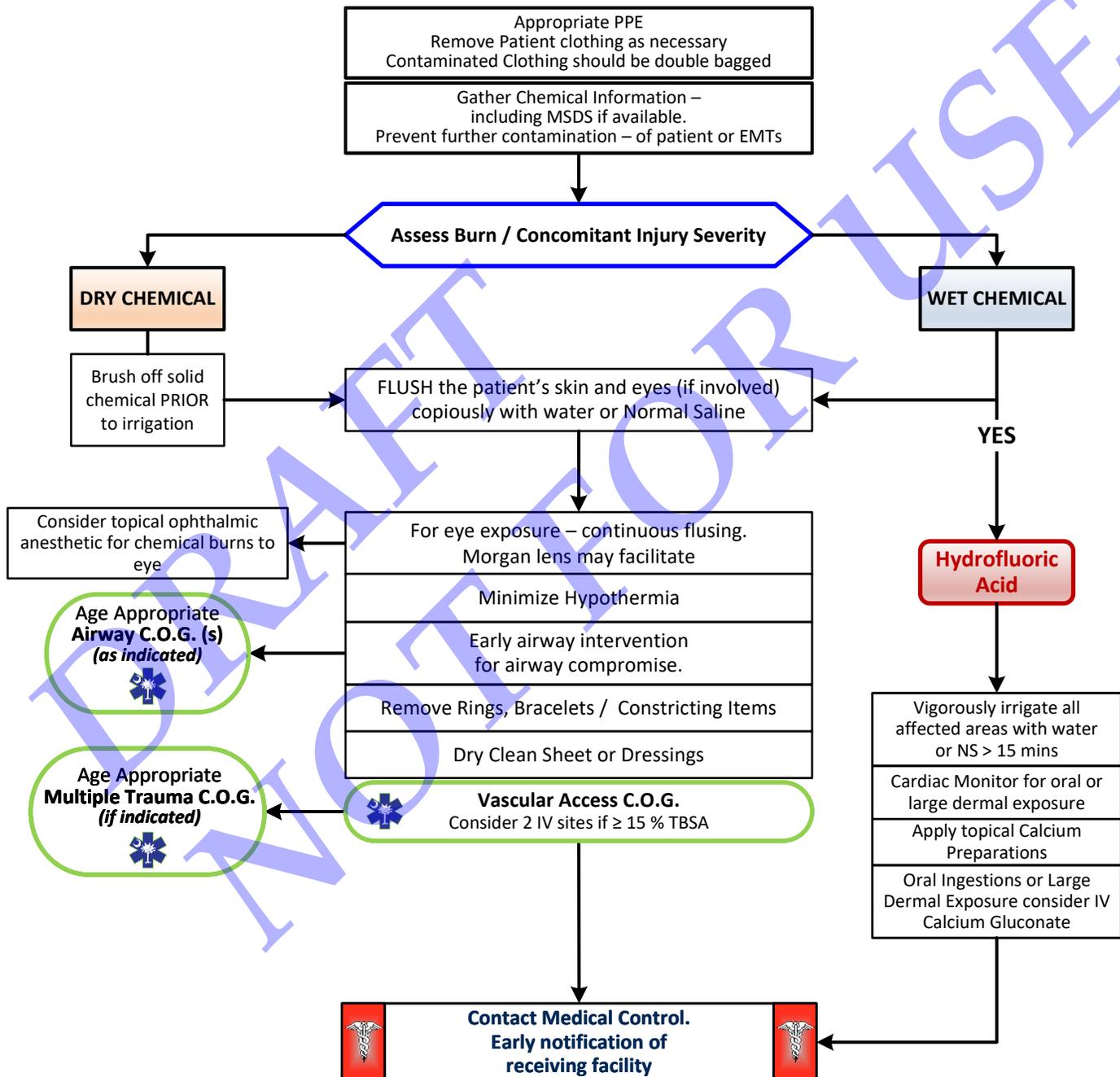
- Type of exposure (acid or alkali chemical)
- Concentration of chemical
- pH of chemical if available
- Inhalation injury
- Time of Injury
- Onset of Burn sensation
- Past medical history and Medications
- Other trauma
- Loss of Consciousness

Signs and Symptoms

- Burns, pain, swelling
- Dizziness
- Loss of consciousness
- Hypotension/shock
- Airway compromise/distress could be indicated by hoarseness/wheezing
- Careful evaluation of ocular and oropharyngeal exposure

Differential

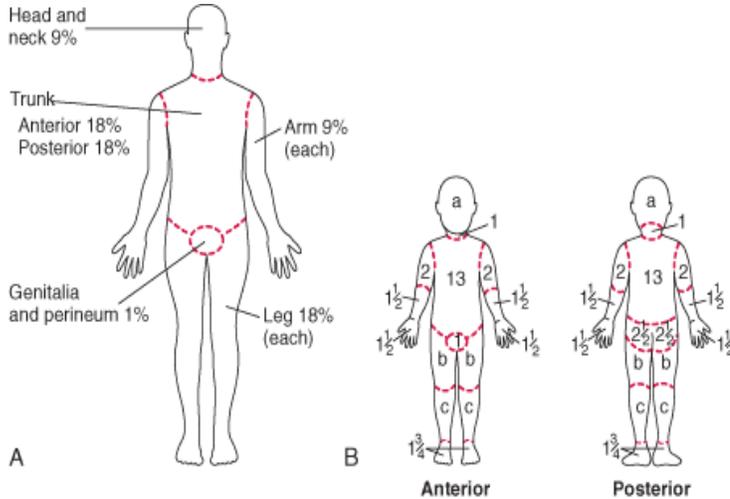
- Thermal / Chemical / Electrical Burn Injury
 - Superficial
 - ❖ (1st Degree) red – painful
 - ❖ (Don't include in TBSA)
 - Partial Thickness
 - ❖ (2nd Degree) blistering
 - Full Thickness
 - ❖ (3rd Degree) painless/charred or leathery skin
- Radiation injury
- Blast injury



ENVIRONMENTAL / TOXIC



Topical Chemical Burn



Relative percentage of body surface area (% BSA) affected by growth

Body Part	Age				
	0 yr	1 yr	5 yr	10 yr	15 yr
a = 1/2 of head	9 1/2	8 1/2	6 1/2	5 1/2	4 1/2
b = 1/2 of 1 thigh	2 3/4	3 1/4	4	4 1/4	4 1/2
c = 1/2 of 1 lower leg	2 1/2	2 1/2	2 3/4	3	3 1/4

Rule of Nines

- Rarely find a complete isolated body part that is injured as described in the Rule of Nines.
- More likely, it will be portions of one area, portions of another, and an approximation will be needed.
- For the purpose of determining the extent of serious injury, differentiate the area with minimal or 1st degree burn (superficial) from those of partial (2nd) or full (3rd) thickness burns.
- For the purpose of determining Total Body Surface Area (TBSA) of burn, include only Partial (2nd) and Full Thickness (3rd) burns. Report the observation of other superficial (1st degree) burns but do not include those burns in your TBSA estimate.
- Some texts will refer to 4th 5th and 6th degree burns. There is significant debate regarding the actual value of identifying a burn injury beyond that of the superficial, partial and full thickness burn at least at the level of emergent and primary care. For EMS work, all are included in Full Thickness burns

Estimate spotty areas of burn by using the size of the patient's palm as 1%

PEARLS

- **Recommended Exam: Mental Status, HEENT, Neck, Heart, Lungs, Abdomen, Extremities, Back, and Neuro**
- **Airway considerations:**
 - For systems performing RSI, Rocuronium is preferred agent (succinylcholine can be used in the first 24-hours)
 - Singed nasal hairs, facial burns, and/or carbonaceous sputum are not absolute indications for intubation in a burn patient.
 - Utilizing non-rebreather face mask as well as NIPPV procedure are acceptable as tolerated.
- **Critical or Serious Burns:**
 - > 5-15% total body surface area (TBSA) 2nd or 3rd degree burns
 - 3rd (full thickness) degree burns > 5% TBSA for any age group
 - Circumferential burns of extremities
 - Electrical or lightning injuries
 - Suspicion of abuse or neglect
 - Inhalation injury
 - Chemical burns
 - Burns of face, hands, perineum, or feet
 - Require direct transport to a Burn Center. Local facility should be utilized ONLY IF distance to Burn Center is excessive or critical interventions such as airway management are not available in the field.
- Burn patients are trauma patients, evaluate for multisystem trauma.
- Assure whatever has caused the burn is no longer contacting the injury. (Stop the burning process!)
- Circumferential burns to extremities are dangerous due to potential vascular compromise secondary to soft tissue swelling.
- Burn patients are prone to hypothermia - never apply ice or cool the burn, must maintain normal body temperature.
- Evaluate the possibility of geriatric abuse with burn injuries in the elderly.
- Never administer IM pain injections to a burn patient.
- If commercially manufactured calcium gluconate gel is not available, a topical calcium gluconate gel preparation can be made by combining 150 mL (5 ounces) of a sterile water-soluble gel (e.g., Surgilube® or KY® jelly) with one of the following:
 - 35 mL of calcium gluconate 10% solution
 - 10g of calcium gluconate tablets (e.g., Tums)
 - 3.5 g calcium gluconate powder or
 - If calcium gluconate is not available, 10 mL of calcium chloride 10% solution in 150 ml in sterile water-soluble gel (e.g., Surgilube® or KY' jelly)
- **KEY DOCUMENTATION ELEMENTS:**
 - Burn site
 - Body Surface Area Involved
 - Identification of Chemical, Chemical pH, and Chemical Concentration
 - Acquisition of and Transfer of MSDS, Chemical Container, or other pertinent substance information to receiving facility.



Electrical Burns

History

- Source of Exposure – Home AC, High Voltage (powerline), DC, etc.
- Time of Injury
- Past medical history /Medications
- Other trauma
- Loss of Consciousness

Signs and Symptoms

- Burns, pain, swelling
- Dizziness
- Loss of consciousness
- Hypotension/shock
- Airway compromise/distress could be indicated by hoarseness/wheezing / Hypotension

Differential

- Superficial (1st Degree) red - painful (Don't include in TBSA)
- Partial Thickness (2nd Degree) blistering
- Full Thickness (3rd Degree) painless/charred or leathery skin
- Thermal injury
- Chemical – Electrical injury
- Radiation injury
- Blast injury

Ensure Electrical Source is NO longer in contact with patient before touching patient.

STOP THE BURN !

**Assess Burn Type
Concomitant Injury Severity**

**ELECTRICAL
BURN**

B Remove metal objects

Consider Airway C.O.G

Consider Spinal Motion Restriction C.O.G.

Consider Trauma C.O.G.

**Cardiac Monitor/12 Lead ECG
Acquisition / Interpretation**

B Identify Contact Points

Consider Vascular Access C.O.G.

Consider Age Appropriate Pain Control C.O.G.

**B Cover burns with
Dry Sterile Dressings**

**Notify Destination or
Contact Medical Control**

When significant Trauma coexists in the Burn Patient – initial transport should be to a BURN Center ONLY if the BURN Center has an appropriate Trauma Designation.

IF the available burn center does not have the appropriate TRAUMA designation for the coexistent injuries, or the patient is unstable for the time required to arrive at the burn center, THEN transport should be to the nearest appropriate trauma center first

**Age Appropriate
Cardiac Arrest /
Pulseless Arrest /
Arrhythmia
C.O.G. (s)
(as indicated)**



ENVIRONMENTAL / TOXIC



Electrical Burns

Critical
(Red)

Serious
(Yellow)

Minor
(Green)

>15% TBSA 2nd/3rd Degree Burn
Burns with Multiple Trauma
Burns with definite airway
compromise

- ❖ Transport to a Burn Center when reasonable or reasonably accessible.
- ❖ Less than 30 minutes is a reasonable distance, at Service discretion for further distances.
- ❖ Pediatric patients should go to institution with BOTH a pediatric hospital and a BURN Center.
- ❖ If not accessible or patient unstable, transport to nearest Level 1 Trauma Center.

5-15% TBSA 2nd/3rd Degree Burn
requiring intubation for airway
stabilization

- ❖ Hypotension or GCS < 14
- ❖ Transport to a Burn Center when reasonable or reasonably accessible.
- ❖ Less than 30 minutes is a reasonable distance, at Service discretion for further distances.
- ❖ Pediatric patients should go to institution with BOTH a pediatric hospital and a BURN Center.
- ❖ If not accessible or patient unstable, transport to nearest Level 1 Trauma Center.

< 5% TBSA 2nd/3rd Degree Burn
Not Intubated,
Normotensive
GCS>14

- ❖ If within 30 minutes of a burn center by ground, transport directly to burn center.
- ❖ If further, transport to the Local Hospital

PEARLS

- **Recommended Exam: Mental Status, HEENT, Neck, Heart, Lungs, Abdomen, Extremities, Back, Neuro, Skin**
- **When Trauma coexists in the Burn Patient – initial transport to a verified Trauma Center based on the Trauma Triage and Bypass Protocol is warranted.**
- **Green, Yellow and Red In burn severity do not apply to the SALT / Start / JumpStart Triage System.**
- **Refer to Rule of Nines: Remember the extent of the obvious external burn from an electrical source, does not always reflect more extensive internal damage not seen.**
- **Bolus infusion of LR/NS (LR Preferred) if hypotensive.**
- **Electrical Burns:**
 - ❖ DO NOT contact patient until you are certain the source of the electrical shock is disconnected.
 - ❖ Attempt to locate contact points (generally there will be two or more.) A point where the patient contacted the source and a point(s) where the patient is grounded. Sites will generally be full thickness. **Do not refer to as entry and exit sites or wounds.**
 - ❖ Cardiac Monitor: Anticipate ventricular or atrial irregularity including VT, VF, atrial fibrillation and / or heart blocks.
 - ❖ Attempt to identify then nature of the electrical source (AC / DC,) the amount of voltage and the amperage the patient may have been exposed to during the electrical shock.
 - ❖ For high voltage injuries (> 1000 v) maintain spinal motion restriction precautions and assume traumatic injuries are present until proven otherwise. Consider same for medium voltage (400 – 1000 v) injuries as well.
- IV Fluids: Run LR at 4 mL/Kg per % TBSA. Only bolus if hypotensive.
- **KEY DOCUMENTATION ELEMENTS:**
 - Characteristics of electrical current (if able to be determined):
 - AC / DC
 - Voltage / Amperage
 - Down Time if found in Cardiac Arrest
 - Positioning of the patient with respect to the electrical source
 - Accurate description of external injuries
 - Document presence or absence of associated trauma
 - Documentation of Cardiac Rhythm and EKG Strips



Radiation Incident

History

- Type of exposure (Inhaled, splashed, solid radiation source, etc.)
- Time of Injury
- Past medical history /Medications
- Other trauma
- Loss of Consciousness
- Tetanus/Immunization status

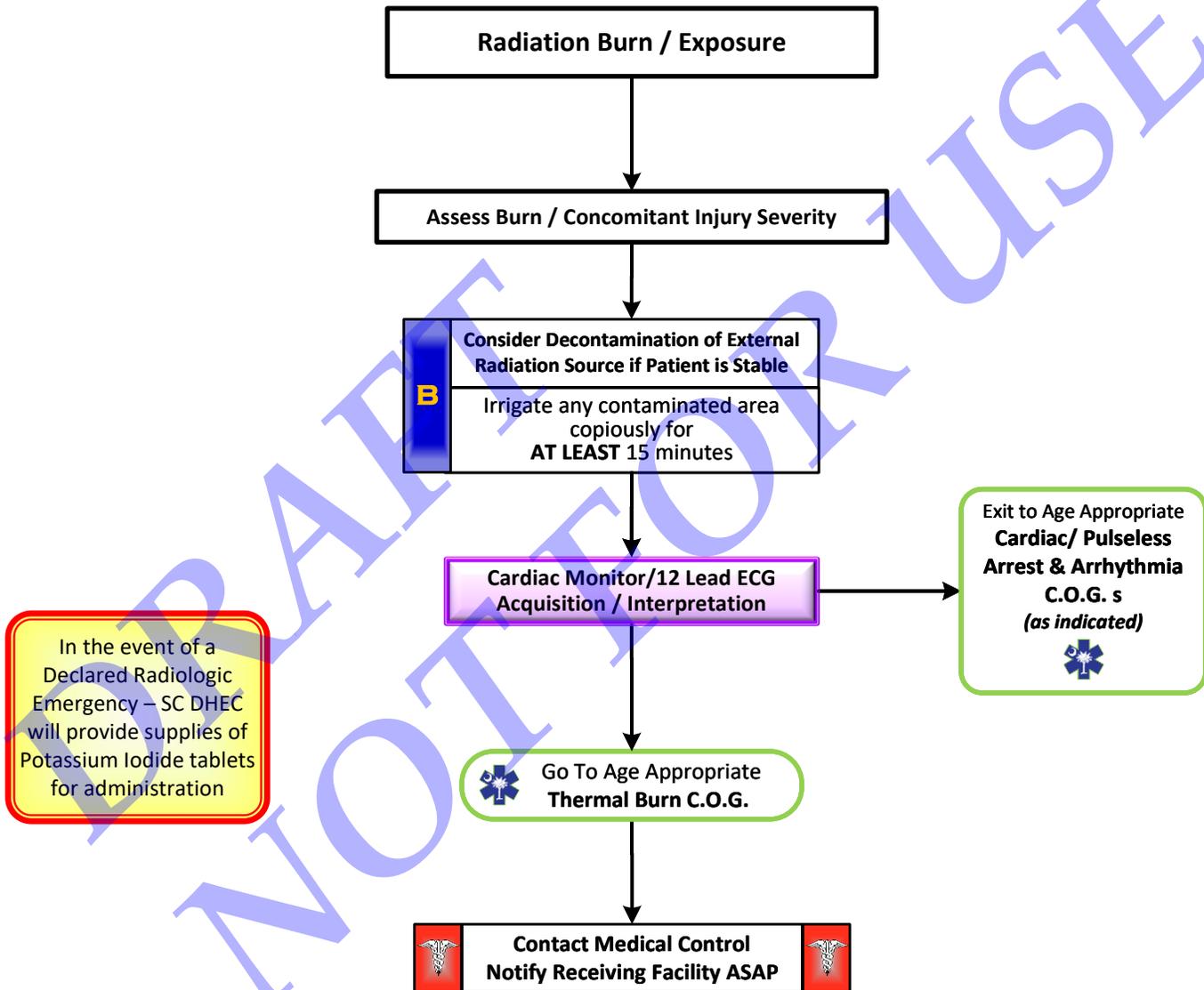
Signs and Symptoms

- Burns, pain, swelling
- Dizziness
- Loss of consciousness
- Hypotension/shock
- Airway compromise/distress could be indicated by hoarseness/wheezing / Hypotension

Differential

- Superficial (1st Degree) red - painful (Don't include in TBSA)
- Partial Thickness (2nd Degree) blistering
- Full Thickness (3rd Degree) painless/charred or leathery skin
- Thermal injury
- Chemical – Electrical injury
- Radiation injury
- Blast injury

Scene Safety / Quantify and Triage Patients / Load and Go with Assessment / Treatment Enroute



ENVIRONMENTAL / TOXIC

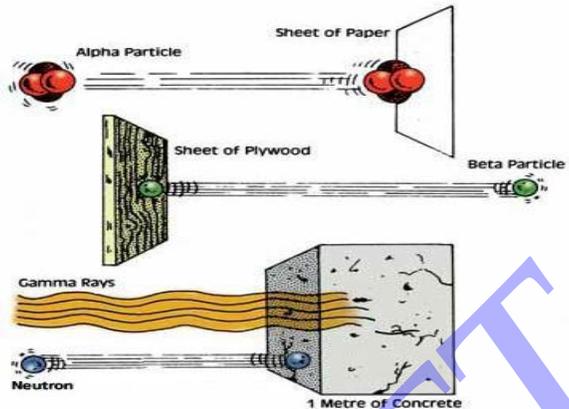
Collateral Injury: Most all injuries immediately seen will be a result of collateral injury, such as heat from the blast, trauma from concussion, treat collateral injury based on typical care for the type of injury displayed.

Qualify: Determine exposure type; external irradiation, external contamination with radioactive material, internal contamination with radioactive material.

Quantify: Determine exposure (generally measured in Grays/Gy). Information may be available from those on site who have monitoring equipment, do not delay transport to acquire this information.



Radiation Incident



Time Phases of Radiation Injury
(Exposure Dose vs Clinical Outcome)

Exposure Dose (Gy)	Prodrome Severity	Manifest Illness - Symptom Severity			Prognosis
		Hematologic	Gastrointestinal	Neurologic	
0.5 to 1.0	+	+	0	0	Survival almost certain
1.0 to 2.0	+ / +++	+	0	0	Survival >90 percent
2.0 to 3.5	++	++	0	0	Probable survival
3.5 to 5.5	+++	+++	+	0	Death in 50% at 3.5 to 6 wks
5.5 to 7.5	+++	+++	++	0	Death probable in 2-3 wks
7.5 to 10	+++	+++	+++	0*	Death probable in 1-2.5 wks
10 to 20	+++	+++	+++	+++	Death certain in 5-12 days
> 20	+++	+++	+++	+++**	Death certain in 2-5 days

Abbreviations: Gy: dose in Grey; 0: no effects; +: mild; ++: moderate; +++: severe or marked
 * Hypotension
 ** Also cardiovascular collapse, fever, shock
 Modified from: Waselenko, JK, MacVittie, TJ, Blakely, WF, et al. Medical management of the acute radiation syndrome: Recommendations of the strategic national stockpile radiation working group. Ann Int Med 2004; 140:1039.

Effects of Radiation by System and Severity

Symptom / Sign	Degree 1	Degree 2	Degree 3	Degree 4
CONSTITUTIONAL				
Fatigue	Able to Work	Work Impaired	Assistance for ADLs	Cannot do ADLs
Temperature	< 38 °C (<100.4 °F)	38-40 °C (100.4-104 °F)	>40 °C for < 24 hours	>40 °C for > 24 hours
B/P	>100/70	<100 / 70	<90/60	<80 Systolic
CUTANEOUS				
Erythema	Minimal, Transient	Moderate < 10% BSA	Marked 10-40% BSA	Severe > 40% BSA
Sensation/Itching	Pruritus	Slight, intermittent. pain	Moderate persistent pain	Severe Persistent Pain
Blistering	Rare	Rare Hemorrhage	Bullae	Bullae Hemorrhage
Desquamation	Absent	Patchy, Dry	Patchy, Moist	Confluent, Moist
Ulcer/Necrosis	Epidermal Only	Dermal	Subcutaneous	Muscle or Bone
Onycholysis	Absent	Partial	Partial	Complete
GASTROINTESTINAL				
Nausea	Mild	Moderate	Intense	Excruciating
Vomiting	Once/day	2-5 times/day	6-10 times/day	>10 times/day
Anorexia	Able to eat	Decreased Intake	Minimal Intake	Parenteral Nutrition
Stool (Number/day)	2-3	4-6	7-9	>10
Stool (Consistency)	Bulky	Loose	Loose	Watery
GI Bleeding	Occult	Intermittent	Persistent	Persistent/Large Amount
Abdominal Cramps/Pain	Minimal	Moderate	Intense	Excruciating
CEREBROVASCULAR				
Headache	Minimal	Moderate	Intense	Excruciating
Neurologic Deficits	Barely Detected	Easily Detected	Prominent	Life-Threatening – LOC
Cognitive Deficits	Minor	Moderate	Major Impairment	Complete Impairment

ENVIRONMENTAL / TOXIC



Radiation Incident

PEARLS

- Dealing with a patient with a radiation exposure can be a frightening experience. Do not ignore the ABC's, a dead but decontaminated patient is not a good outcome. Refer to the Decontamination Procedure for more information.
- Normal Saline or Sterile Water is preferred, however if not available, do not delay irrigation using tap water. Other water sources may be used based on availability. Flush the area as soon as possible with the cleanest readily available water or saline solution using copious amounts of fluids.
- Maintain as much distance and shielding from source as possible.
- Wrap patient in clean linen to avoid particulate contamination of receiving facility
- Cover all open wounds to reduce internal contamination/exposure.
- **Three methods of exposure:**
 - External irradiation
 - External contamination
 - Internal contamination
- **Two classes of radiation:**
 - Ionizing radiation (greater energy) is the most dangerous and is generally in one of three states: Alpha Particles, Beta Particles and Gamma Rays.
 - Non-ionizing (lower energy) examples include microwaves, radios, lasers and visible light.
- Radiation burns with early presentation are unlikely, it is more likely this is a combination event with either thermal or chemical burn being present as well as a radiation exposure. Where the burn is from a radiation source, it indicates the patient has been exposed to a significant source, (> 250 rem).
- Patients experiencing radiation poisoning are not contagious. Cross contamination is only a threat with external and internal contamination.
- Typical ionizing radiation sources in the civilian setting include soil density probes used with roadway builders and medical uses such as x-ray sources as well as radiation therapy. Sources used in the production of nuclear energy and spent fuel are rarely exposure threats as is military sources used in weaponry. Nevertheless, these sources are generally highly radioactive and in the unlikely event they are the source, consequences could be significant and the patient's outcome could be grave.
- **The three primary methods of protection from radiation sources:**
 - Limiting time of exposure
 - Distance from the source
 - Shielding from the source
- **Dirty bombs:** Ingredients generally include previously used radioactive material combined with a conventional explosive device to spread and distribute the contaminated material.
- Refer to Decontamination Procedure / WMD / Nerve Agent Protocol for dirty contamination events.
- If there is a time lag between the time of exposure and the encounter with EMS, key clinical symptom evaluation includes: Nausea/ Vomiting, hypothermia/hyperthermia, diarrhea, neurological/cognitive deficits, headache and hypotension.
- This event may require an activation of the National Radiation Injury Treatment Network.
- **KEY DOCUMENTATION ELEMENTS:**
 - Duration of exposure to the radioactive source or environment
 - Distance (if able to be determined) from the radioactive source (if known)
 - Source of radiation (if known)
 - Scene Measurement of radioactivity
 - Time of onset of vomiting
 - Use of dosimetry by EMS Clinicians and use of appropriate PPE



Conducted Electrical Device (TASER®)

History

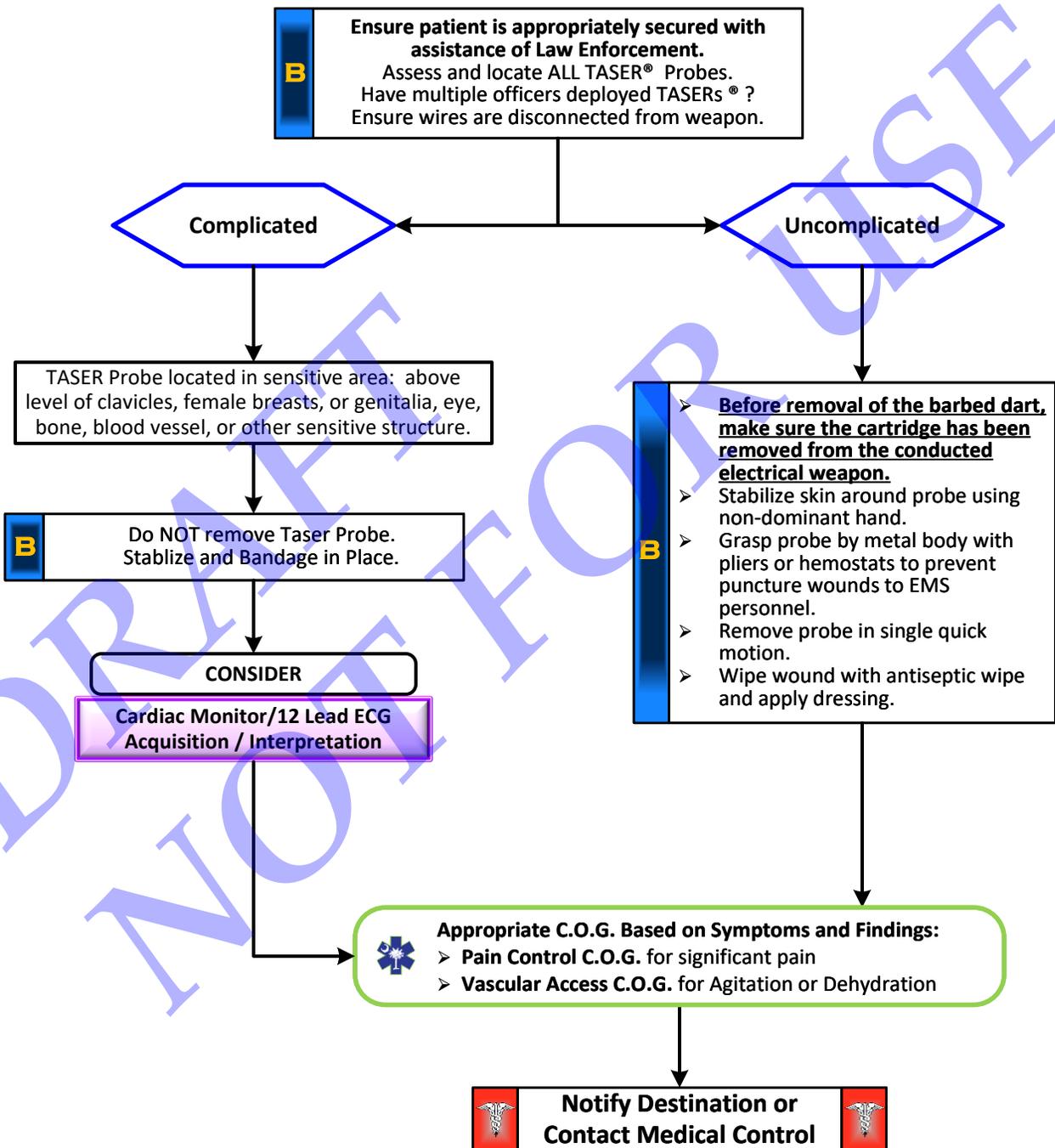
- Evaluate underlying issue that led to deployment of TASER
- Comprehensive evaluation for hypoglycemia, head injury, medication reaction

Signs and Symptoms

- Agitation
- Muscle Spasm
- Injury to head (from fall)
- Elevated Temperature
- Hallucinations / Behavioral Illness

Differential

- Hypoglycemia
- Toxic / Adverse Drug Reaction
- Concomitant Alcohol/Drug Intoxication
- Head Injury
- Sepsis
- Behavioral Illness



ENVIRONMENTAL / TOXIC



Conducted Electrical Device (TASER®)

ENVIRONMENTAL / TOXIC

DRAFT FOR USE

PEARLS

- **Recommended Exam: Mental Status, Skin, Extremities (Location of injury), and a complete Neck, Lung, Heart, Abdomen, Back, and Neuro exam if systemic effects are noted**
- Where darts have penetrated or are adjacent to sensitive and/or high risk areas, such as the eyes, ears, nose, mouth, face, neck, genitalia, spine, hands, feet or joints, the dart should be stabilized and bandaged in situ.
- A patient with a pacemaker should undergo pacemaker assessment. That is, a pacemaker 'interrogation' should be performed by the Pacemaker technicians.
- The potential effects of TASER® discharge on the fetus are unknown, and pregnant women should be transported to the Emergency Department.
- **Before removal of the barbed dart, make sure the cartridge has been removed from the conducted electrical weapon.**
- Pre-existing injuries and toxic conditions leading to the patient being tasered are the most important problems requiring medical treatment after Taser use. Be vigilant for alcohol/drug intoxication; head injury; hypoglycemia; metabolic acidosis.
- EMS clinicians who respond for a conducted electrical weapon patient **should not** perform a "medical clearance" for law enforcement to then take the patient to a non medical facility.
- Law Enforcement should accompany any patient who has been "tasered" and/or requires physical restraints.
- **KEY DOCUMENTATION ELEMENTS:**
 - Vital Signs
 - If darts removed, document the removal location in the patient care report.
 - Physical exam and Trauma Findings
 - Cardiac rhythm and changes
 - Neurologic status assessment findings



Bites and Envenomations

History

- Type of bite / sting
- Description or bring creature / photo with patient for identification
- Time, location, size of bite / sting
- Previous reaction to bite / sting
- Domestic vs. Wild
- Tetanus and Rabies risk
- Immunocompromised patient

Signs and Symptoms

- Rash, skin break, wound
- Pain, soft tissue swelling, redness
- Blood oozing from the bite wound
- Evidence of infection
- Shortness of breath, wheezing
- Allergic reaction, hives, itching
- Hypotension or shock

Differential

- Animal bite
- Human bite
- Snake bite (poisonous)
- Spider bite (poisonous)
- Insect sting / bite (bee, wasp, ant, tick)
- Infection risk
- Rabies risk
- Tetanus risk

South Carolina Poison Control Center
(803) 765-7359
(800) 222-1222

B Hemorrhage Control Procedure
(if indicated)

CONSIDER

Cardiac Monitor/12 Lead ECG
Acquisition / Interpretation

Position patient in position of comfort
Remove any constricting clothing/bands/jewelry
Mark margins of swelling/redness & note time
Immobilize area or limb
Ice/Cold application for insect sting/bite with pain/swelling

Appropriate C.O.G. Based on Symptoms and Findings:

- Pain Control C.O.G.
- Vascular Access C.O.G.
- Allergic Reaction C.O.G.
- Trauma C.O.G.
- Hypotension / Shock C.O.G.
- Extremity Trauma C.O.G.

Identification

Spider Bite / Bee or Wasp Sting

B	Keep bitten area at level of heart <i>if able</i>
	Apply Ice Packs
P	Muscle Spasm Consider Benzodiazepine

Snake Bite

B	Keep bitten area at level of heart <i>if able</i> . Do NOT Elevate Remove any constricting clothing / bands
B	DO NOT apply ICE. Do NOT apply tourniquet or constricting bands. Do NOT Incise bite marks. Do NOT Suction bite marks.
	Mark Margin of Swelling / Redness and Time
	Monitor and Reassess

Mammal Bite

Transport

NO

Animal Bites:
Document contact with Animal Control Officer.
If patient not transported Document patient advised to follow up for medical care and possible rabies prophylaxis
(if indicated)

YES

Notify Destination or Contact Medical Control

ENVIRONMENTAL / TOXIC



Bites and Envenomations

PEARLS

- **Recommended Exam: Mental Status, Skin, Extremities (Location of injury), and a complete Neck, Lung, Heart, Abdomen, Back, and Neuro exam if systemic effects are noted**
- **Do not put responders in danger attempting to capture and animal or insect for identification purposes.**
- **Human bites:**
 - Human bites have higher infection rates than animal bites due to normal mouth bacteria.
- **Dog / Cat / Carnivore bites:**
 - Carnivore bites are much more likely to become infected and all have risk of Rabies exposure.
 - Cat bites may progress to infection rapidly due to a specific bacteria (Pasteurella multocida).
- **Snake bites:**
 - Poisonous snakes in this area are generally of the pit viper family: rattlesnake, water moccasin, and copperhead.
 - Coral snake bites are rare: Very little pain but very toxic. "Red on yellow - kill a fellow, red on black - venom lack."
 - Amount of envenomation is variable, generally worse with larger snakes and early in spring.
- **Spider bites:**
 - Black Widow spider bites tend to be minimally painful, but over a few hours, muscular pain and severe abdominal pain may develop (spider is black with red hourglass on belly).
 - Brown Recluse spider bites are minimally painful to painless. Little reaction is noted initially but tissue necrosis at the site of the bite develops over the next few days (brown spider with fiddle shape on back).
- Evidence of infection: swelling, redness, drainage, fever, red streaks proximal to wound.
- Immunocompromised patients are at an increased risk for infection: diabetes, chemotherapy, transplant patients.
- Consider contacting the South Carolina Poison Control Center for guidance (1-800-222-1222).
- Do NOT apply Tourniquet for envenomations.
- Do NOT Incise Bite wounds
- Do NOT apply suction to bite wounds.
- **For patients refusing transport following wild mammal bites – ENCOURAGE medical follow up ASAP for consideration of rabies prophylaxis**
 - Document recommendation for Medical Follow Up. Try to get witness signatures for recommendation.
 - Notify Animal Control
- **KEY DOCUMENTATION ELEMENTS:**
 - Accurate description of the suspected bite source
 - Repeat evaluation and documentation of signs and symptoms as patient clinical condition may rapidly deteriorate.
 - Time of symptoms onset and time of initiation of exposure specific treatments
 - Vital Signs (repeated measurements)
 - Therapy and response to therapy.



Bites and Envenomations



Brown Recluse Spider

Black Widow Spider



Eastern Diamondback Rattlesnake



Timber Rattlesnake

Pygmy Rattlesnake



Coral Snake - POISONOUS

Scarlet King Snake – NON-Poisonous

Copperhead Snake



Cottonmouth Water Moccasin

ENVIRONMENTAL / TOXIC



Marine Envenomations / Injury

History

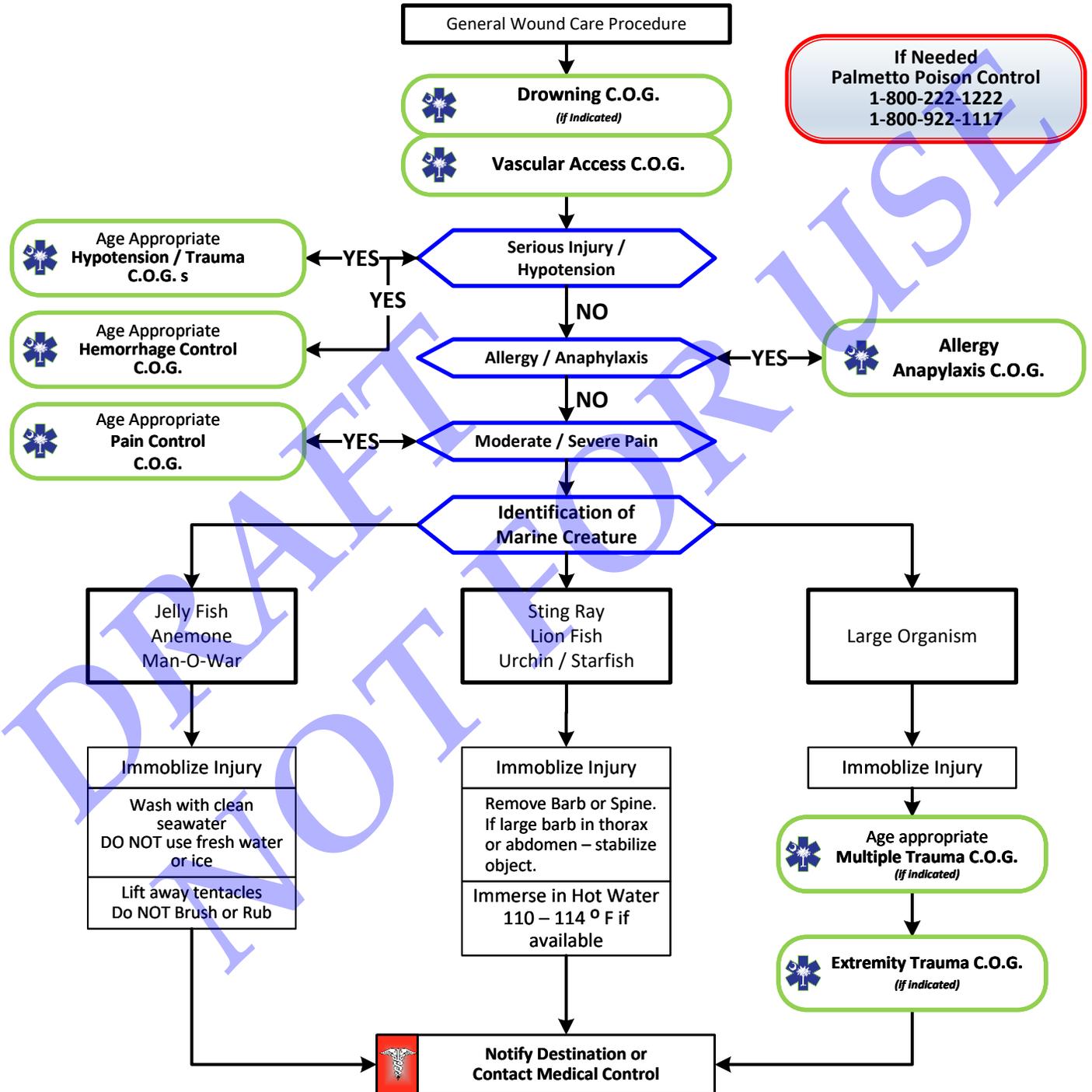
- Type of bite / sting
- Identification of organism
- Previous reaction to marine organism
- Immunocompromised
- Household pets (i.e. marine)

Signs and Symptoms

- Intense localized pain
- Increased oral secretions
- Nausea / vomiting
- Abdominal cramping
- Allergic reaction / anaphylaxis

Differential

- Jellyfish sting
- Sea Urchin sting
- Sting ray barb
- Coral sting
- Swimmers itch
- Cone Shell sting
- Fish bite
- Lion Fish sting



ENVIRONMENTAL / TOXIC



Marine Envenomations / Injury



Anemone



Jellyfish



Man of War



Stingray



Lion Fish

KEY DOCUMENTATION ELEMENTS:

- Accurately describe the suspect bite or sting source – without risking patient or EMS personnel
- Only transport source animal/insect if it can be done safely in a hard sided container
- Repeat evaluation and documentation of signs and symptoms. Patient clinical condition may deteriorate rapidly
- Time of symptom onset and time of initiation of exposure specific treatments
- Therapy and response to Therapy

PEARLS

- **Ensure your safety: Avoid the organism or fragments of the organism as they may impart further sting / injury.**
- **Priority is removal of patient from water (safely) to prevent drowning.**
- Patients can suffer cardiovascular collapse from both the venom and / or anaphylaxis even in seemingly minor envenomations.
- Ensure good wound care, immobilization and pain control.
- Sea creature bites and stings produce moderate to severe pain.
- **Coral:**
 - Coral is covered by various living organisms which are easily dislodged from the structure.
 - Victim may swim into coral causing small cuts and abrasions and the coral may enter cuts causing little if any symptoms initially.
 - The next 24 – 48 hours may reveal an inflammatory reaction with swelling, redness, itching, tenderness and ulceration
 - Treatment is flushing with large amounts of fresh water or soapy water then repeating
- **Jelly Fish / Anemone / Man-O-War:**
 - Wash the area with fresh seawater to remove tentacles and nematocysts.
 - Do not apply fresh water or ice as this will cause nematocysts firing as well.
 - Recent evidence does not demonstrate a clear choice of any solution that neutralizes nematocysts.
 - 50:50 mixture of Baking Soda and Seawater, and even meat tenderizer may have similar effects.
 - Immersion in warm water for 20 minutes, 110 – 114°F (43 - 46°C), has recently been shown to be effective in pain control.
 - Shaving cream may be useful in removing the tentacles and nematocysts with a sharp edge (card).
 - Stimulation of the nematocysts by pressure or rubbing cause the nematocyst to fire even if detached from the jellyfish.
 - Lift away tentacles as scraping or rubbing will cause nematocysts firing.
 - Typically symptoms are immediate stinging sensation on contact, intensity increases over 10 minutes.
 - Redness and itching usually occur.
 - Papules, vesicles and pustules may be noted and ulcers may form on the skin.
 - Increased oral secretions and gastrointestinal cramping, nausea, pain or vomiting may occur.
 - Muscle spasm, respiratory and cardiovascular collapse may follow.
- **Lionfish:**
 - This may occur in the home as they are often kept as pets in saltwater aquariums.
 - Remove any obvious protruding spines and irrigate area with copious amounts of saline.
 - The venom is heat labile so immersion in hot water, 110 – 114°F (43 - 46°C) for 30 to 90 minutes is the treatment of choice but do not delay transport if indicated.
- **Stingrays:**
 - Typical injury is swimmer stepping on ray and muscular tail drives 1 – 4 barbs into victim.
 - Venom released when barb is broken.
 - Typical symptoms are immediate pain which increases over 1 – 2 hours. Bleeding may be profuse due to deep puncture wound.
 - Nausea, vomiting, diarrhea, muscle cramping and increased urination and salivation may occur.
 - Seizures, hypotension and respiratory or cardiovascular collapse may occur.
 - Irrigate wound with saline. Extract the spine or barb unless in the abdomen or thorax, contact medical control for advise.
 - Immersion in hot water if available for 30 to 90 minutes but do not delay transport.



Hyperthermia

History

- Age – Extremes of age more susceptible
- Exposure to increased temperatures and / or humidity
- Past medical history / medications
- Extreme exertion
- Time and length of exposure
- Poor PO intake
- Fatigue and / or muscle cramping
- EtOH / Illicit Drug Use

Signs and Symptoms

- Altered mental status or unconsciousness
- Hot, dry or sweaty skin
- Hypotension or shock
- Seizures
- Nausea

Differential

- Fever (Infection)
- Dehydration
- Medications/Drugs
- Hyperthyroidism (Storm)
- Delirium tremens (DT's)
- Heat cramps
- Heat exhaustion
- Heat stroke
- CNS lesions or tumors

Degrees Fahrenheit	Degrees Centigrade(Celsius)
98.6	37.00
99	37.22
100	37.78
101	38.33
102	38.89
103	39.44
104	40.00
105	40.56
106	41.11
107	41.67
108	42.22
109	42.78
110	43.33
212	100.00

B Temperature Measurement Procedure (if available)
Temperature Measurement should NOT delay treatment of Hyperthermia

B Remove from heat source to cool environment
Passive cooling measures
Remove clothing
Active Cooling Measures
Target Temp < 102.5°F
Blood Glucose Analysis

Glucose Management C.O.G. (If Indicated)

Assess Symptom Severity

HEAT CRAMPS
Normal to elevated body temperature
Warm, moist skin
Weakness, Muscle cramping

HEAT EXHAUSTION
Elevated body temperature
Cool, moist skin
Weakness, Anxious, Tachypnea

HEAT STROKE
Body temperature, usually > 105°F
Hot, dry skin
Hypotension, AMS / Coma

B PO Fluids as tolerated
Monitor and Reassess

Cardiac Monitor/12 Lead ECG Acquisition / Interpretation

Vascular Access C.O.G. (as indicated)

Poor Perfusion / Hypoperfusion

YES
Hypotension C.O.G. (as indicated)

NO
Monitor and Reassess

Airway C.O.G. (as indicated)

Altered Mental Status C.O.G. (as indicated)

Seizure C.O.G. (as indicated)

For aggressive active cooling consider use of a large vinyl/rubber bag (e.g Body Bag) to cocoon the patient in ice

Notify Destination or Contact Medical Control

ENVIRONMENTAL / TOXIC



Hyperthermia

PEARLS

- **Recommended Exam: Mental Status, Skin, HEENT, Heart, Lungs, Neuro**
- **Extremes of age are more prone to heat emergencies (i.e. young and old). Obtain and document patient temperature if able.**
- Predisposed by use of: tricyclic antidepressants, phenothiazines, anticholinergic medications, antipsychotics, synthetic cannabinoids, and excessive alcohol.
- Cocaine, Amphetamines, and Salicylates may elevate body temperatures.
- Sweating generally disappears as body temperature rises above 105° F (40° C).
- Intense shivering may occur as patient is cooled.
- **Heat Cramps** consists of benign muscle cramping secondary to dehydration and is not associated with an elevated temperature.
- **Heat Exhaustion** consists of dehydration, salt depletion, dizziness, fever, mental status changes, headache, cramping, nausea and vomiting. Vital signs usually consist of tachycardia, hypotension, and an elevated temperature.
- **Heat Stroke** consists of dehydration, tachycardia, hypotension, temperature >104° F (40° C), and an altered mental status.
 - **Exertional Heat Stroke:**
 - In exertional heat stroke (athletes, hard labor), the patient may have sweated profusely and be wet on exam.
 - **Rapid cooling takes precedence over transport as early cooling decreases morbidity and mortality.**
 - If available, immerse in an ice water bath for 5 – 10 minutes. Monitor rectal temperature and remove patient when temperature reaches 102.5°F (39°C). Your goal is to decrease rectal temperature below 104°F (40°C) with target of 102.5°F (39°C) within 30 minutes. Stirring the water aids in cooling.
 - Other methods include cold wet towels below and above the body or spraying cold water over body continuously.
 - For aggressive active cooling consider the use of a large rubber/vinyl bag (e.g. BodyBag or similar) to cocoon the patient in ice (i.e. ice under, around, and over the patient)
- **Neuroleptic Malignant Syndrome (NMS):**
 - Neuroleptic Malignant Syndrome is a hyperthermic emergency which is not related to heat exposure.
 - It occurs after taking neuroleptic antipsychotic medications. This may occur at anytime while the patient is taking the medication and is unrelated to the duration of treatment.
 - This is a rare but often lethal syndrome characterized by muscular rigidity, AMS, tachycardia and hyperthermia.
 - **Drugs Associated with Neuroleptic Malignant Syndrome:**
 - Prochlorperazine (Compazine), promethazine (Phenergan), clozapine (Clozaril), and risperidone (Risperdal) metoclopramide (Reglan), amoxapine (Ascendin), and lithium. Potent typical neuroleptics such as haloperidol, fluphenazine, chlorpromazine, trifluoperazine, and prochlorperazine have been most frequently associated with NMS and thought to confer the greatest risk.
 - **Management of NMS:**
 - Supportive care with attention to hypotension and volume depletion.
 - Use benzodiazepines such as diazepam or midazolam for seizures and / or muscular rigidity.
- **Rapid cooling takes precedence over transport as early cooling decreased morbidity and mortality. Goal temperature is between 100.4 - 102.5 degF.**
- **ACTIVE Cooling includes EVAPORATIVE Cooling as well as placement of Ice Packs in the groin, axillae, and on the head.**
- **KEY DOCUMENTATION ELEMENTS:**
 - Patient assessment including:
 - All types of medications and / or drug use
 - Detailed Past Medical History
 - Environmental assessment performed. (With Ambient Temperature)
 - Cooling interventions considered and implemented
 - Decision making regarding monitoring ABCs (Airway, Breathing, Circulation)
 - Vital Signs – with Core Temperature
- **KEY PERFORMANCE MEASURES:**
 - Blood Glucose Level Obtained
 - Fluids given for hypotension
 - Attempts to reduce Core Temperature
 - Time from arrival at scene to when active cooling is started



Hypothermia

History

- Past medical history / medications
- Exposure to environment even in normal temperatures
- Exposure to extreme cold
- Extremes of age, very young & old
- Drug use: alcohol, barbituates
- Infections / Sepsis
- Length of exposure / wind chill

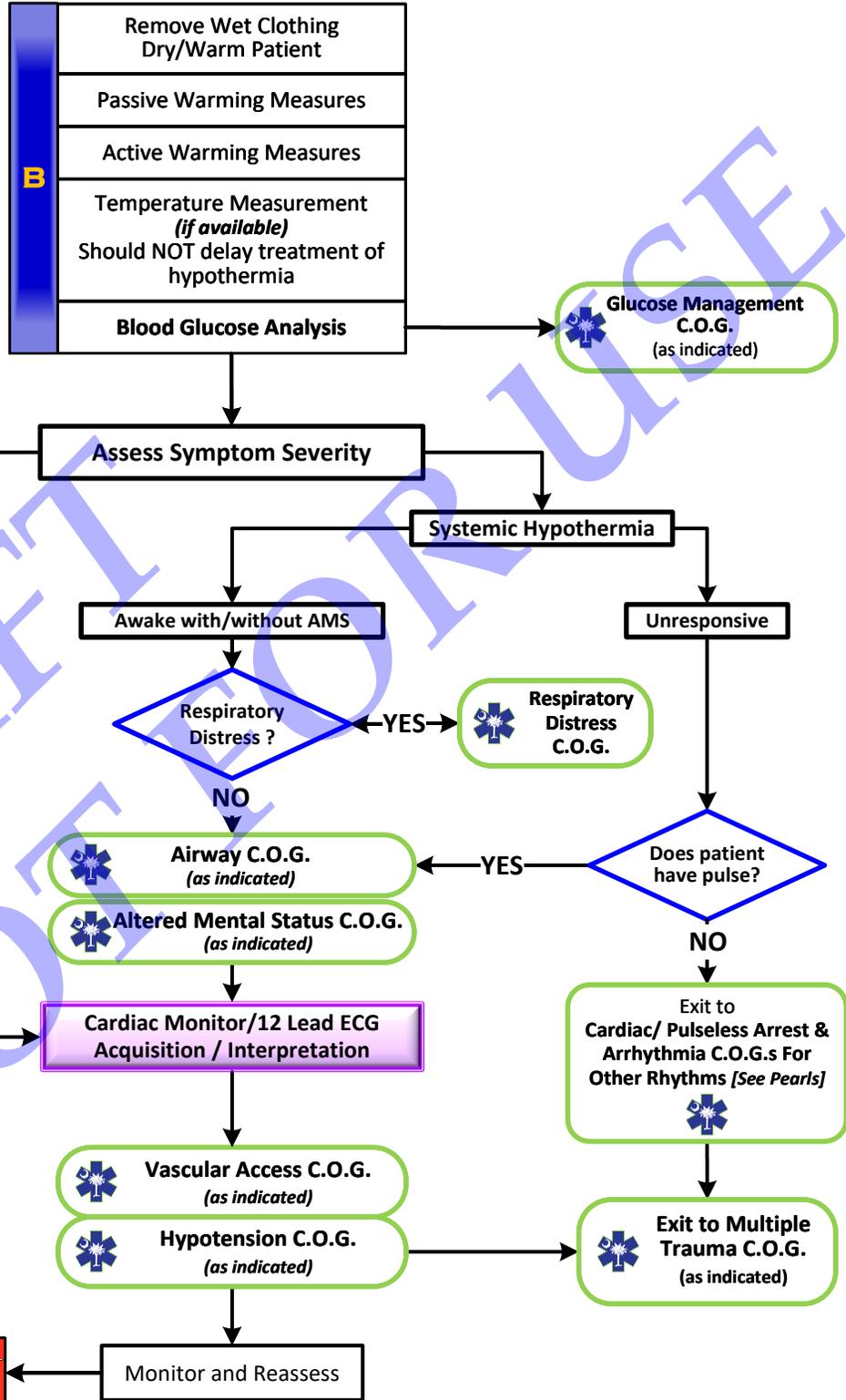
Signs and Symptoms

- Cold, clammy
- Shivering
- Altered mental status / coma
- Extremity pain or sensory abnormality
- Bradycardia
- Hypotension or shock

Differential

- Sepsis
- Environmental exposure
- Hypoglycemia
- CNS dysfunction
 - Stroke
 - Head injury
 - Spinal cord injury

Degrees Fahrenheit	Degrees Centigrade(Celsius)
0	-17.78
32	0.00
75	23.89
77	25.00
79	26.11
81	27.22
83	28.33
85	29.44
87	30.56
89	31.67
91	32.78
93	33.89
95	35.00
97	36.11
98.6	37.00



ENVIRONMENTAL / TOXIC



Hypothermia

- **PEARLS**

- **Recommended Exam: Mental Status, Heart, Pulses, Lungs, Extremities, Neuro**

- **NO PATIENT IS DEAD UNTIL WARM AND DEAD (Body temperature \geq 93.2 degrees F, 32 degrees C.)**

- **Hypothermia categories:**

- Mild 90 – 95 degF (32 – 35 degC)
- Moderate 82 – 90 degF (28 – 32 degC)
- Severe < 82 degF (< 28 degC)
- Profound <75 degF (<24 degC)

- **Mechanisms of hypothermia:**

- Radiation: Heat loss to surrounding objects via infrared energy (60 % of most heat loss.)
- Convection: Direct transfer of heat to the surrounding air.
- Conduction: Direct transfer of heat to direct contact with cooler objects (important in submersion.)
- Evaporation: Vaporization of water from sweat or other body water losses.

- Contributing factors of hypothermia: Extremes of age, malnutrition, alcohol or other drug use.

- If the temperature is unable to be measured, treat the patient based on the suspected temperature.

- **ACTIVE WARMING**

- Remove from cold environment and to warm environment protected from wind and wet conditions.
- Remove wet clothing and provide warm blankets / warming blankets.
- Hot packs can be activated and placed in the armpit and groin area if available. Care should be taken not to place the packs directly against the patient's skin

- **Caution if Intubation is required.**

- **Should be performed by the most experienced personnel.**
- **Gentle manipulation of the patient is required.**
- **Avoid Hyperventilation.**

- **CPR:**

- **Severe hypothermia may cause cardiac instability and rough handling of the patient theoretically can cause ventricular fibrillation. This has not been demonstrated or confirmed by current evidence. Intubation and CPR techniques should not be withheld due to this concern. Intubation can cause ventricular fibrillation so it should be done gently by most experienced person**
- **Below 86 ° F (30 ° C) antiarrhythmics may not work and if given should be given at increased intervals. Contact Medical Control for direction. Epinephrine / Vasopressin can be administered. Below 86 ° F (30 ° C) pacing should not be done.**
- **Consider withholding CPR if patient has organized rhythm or has other signs of life. Contact Medical Control.**
- **If the patient is below 86 ° F (30 ° C) then defibrillate 1 time if defibrillation is required. Deferring further attempts until more warming occurs is controversial. Contact Medical Control for direction.**
- **Hypothermia may produce severe bradycardia so take at least 45 seconds to palpate for a pulse.**

- **KEY DOCUMENTATION ELEMENTS:**

- Duration of Cold Exposure
- Ambient Temperature and recent range of temperatures
- Rewarming attempts or other therapies performed prior to EMS arrival
- Patient Core Temperature
- Patient use of alcohol / drugs
- Presence of Cardiac Arrhythmias and EKG Strips. (Rhythm strips should be long (recommend 60 secs).
- Documentation of associated trauma (per Trauma Protocol) where present
- Blood Glucose Level Obtained



Drowning

History

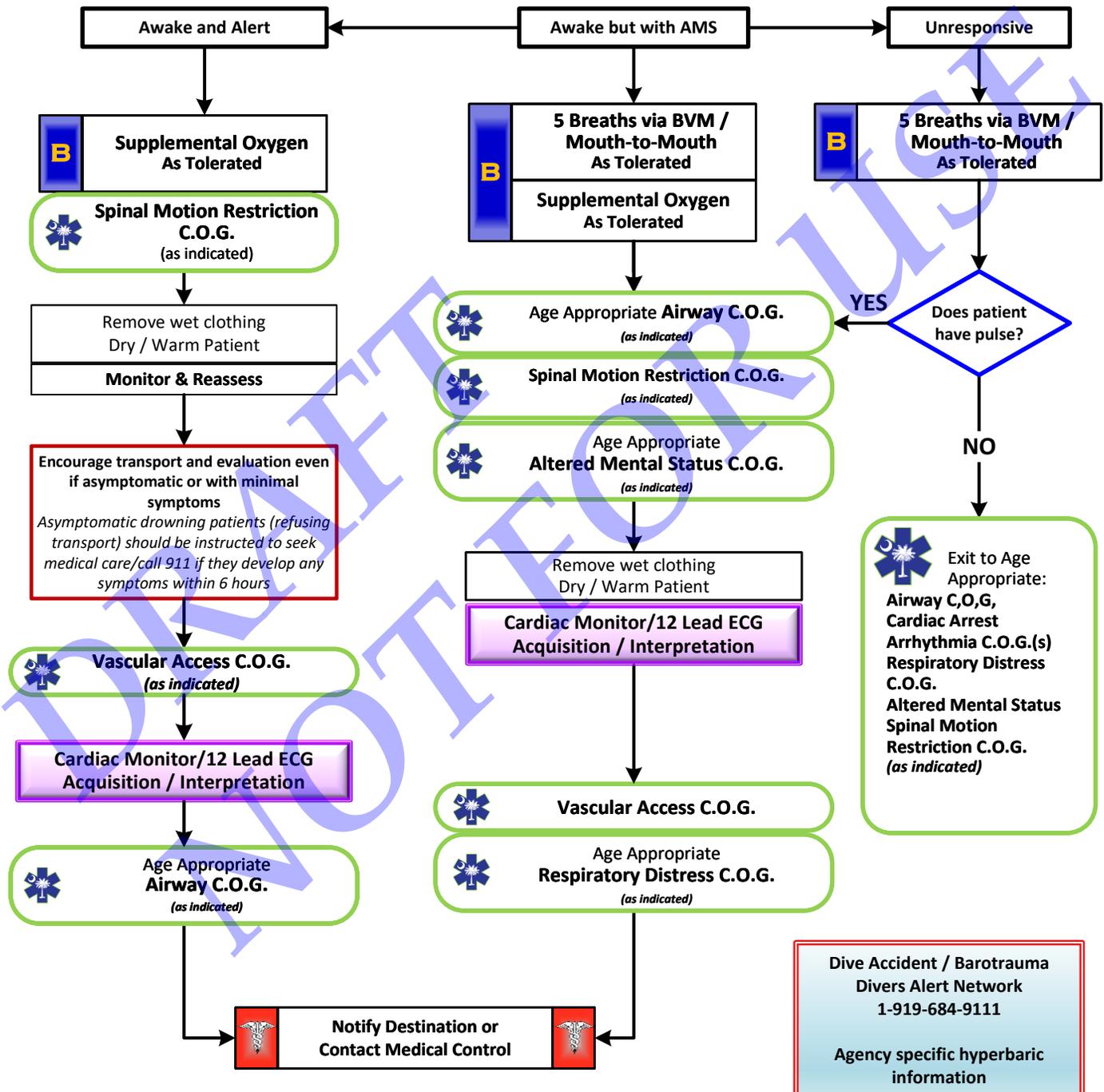
- Submersion in water regardless of depth
- Possible trauma to C-spine
- History of trauma ie: diving board
- Duration of immersion
- Temperature of water or possibility of hypothermia
- Waterskiing, Surfing, or Watercraft accident
- SCUBA event *

Signs and Symptoms

- Mental status changes
- Unresponsive
- Decreased or absent vital signs
- Apnea
- Coughing
- Stridor / Wheezing / Rales
- Vomiting

Differential

- Trauma
- Pre-existing medical problem (hypoglycemia, cardiac dysrhythmia)
- Pressure injury (diving)
- Barotrauma
- Decompression sickness
- Post-immersion syndrome
- Hypothermia



ENVIRONMENTAL / TOXIC



Drowning

**HYPERBARIC OXYGEN (HBO)
FACILITIES:
Dr. Robinson to get this information**

PEARLS

- **Recommended Exam: Respiratory, Mental status, Trauma Survey, Cardiac Exam, Skin, Neuro**
- **Drowning is the process of experiencing respiratory impairment (any respiratory symptom) from submersion / immersion in a liquid.**
- **Begin with BVM ventilations, if patient does not tolerate then apply appropriate mode of supplemental oxygen.**
- **Ensure scene safety. Drowning is a leading cause of death among would-be rescuers.**
- **When feasible, only appropriately trained and certified rescuers should remove patients from areas of danger.**
- **Regardless of water temperature – resuscitate all patients with known submersion time of ≤ 30 minutes.**
- **Regardless of water temperature – If submersion time ≥ 90 minutes consider moving to recovery phase instead of rescue.**
 - **Submersion survivability is estimated at 30 minutes for water temperature > 43 degF and 90 minutes for water temperature < 43 degF.**
- **Foam is usually present in airway and may be copious, DO NOT waste time attempting to suction. Ventilate with BVM through foam (suction water and vomit only when present.)**
- **Cardiac arrest in drowning is caused by hypoxia, airway and ventilation are equally important to high-quality CPR.**
- **Encourage transport of all symptomatic patients (cough, foam, dyspnea, abnormal lung sounds, hypoxia) due to potential worsening over the next 6 hours.**
- **For SCUBA* Related Incidents – Refer to Diving/SCUBA Protocol and consider transport to Hyperbaric Oxygen (HBO) Center**
- **High Flow Oxygen should be delivered via NRB Mask at > 15 lpm enroute.**
- **Predicting prognosis in prehospital setting is difficult and does not correlate with mental status. Unless obvious death, transport.**
- **Hypothermia is often associated with drowning and submersion injuries even with warm ambient conditions.**
- **Drowning patient typically has $< 1 - 3$ mL/kg of water in lungs (does not require suction.) Primary treatment is reversal of hypoxia.**
- **Spinal immobilization is usually unnecessary. When indicated it should not interrupt ventilation, oxygenation and / or CPR.**
- **KEY DOCUMENTATION ELEMENTS:**
 - Mechanism of injury or history suggesting cervical spine injury
 - Submersion Time
 - Water Temperature
 - Activities leading to drowning
 - Core Temperature when available