



Pediatric Altered Mental Status

History

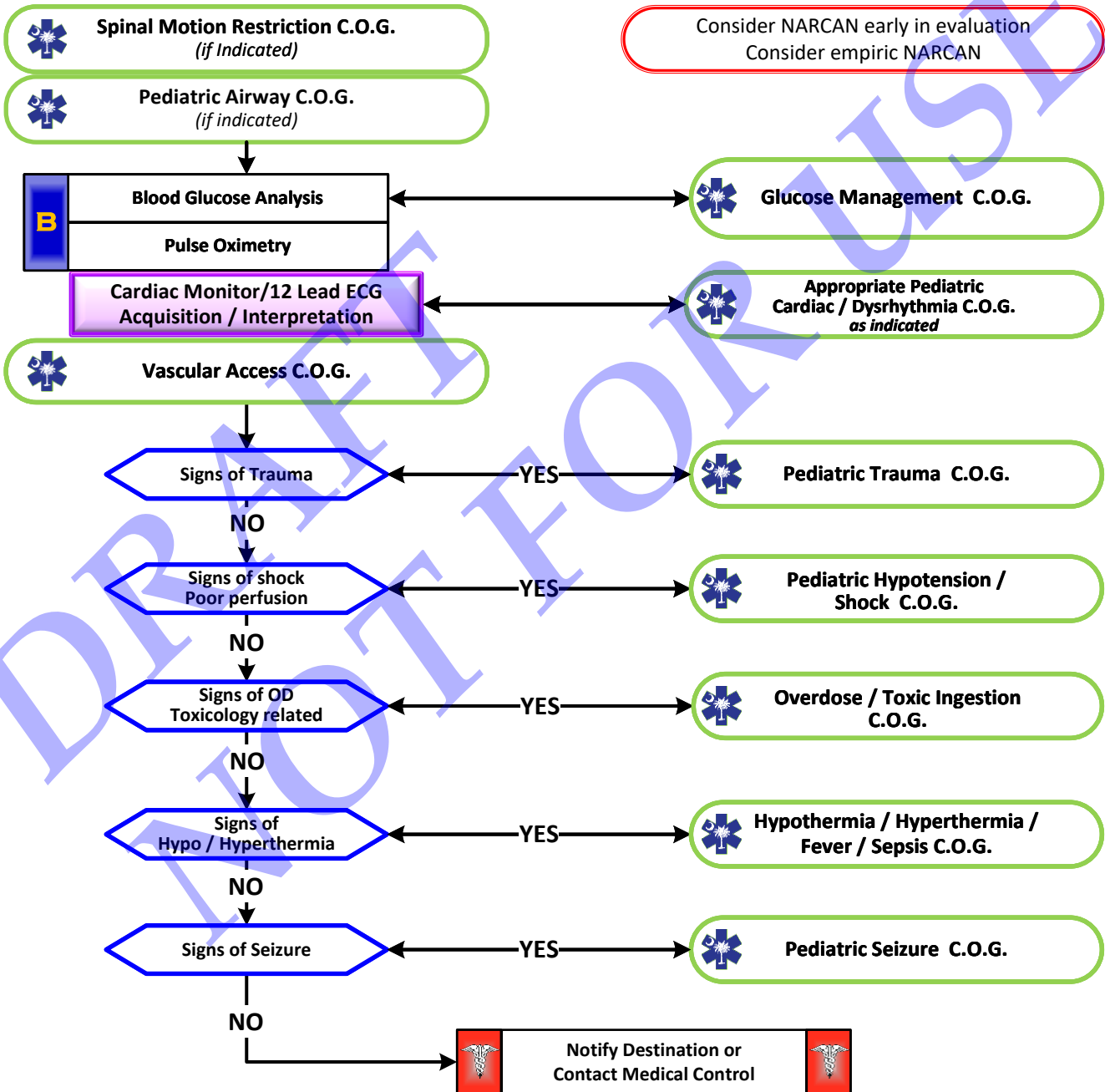
- Past medical history
- Medications
- Recent illness
- Irritability
- Lethargy
- Changes in feeding / sleeping
- Diabetes
- Potential ingestion
- Trauma
- History of exposure to drugs

Signs and Symptoms

- Decrease in mentation
- Change in baseline mentation
- Decrease in Blood sugar
- Cool, diaphoretic skin
- Increase in Blood sugar
- Warm, dry, skin, fruity breath, Kussmaul respirations, signs of dehydration
- Fever

Differential

- Hypoxia
- CNS (trauma, stroke, seizure, infection)
- Thyroid (hyper / hypo)
- Shock (septic-infection, metabolic, traumatic)
- Diabetes (hyper / hypoglycemia)
- Toxicological
- Acidosis / Alkalosis
- Environmental exposure
- Electrolyte abnormalities
- Psychiatric disorder
- Infection





Pediatric Altered Mental Status

PEARLS

- **Recommended Exam: Mental Status, HEENT, Skin, Heart, Lungs, Abdomen, Back, Extremities, Neuro.**
- **AMS may present as a sign of an environmental toxin or Haz-Mat exposure - protect personal safety.**
- **General:**
 - ❖ **The patient with AMS poses one of the most significant challenges.**
 - ❖ **A careful assessment of the patient, the scene and the circumstances should be undertaken.**
 - ❖ **Assume the patient has a life threatening cause of their AMS until proven otherwise.**
 - ❖ **Pay careful attention to the head exam for signs of bruising or other injury.**
 - ❖ **Information found at the scene must be communicated to the receiving facility.**
- Naloxone may be given by EMTs or AEMTs by either auto-injector or nasal spray only per local medical control option.
- Empiric NARCAN in the altered pediatric patient should be considered.
- Do not let alcohol confuse the clinical picture. Patients who routinely consume alcohol frequently develop hypoglycemia and may have unrecognized injuries.
- Consider Restraints if necessary for patient's and/or personnel's protection per the restraint procedure.
- **Substance misuse:**
 - Patients ingesting substances can pose a great challenge.
 - DO NOT assume recreational drug use and / or alcohol are the sole reasons for AMS.
 - Misuse of alcohol may lead to hypoglycemia.
 - More serious underlying medical and trauma conditions may be the cause.
- **Behavioral health:**
 - The behavioral health patient may present a great challenge in forming a differential.
 - DO NOT assume AMS is the result solely of an underlying psychiatric etiology.
 - Often an underlying medical or trauma condition precipitates a deterioration of a patients underlying disease.
- **Spinal Motion Restriction / Trauma:**
 - Only utilize spinal immobilization if the situation warrants.
 - The patient with AMS may worsen with increased agitation when immobilized.
- **It is safer to assume hypoglycemia than hyperglycemia if doubt exists. Recheck blood glucose after Dextrose or Glucagon**
- **KEY DOCUMENTATION:**
 - Glasgow Coma Score (GCS) or AVPU description
 - Baseline developmental status and change from baseline.
 - Known / Suspected Alcohol or Drug use
 - Vital signs to include: Temperature – when able. SpO2.
 - Consideration of Sepsis as etiology
 - Pupil and Neck Examination
 - IV Fluids administered for poor perfusion / hypotension – Fluid Type and Volume administered.
 - Blood Glucose Level
 - Naloxone used as therapeutic intervention – not diagnostic tool
 - CO Detector used when available.



Pediatric Seizure

History

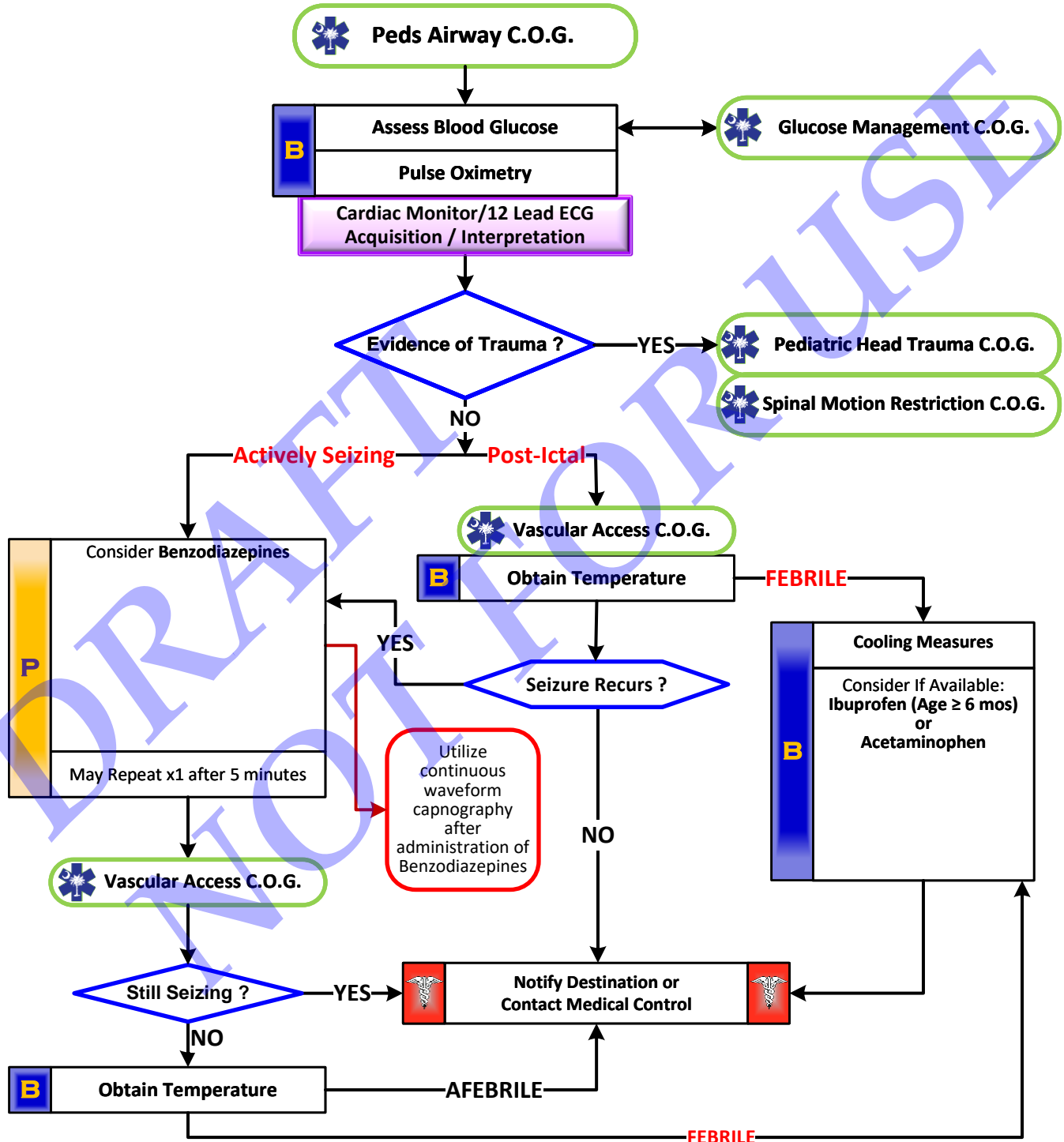
- Fever
- Prior history of seizures
- Seizure medications
- Reported seizure activity
- History of recent head trauma
- Congenital abnormality
- Consider pregnancy in teenage female
- Hypertension in teenagers
- Family history of seizure
- Substance Abuse

Signs and Symptoms

- Observed seizure activity
- Altered mental status
- Hot, dry skin or elevated body temperature
- Loss of Bowel or Bladder continence
- Tongue biting

Differential

- Fever
- Infection
- New onset Epilepsy
- Head trauma
- Medication or Toxin
- Hypoxia or Respiratory failure
- Hypoglycemia
- Metabolic abnormality / acidosis
- Tumor





Pediatric Seizure

Formula for calculating dose of IV Dextrose:		
Desired Dose (G/Kg)	Fluid Type	mL of Fluid Dose
0.5 G/Kg	50% Dextrose (D50W)	1 mL/Kg
	25% Dextrose (D25W)	2 mL/Kg
	10% Dextrose (D10W)	5 mL/Kg
	5% Dextrose (D5W)	10 mL/Kg
1 G/Kg	50% Dextrose (D50W)	2mL/Kg
	25% Dextrose (D25W)	4 mL/Kg
	10% Dextrose (D10W)	10 mL/Kg
	5% Dextrose (D5W)	20 mL/Kg

Maximum Dose = 25 Gms Dextrose / Dose

Recommended Treatment Regimen For Pediatric Seizure			
Drug	Route	Dosage	Maximum
Midazolam	IM (IN)	0.2 mg/Kg	10 mg*
Midazolam	IV / IO	0.1 mg/Kg	4 mg
Lorazepam	IV / IO	0.1 mg/Kg	4 mg
Diazepam	IV / IO	0.2 mg/Kg	10 mg

*Midazolam IM / IN for no vascular access

PEARLS

- **Recommended Exam: Vital Signs (including Temperature), Mental Status, HEENT, Heart, Lungs, Extremities, Neuro**
- **Items in Red Text are key performance measures used to evaluate protocol compliance and care**
- **Consider Spinal Motion Restriction.**
- **Maintain SpO₂ > or = [94%].**
- **Φ For Blood Glucose Level of < or = 60 – TREAT for hypoglycemia.**
- Assess possibility of occult trauma and substance exposure or abuse.
- **Addressing the ABCs and verifying blood glucose is more important than stopping the seizure**
- **Avoiding hypoxemia is extremely important**
- **Status Epilepticus** is defined as two or more successive seizures without a period of consciousness or recovery. This is a true emergency requiring rapid treatment and transport and possibly airway control,.
- **Grand mal seizures (generalized)** are associated with loss of consciousness, incontinence, and tongue trauma.
- **Focal seizures (petit mal)** effect only a part of the body and do not usually result in a loss of consciousness.
- **Jacksonian seizures** are seizures which start as a focal seizure and become generalized.
- Be prepared for airway problems and continued seizures.
- If evidence or suspicion of trauma, spine should be immobilized.
- In an infant, a seizure may be the only evidence of a closed head injury.
- Be prepared to assist ventilations especially if diazepam or midazolam is used.
- Medication Administration:
 - IM route is preferred over IV or IO if IV not already established.
 - IN route as an alternative.
 - **Midazolam IM preferred if no access.** Dosages per local medical control.
 - **Diazepam** (Valium) is not effective due to erratic absorption when administered IM. It should be given IV or Rectally.
 - **Rectal Diazepam/Lorazepam:** Draw drug dose up in a 3 ml syringe. Remove needle from syringe and attached syringe to an IV extension tube. Cut off the distal end of the extension tube leaving about 3 or 4 inches of length. Insert tube in rectum and inject drug. Flush extension tube with 3 ml of air and remove.
- **Obtain continuous waveform capnography after Benzodiazepine administration.**
- *** D10 used in Newborn/Infant and D25 used in Pediatric**
- Hypoglycemic patients who are treated in the field for seizure should be transported to hospital, regardless of whether they return to baseline mental status after treatment
 - Maximum of 25 G Dextrose per dose.
- **For actively seizing patients on EMS arrival, (i.e. no IV) consider IM VERSED (Midazolam) prior to establishing IV access.**
- For new onset seizures or seizures that are refractory to treatment, consider other potential causes including, but not limited to, trauma, stroke, electrolyte abnormality, toxic ingestion, hyperthermia, toxin exposure.
- **KEY DOCUMENTATION:**
 - Actively seizing during transport and time of seizure onset/cessation
 - Onset, focality, direction of eye deviation
 - Concurrent symptoms of apnea, cyanosis, vomiting, bowel/bladder incontinence, or fever
 - Medication amounts/routes given by bystanders or prehospital clinicians
 - Neurologic status (GCS, nystagmus, pupil size, focal neurologic deficit, or signs of stroke)
 - Blood glucose level



Pediatric Vomiting / Diarrhea

History

- Age
- Time of last meal
- Last bowel movement / emesis
- Improvement or worsening with food or activity
- Other sick contacts
- Past Medical History
- Past Surgical History
- Medications
- Travel history
- Bloody Emesis or diarrhea

Signs and Symptoms

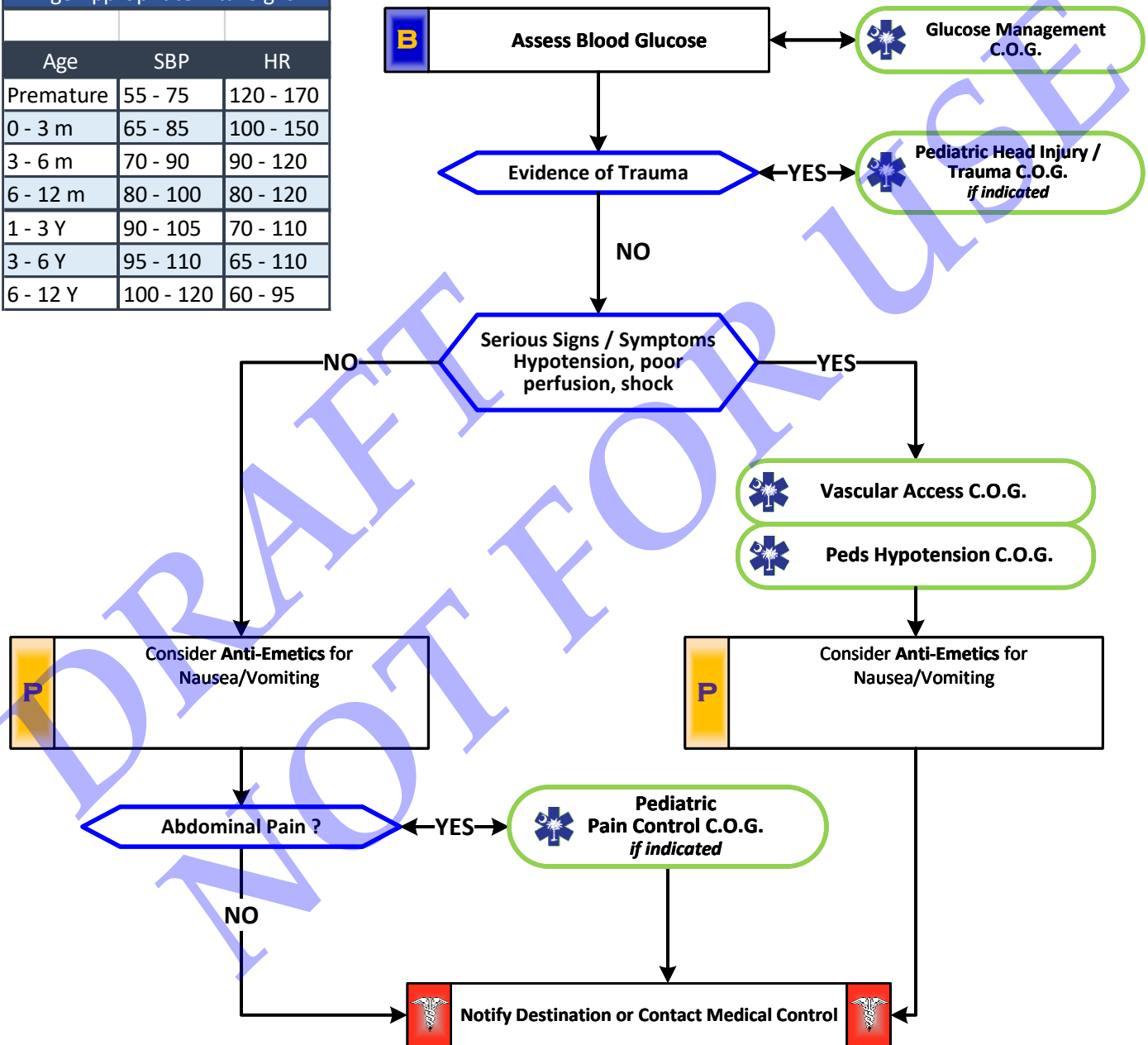
- Pain
- Distension
- Constipation
- Diarrhea
- Anorexia
- Fever
- Cough,
- Dysuria

Differential

- CNS (Increased pressure, headache, tumor, trauma or hemorrhage)
- Drugs
- Appendicitis
- Gastroenteritis
- GI or Renal disorders
- Diabetic Ketoacidosis
- Infections (pneumonia, influenza)
- Electrolyte abnormalities

Age Appropriate Vital Signs

Age	SBP	HR
Premature	55 - 75	120 - 170
0 - 3 m	65 - 85	100 - 150
3 - 6 m	70 - 90	90 - 120
6 - 12 m	80 - 100	80 - 120
1 - 3 Y	90 - 105	70 - 110
3 - 6 Y	95 - 110	65 - 110
6 - 12 Y	100 - 120	60 - 95





Pediatric Vomiting / Diarrhea

Recommended Treatment Regimen For Pediatric Nausea/Vomiting

Drug	Route	Dosage	Maximum
Ondansetron	IV / PO	0.15 mg/Kg	4 mg *
Prochlorperazine	IV / IM	0.1 mg/Kg	10 mg ^
Diphenhydramine	IV / IM	0.1mg/Kg	25 mg ^

* 6 m - 14 Y old

^ ONLY > 2 years and > 12 Kg

PEARLS

- **Recommended Exam: Mental Status, Skin, HEENT, Neck, Heart, Lungs, Abdomen, Back, Extremities, Neuro**
- **Heart Rate: One of the first clinical signs of dehydration, almost always increased heart rate, tachycardia increases as dehydration becomes more severe, very unlikely to be significantly dehydrated if heart rate is close to normal.**
- Beware of vomiting only in children. Pyloric stenosis, bowel obstruction, and CNS processes (bleeding, tumors, or increased CSF pressures) all often present with vomiting.
- Document the mental status and vital signs prior to administration of antiemetic medications.
- Vomiting and diarrhea are common symptoms, but can be the symptoms of uncommon and serious pathology such as carbon monoxide poisoning, new onset diabetes, diabetic ketoacidosis (DKA), and organophosphate poisoning. Maintain a high index of suspicion.
- **Zofran (Ondansetron) is preferred anti-emetic for children.**
- **KEY DOCUMENTATION ELEMENTS:**
 - Patient Age, Weight and/or Length based weight measure for pediatric patients
 - Blood Glucose Level
 - Medications Given Including: Time, Dose, Dose Units, Route, Response, and Complications or Adverse Events
 - Vital Signs – Before AND After medication administration AND After each fluid bolus
 - History and Physical regarding etiology of Nausea, Vomiting, and/or Diarrhea.



Pediatric Respiratory Distress

History

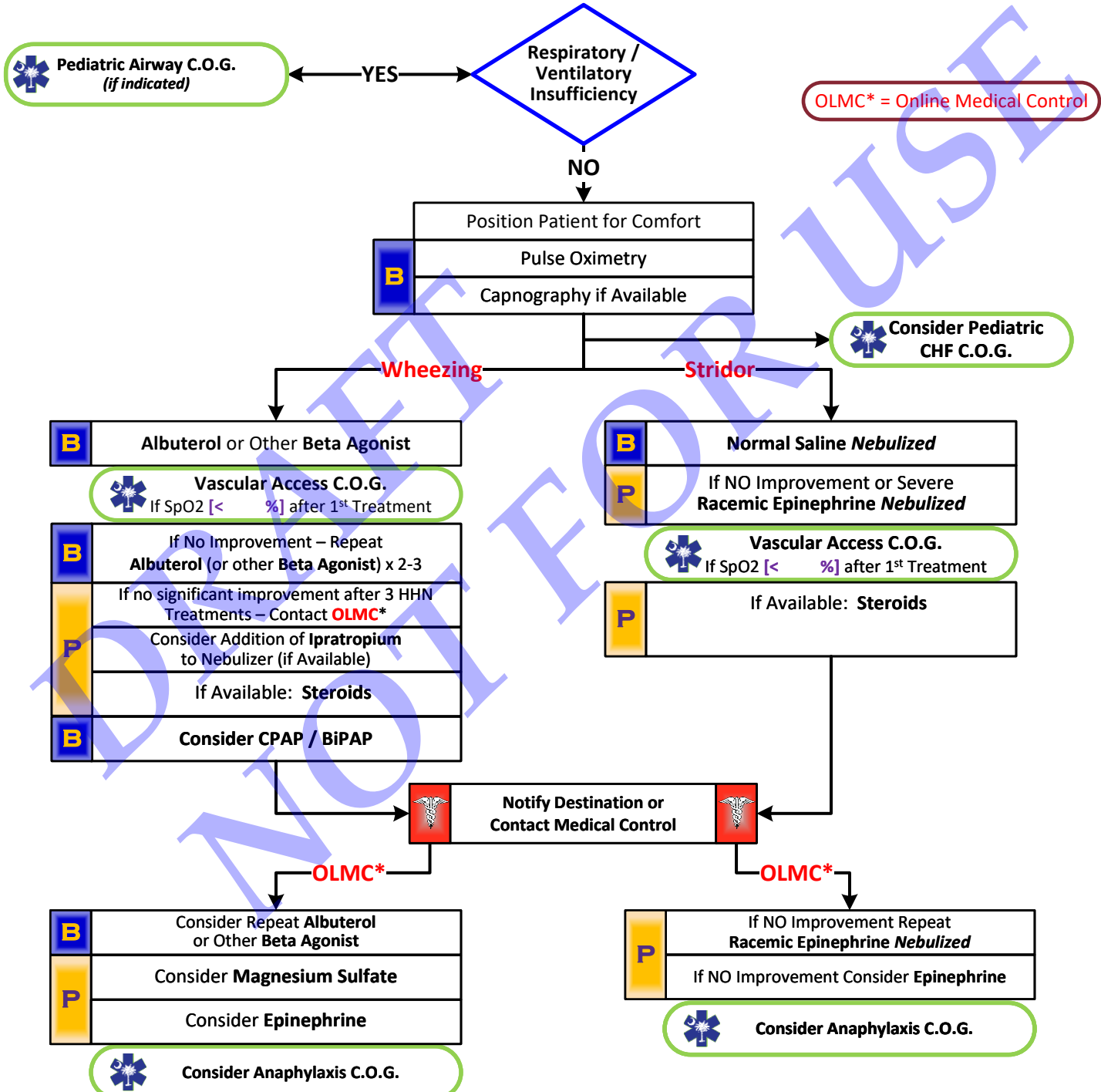
- Time of onset
- Possibility of foreign body
- Medical history
- Medications
- Fever or respiratory infection
- Other sick siblings / contacts
- History of trauma

Signs and Symptoms

- Wheezing or stridor
- Respiratory retractions
- Increased Respiratory Rate
- Increased heart rate
- Altered level of consciousness
- Nasal flaring / tripodding
- Anxious appearance

Differential

- Allergic Reaction
- Asthma
- Aspiration
- Foreign body
- Infection
 - Pneumonia
 - Croup
 - Epiglottitis
 - RSV
- Congenital heart disease
- Medication or Toxin
- Trauma





Pediatric Respiratory Distress

Endotracheal Tube Sizes		
Age	Size (mm) Uncuffed	Size (mm) Cuffed *
Premature	2.5	
Term to 3 m	3.0	
3 - 7 m	3.5	3.0
7 - 15 m	4.0	3.5
15 - 24 m	4.5	3.5
2 - 15 Y	[age(yrs)/4] +4	[age(yrs)/4]+3.5
> 15 Y		7.5 female - 8.0 male
(* Cuffed tubes preferred in pediatrics)		

Age Adjusted Abnormal Vital Signs			
Age	Heart Rate	Respiratory Rate	Systolic BP mm/Hg
Infant - 1 Y	<100 or >180	<30 or >60	<70
Toddler (1-2 Y)	<80 or >150	<20 or > 40	<75
Preschooler (3-5 Y)	<75 or >110	<20 or > 34	<80
School Age (6-9 Y)	<70 or > 100	<16 or >25	<85
Adolescent (10-17 Y)	<60 or >100	<12 or >20	<90

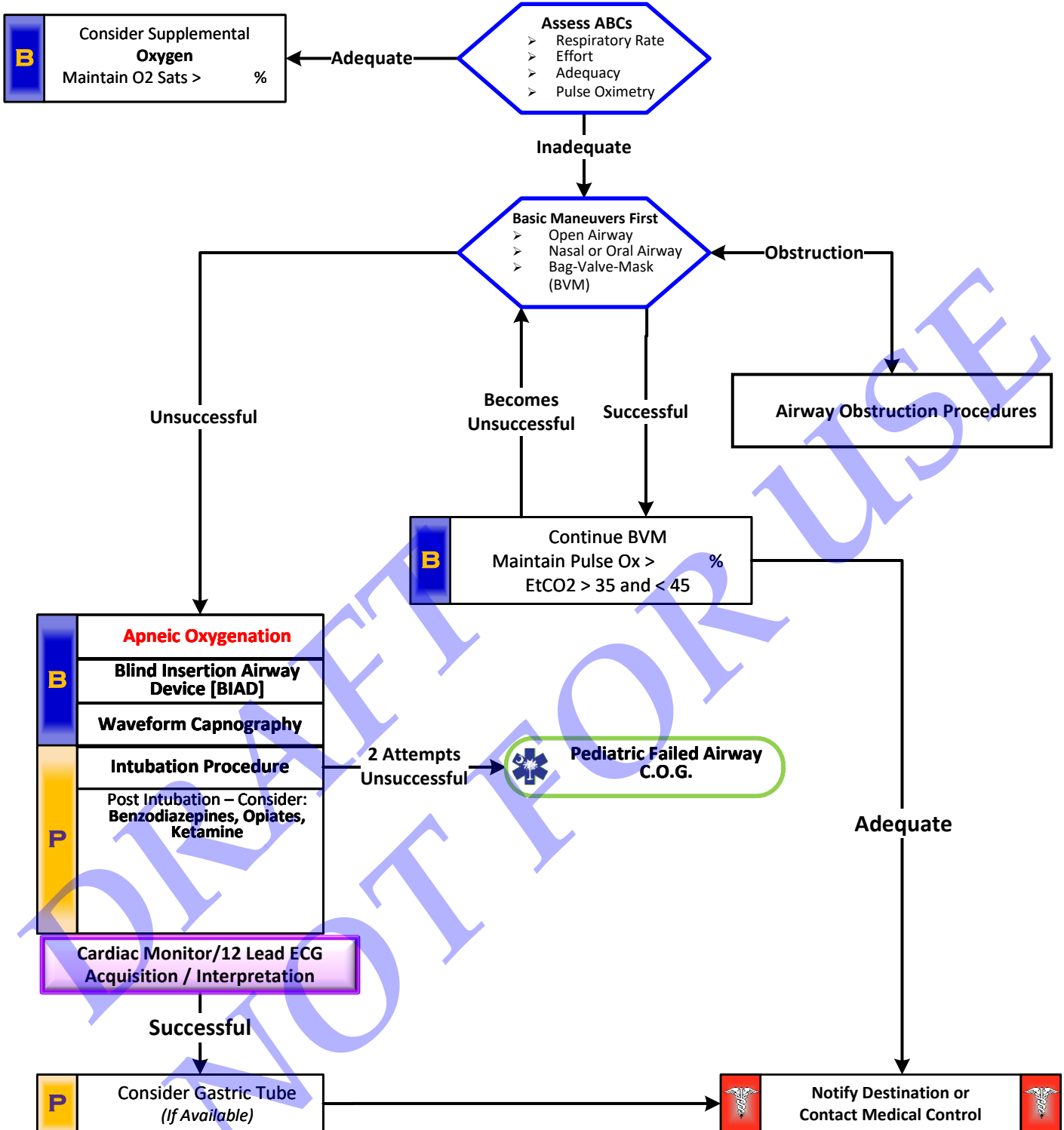
ESTIMATION OF ENDOTRACHEAL TUBE DEPTH FOR PEDIATRICS
Estimated D (depth) [in cms] = 4 + (0.1 x Height in Centimeters)

PEARLS

- **Recommended Exam: Mental Status, HEENT, Skin, Neck, Heart, Lungs, Abdomen, Extremities, Neuro**
- **Items in Red Text are key performance measures used to evaluate protocol compliance and care.**
- Do not force a child into a position. They will protect their airway by their body position.
- The most important component of respiratory distress is airway control.
- **Bronchiolitis** is a viral infection typically affecting infants which results in wheezing which may not respond to beta-agonists. Consider Epinephrine if patient < 18 months and not responding to initial beta-agonist treatment.
- **Croup** typically affects children ≤6 years old, with a peak incidence between six months to three years of age; it is uncommon in children >6 years old. It is viral, possible fever, gradual onset, drooling is rarely noted.
- **Epiglottitis** typically affects children > 2 years of age.
 - Young children (<5 years of age) with H. influenzae type b (Hib) epiglottitis may present with respiratory distress, anxiety, and the characteristic "tripod" or "sniffing" posture in which they assume a sitting position with the trunk leaning forward, neck hyperextended, and chin thrust forward in an effort to maximize the diameter of the obstructed airway. They may be reluctant to lie down. The presentation may be subtle.
 - Drooling is often present.
 - Cough is typically absent.
 - IF bacterial, with fever, rapid onset, possible stridor, patient wants to sit up to keep airway open, drooling is common.
 - Airway manipulation may worsen the condition.
 - Avoid direct laryngoscopy unless intubation is imminent.
- This protocol includes all patients with respiratory distress including, Asthma, Reactive Airway Disease, Bronchospasm, Viral URI, Pneumonia, CHF, and Airway Foreign Body.
- **Combination nebulizers containing albuterol and ipratropium:**
 - Patients may receive more than 3 nebulizer treatments, treatments should continue until improvement.
 - Following 3 combination nebulizers, it is acceptable to continue albuterol solely with subsequent treatments as there is no proven benefit to continual use of ipratropium.
- **Epinephrine:**
 - If allergic reaction or anaphylaxis is suspected, give immediately and repeat until improvement.
 - If allergic reaction is not suspected, administer with impending respiratory failure and no improvement.
 - May use Regular Epinephrine 1:1,000 if Racemic Epinephrine not available (Admixture: 1 mL + 3mL NS).
- Consider Magnesium Sulfate with impending respiratory failure and no improvement.
- Pulse oximetry should be monitored continuously if initial saturation is < or = 94%, or there is a decline in patients status despite normal pulse oximetry readings and consider End-tidal CO2 monitoring if available.
- **CPAP or Non-Invasive Positive Pressure Ventilation:**
 - May be used with COPD, Asthma, Allergic reactions, and CHF.
 - Consider early in treatment course.
 - Consider removal if SBP remains < 100 mmHg and not responding to other treatments.
- A silent chest in respiratory distress is a pre-respiratory arrest sign.
- Contact Medical Control prior to administering epinephrine in patients who have a history of cardiac disease or if the patient's heart rate is >150 (or age adjusted normals). Epinephrine may precipitate cardiac ischemia. A 12-lead ECG should be performed on these patients.
- **Capnography is:**
 - **Required for ALL Intubated Patients and Cricothyroidotomy Patients***
 - **Strongly Recommended /Strongly Encouraged for all unstable patients**
 - **Strongly Recommended / Strongly Encouraged for utilization of any Airway Device (e.g. BIAD)**
- **KEY DOCUMENTATION:**
 - Initial key aspects of the physical examination and after each intervention.
 - Respiratory Rate
 - Oxygen Saturation
 - EtCO2 / Waveform shape
 - Breath Sounds and Quality
 - Use of Accessory Muscles
 - Mental Status
 - Response to Interventions



Airway, Pediatric





Airway, Pediatric

Endotracheal Tube Sizes		
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Premature	2.5	
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3 - 7 m	3.5	3.0
7 - 15 m	4.0	3.5
15 - 24 m	4.5	3.5
2 - 15 Y	[age(yrs)/4] +4	[age(yrs)/4]+3.5
> 15 Y		7.5 female - 8.0 male
(* Cuffed tubes preferred in pediatrics)		
Estimation of Endotracheal Tube Depth for Pediatrics		
Estimated D (depth) [in cms] = 4 + (0.1 x Height in Centimeters)		

PEARLS

- For this protocol, pediatric is defined as: < 12 years old AND [a] < 55 Kg -or- [b] Fits on Standardized Pediatric Length Based Tape
- Capnography is:
 - Required for ALL Intubated Patients*
 - Recommended / Encouraged for all unstable patients
 - Recommended / Encouraged for utilization of any Airway Device (e.g. BIAD)
- If an effective airway is being maintained by BVM with continuous pulse oximetry values of > [%], it is acceptable to continue with basic airway measures instead of using a BIAD or Intubation.
- For the purposes of this protocol an adequate airway is when the patient is receiving appropriate oxygenation and ventilation without undue risk of aspiration or worsening airway pathology.
- An Intubation Attempt is defined as passing the laryngoscope blade or endotracheal tube past the teeth or inserted into the nasal passage.
- Ventilatory rate are typically about 30 for Neonates, 25 for Toddlers, 20 for School Age, and for Adolescents the normal Adult rate of 12 per minute. Maintain a EtCO₂ between 35 and 45 and avoid hyperventilation.
- It is strongly encouraged to complete an Airway Evaluation Form with any BIAD or Intubation procedure.
- Paramedics should consider using a BIAD if oral-tracheal intubation is unsuccessful.
- Maintain C-spine immobilization for patients with suspected spinal injury.
- Do not assume hyperventilation is psychogenic - use oxygen, not a paper bag.
- BURP** maneuver (Backward, Upward, Rightward, Posterior pressure on larynx) should be used to assist with difficult intubations. [Sellick's maneuver no longer recommended by AHA.]
- Hyperventilation in deteriorating head trauma should only be done to maintain a EtCO₂ (pCO₂) of 30-35.
- Gastric tube placement should be considered in all intubated patients.
- It is important to secure the endotracheal tube well. Manual stabilization of the endotracheal tube should be used during all patient moves/transfers.
- KEY DOCUMENTATION POINTS:**
 - Vital Signs and Appropriate Physical Examination
 - Efforts to maintain/improve airway
 - Indications for Advanced Airway Management
 - Occurrence of peri-intubation hypoxia (< 90% SpO₂); bradycardia, hypotension, or cardiac arrest
 - Peri-intubation period encompasses the time from administration of any sedative/paralyzing agent or initiation of intubation up to 10 minutes after the final airway procedure has been terminated.
 - Post-intubation with advanced airway, EtCO₂ value and capnograph should be documented immediately after airway placement, with each patient movement (e.g., into and out of ambulance), **and** at the time of patient transfer in the ED
 - Documentation of ALL attempts at intubation based upon definition.
 - Documentation of all times – including:
 - Initial Assessment
 - Drug Administration
 - Time of Advanced Airway Attempts
 - Contact with Receiving Facility



Pediatric Hypotension / Shock

History

- Blood loss
- Fluid loss
 - Vomiting
 - Diarrhea
 - Fever
- Infection
- Congenital Defects
- Birth Complications

Signs and Symptoms

- Restlessness, confusion, weakness
- Dizziness
- Increased HR, rapid pulse
- Decreased BP
- Pale, cool, clammy skin
- Delayed capillary refill

Differential

- Trauma
- Infection
- Dehydration
 - Vomiting
 - Diarrhea
 - Fever
- Congenital heart disease
- Medication or Toxin
- Allergic reaction

Use Age Appropriate Vital Signs



Vascular Access C.O.G.

Consider NARCAN early



Pediatric Multiple Trauma C.O.G.

YES

Evidence or History of Trauma ?



Consider Blood Administration if available and if blood loss / trauma and if patient meets all criteria

NO



Glucose Management C.O.G.

B

Assess Blood Glucose

A

Normal Saline Bolus (#1) 20 mL/Kg

A

Consider Repeating:
Normal Saline Bolus (#2) 20 mL/Kg*
*Consider Congenital Heart Disease Prior to 2nd Bolus

A

Consider Repeating:
Normal Saline Bolus (#3) 20 mL/Kg

Maximum Total Boluses 60cc/Kg

P

Consider: Steroids
Consider: Pressor Infusion



Consider OD / Toxic C.O.G.



Notify Destination or Contact Medical Control



Age Appropriate Vital Signs		
Age	SBP	HR
Premature	55 - 75	120 - 170
0 - 3 m	65 - 85	100 - 150
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Pediatric Hypotension / Shock

Vasopressor medications (in order of preference)

1. Epinephrine IV drip 0.02–0.2 mcg/kg/min titrated to a MAP greater than 65 mmHg

OR

2. Epinephrine by push dose (dilute boluses):

- ❖ prepare 10 mcg/mL by adding 1 mL of 0.1 mg/mL epinephrine to 9 mL of normal saline, then administer 10–20 mcg boluses (1–2 mL) q 2 minutes titrated MAP greater than 65 mmHg

OR

3. Norepinephrine 0.02–0.4 mcg/kg/minute IV titrated to a MAP greater than 65 mmHg

PEARLS

- **Recommended Exam: Mental Status, Skin, HEENT, Heart, Lung, Abdomen, Extremities, Back, Neuro**
- Hypotension can be defined as a systolic blood pressure of less than the age appropriate Systolic BP. This is not always reliable and should be interpreted in context and patient's typical BP if known. Consider all possible causes of shock and treat per appropriate protocol.
- Decreasing heart rate and hypotension occur late in children and are signs of imminent cardiac arrest.
- Most maternal medications pass through breast milk to the infant. Examples: Narcotics, Benzodiazepines.
- Consider possible allergic reaction or early anaphylaxis.
- Consider sepsis as possible etiology and measure a body temperature as part of vital signs.
- If patient has a history of cardiac disease, (prematurity) chronic lung disease, or renal disease limit Normal Saline bolus to 10 ml/kg unless otherwise directed by Medical Control Physician
- Shock often may present with normal vital signs and may develop insidiously. Tachycardia may be the only manifestation.
- Fluid of up to 20 mL/kg of isotonic fluid (Local Medical Control) by administering rapid, predetermined boluses unless the MAP goal is achieved, or pulmonary edema develops.
 - Consideration of Congenital Heart Disease should be entertained prior to 2nd IV Bolus.
 - If available, the administration of packed red blood cells, other blood components or whole blood may be indicated for hemorrhagic shock
 - Early, aggressive IV fluid administration is essential in the treatment of suspected septic shock
- Patients predisposed to shock:
 - Immunocompromised (patients undergoing chemotherapy or with a primary or acquired immunodeficiency)
 - Adrenal insufficiency (Addison's disease, congenital adrenal hyperplasia, chronic or recent steroid use)
 - History of a solid organ or bone marrow transplant
- Hypotension indicates uncompensated shock, which may progress to cardiopulmonary failure within minutes.
- Repeat Vital Signs AFTER each Bolus or Change in Pharmacologic Therapy (Change in Dose or Agent).
- Consider all possible causes of shock and treat per appropriate protocol:
- **Hypovolemic Shock:**
 - Hemorrhage, trauma, GI bleeding, dehydration, or pregnancy related bleeding.
- **Cardiogenic Shock:**
 - Heart failure, MI, Cardiomyopathy, Congenital Heart Disease, Myocardial contusion, Ruptured ventricular/septum/valve, toxins.
- **Distributive Shock:**
 - Sepsis, Anaphylactic, Neurogenic (hallmark is warm, dry, pink skin with normal capillary refill time and typically alert), Toxins.
- **Obstructive Shock:**
 - Pericardial tamponade, Pulmonary embolus, Tension pneumothorax. Signs may include hypotension with distended neck veins, tachycardia, unilateral decreased breath sounds or muffled heart sounds.
- **Acute Adrenal Insufficiency:**
 - State where body cannot produce enough steroids (glucocorticoids/mineralocorticoids). May have primary adrenal disease or more commonly have stopped a steroid like prednisone. Usually hypotensive with nausea, vomiting, dehydration and/or abdominal pain.
 - If suspected Paramedic should give Methylprednisolone [2mg/Kg to max of 125 mg IM / IV / IO] or Dexamethasone [0.6 mg/Kg to max of 10 mg IM / IV / IO]. May administer prescribed steroid carried by patient IM / IV / IO. Patient may have Hydrocortisone (Cortef or Solu-Cortef). Dose: < 1y.o. give 25 mg, 1-12 y.o. give 50 mg, and > 12 y.o. give 100 mg or dose specified by physician.
 - May use steroid agent specific to your local drug list.
- **KEY DOCUMENTATION:**
 - Medications administered
 - Full vital signs (pulse, blood pressure, respiratory rate, neurologic status) with reassessment at minimum Q 15 minutes or more frequently as appropriate.
 - Amount of Fluids Administered
 - Notification of receiving facility on Transport.



Pediatric Cardiac Arrest

History

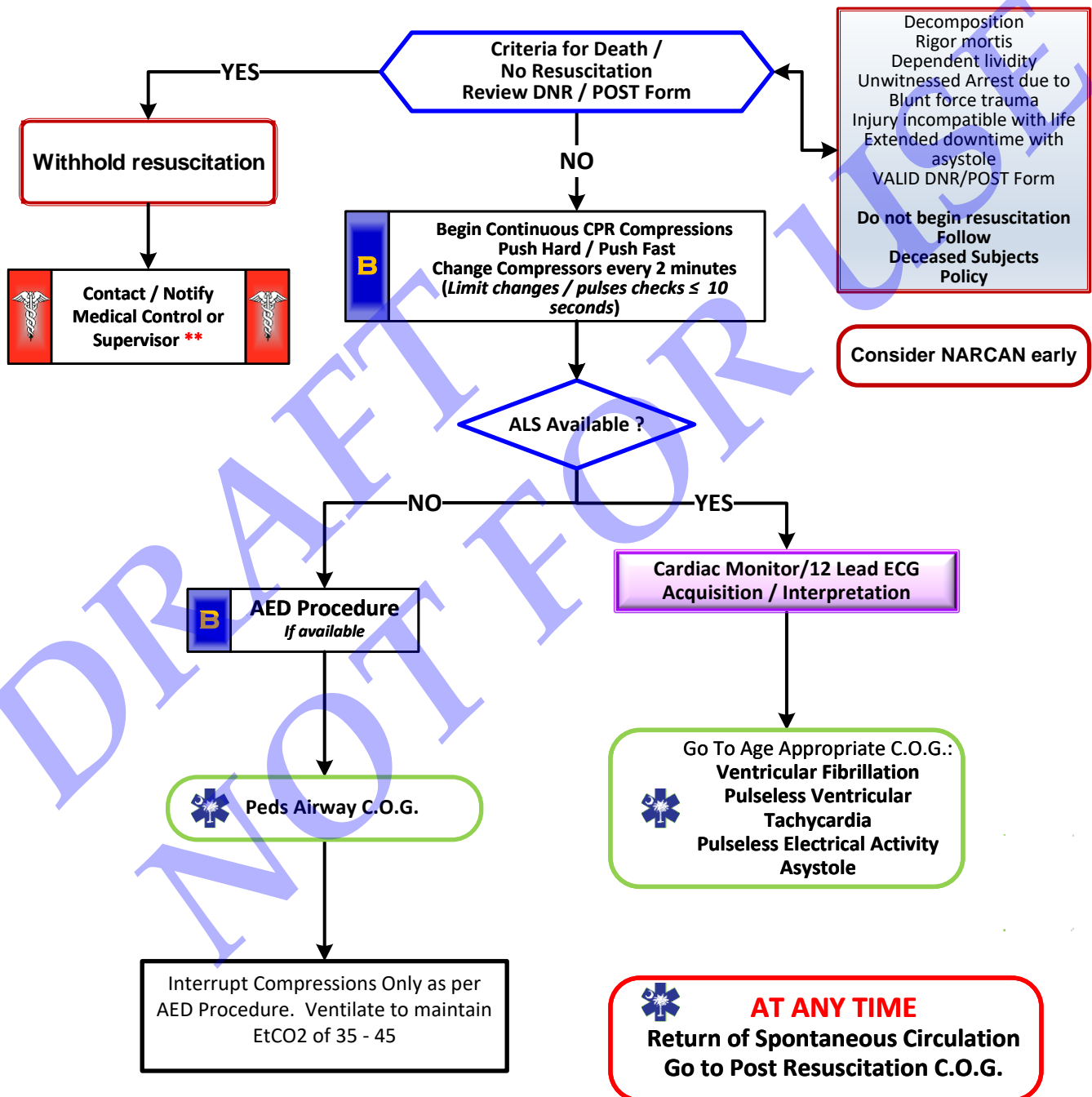
- Time of arrest
- Medical history
- Medications
- Possibility of Airway foreign body / obstruction
- Hypothermia

Signs and Symptoms

- Unresponsive
- Cardiac arrest

Differential

- Respiratory failure
 - Foreign body, Secretions, Infection (croup, epiglottitis)
- Hypovolemia (dehydration)
- Congenital heart disease
- Trauma
- Tension pneumothorax, cardiac tamponade, pulmonary embolism
- Hypothermia
- Toxin or medication
- Electrolyte abnormalities (Glucose, K)
- Acidosis





Pediatric Cardiac Arrest

PEARLS

- **Recommended Exam: Mental Status, Heart, Lungs**
- In order to be successful in pediatric arrests, a cause must be identified and corrected.
- Airway and Ventilation is the most important intervention in Pediatric Cardiac Arrest. This should be accomplished immediately. Patient survival is often dependent on airway management success.
- ****Contact Supervisor Based on Local Policy and Written Protocol to Withhold Resuscitation.**
- **Team Focused Approach / Pit-Crew Approach recommended; assign responders to predetermined tasks. Refer to optional protocol or development of local agency protocol.**
- **Efforts should be directed at high quality and continuous compressions with limited interruptions and early defibrillation when indicated.**
- **DO NOT HYPERVENTILATE: If no advanced airway (BIAD, ETT) compression to ventilation ratio is 30:2. If advanced airway in place, ventilate 10 breaths per minute with continuous, uninterrupted compressions.**
- **Do not interrupt compressions to place endotracheal tube. Consider BIAD first to limit interruptions.**
- Success is based on proper planning and execution. Procedures require space and patient access. Make room to work.
- **Consider the use of an appropriately sized SGA if BVM (with OPA/NPA) alone is not effective in maintaining oxygenation and/or ventilation. This is especially important in children as Endotracheal Intubation has not been shown to improve outcomes over prehospital BVM or (BIAD) SGA**
- **Reassess and document BIAD and / or endotracheal tube placement and EtCO₂ frequently, after every move, and at transfer of care.**
 - All Cardiac Arrest patients should have continuous waveform capnography applied
 - IV / IO access and drug delivery is secondary to high-quality chest compressions and early defibrillation.
 - IV access is preferred route. Follow IV or IO Access Protocol .
- **Defibrillation:**
 - Follow manufacture's recommendations concerning defibrillation / cardioversion energy when specified.
 - Charge defibrillator during chest compressions, near the end of 2-minute cycle, to decrease peri-shock pause.
 - Following defibrillation, provider should immediately restart chest compressions with no pulse check until end of next cycle.
- **End Tidal CO₂ (EtCO₂)**
 - If EtCO₂ is < 10 mmHg, improve chest compressions.
 - Goal EtCO₂ = 35-45 mmHg
 - If EtCO₂ spikes, typically > 40 mmHg, consider Return of Spontaneous Circulation (ROSC)
- **Special Considerations:**
 - **Opioid Overdose** - If suspected, administer Naloxone per Overdose / Toxic Ingestion Protocol while ensuring airway, oxygenation, ventilations, and high-quality chest compressions.
 - **Drowning / Suffocation / Asphyxiation / Hanging / Lightning Strike** – Hypoxic associated cardiac arrest and prompt attention to airway and ventilation is priority followed by high-quality and continuous chest compressions and early defibrillation.
- **Key Documentation:**
 - Resuscitation attempted and all interventions performed
 - Arrest witnessed / Not-witnessed.
 - CPR Prior to EMS Arrival
 - First monitored rhythm
 - Outcome / Any ROSC
 - Presumed Etiology (Presumed Primary Cardiac; Trauma; Submersion; Respiratory; Other Non-Cardiac; Unknown)
 - Documentation of all acquired EKG Strips
 - Documentation of Termination of Resuscitation Efforts and reasons for Termination.
 - Reassess and document endotracheal tube placement and EtCO₂ frequently, after every move, and at transfer of care.



Pediatric Pulseless

Ventricular Tachycardia / Ventricular Fibrillation

History

- Past medical history
- Medications or Toxic Ingestion (Aminophylline, Diet pills, Thyroid supplements, Decongestants)
- Drugs (nicotine, cocaine)
- Congenital Heart Disease
- Respiratory Distress
- Syncope or Near Syncope

Signs and Symptoms

- Heart Rate:
 - Child > 180/bpm
 - Infant > 220/bpm
- Pale or Cyanosis
- Diaphoresis
- Tachypnea
- Vomiting
- Hypotension
- Altered Level of Consciousness
- Pulmonary Congestion
- Syncope

Differential

- Heart disease (Congenital)
- Hypo / Hyperthermia
- Hypovolemia or Anemia
- Electrolyte imbalance
- Anxiety / Pain / Emotional stress
- Fever / Infection / Sepsis
- Hypoxia
- Hypoglycemia
- Medication / Toxin / Drugs (see HX)
- Pulmonary embolus
- Trauma
- Tension Pneumothorax

Single lead ECG able to diagnose and treat arrhythmia
12 Lead ECG not necessary to diagnose and treat, but preferred when patient stable

B Begin Continuous CPR Compressions
Push Hard / Push Fast
Change Compressors every 2 minutes
(Limit changes / pulses checks ≤ 10 seconds)

Cardiac Monitor/12 Lead ECG Acquisition / Interpretation

Rhythm Shockable

Asystole / PEA Guideline as indicated

B Continuous CPR Compressions
Push Hard / Push Fast
Change Compressors every 2 minutes

Vascular Access C.O.G.

Rhythm Shockable

B Continuous CPR Compressions
Push Hard / Push Fast
P Epinephrine every 3 to 5 minutes.
Consider Advanced Airway

Rhythm Shockable

B Continuous CPR Compressions
Push Hard / Push Fast
P Amiodarone or Lidocaine
Treat Reversible Causes

NO

NO

ROSC

ROSC C.O.G. as indicated

Notify Destination or Contact Medical Control

PEDIATRIC CARDIOVASCULAR



Pediatric Pulseless

Ventricular Tachycardia / Ventricular Fibrillation

PEARLS

- **Recommended Exam: Mental Status, Skin, Neck, Lung, Heart, Abdomen, Back, Extremities, Neuro**
- **Wide Complex Tachycardia (> 0.08 seconds):**
 - SVT with aberrancy.
 - VT: Uncommon in children. Rates may vary from near normal to > 200 / minute. Most children with VT have underlying heart disease / cardiac surgery / long QT syndrome / cardiomyopathy.
- **Torsades de Pointes / Polymorphic (multiple shaped) Tachycardia:**
 - Rate is typically 150 to 250 beats / minute.
 - Associated with long QT syndrome, hypomagnesaemia, hypokalemia, many cardiac drugs.
 - May quickly deteriorate to Ventricular Fibrillation / Asystole..
- Monitor for hypotension after administration of Antiarrhythmics.
- Monitor for respiratory depression and hypotension associated with Benzodiazepines.
- Continuous pulse oximetry is required for all Patients.
- Document all rhythm changes with monitor strips and obtain monitor strips with each therapeutic intervention.
- **KEY DOCUMENTATION:**
 - Initial rhythm and all rhythm changes
 - Time, Dose, and Response to medications given
 - Cardioversion times, Synchronization, Number of Attempts, Joules, and Response
 - Obtain monitor strips after each intervention
 - Patient Weight
 - Pediatric length based tape color (for pediatrics who fit on tape).
 - History of event supporting treatment of underlying causes.
 - Blood Sugar Obtained
 - Use of Sedation for responsive patients



Pediatric Asystole / PEA

History

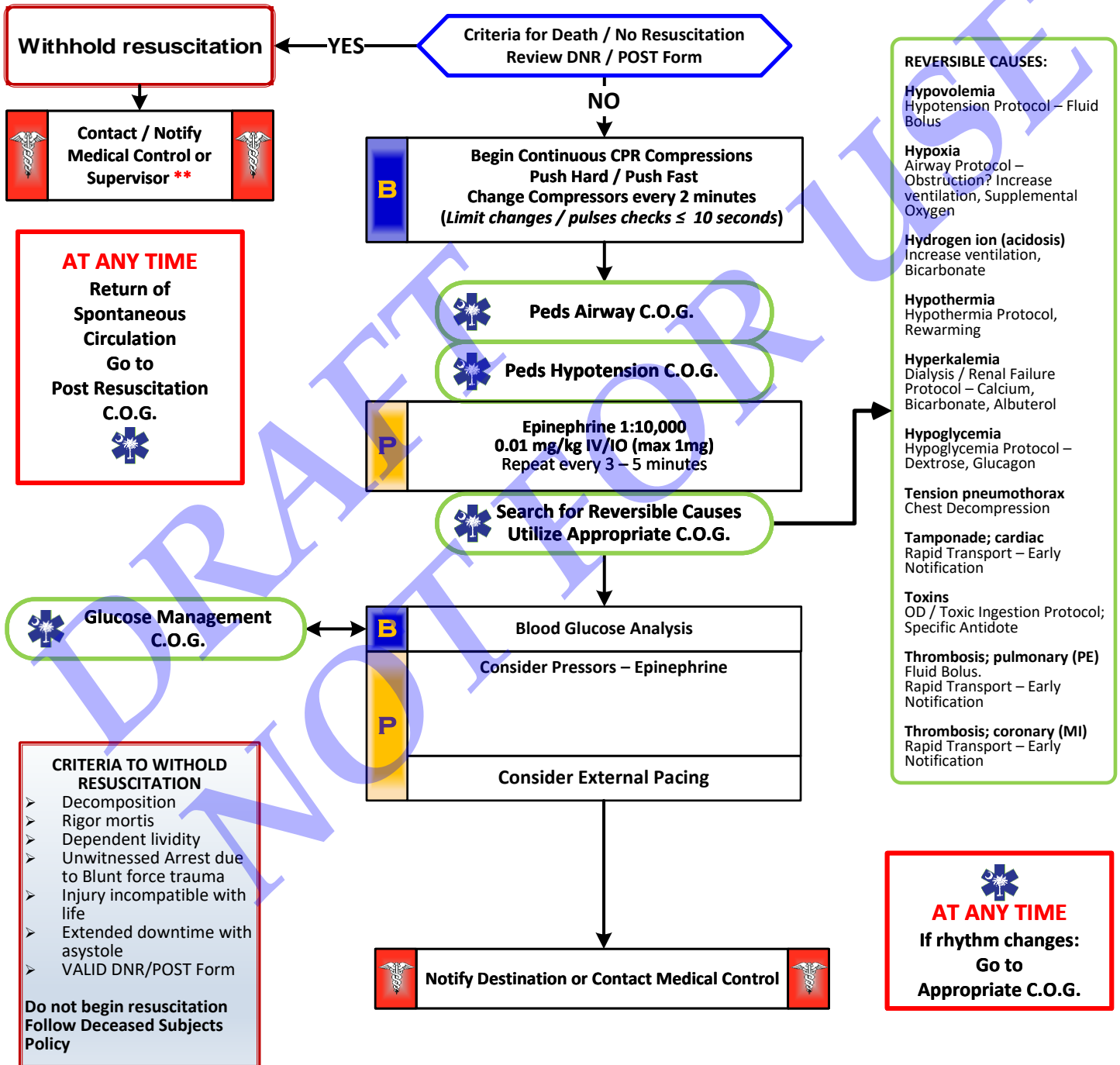
- Events leading to arrest
- Estimated downtime
- Past medical history
- Medications
- Existence of terminal illness
- Airway obstruction
- Hypothermia
- Suspected abuse; shaken baby syndrome, Pediatric Abusive Head Trauma pattern of injuries
- SIDS

Signs and Symptoms

- Unresponsive
- Cardiac Arrest
- Signs of lividity or rigor

Differential

- Respiratory failure
- Foreign body
- Hyperkalemia
- Infection (croup, epiglottitis)
- Hypovolemia (dehydration)
- Congenital heart disease
- Trauma
- Tension pneumothorax
- Hypothermia
- Toxin or medication
- Consider NARCAN early
- Hypoglycemia
- Acidosis



PEDIATRIC CARDIOVASCULAR



Pediatric Asystole / PEA

PEARLS

- **Recommended Exam: Mental Status, Heart, Lungs**
- **In order to be successful in pediatric arrests, a cause must be identified and corrected.**
- **Airway and Ventilation is the most important intervention in Pediatric Cardiac Arrest. This should be accomplished immediately. Patient survival is often dependent on airway management success.**
- ****Contact Supervisor Based on Local Policy and Written Protocol to Withhold Resuscitation.**
- **Team Focused Approach / Pit-Crew Approach recommended; assign responders to predetermined tasks. Refer to optional protocol or development of local agency protocol.**
- **Efforts should be directed at high quality and continuous compressions with limited interruptions and early defibrillation when indicated.**
- **DO NOT HYPERVENTILATE: If no advanced airway (BIAD, ETT) compression to ventilation ratio is 30:2. If advanced airway in place, ventilate 10 breaths per minute with continuous, uninterrupted compressions.**
- **Do not interrupt compressions to place endotracheal tube. Consider BIAD first to limit interruptions.**
- Success is based on proper planning and execution. Procedures require space and patient access. Make room to work.
- **Reassess and document BIAD and / or endotracheal tube placement and EtCO₂ frequently, after every move, and at transfer of care.**
 - All Cardiac Arrest patients should have continuous waveform capnography applied
 - IV / IO access and drug delivery is secondary to high-quality chest compressions and early defibrillation.
 - IV access is preferred route. Follow IV or IO Access Protocol .
- **Defibrillation:**
 - Follow manufacture's recommendations concerning defibrillation / cardioversion energy when specified.
 - Charge defibrillator during chest compressions, near the end of 2-minute cycle, to decrease peri-shock pause.
 - Following defibrillation, provider should immediately restart chest compressions with no pulse check until end of next cycle.
- **End Tidal CO₂ (EtCO₂)**
 - If EtCO₂ is < 10 mmHg, improve chest compressions.
 - Goal EtCO₂ = 35-45 mmHg
 - If EtCO₂ spikes, typically > 40 mmHg, consider Return of Spontaneous Circulation (ROSC)
- **Special Considerations:**
 - **Opioid Overdose** - If suspected, administer Naloxone per Overdose / Toxic Ingestion Protocol while ensuring airway, oxygenation, ventilations, and high-quality chest compressions.
 - **Drowning / Suffocation / Asphyxiation / Hanging / Lightning Strike** – Hypoxic associated cardiac arrest and prompt attention to airway and ventilation is priority followed by high-quality and continuous chest compressions and early defibrillation.
- **KEY DOCUMENTATION:**
 - Resuscitation attempted and all interventions performed
 - Arrest witnessed / Not-witnessed.
 - CPR Prior to EMS Arrival
 - First monitored rhythm
 - Outcome / Any ROSC
 - Presumed Etiology (Presumed Primary Cardiac; Trauma; Submersion; Respiratory; Other Non-Cardiac; Unknown)
 - Documentation of all acquired EKG Strips
 - Documentation of Termination of Resuscitation Efforts and reasons for Termination.
 - Reassess and document endotracheal tube placement and EtCO₂ frequently, after every move, and at transfer of care.



Pediatric Post Resuscitation

History

- Respiratory arrest
- Cardiac arrest

Signs/Symptoms

- Return of pulse

Differential

- Continue to address specific differentials associated with the original dysrhythmia

Age Appropriate Vital Signs		
Age	SBP	HR
Premature	55 - 75	120 - 170
0 - 3 m	65 - 85	100 - 150
3 - 6 m	70 - 90	90 - 120
6 - 12 m	80 - 100	80 - 120
1 - 3 Y	90 - 105	70 - 110
3 - 6 Y	95 - 110	65 - 110
6 - 12 Y	100 - 120	60 - 95

Cardiac Monitor/12 Lead ECG Acquisition / Interpretation

Repeat Primary Assessment

B Optimize Ventilation and Oxygenation
Maintain SpO2 \geq %

Pediatric Airway C.O.G.

B EtCO2: 35 – 45 mmHg
DO NOT HYPERVENTILATE
Monitor Vital Signs / Reassess

Vascular Access C.O.G.

Hypotension
Age based?

← YES →

NO

B Blood Glucose Assessment

Symptomatic
Bradycardia?

← YES →

NO

Symptomatic
Tachycardia?

← YES →

NO

Antiarrhythmic
utilized for ROSC

← YES →

NO

P Continue Antiarrhythmic Utilized

P Consider Sedation / Paralysis

Notify Destination or
Contact Medical Control

Arrhythmias are common and usually self limiting after ROSC



If Arrhythmia Persists follow Rhythm Appropriate C.O.G.

Peds Respiratory Distress
C.O.G.
(if Respiratory Distress)

Hypotension
C.O.G.

Glucose Management
C.O.G.

Pediatric Bradycardia
C.O.G.

Pediatric Tachycardia
C.O.G.



Pediatric Post Resuscitation

PEARLS

- **Recommended Exam: Mental Status, Neck, Skin, Lungs, Heart, Abdomen, Extremities, Neuro**
- Hyperventilation is a significant cause of hypotension / recurrence of cardiac arrest in post resuscitation phase and must be avoided.
- Appropriate post-resuscitation management may best be planned in consultation with medical control.
- Most patients immediately post resuscitation will require ventilatory assistance.
- The condition of post-resuscitation patients fluctuates rapidly and continuously, and they require close monitoring.
- Common causes of post-resuscitation hypotension include hyperventilation, hypovolemia, pneumothorax, and medication reaction to ALS drugs.
- Titrate Pressor Agent to maintain a systolic blood pressure > 90 mmHg or a MAP of > 60. Ensure adequate fluid resuscitation is ongoing.
- **Pain/sedation:**
 - Patients requiring advanced airways and ventilation commonly experience pain and anxiety.
 - Unrelieved pain can lead to increased catecholamine release, ischemia, immunosuppression, and prolonged hospitalization.
 - Ventilated patients cannot communicate pain / anxiety and providers are poor at recognizing pain / anxiety.
 - Vital signs such as tachycardia and / or hypertension can provide clues to inadequate sedation, however they both are not always reliable indicators of patient's lack of adequate sedation.
 - Pain must be addressed first, before anxiety. Opioids are typically the first line agents before benzodiazepines. Ketamine is also a reasonable first choice agent.
- **Ventilator / Ventilation strategies:**
 - Tailored to individual patient presentations. Medical Control can indicate different strategies above.
 - In general ventilation with BVM should cause chest rise. With mechanical ventilation a reasonable tidal volume should be about 6 mL/kg and peak pressures should be < 30 cmH2O.
 - Continuous pulse oximetry and capnography should be maintained during transport for monitoring.
 - Head of bed should be maintained at least 10 – 20 degrees of elevation when possible to decrease aspiration risk.
- **EtCO2 Monitoring:**
 - Initial End tidal CO2 may be elevated immediately post-resuscitation, but will usually normalize.
 - Goal is 35 – 45 mmHg but avoid hyperventilation to achieve.
- Consider transport to facility capable of managing the post-arrest patient including cardiology / cardiac catheterization, intensive care service, and neurology services.
- The condition of post-resuscitation patients fluctuates rapidly and continuously, and they require close monitoring.
- **KEY DOCUMENTATION:**
 - Immediate post-arrest rhythms, vital signs (Pulse Rate, Blood Pressure, Respiratory Rate, Neurologic Status) and Oxygen Saturation.
 - Documentation of EndTidal CO2 measurements by Continuous Waveform Capnography.
 - Post-ROSC 12 lead EKG.



Pediatric Tachycardias (With A Pulse)

History

- Past medical history
- Medications or Toxic Ingestion (Aminophylline, Diet pills, Thyroid supplements, Decongestants)
- Drugs (nicotine, cocaine)
- Congenital Heart Disease
- Respiratory Distress
- Syncope or Near Syncope

Signs and Symptoms

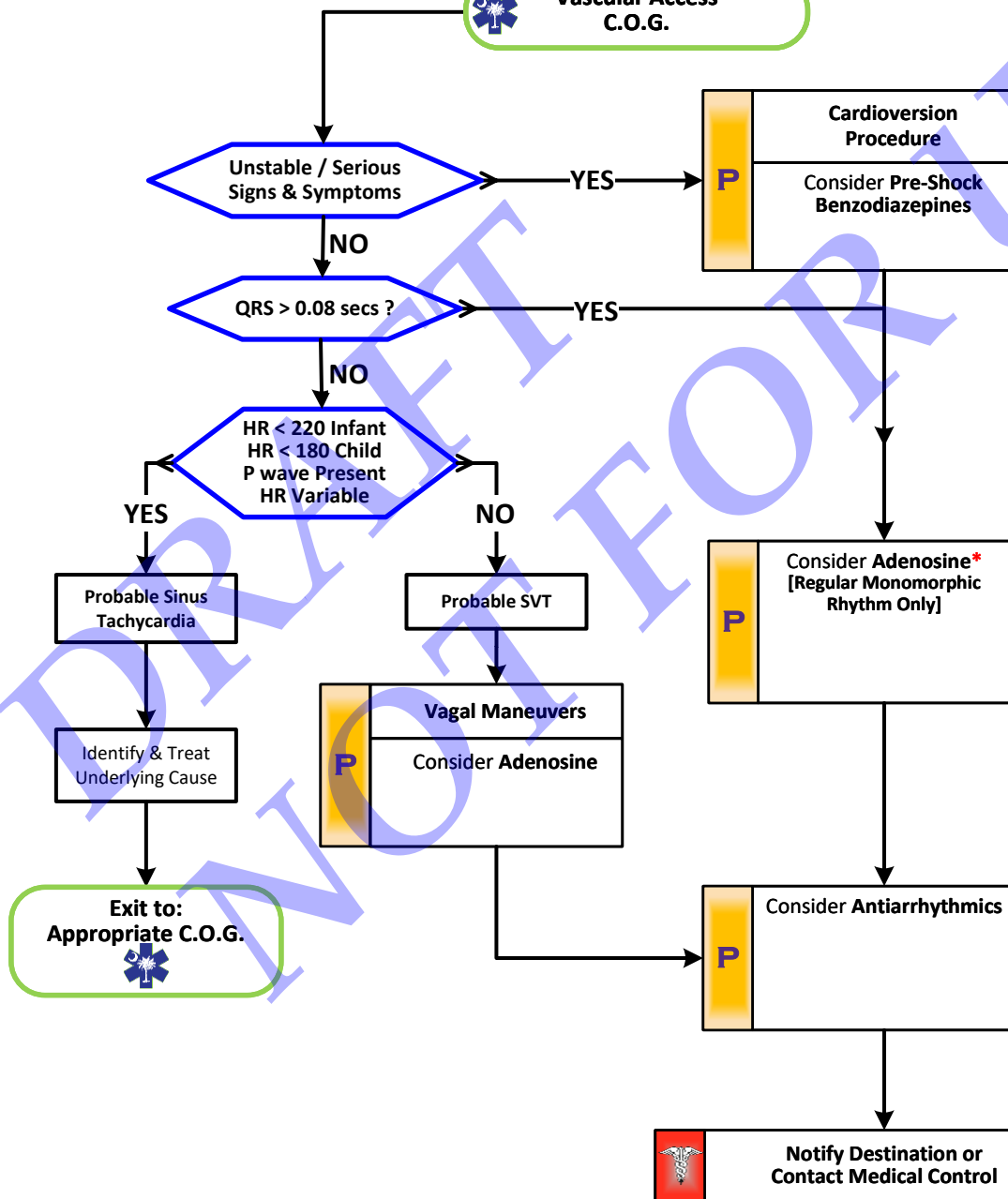
- Heart Rate:
 - Child > 180/bpm
 - Infant > 220/bpm
- Pale or Cyanosis
- Diaphoresis
- Tachypnea
- Vomiting
- Hypotension
- Altered Level of Consciousness
- Pulmonary Congestion
- Syncope

Differential

- Heart disease (Congenital)
- Hypo / Hyperthermia
- Hypovolemia or Anemia
- Electrolyte imbalance
- Anxiety / Pain / Emotional stress
- Fever / Infection / Sepsis
- Hypoxia
- Hypoglycemia
- Medication / Toxin / Drugs (see HX)
- Pulmonary embolus
- Trauma
- Tension Pneumothorax

Cardiac Monitor/12 Lead ECG Acquisition / Interpretation

Vascular Access C.O.G.



AT ANY TIME Pulseless
Go To Pediatric Cardiac Arrest C.O.G.

Single lead ECG able to diagnose and treat arrhythmia
12 Lead ECG not necessary to diagnose and treat, but preferred when patient stable

PEDIATRIC CARDIOVASCULAR



Pediatric Tachycardias (With A Pulse)

PEARLS

- **Recommended Exam: Mental Status, Skin, Neck, Lung, Heart, Abdomen, Back, Extremities, Neuro**
- **Serious Signs and Symptoms:**
 - Respiratory distress / failure.
 - Signs of shock / poor perfusion with or without hypotension.
 - AMS
 - Sudden collapse with rapid, weak pulse
- **Narrow Complex Tachycardia (≤ 0.08 seconds):**
 - Sinus tachycardia: P waves present. Variable R-R waves. Infants usually < 220 beats / minute. Children usually < 180 beats / minute.
 - SVT: $> 90\%$ of children with SVT will have a narrow QRS (≤ 0.08 seconds.) P waves absent or abnormal. R-R waves not variable. Usually abrupt onset. Infants usually > 220 beats / minute. Children usually > 180 beats / minute.
 - Atrial Flutter / Fibrillation
- **Wide Complex Tachycardia (> 0.08 seconds):**
 - SVT with aberrancy.
 - VT: Uncommon in children. Rates may vary from near normal to > 200 / minute. Most children with VT have underlying heart disease / cardiac surgery / long QT syndrome / cardiomyopathy.
- **Torsades de Pointes / Polymorphic (multiple shaped) Tachycardia:**
 - Rate is typically 150 to 250 beats / minute.
 - Associated with long QT syndrome, hypomagnesaemia, hypokalemia, many cardiac drugs.
 - May quickly deteriorate to Ventricular Fibrillation / Asystole..
- **Vagal Maneuvers:**
 - Breath holding. Blowing a glove into a balloon. Have child blow out "birthday candles" or through an obstructed straw. Infants: May put a bag of ice water over the upper half of the face careful not to occlude the airway.
- Separating the child from the caregiver may worsen the child's clinical condition.
- Pediatric paddles should be used in children < 10 kg or Broselow-Luten color Purple if available.
- Generally, the maximum sinus tachycardia rate is 220 – the patient's age in years.
- *** Adenosine should NOT be given for unstable or for irregular or for polymorphic wide-complex tachycardias as it may cause degeneration of the arrhythmia to Ventricular Fibrillation.**
- Monitor for hypotension after administration of Antiarrhythmics.
- Monitor for respiratory depression and hypotension associated with Benzodiazepines.
- Continuous pulse oximetry is required for all Patients.
- Document all rhythm changes with monitor strips and obtain monitor strips with each therapeutic intervention.
- **KEY DOCUMENTATION:**
 - Initial rhythm and all rhythm changes
 - Time, Dose, and Response to medications given
 - Cardioversion times, Synchronization, Number of Attempts, Joules, and Response
 - Obtain monitor strips after each intervention
 - Patient Weight
 - Pediatric length based tape color (for pediatrics who fit on tape).
 - History of event supporting treatment of underlying causes.
 - Blood Sugar Obtained
 - Use of Sedation for responsive patients



Pediatric Bradycardia

History

- Past medical history
- Foreign body exposure/swallowed
- Respiratory distress or arrest
- Apnea
- Possible toxic or poison exposure
- Congenital disease
- Medication (maternal or infant)

Signs and Symptoms

- Decreased heart rate
- Delayed capillary refill or cyanosis
- Mottled, cool skin
- Hypotension or arrest
- Altered level of consciousness

Differential

- Respiratory failure
 - Foreign body
 - Secretions
 - Infection (croup, epiglottitis)
- Hypovolemia (dehydration)
- Congenital heart disease
- Trauma
- Tension pneumothorax
- Hypothermia
- Toxin or medication
- Hypoglycemia
- Acidosis

AT ANY TIME
Pulseless
Go To Pediatric
Cardiac Arrest C.O.G.



Pediatric Airway C.O.G.

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

Poor Perfusion /
Decreased Blood Pressure
Respiratory Insufficiency

NO

Monitor & Reassess

YES



Vascular Access C.O.G.



Hypotension C.O.G.



Respiratory Distress C.O.G.

REVERSIBLE CAUSES:

Hypovolemia

Hypotension Protocol – Fluid Bolus

Hypoxia

Airway Protocol – Obstruction? Increase ventilation, Supplemental Oxygen

Hydrogen ion (acidosis)

Increase ventilation, Bicarbonate

Hypothermia

Hypothermia Protocol, Rewarming

Hyperkalemia

Dialysis / Renal Failure Protocol – Calcium, Bicarbonate, Albuterol

Hypoglycemia

Hypoglycemia Protocol – Dextrose, Glucagon

Tension pneumothorax

Chest Decompression

Tamponade; cardiac

Rapid Transport – Early Notification

Toxins

OD / Toxic Ingestion Protocol;
Specific Antidote

Thrombosis; pulmonary (PE)

Fluid Bolus.
Rapid Transport – Early Notification

Thrombosis; coronary (MI)

Rapid Transport – Early Notification

B	Heart Rate < 60 in Infant CPR
P	Epinephrine 1:10,000
P	Atropine

Consider Reversible Causes

P	Consider Pressor Agents
P	Consider External Pacing

Monitor & Reassess

Notify Destination or Contact Medical Control



Pediatric Bradycardia

PEARLS

- **Recommended Exam: Mental Status, Neck, Heart, Lungs, Neuro**
- **Age/Weight/Length based system to accurately calculate drug dosages and equipment**
- Infant = < 1 year of age
- The majority of pediatric arrests are due to airway problems.
- **Hypoxemia is a common cause of bradycardia. Ensure oxygenation and support respiratory effort.**
- Most maternal medications pass through breast milk to the infant.
- Hypoglycemia, severe dehydration and narcotic effects may produce bradycardia.
- Pediatric patients requiring external transcutaneous pacing require the use of pads appropriate for pediatric patients per the manufacturers guidelines.
- Minimum Atropine dose is 0.1 mg IV.
- **Identifying signs and symptoms of poor perfusion caused by bradycardia are paramount.**
- **Rhythm should be interpreted in the context of symptoms and pharmacological treatment given only when symptomatic, otherwise monitor and reassess.**
- **Consider hyperkalemia with wide complex, bizarre appearance of QRS complex, and bradycardia.**
 - Give Calcium Chloride or Gluconate in addition to Sodium Bicarbonate if hyperkalemia suspected.
 - Consider high dose albuterol nebulizer if hyperkalemia suspected.
- **12-Lead ECG:**
 - 12 Lead ECG not necessary to diagnose and treat
 - Obtain when patient is stable and/or following rhythm conversion.
- Pharmacological treatment of Bradycardia is based upon the presence or absence of symptoms. **If symptomatic treat, if asymptomatic, monitor only.**
- **Atropine:**
 - Atropine is considered a first line agent in symptomatic bradycardia.
 - Ineffective and potentially harmful in cardiac transplantation. May cause paradoxical bradycardia.
- **Symptomatic bradycardia causing shock or peri-arrest condition:**
 - If no IV or IO access immediately available start Transcutaneous Pacing, establish IV / IO access, and then administer atropine and/or epinephrine.
 - Epinephrine or Dopamine may be considered if no response to Atropine.
- **Symptomatic condition**
 - Arrhythmia is causing symptoms such as palpitations, lightheadedness, or dyspnea, but cardiac arrest is not imminent.
 - Symptomatic bradycardia usually occurs at rates < 50 beats per minute.
 - Search for underlying causes such as hypoxia or impending respiratory failure.
- **Serious Signs / Symptoms:**
 - Hypotension. Acutely altered mental status. Signs of shock / poor perfusion.
 - Acute CHF.
- **Transcutaneous Pacing Procedure (TCP)**
 - Indicated with unstable bradycardia unresponsive to medical therapy.
 - If time allows transport to specialty center because transcutaneous pacing is a temporizing measure.
 - Transvenous / permanent pacemaker will probably be needed.
 - Immediate TCP with high-degree AV block (2d or 3d degree) with no IV / IO access.
- Consider treatable causes for Bradycardia (Beta Blocker OD, Calcium Channel Blocker OD, etc.)
- If vascular access is problematic and the patient is symptomatic, initial therapy with external pacing may be warranted.
- **KEY DOCUMENTATION ELEMENTS:**
 - Initial Vital Signs and Blood Glucose
 - Cardiac Rhythm / Rate
 - Time, dose, and response to medications administered
 - Pacing:
 - Time started or discontinued
 - Rate, Joules, Capture
 - Response Rate
 - Sedation utilized – dose and timing
 - Patient Weight
 - Pediatric length based on tape color
 - History of event supporting treatment of underlying causes



Pediatric Pulmonary Edema / CHF

History

- Congenital Heart Disease
- Chronic Lung Disease
- Congestive heart failure
- Past medical history

Signs/Symptoms

- Infant: Respiratory distress, poor feeding, lethargy, weight gain, +/- cyanosis
- Child/Adolescent: Respiratory distress, bilateral rales, apprehension, orthopnea, jugular vein distention (rare), pink, frothy sputum, peripheral edema, diaphoresis, chest pain
- Hypotension, shock

Differential

- Congestive heart failure
- Asthma
- Anaphylaxis
- Aspiration
- Pleural effusion
- Pneumonia
- Pulmonary embolus
- Pericardial tamponade
- Toxic Exposure

B	Pulse Oximetry
	Capnography if Available
	Maintain Pulse Ox $>$ % EtCO₂ $>$ 35 and $<$ 45

Cardiac Monitor/12 Lead ECG Acquisition / Interpretation

**Airway Patent
Ventilations adequate
Oxygenation adequate**

NO → **Pediatric Airway C.O.G. (if indicated)**

Pediatric Respiratory Distress C.O.G. (if indicated)

YES

**Allergic Reaction
Anaphylaxis**

YES → **Allergic Reaction / Anaphylaxis C.O.G.**

NO

Vascular Access C.O.G.

B	Position child with Head of bed in up-position (25-40°) Flex hips with support under knees so that they are bent 90°
	Transport to a Pediatric Specialty Center <i>if available</i>

Notify Destination or Contact Medical Control

***OLMC**

P	Consider: CPAP / BiPAP	P
P	Consider: Diuretics Inotropic Agents	P

REQUIRES Direct ONLINE MEDICAL CONTROL INPUT

PEDIATRIC CARDIOVASCULAR



Pediatric Pulmonary Edema / CHF

PEARLS

- **Recommended exam: Mental status, Respiratory, Cardiac, Skin, Neuro**
- **Contact Medical Control early in the care of the pediatric cardiac patient.**
- **Most children with CHF have a congenital heart defect, obtain a precise past medical history.**
- **Congenital heart disease varies by age:**
 - < 1 month: Tetralogy of Fallot, Transposition of the great arteries, Coarctation of the aorta.
 - 2 – 6 months: Ventricular septal defects (VSD), Atrioseptal defects (ASD).
- **Any age:** Myocarditis, Pericarditis, SVT, heart blocks.
- **Treatment of Congestive Heart Failure / Pulmonary edema may vary depending on the underlying cause and should include consultation with Medical Control:**
- Do not assume all wheezing is pulmonary, especially in a cardiac child: avoid albuterol unless strong history of recurrent wheezing secondary to pulmonary etiology (discuss with Medical Control)
- **KEY DOCUMENTATION:**
 - Initial Vital Signs including B/P, Pulse Rate, Respiratory Rate, SpO2, EtCO2,
 - Pertinent Exam: Cardiac Sounds, Chest Auscultation, Jugular Veins, Peripheral Edema, Accessory muscle use
 - Presenting Symptoms: Chest Pain, Dyspnea, Palpitations, Edema, etc.
 - EKG Evaluation and Strips.
 - Repeat Vital Signs as above + Repeat Physical Examination
 - Interventions and response to interventions

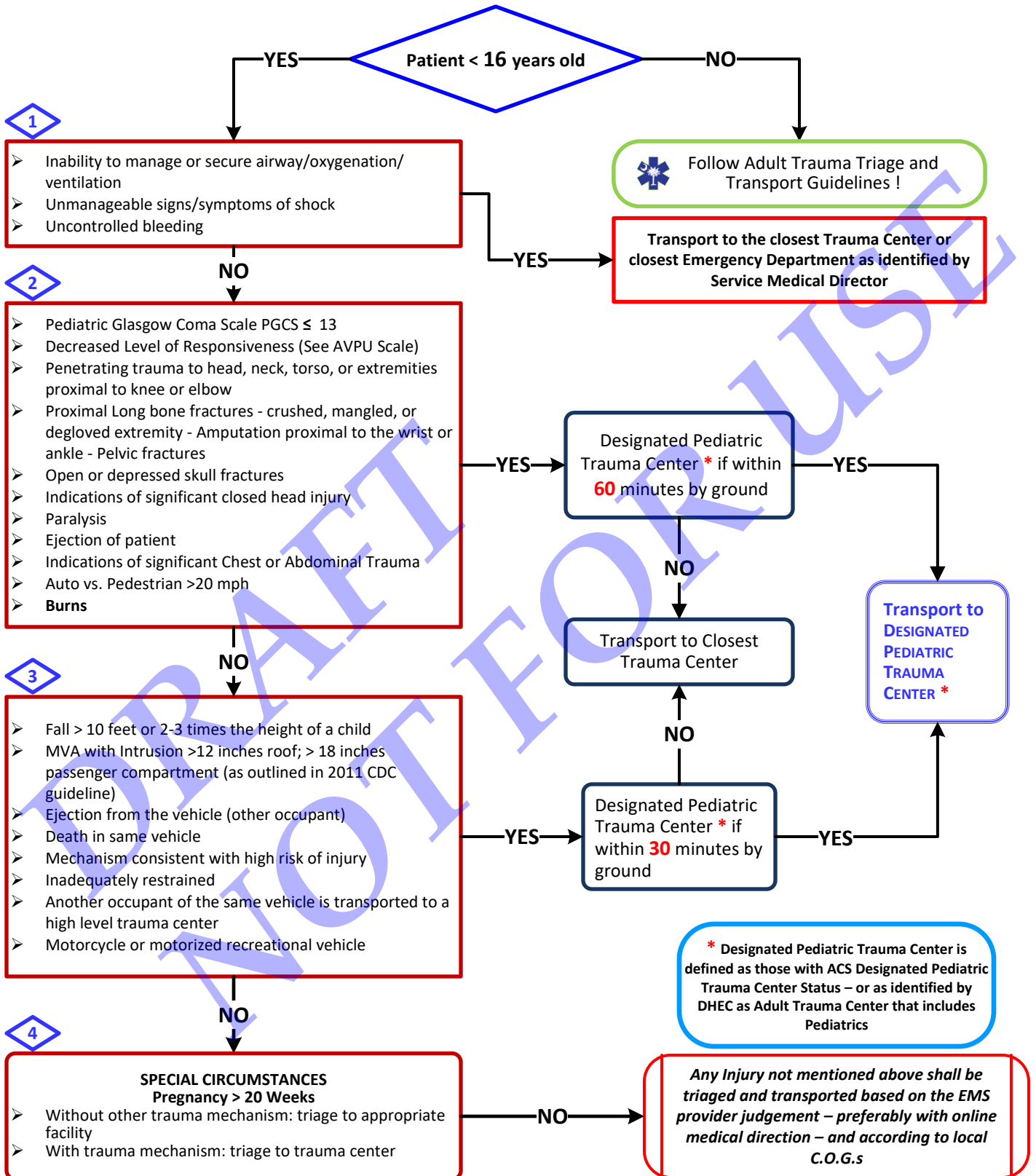


Pediatric Trauma Triage & Transport



Assessment for Serious Signs / Symptoms / Mechanism

This protocol applies to patients a prudent provider should consider as having a mechanism/event consistent with significant/major trauma and is not meant to be inclusive of all minor injuries



PEDIATRIC TRAUMA



Pediatric Trauma Triage & Transport



PEDIATRIC GLASGOW COMA SCALE (PGCS)

ACTION	AGE > 1 year	AGE < 1 YEAR		SCORE
EYE Opening	Spontaneously	Spontaneously		4
	To Verbal Command	To Shout		3
	To Pain	To Pain		2
	No Response	No Response		1
MOTOR Response	Obeys	Spontaneously		6
	Localizes Pain	Localizes Pain		5
	Flexion - Withdrawal	Flexion - Withdrawal		4
	Flexion - Abnormal (Decorticate Rigidity)	Flexion - Abnormal (Decorticate Rigidity)		3
	Extension (Decerebrate Rigidity)	Extension (Decerebrate Rigidity)		2
	No Response	No Response		1
	> 5 years	2 - 5 Years	0 - 23 Months	
VERBAL Response	Oriented	Appropriate words/phrases	Smiles/coos appropriately	5
	Disoriented/Confused	Inappropriate words	Cries and IS Consolable	4
	Inappropriate words	Persistent cries and screams	Persistent inappropriate crying and/or screaming	3
	Incomprehensible sounds	Grunts	Grunts, agitated, and restless	2
	No Response	No Response	No Response	1
Total Pediatric Glasgow Coma Score (3-15)				

Age Adjusted Abnormal Vital Signs			
Age	Heart Rate	Respiratory Rate	Systolic BP mm/Hg
Infant - 1 Y	<100 or >180	<30 or >60	<70
Toddler (1-2 Y)	<80 or >150	<20 or > 40	<75
Preschooler (3-5 Y)	<75 or >110	<20 or > 34	<80
School Age (6-9 Y)	<70 or > 100	<16 or >25	<85
Adolescent (10-17 Y)	<60 or >100	<12 or >20	<90

AVPU Scale	
A	Patient Alert
V	Patient Responds to Voice
P	Patient Responds to Pain
U	Patient Unresponsive

***** WHEN IN DOUBT – TRANSPORT TO PEDIATRIC TRAUMA CENTER.
*** DO NOT HESITATE TO CONTACT MEDICAL CONTROL FOR QUESTIONS OR ADVICE !**

* DESIGNATED PEDIATRIC TRAUMA CENTERS (SC)

- Grand Strand Medical Center [F00004780]
- PRISMA Health Greenville Memorial [F00004703]
- McLeod Regional Medical Center – Florence [F00045381]
- MUSC Children’s Health [F00004807]
- PRISMA Health Richland [F00004741]

* DESIGNATED PEDIATRIC TRAUMA CENTERS (Out of State)

- CMC Charlotte (NC)
- Augusta UMC / Children’s Hospital of Georgia (GA)
- Savannah Children’s (GA)

KEY DOCUMENTATION ELEMENTS:

- Mechanism of injury
- Patient age and sex
- Primary and secondary survey
- Apparent injuries
- Serial vital signs including neurologic status assessments
- Some clinicians ask for the lowest blood pressure and highest pulse
- Scene time
- Procedures performed and patient response
- Pre-arrival notification and preparation



Pediatric Major Trauma

History

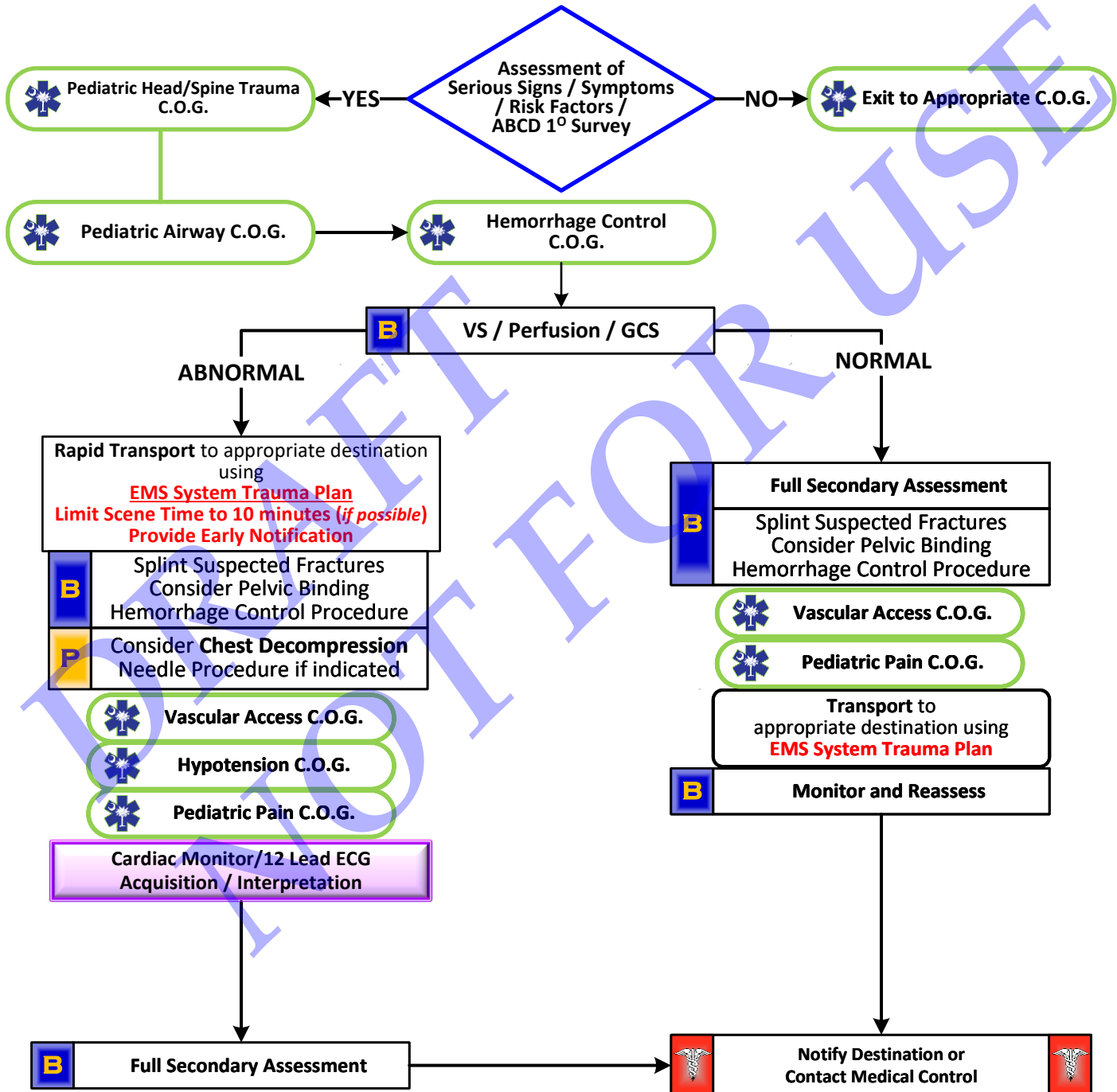
- Time and mechanism of injury
- Height of any fall
- Damage to structure or vehicle
- Location in structure or vehicle
- Others injured or dead
- Any Loss of Consciousness
- Speed and details of MVC
- Restraints / Protective equipment
Car Seat / Helmet / Pads / Ejection
- Past medical history
- Medications

Signs and Symptoms

- Pain, swelling
- Deformity, lesions, bleeding
- Altered mental status
- Unconscious
- Hypotension or shock
- Cardiac/Respiratory Arrest

Differential (Life Threatening)

- Chest
 - Tension pneumothorax
 - Flail chest
 - Pericardial tamponade
 - Open chest wound
 - Hemothorax
- Intra-abdominal bleeding
- Pelvis / Femur fracture
- Spine fracture / Cord injury
- Head injury (see Head Trauma)
- Extremity fracture / dislocation
- HEENT (Airway obstruction)
- Hypothermia





Pediatric Major Trauma

DRAFT FOR USE

PEARLS

- **Recommended Exam: Mental Status, Skin, HEENT, Heart, Lung, Abdomen, Extremities, Back, Neuro**
- **Transport Destination is chosen based on the EMS System Trauma Plan with EMS pre-arrival notification.**
- Examine all restraints / protective equipment for damage.
- In prolonged extrications or serious trauma consider air transportation for extended transport times.
- Do not overlook the possibility for child abuse.
- Consider non-accidental trauma in situations where injuries are inconsistent with mechanism, unexplained injuries exist, or there are conflicting reports of injury
- See considerations for Non-accidental trauma in Pediatric Head/Spine Trauma Protocol
- Scene times should **not** be delayed for procedures. These should be performed en route when possible.
- Bag valve mask is an acceptable method of managing the airway if pulse oximetry can be maintained above 90%.
- **KEY DOCUMENTATION ELEMENTS:**
 - Mechanism of injury
 - Patient age and sex
 - Primary and secondary survey
 - Apparent injuries
 - Serial vital signs including neurologic status assessments
 - Some clinicians ask for the lowest blood pressure and highest pulse
 - Scene time
 - Procedures performed and patient response
 - Pre-arrival notification and preparation



Pediatric Head Trauma

History

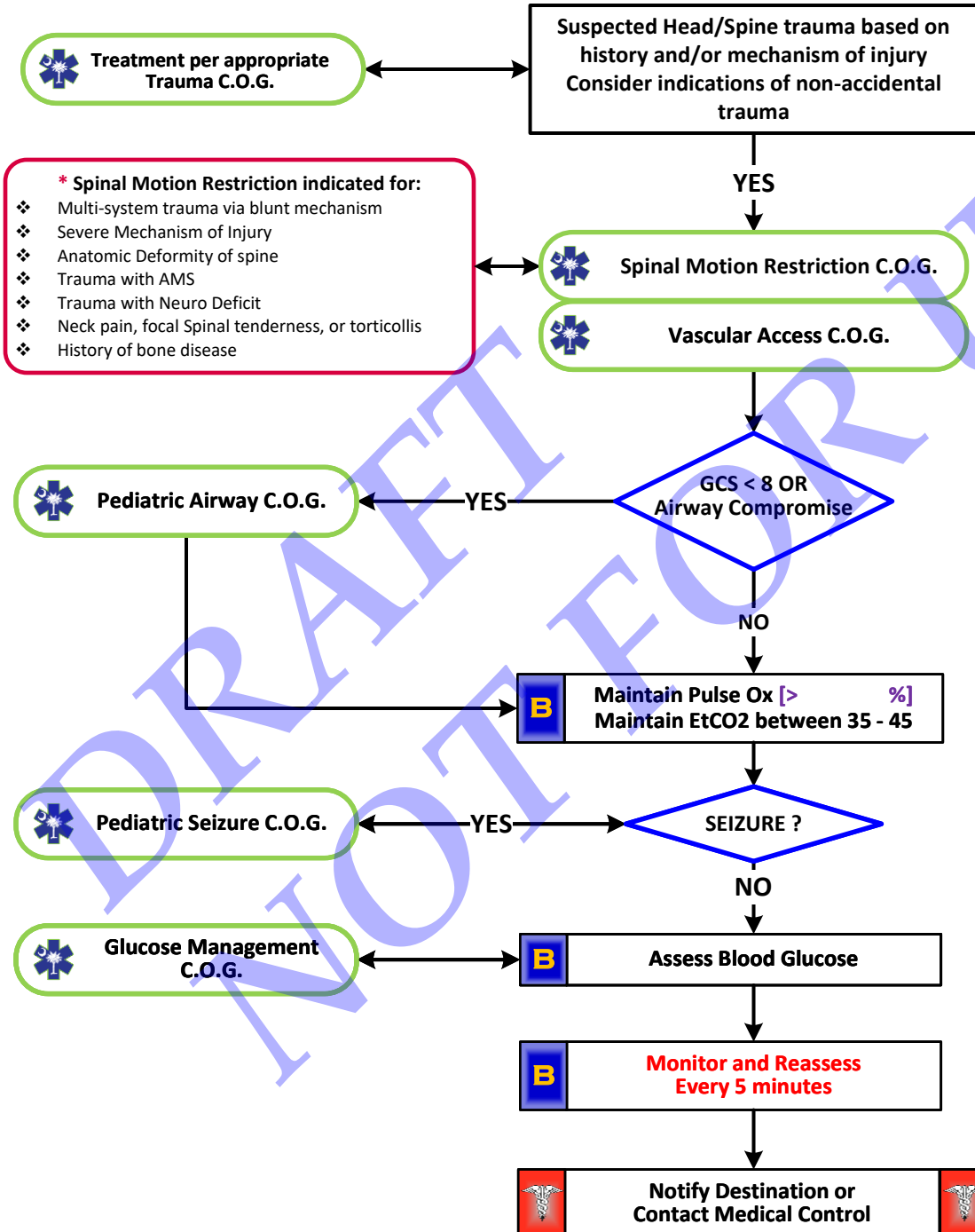
- Time of injury
- Mechanism (blunt vs. penetrating)
- Loss of consciousness
- Bleeding
- Past medical history
- Medications
- Evidence for multi-trauma
- Evidence of abuse

Signs and Symptoms

- Pain, swelling, bleeding
- Altered mental status
- Unconscious
- Respiratory distress / failure
- Vomiting
- Major traumatic mechanism of injury
- Seizure
- Gait Disturbance

Differential

- Skull fracture
- Brain injury (Concussion, Contusion, Hemorrhage or Laceration)
- Epidural hematoma
- Subdural hematoma
- Subarachnoid hemorrhage
- Spinal injury
- Abuse





Pediatric Head Trauma

❖ Considerations for Non-Accidental Trauma:

- Injuries inconsistent with mechanism or history
- Conflicting historical reports of injury
- Unexplained or underexplained injury

❖ Severe Mechanism Events:

- Fall greater than 10 feet or 2-3 x height of child
- High risk auto crash (MVA with >12 inches intrusion of roof, or >18 inches of passenger compartment, ejection, death of other occupant in vehicle) OR Auto-vs-Pedestrian
- Axial load injuries (i.e. diving)
- High velocity blunt trauma

❖ Altered Mental Status:

- Inconsolable infant/child, extreme agitation
- Decreased LOC (AVPU scale) or Pediatric GCS <15

❖ Focal Neurological findings:

- Asymmetric movement of extremities
- Abnormal gait/tone or abrupt change in ability to walk/stand

❖ Special Considerations

- Spinal Motion Restriction – appropriately sized cervical collar + Spinal stabilization with head, neck, and torso in alignment. Methods of accomplishing spinal motion restriction might include a pediatric immobilization device, long backboard, scoop stretcher, vacuum mattress, or ambulance cot.
- There is generally no role for spinal motion restriction in penetrating trauma
- In determining method of spinal motion restriction, consider patient age, associated injuries, and ability to cooperate with motion restriction efforts
- Appropriately sized cervical collar is critical: Chin is flush with the chin piece, collar is snug but not touching trachea.
- If an appropriately sized cervical collar is not available or not tolerated, consider foam immobilization device or towel rolls
- When warranted, use approved pediatric immobilization devices
- If adult or pediatric long spine boards are used to maintain motion restriction, ensure appropriate padding for voids
- In young children, particularly under the age of 3, variation of head size to body ratio there is significant concern in the spinal motion restriction process. It is critical to avoid flexion of the upper cervical spine. Special attention to appropriate neutral in-line positioning of the head while supine is warranted and should include attention to appropriate patient positioning and use of appropriate padding of the shoulders/torso. Failure to do so may result in unintended movement of the cervical spine or potential airway compromise.

PEARLS

- **Recommended Exam: Mental Status, HEENT, Heart, Lungs, Abdomen, Extremities, Back, Neuro**
- Increased intracranial pressure (ICP) may cause hypertension and bradycardia (Cushing's Response).
- Hypotension usually indicates injury or shock unrelated to the head injury.
- The most important item to monitor and document is a change in the level of consciousness.
- Concussions are periods of confusion or LOC associated with trauma which may have resolved by the time EMS arrives. Any prolonged confusion or mental status abnormality which does not return to normal within 15 minutes or any documented loss of consciousness should be evaluated by a physician ASAP.
- **KEY DOCUMENTATION ELEMENTS:**
 - Airway status and management
 - EtCO₂ monitored and documented for all traumatic brain injury (TBI) patients with advanced airway and strict avoidance of hyperventilation, overventilation, and hypocapnia)
 - Neurological status with vitals: AVPU, GCS
 - Exams: Neurological and Mental Status Assessment pre- and post-treatment
 - Triage to the appropriate level hospital within the local trauma system