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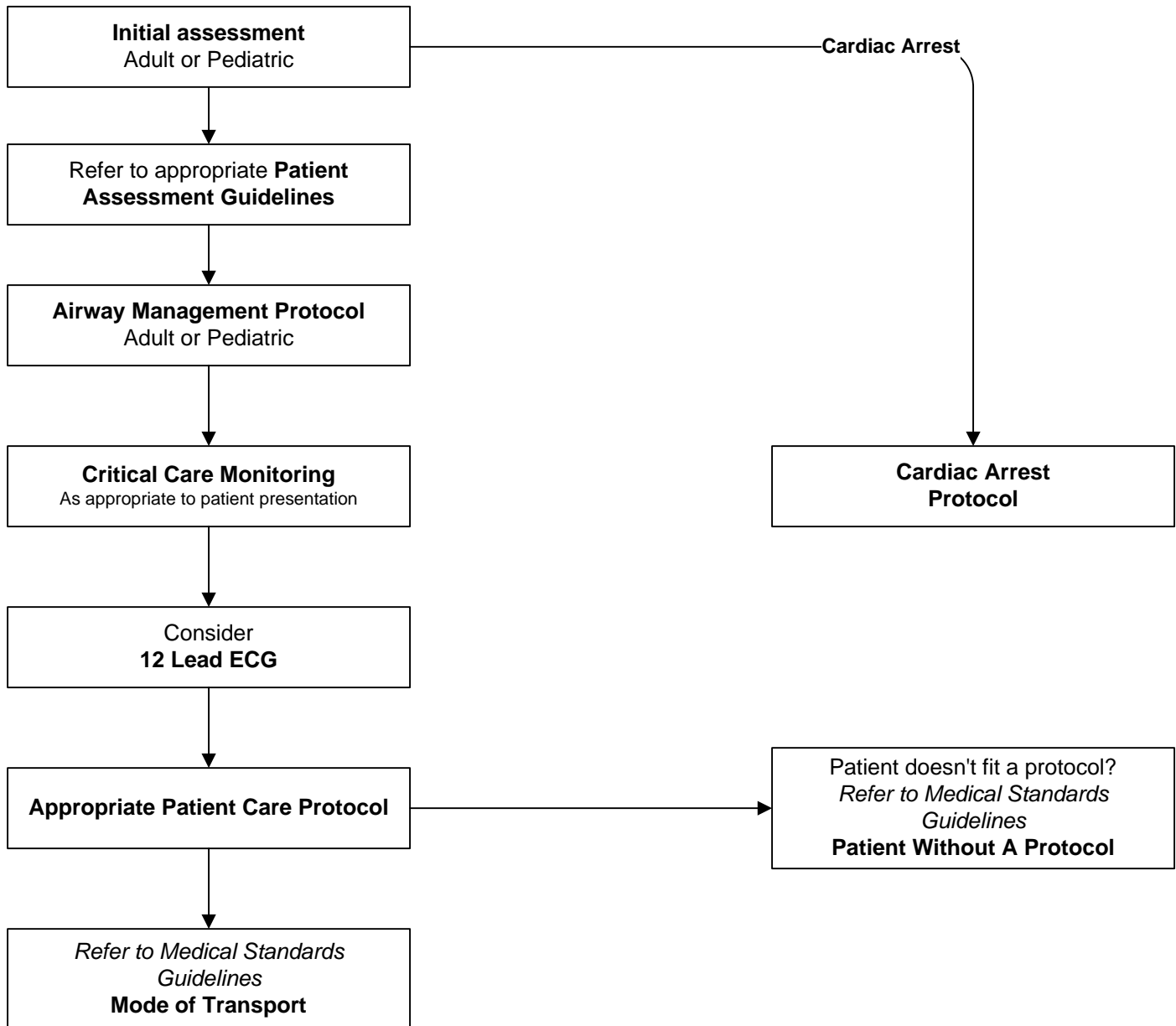
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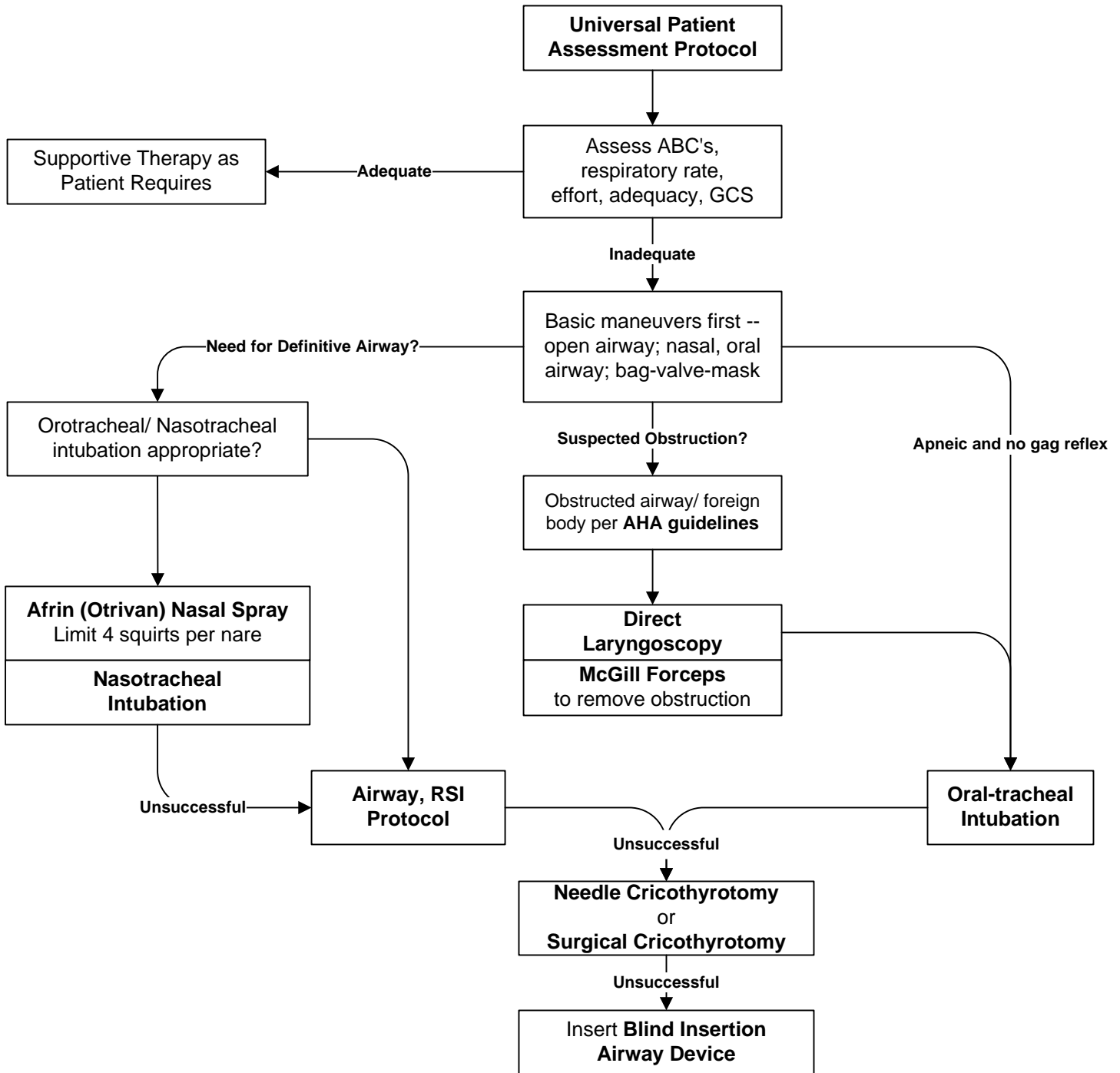
### **Drug Formulary**

# Universal Patient Assessment Protocol



## Pearls:

- **Exam:** Minimal exam if not noted on the specific protocol is vital signs, mental status, location of injury or complaint, and review of labs, x-rays, and medical records if available.
- **Critical Care Monitoring** includes; Cardiac Monitor and/or Pacer, 12 Lead ECG, Pulse Oximetry, Capnometry, Invasive Pressure Monitoring, Esophageal Stethoscope, Doppler (Vascular or OB Probe) and continuous Temperature Monitoring.
- Required vital signs on every patient include blood pressure, pulse, respirations, pulse oximetry, temperature, pain / severity.
- If suspicion of aortic dissection, blood pressure in all extremities should be obtained and documented.
- Timing of transport should be based on patient's clinical condition and the Mode of Transport Guideline.

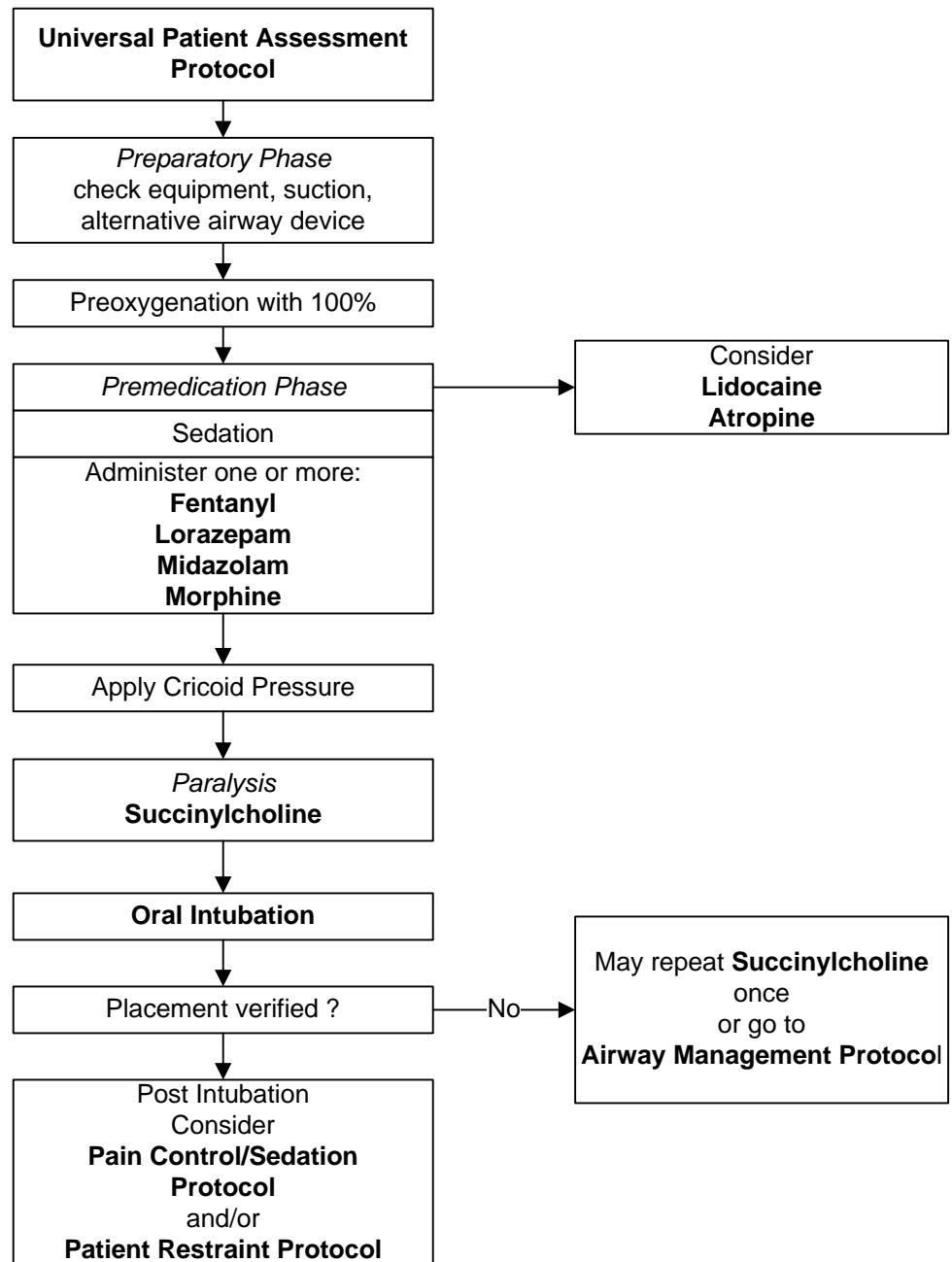


**Pearls:**

- **Capnometry or capnography to measure CO2 is mandatory with all methods of intubation. Document result.**
- ETT placement must be confirmed by at least two indicators (CXR, ETCO2, breath sounds, chest assessment, etc.).
- Maintain C-spine immobilization for patients with suspected spinal injury.
- In suspected head trauma, ventilation should be done to maintain normocapnia; pCO2 of 35-45. Unless signs of acute neurological deterioration.
- **Gastric tube placement** should be considered in all intubated patients.
- Consider c-collar to maintain ETT placement for all intubated patients.

Reference: Tintinalli, J.E., Kelen, G.D., Stapczynski, J.S. Emergency Medicine 6th Ed. 2004, Mcgraw Hill. Pg 102-123.

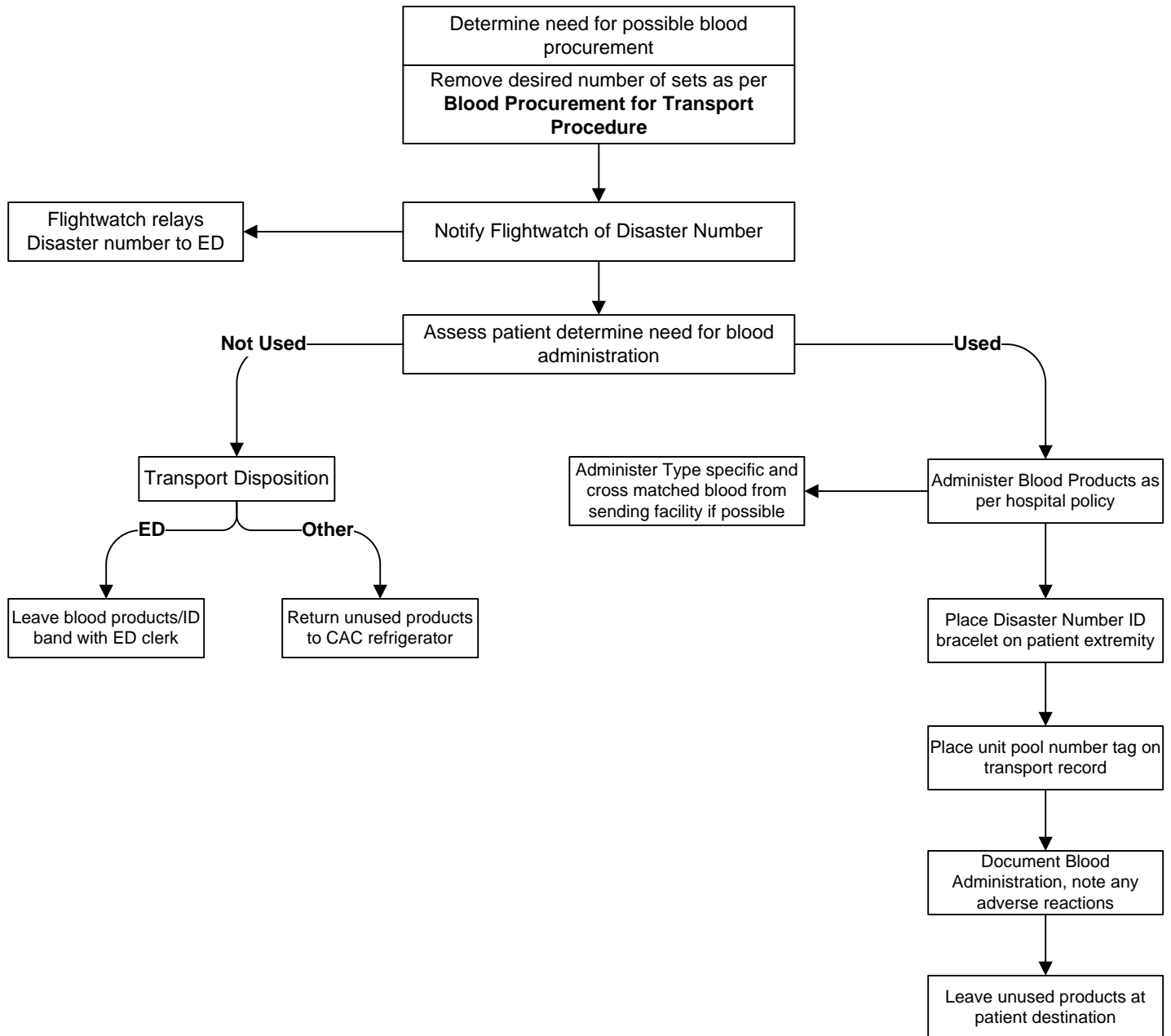
# Airway Management: Rapid Sequence Induction



**Pearls:**

- **If first intubation attempt fails, make an adjustment and try again:**
- Different laryngoscope blade
- Different ETT size
- Change cricoid pressure
- Apply BURP maneuver (**B**ack [posterior], **U**p, and to patient's **R**ight **P**osterior)
- Laryngeal manipulation
- Change head positioning, if no c-spine trauma
- Consider other provider after two unsuccessful attempts.
- In emergent RSI situations, pulse oximetry is the minimum amount of monitoring equipment.
- Assign roles prior to procedure, preferably one provider to airway, one provider for medications/monitoring.
- Adult patients requiring a second dose of **Succinylcholine**, should be premedicated with **Atropine**.

**Reference:** Tintinalli, J.E., Kelen, G.D., Stapczynski, J.S. Emergency Medicine 6th Ed. 2004, Mcgraw Hill. Pg 108-120,1559t.

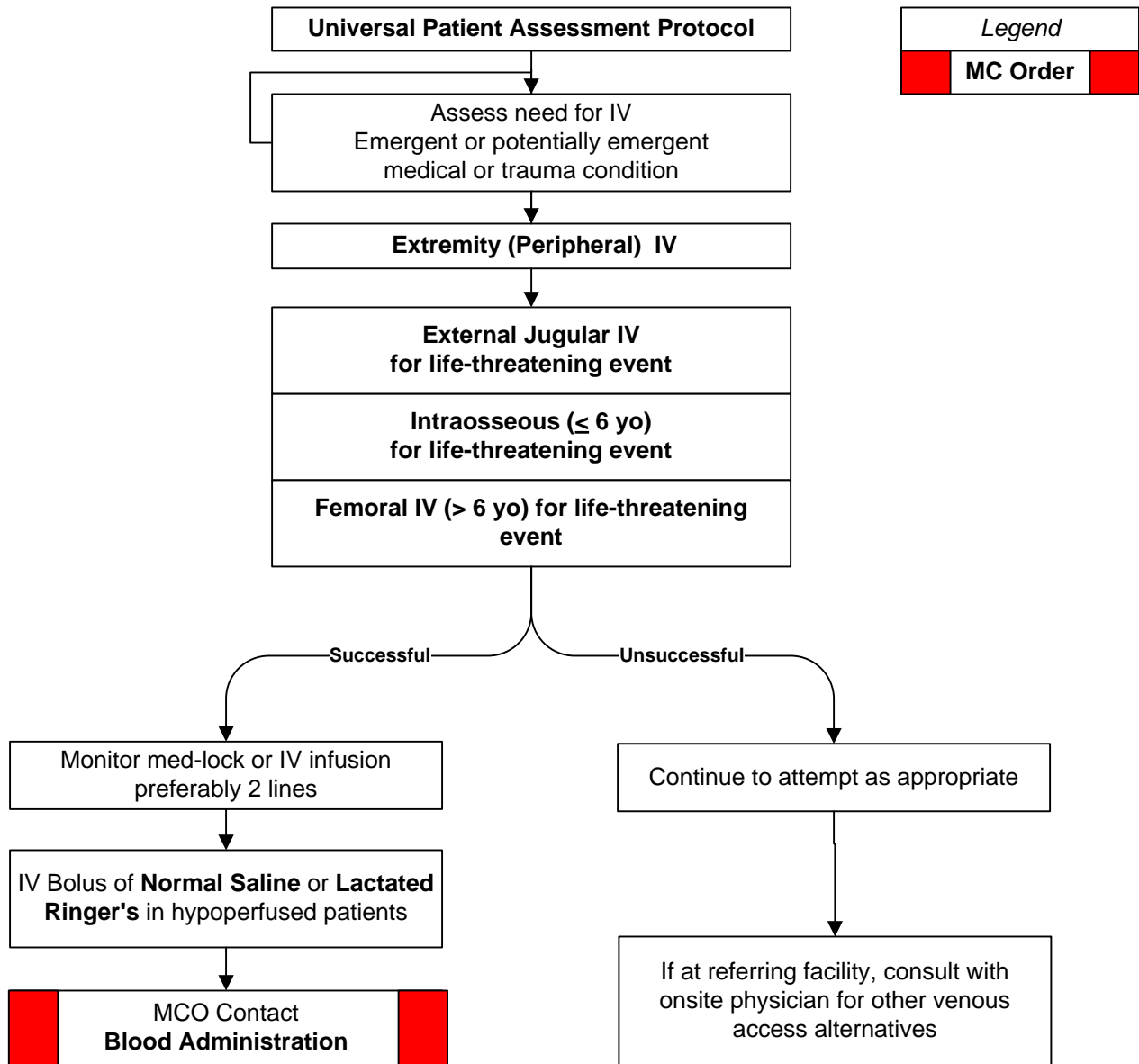


**Pearls:**

- Refer to the UNC Hospitals Department of Nursing-Nursing Procedure Manual for ***Transfusion of Blood and Blood Products***.
- If any adverse reaction noted stop transfusion immediately.
- Document vital signs including temperature at least prior to administration and every fifteen minutes during transfusion.

**Reference:** Tintinalli, J.E., Kelen, G.D., Stapczynski, J.S. Emergency Medicine 6th Ed. 2004, Mcgraw Hill.

# IV Access/ Fluid Administration



## Pearls:

- External jugular ( $> 12$  years of age).
- Any prehospital fluids or medications approved for IV use, may be given through an intraosseous IV.
- All IV rates should be at KVO (minimal rate to keep vein open) unless administering fluid bolus.
- External jugular lines can be attempted initially in life-threatening events where no obvious peripheral site is noted or when unable to establish extremity IV in patients requiring IV access.
- In the setting of **cardiac arrest**, any preexisting dialysis shunt or external central venous catheter may be used.
- In patients who are hemodynamically unstable or in extremis, prior to accessing dialysis shunts or external central venous catheters attempts should be made to secure peripheral or central access.
- Any venous catheter which has already been accessed prior to transport team arrival may be used after confirming patency.
- Upper extremity IV sites are preferable to lower extremity sites.
- Lower extremity IV sites are contraindicated in patients with vascular disease or diabetes.
- In post-mastectomy patients, avoid IV, blood draw, injection, or blood pressure in arm on affected side.
- Central Line Fluids should be placed on an infusion pump or use pressure bags.
- If exact fluid volumes are to be given, the fluids must be placed on an infusion pump.
- If unable to establish IV access, medications can be administered through other approved routes per medication formulary.

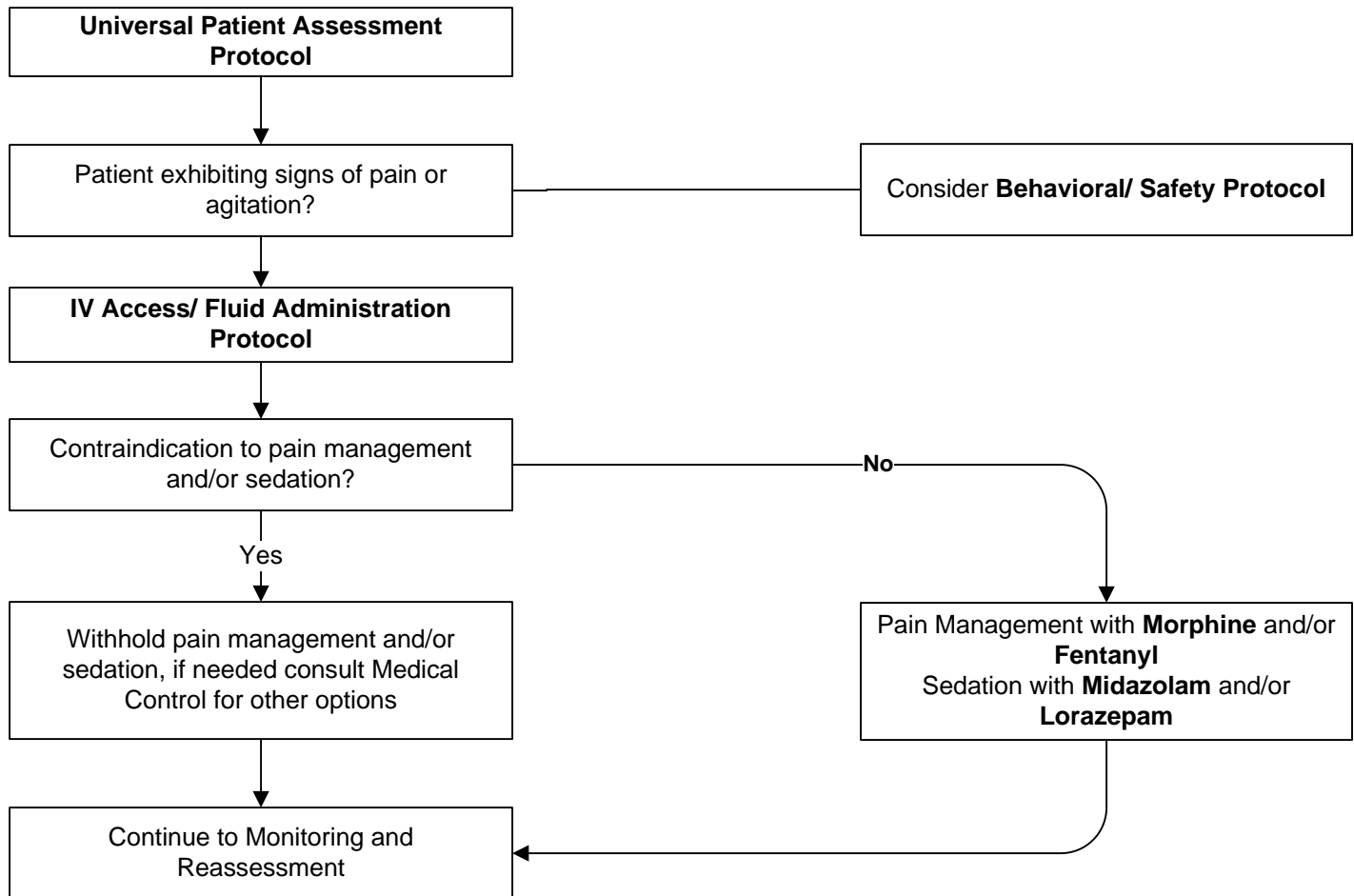


**Differentials:**

- Per the specific protocol
- Hypoxia
- Musculoskeletal
- Visceral (abdominal)
- Cardiac
- Pleural / Respiratory
- Neurogenic
- Renal (colic)

**Diagnostic Studies (if available):**

- Urine Analysis
- CBC w/ differential
- Electrolytes
- Kidney function studies
- Toxicology Screen



**Pearls:**

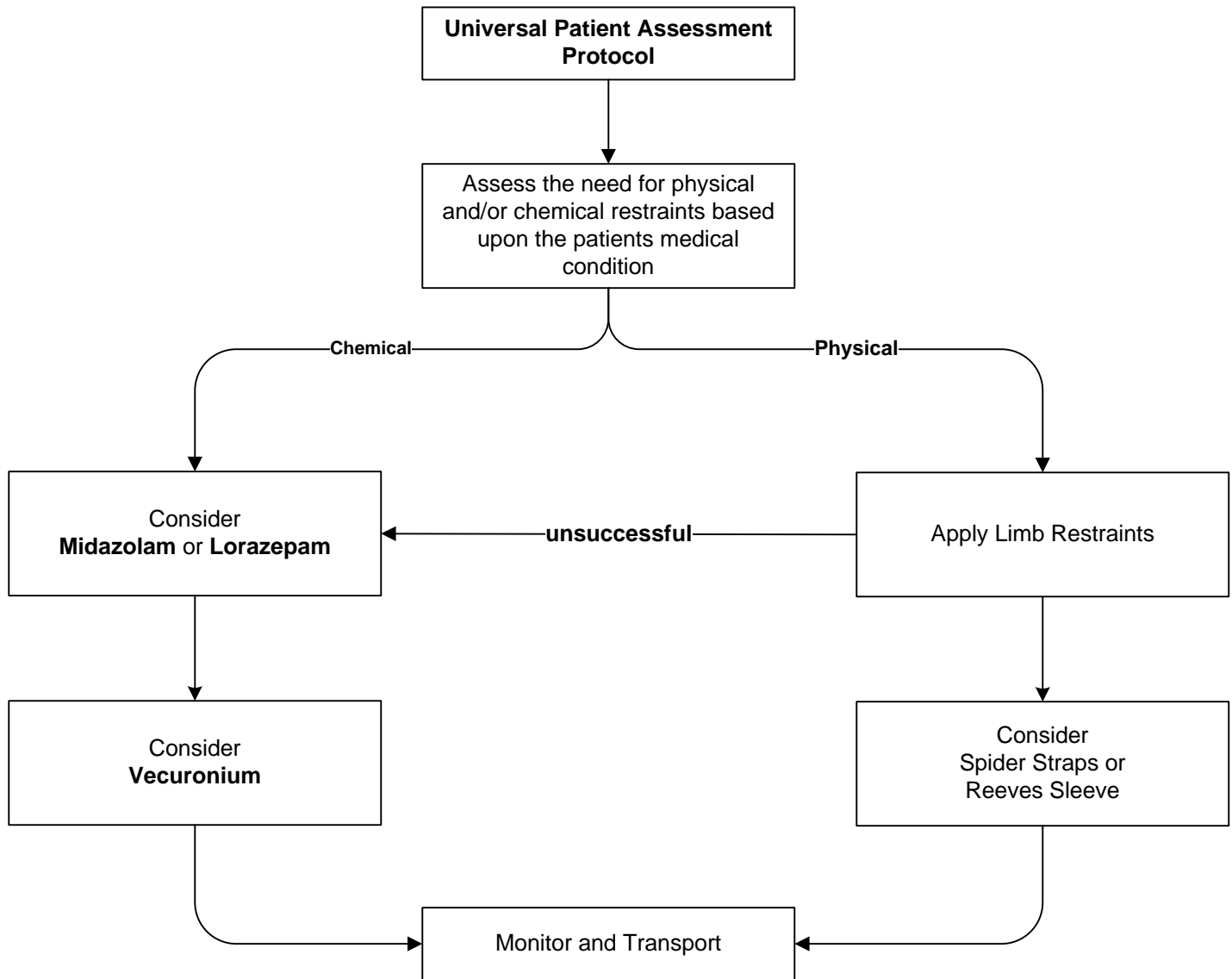
- Indications for pain or agitation may include information gathered from hemodynamic monitoring of patients who are unable to verbalize complaint.
- Pain severity (0-10) is a vital sign to be recorded pre and post IV delivery and at disposition.
- Vital signs should be obtained pre and post administration of all pain/sedation medications.
- Use caution with Morphine administration in patients with relative hypotension, respiratory distress or severe COPD.
- Dosage may be adjusted based upon patient past medical history or age (i.e. renal disease/transplant).
- All patients should have drug allergies documented prior to administering pain medications.

**Reference:** Tintinalli, J.E., Kelen, G.D., Stapczynski, J.S. Emergency Medicine 6th Ed. 2004, Mcgraw Hill.



**Indications:**

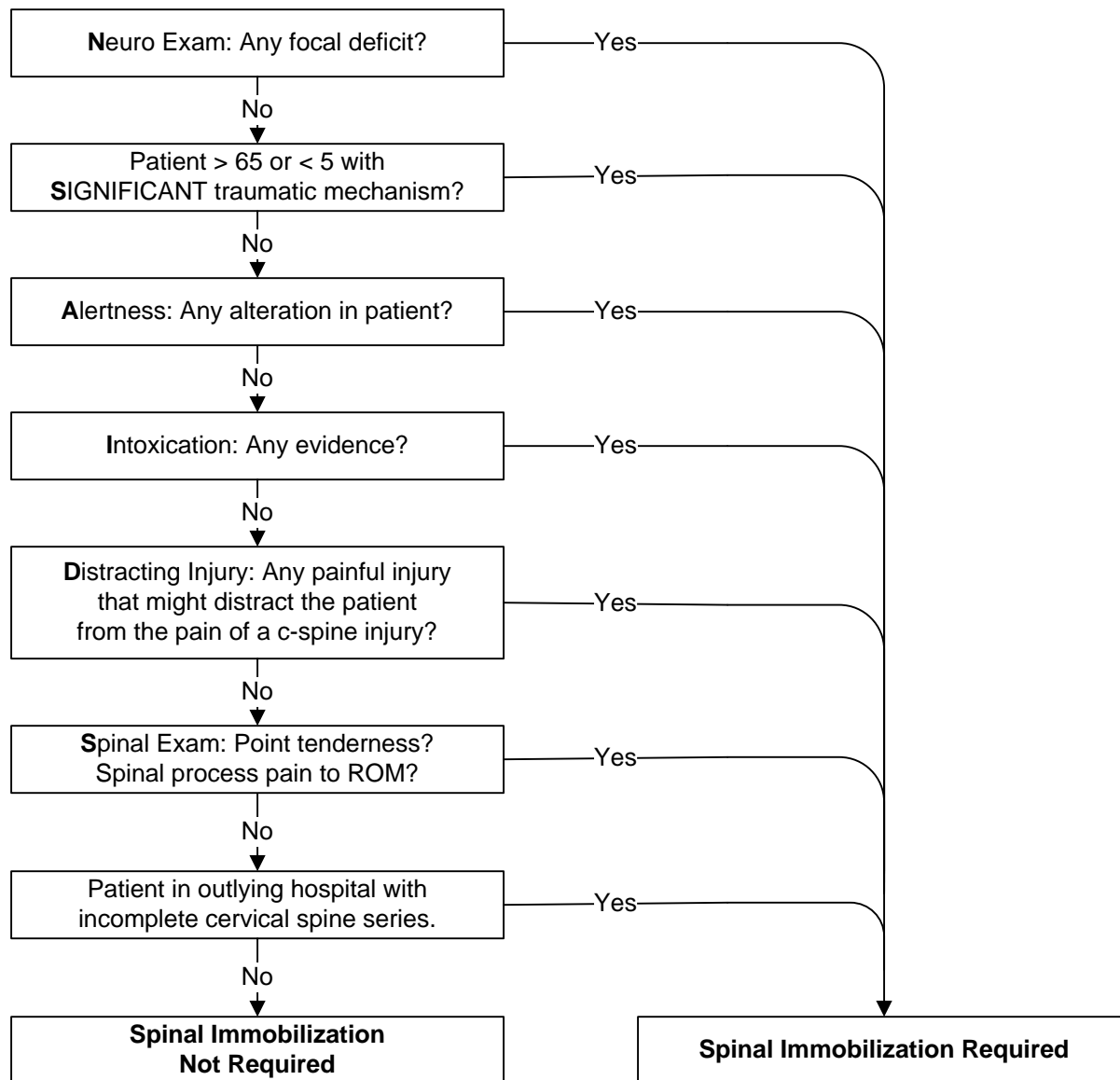
- Patients that are agitated and combative that do not respond to verbal techniques.
- The need to control invasive devices such as endotracheal tubes, IV lines, monitoring devices.
- Provide a safe transport environment for patient and transport team.



**Pearls:**

- Physical Restraints: Use of any physical device that involuntarily limits movement of patients extremities.
- Chemical Restraints: Use of any pharmacological agents such as but not limited to paralytics, sedatives, hypnotics, analgesics for the purpose of blunting patient awareness and response to their external environment.
- When limb restraints are applied, distal pulses and circulation should be checked frequently.
- Any patient who has application of restraint protocol, must have type restraint usage documented in accordance with program and UNC Hospitals Policy and Procedures Manual **Restraint Use R-5**.

**Reference:** Marx, J. A. Hockberger, R. S. Walls, R. M., et al. Rosen's Emergency Medicine: Concepts and Clinical Practice 6th Ed. Philadelphia: Mosby 2006.



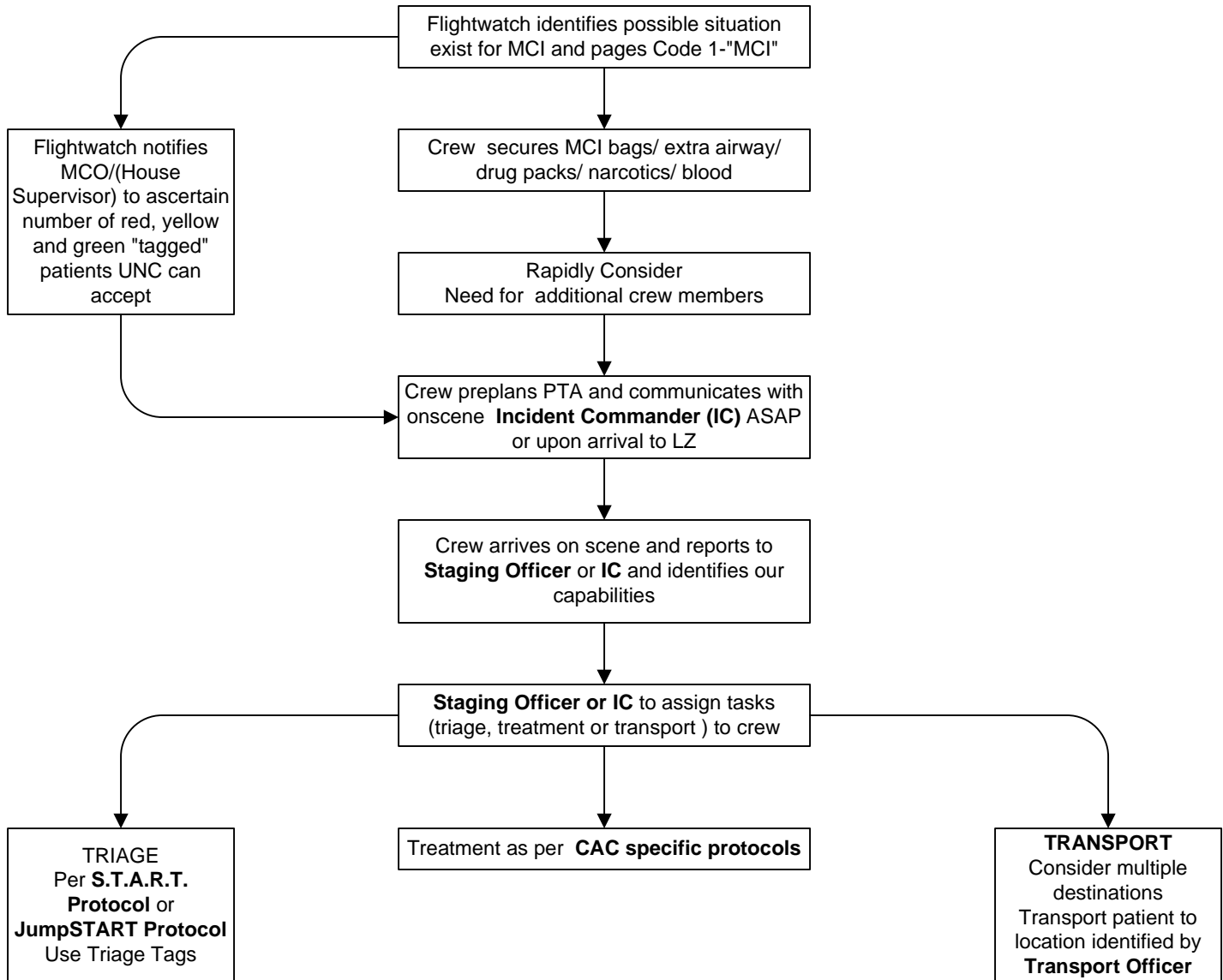
**Pearls:**

- **Exam:** Mental Status, Skin, Neck, Heart, Lungs, Abdomen, Back, Extremities, Neurological Assessment.
- Significant mechanism includes high-energy events such as ejection, high falls, and abrupt deceleration crashes and may indicate the need for spinal immobilization in the absence of symptoms.
- Range of motion should NOT be assessed if patient has midline spinal tenderness. Patient's range of motion should not be assisted. The patient should touch their chin to their chest, extend their neck (look up), and turn their head from side to side (shoulder to shoulder) without spinal process pain.
- The acronym "NSAIDS" should be used to remember the steps in this protocol based upon National Emergency X-Radiography Utilization study (NEXUS).
- **"N"** = Neurologic exam. Look for focal deficits such as tingling, reduced strength, or numbness in an extremity.
- **"S"** = Significant mechanism in extremes of age.
- **"A"** = Alertness. Is patient oriented to person, place, time, and situation? Any change to alertness with this incident?
- **"I"** = Intoxication. Is there any indication that the person is intoxicated (impaired decision making ability)?
- **"D"** = Distracting injury. Is there any other injury which is capable of producing significant pain in this patient?
- **"S"** = Spinal exam. Look for point tenderness in any spinal process or spinal process tenderness with range of motion. Range of motion should not be assessed if midline pain is present on initial process exam.

**Reference:** Tintinalli, J.E., Kelen, G.D., Stapczynski, J.S. Emergency Medicine 6th Ed. 2004, McGraw Hill.



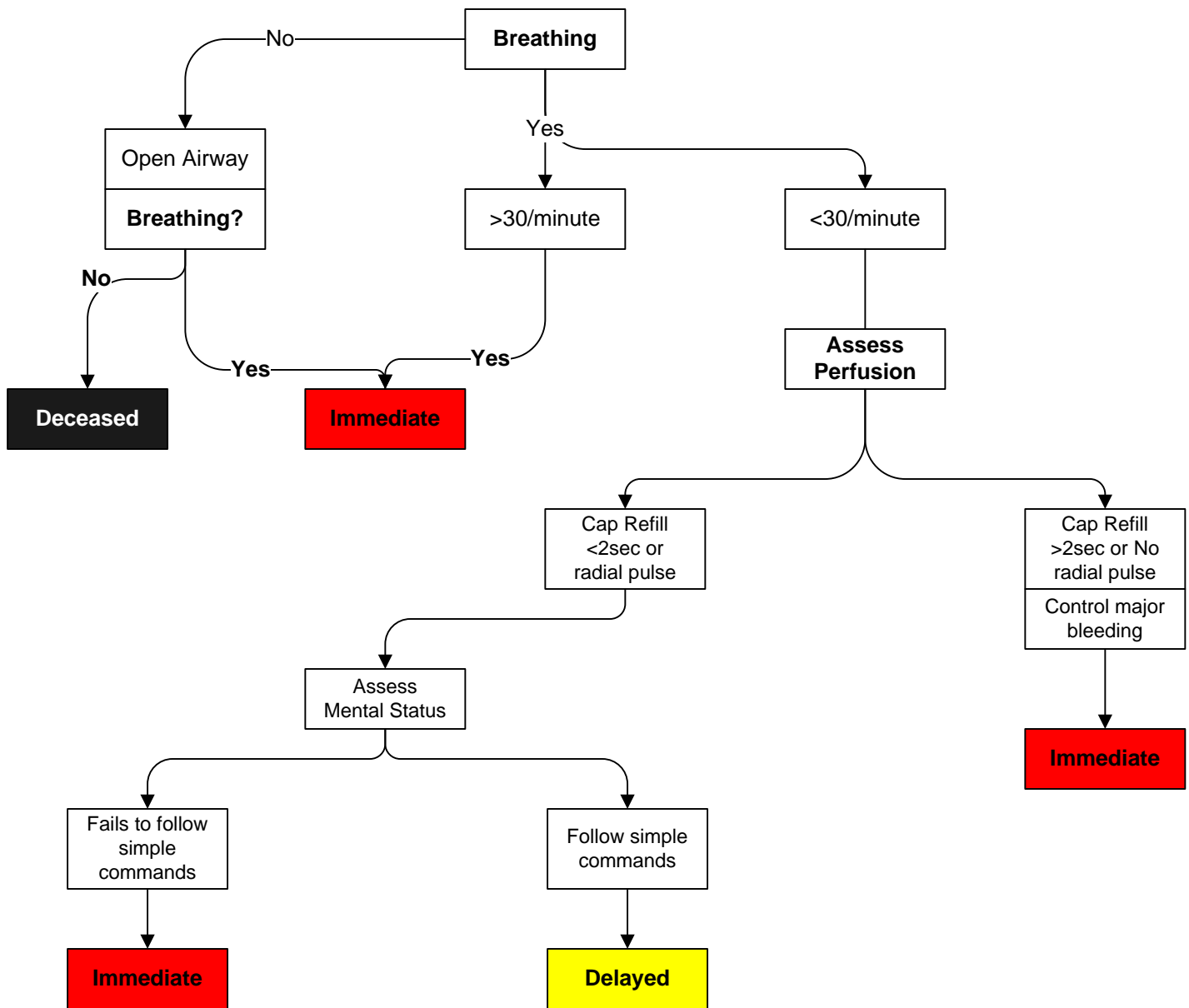
**Indication:** Any situation in which local emergency services are overwhelmed and UNC Air Care and Ground Transport Service is requested to assist with multiple patients, advanced procedures, treatment, triage and/or transport.



**Pearls:**

- Multi-casualty Incident (MCI) is defined by the county requesting our services, usually defined as 5 or more patients and/or when local resources are overwhelmed.
- Flexibility exist to take additional crew members/emergency department physicians/split crews as situations dictate.
- Debriefing will occur post event consider Critical Incident Stress Debriefing (CISD) early;
  - Internal: medical crew, flightwatch, MCO.
  - External: medical crew rep to outside agencies if at all possible.
- Debriefing should discuss event, actions that went well and actions that need improvement.

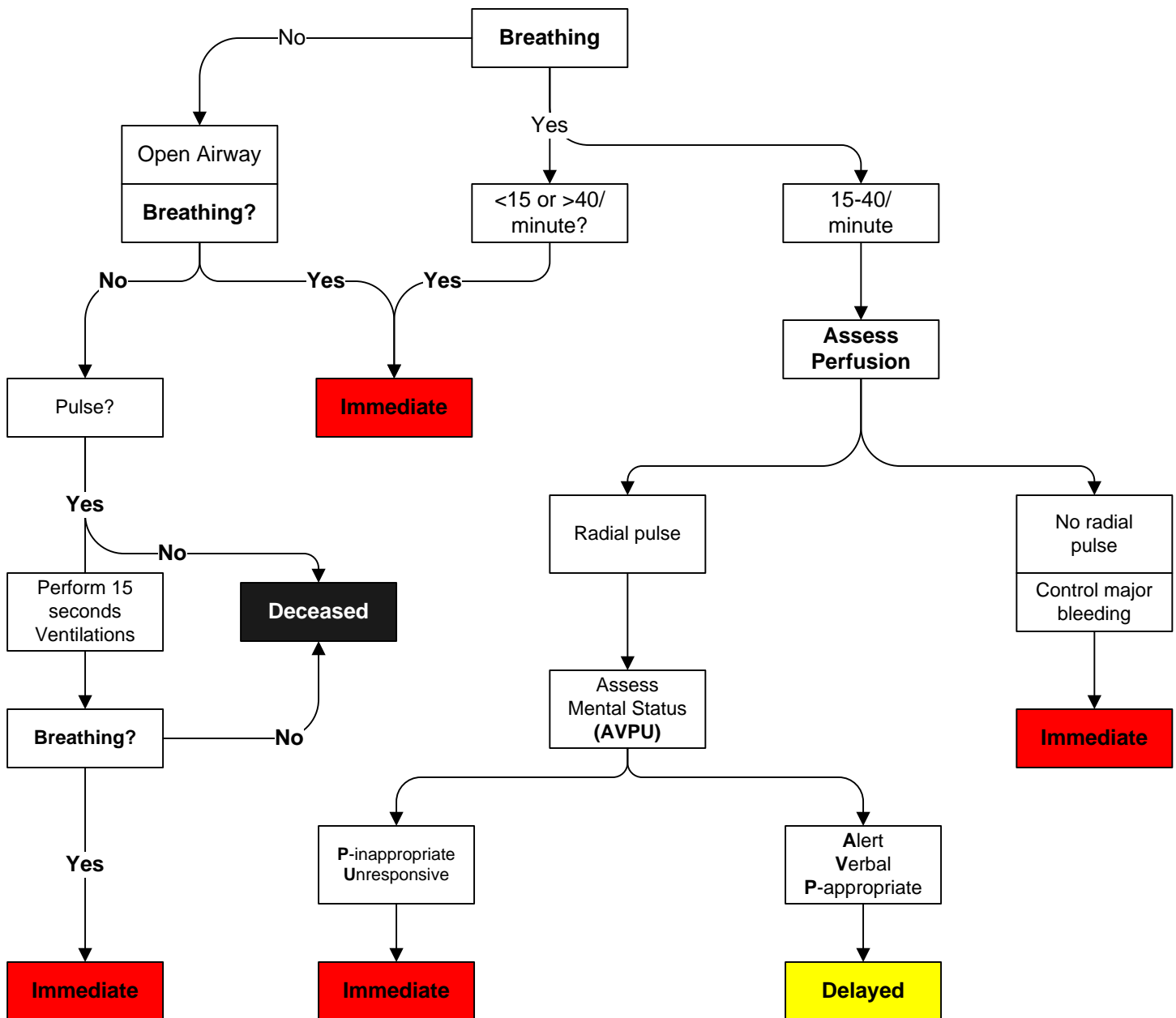
# Simple Triage And Rapid Transport (S.T.A.R.T)



**Pearls:**

- **START** refers to specific triage method that evaluates patients' respiratory, circulatory and neurological function and categorizes them into four care categories.
- Based upon triage tags the "color" conditions are as follows:
- **Red-Immediate:** treat and transport those patients who are viable and have life-threatening injuries first.
- **Yellow-Delayed:** treat and transport those patients who have impending or potential life threats next.
- **Green-Minor:** without life-threatening injuries should be transported last. Designate an area for "walking wounded"- these are green tag patients (reassess patients later).
- **Black-Deceased/ non-salvagable:** patients with obvious mortal wounds or in cardiac arrest that usually will not be treated unless adequate resources are available. (Exception is cardiac arrest due to lightning strike)
- The dynamics of the incident may change patient triage status.

**Reference:** Widely recognized multi-casualty incident (MCI) systems in the United States developed jointly by the Newport Beach Fire Department and Hoag Hospital in California.



**Pearls:**

- **JumpSTART** refers to specific triage method for children less than 8 years old that evaluates patients' respiratory, circulatory and neurological function and categorizes them into four care categories.
- Based upon triage tags the "color" conditions are as follows:
- **Red-Immediate:** treat and transport those patients who are viable and have life-threatening injuries first.
- **Yellow-Delayed:** treat and transport those patients who have impending or potential life threats next.
- **Green-Minor:** without life-threatening injuries should be transported last. Designate an area for "walking wounded"- these are green tag patients (reassess patients later).
- **Black-Deceased/ non-salvageable:** patients with obvious mortal wounds or in cardiac arrest that usually will not be treated unless adequate resources are available. (Exception is cardiac arrest due to lightning strike)
- The dynamics of the incident may change patient triage status.

**Reference:** Developed as an adjunct to the START triage method to address the physiological differences of children. Lou Romig, MD, Medical Director of South Florida Regional Disaster Medical Assistance Team and Medical Advisor for Miami-Dade Fire Rescue District.



**Definition:** Weapons of Mass Destruction (WMD) include any weapon or device that are intended, or have the capability, to cause death or serious bodily injury to a significant number of people through the release of toxic or poisonous chemicals or their precursors, a disease organism, incendiary/explosives, radiation or radioactivity.

Flightwatch identifies possible situation exist for MCI and pages **Code 1-"WMD"**

	Biological	Nuclear	Incendiary	Chemical	Explosive
<b>Risk Assessment</b>	Moderate	Lowest	Highest	Moderate	Highest
<b>Type Scene</b>	Multifocal	Possible Multifocal	Unifocal	Possible Multifocal	Unifocal
<b>Type Weapons</b>	Anthrax, small pox, plague, botulinum toxin, ricin	Nuclear Weapons, "dirty" weapon-radiological waste	Fuels, propellants	Nerve, blood, blister, choking agents, any manufacturer chemical	Pyrotechnics, pipe bombs, "fertilizer" bombs
<b>Time Element</b>	Hours to days	Seconds to Weeks	Seconds to hours	Minutes to hours	Seconds to minutes
<b>Management Strategies</b>	Early detection, recognition, treatment	Decontamination and Trauma care	Trauma Care	Decontamination and Antidotes	Trauma Care

**Pearls:**

- Crew Safety is paramount!
- Landing zone and staging area should be remote if at all possible. Remember "uphill" and "upwind".
- If you are not familiar with the WMD used, consult on-scene Haz-Mat team and contact MCO.
- Treat patient based upon appropriate protocol.
- "Hot" and "warm" zones are off limits to our crews, patients must be decontaminated and brought out to "cold" zone.
- Refer to **Mass Casualty Incidents Protocol** for crew on-scene operations.
- B-NICE-Biological, Nuclear, Incendiary, Chemical, Explosive.
- Be aware that WMD could be a combination of any B-NICE.
- **Risk Assessment** includes potential risk, ease of use, and community susceptibility.
- **Type Scene** refers to scope of incident (one location versus multiple/community wide).
- **Type Weapons** list possible weapons but does not include all potential threats.
- **Time Element** refers to how long the initial incident may affect area.

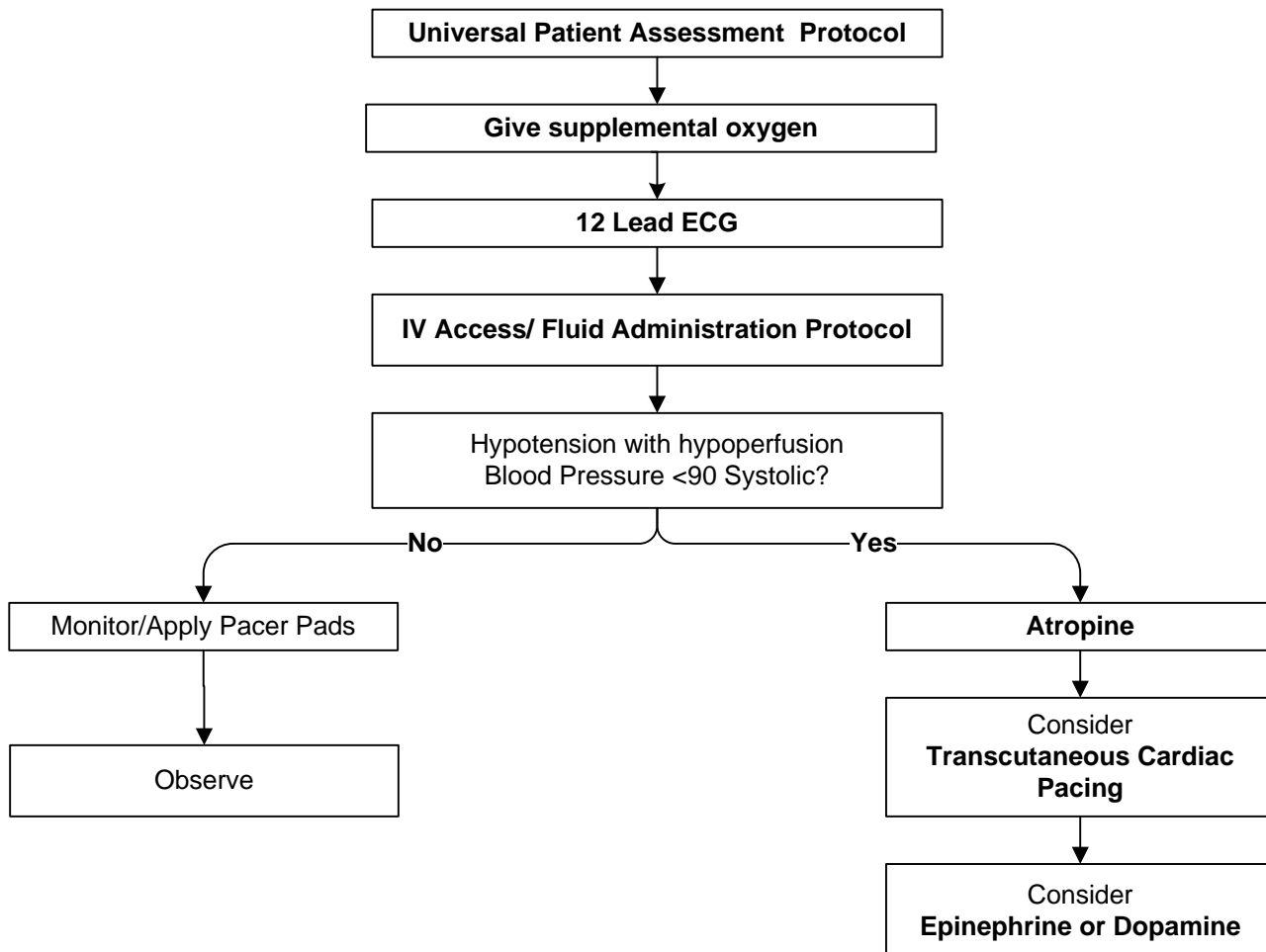
# Bradycardia

### Differentials:

- Acute myocardial infarction
- Hypoxia
- Hypothermia
- Sinus bradycardia
- Atelectes
- Head injury (elevated ICP) or Stroke
- Spinal cord lesion
- Sick sinus syndrome
- AV blocks (1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> degree)

### Diagnostic Studies (if available):

- 12 lead EKG
- Serum cardiac markers
- Toxicology studies
- Chest x-ray
- Electrolytes
- Renal function studies
- CBC w/differential
- Coags



### Pearls:

- o The use of lidocaine in heart block can worsen bradycardia and lead to asystole and death.
- o Pharmacological treatment of Bradycardia is based upon the presence or absence of hypotension.
- o Hypoperfusion includes cool, pale, diaphoretic skin, delayed capillary refill time.
- o **If hypotension exists, treat. If blood pressure is adequate, monitor only.**
- o Search for and treat possible contributing factors: hypovolemia, hypoxia, hydrogen ion (acidosis), hypo/hyperkalemia, hypoglycemia, hypothermia, toxins, cardiac tamponade, tension pneumothorax, thrombosis (coronary or pulmonary), trauma (hypovolemia, increased ICP).

**Reference:** (2005, November, 25). Management of Cardiac Arrest. *Circulation*, 112; IV-58-IV-66, Retrieved February 04, 2008, from [http://circ.ahajournals.org/cgi/content/full/112/24\\_suppl/IV-58](http://circ.ahajournals.org/cgi/content/full/112/24_suppl/IV-58)



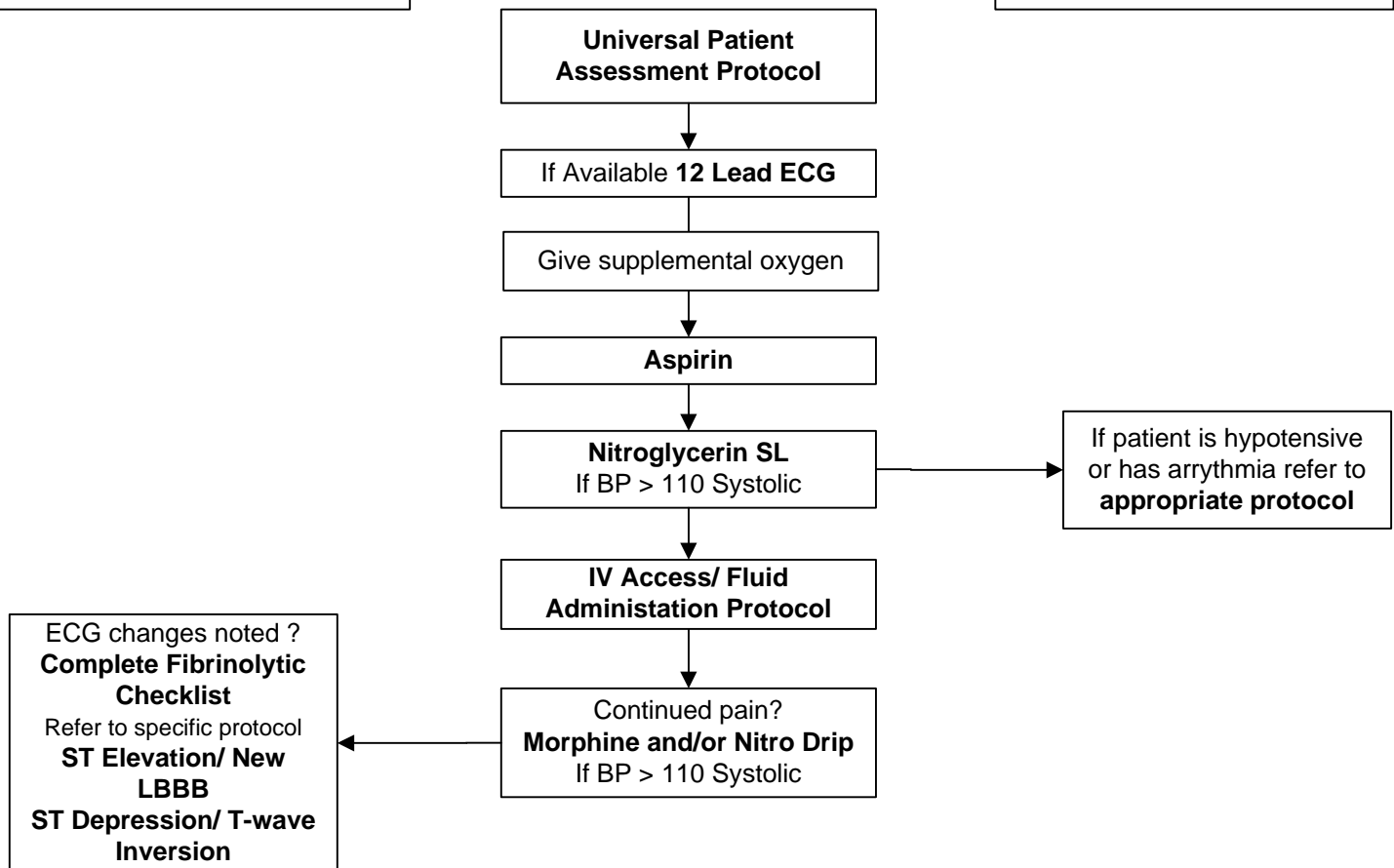
# Chest Pain/ Ischemic

## Differentials:

- Trauma/ Medical
- Angina/ Myocardial infarction
- Pericarditis
- Pulmonary embolism
- Asthma/ COPD
- Pneumothorax
- Aortic dissection or aneurysm
- GE reflux or Hiatal Hernia
- Esophageal spasm
- Chest wall injury or pain
- Pleural pain

## Diagnostic Studies (if available):

- 12-lead EKG
- Serial Cardiac Markers
- Troponin
- Echocardiography
- Chest X-ray
- CBC
- Electrolytes
- Renal function studies
- Coags



## Pearls:

- o Avoid Nitroglycerin in any patient who has used Viagra (sildenafil) in the past 24 hours due to potential for severe hypotension.
- o Consider Right-side EKG.
- o If patient has taken nitroglycerin without relief, consider potency of the medication.
- o Monitor for hypotension after administration of nitroglycerin and morphine.
- o Consider serial 12-lead EKG if change in pain or physiological status.
- o Diabetics and geriatric patients often have atypical pain, or only generalized complaints.
- o Cardiac transplant patients may exhibit no pain due to denervation.

**Reference:** (2005, November, 25). Mangement of Cardiac Arrest. *Circulation*, 112; IV-58-IV-66, Retrieved Feburary 04, 2008, from [http://circ.ahajournals.org/cgi/content/full/112/24\\_suppl/IV-58](http://circ.ahajournals.org/cgi/content/full/112/24_suppl/IV-58)



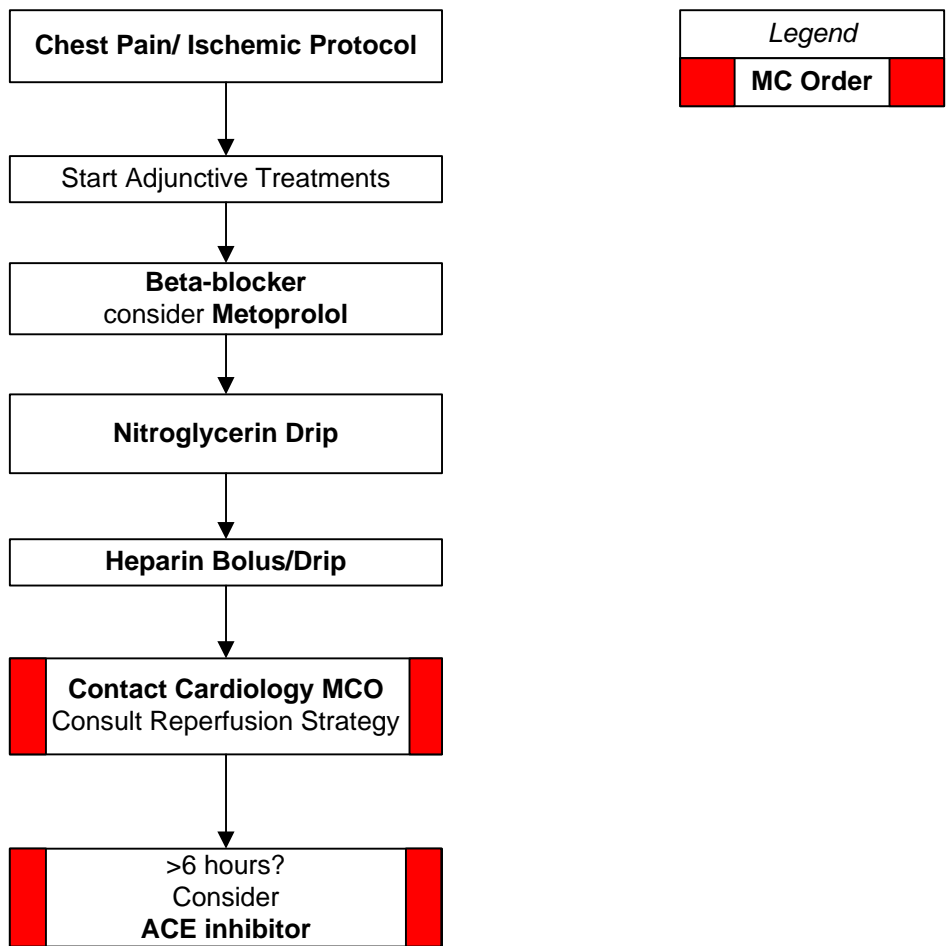
# ST Elevation/New LBBB

**Indications:**

- ST Elevation AMI.
- ST Elevation greater/equal 1mm in 2 or more contiguous leads.
- New or presumably new LBBB (BBB obscuring ST-segment analysis).
- >90% of pts with ischemic-type chest pain and ST elevation will develop new Q waves or +serum markers for AMI.
- Pts with hyperacute T waves benefit when AMI diagnosis is certain, repeat 12 lead helpful.
- Pts with ST depression in early precordial leads who have posterior MI benefit when AMI diagnosis is certain.

Diagnostic Studies (if available):

- 12-lead EKG
- Serial Cardiac Markers
- Troponin
- Echocardiography
- Chest X-ray
- CBC w/ differential
- Electrolytes
- Coags



**Pearls:**

- o Reperfusion strategy includes; fibrinolytic therapy, IABP, emergent transport for interventional therapy (cardiac cath, CABG).
- o High-risk patients defined as persistent symptoms, recurrent ischemia, depress LV function, wide spread EKG changes and prior AMI, PCI, CABG.

**Reference:** (2005, November, 25). Management of Cardiac Arrest. *Circulation*, 112; IV-58-IV-66, Retrieved February 04, 2008, from [http://circ.ahajournals.org/cgi/content/full/112/24\\_suppl/IV-58](http://circ.ahajournals.org/cgi/content/full/112/24_suppl/IV-58)

# ST Depression/T-wave Inversion

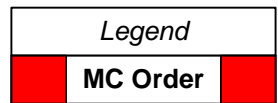
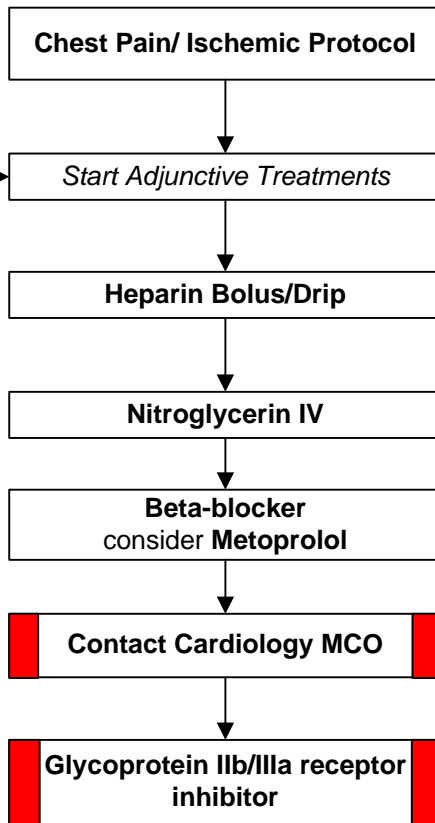
**Indications:**

- ST Depression or dynamic T-wave inversion; strongly suspicious for ischemia
- High-risk unstable angina/ non-ST elevation AMI
- ST Depression >1mm
- Marked symmetrical T-wave inversion in multiple precordial leads.
- Dynamic ST-T changes with pain.
- High-risk subgroup with increased mortality:
  - Persistent symptoms, recurrent ischemia
  - Diffuse or widespread EKG abnormalities
  - Depressed LV function
  - Congestive Heart Failure
  - Serum marker release: +troponin or CK-MB+

**Diagnostic Studies (if available):**

- 12-lead EKG
- Serial Cardiac Markers
- Troponin
- Echocardiography
- Chest X-ray
- CBC w/ differential
- Electrolytes
- Coags

**Non-Diagnostic EKG:**  
 absence of changes in ST segment or T-waves  
 Intermediate/low risk unstable angina  
**Meets criteria for unstable angina or Troponin +?**



**Pearls:**

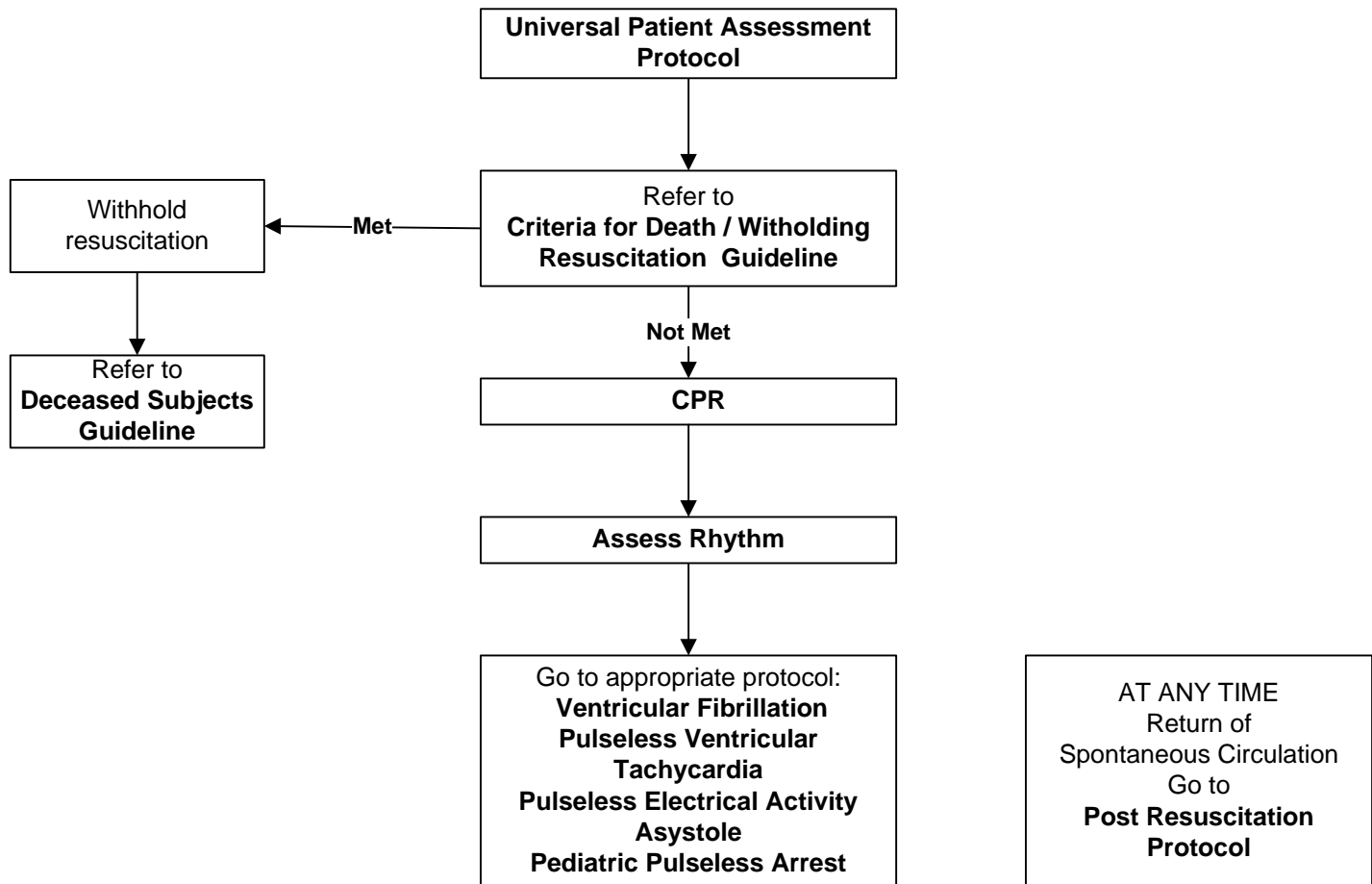
- o High-risk patients defined as persistent symptoms, recurrent ischemia, depressed LV function, wide spread EKG changes and prior AMI, PCI, CABG.
- o **Nondiagnostic or normal EKG:**
- o ST depression 0.5-1.0mm
- o T-wave inversion or flattening in leads with dominant R waves
- o Normal EKG
- o **Heterogenous group:** rapid assessment needed by; (Pts with + serum markers, EKG changes or functional studies-manage as high-risk.
- o Serial EKG's
- o ST-segment monitoring
- o Serum Cardiac Markers

Reference: (2005, November, 25). Management of Cardiac Arrest. *Circulation*, 112;IV-58-IV-66, Retrieved February 04, 2008, from [http://circ.ahajournals.org/cgi/content/full/112/24\\_suppl/IV-58](http://circ.ahajournals.org/cgi/content/full/112/24_suppl/IV-58)

# Cardiac Arrest

**Differential:**

- Medical / Trauma
- Trauma Blunt vs. Penetrating
- V. Fib / Pulseless V. tach
- Asystole
- Pulseless Electrical Activity (PEA)



**Pearls:**

- If witnessed arrest – administer a **precordial thump**.
- Reassess airway frequently and with every patient move.
- Use of **Capnography** may give early indication (sudden spike) of ROSC prior to detectable pulses.
- Maternal Arrest- Treat mother per appropriate protocol with immediate notification of Medical Control and rapid transport.
- Confirm rhythm 2 contiguous leads.

Reference: (2005, November, 25). Management of Cardiac Arrest. *Circulation*, 112; IV-58-IV-66, Retrieved February 04, 2008, from [http://circ.ahajournals.org/cgi/content/full/112/24\\_suppl/IV-58](http://circ.ahajournals.org/cgi/content/full/112/24_suppl/IV-58)

# Ventricular Fibrillation Pulseless Vent. Tachycardia

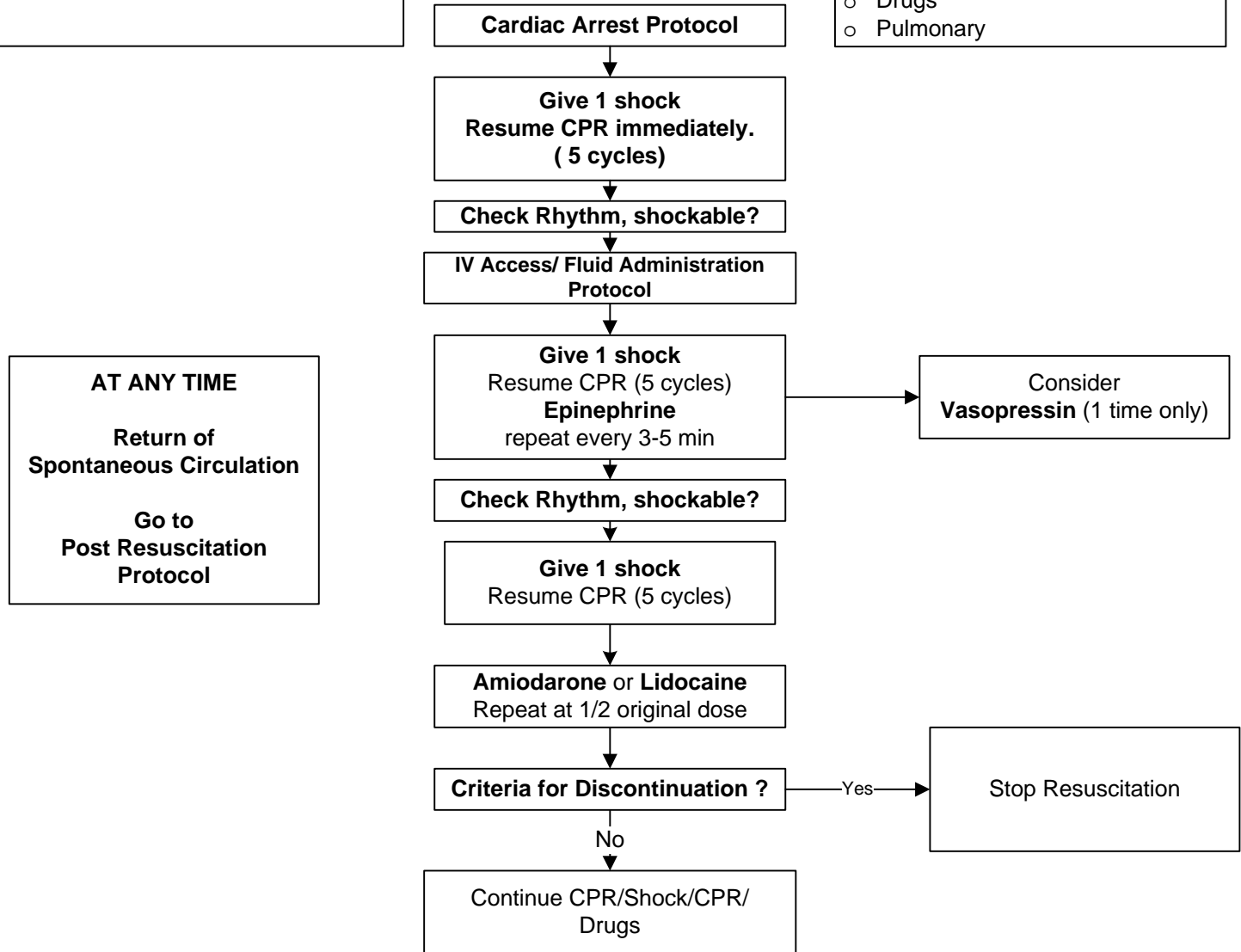


**Indication:**

- Unresponsive, apneic, pulseless
- Ventricular fibrillation or ventricular tachycardia on ECG.

**Differentials:**

- o Asystole
- o Artifact / Device failure
- o Cardiac
- o Endocrine / Metabolic
- o Drugs
- o Pulmonary



**Pearls:**

- Secondary ABCD Survey-Airway, Breathing, Circulation, Differential Diagnosis.
- CPR should resume immediately after shocks and continue while defibrillator is charging, to minimize interruptions of chest compressions.
- Consider **Magnesium Sulfate** for refractory or polymorphic V-tach (Torsades de Pointes).
- Consider **Procainamide** for intermittent/recurrent VF/VT.
- Consider **Calcium** if hyperkalemia is suspected. (renal failure, dialysis).
- Consider **Sodium Bicarbonate** for prolong resuscitation efforts.
- If defibrillation is successful and patient rearrests, return to previously successful energy level.
- Defibrillate (**120-200 J**) with **biphasic** or (**360J**) with **monophasic**.

**Reference:** (2005, November, 25). Management of Cardiac Arrest. *Circulation*, 112; IV-58-IV-66, Retrieved February 04, 2008, from [http://circ.ahajournals.org/cgi/content/full/112/24\\_suppl/IV-58](http://circ.ahajournals.org/cgi/content/full/112/24_suppl/IV-58).

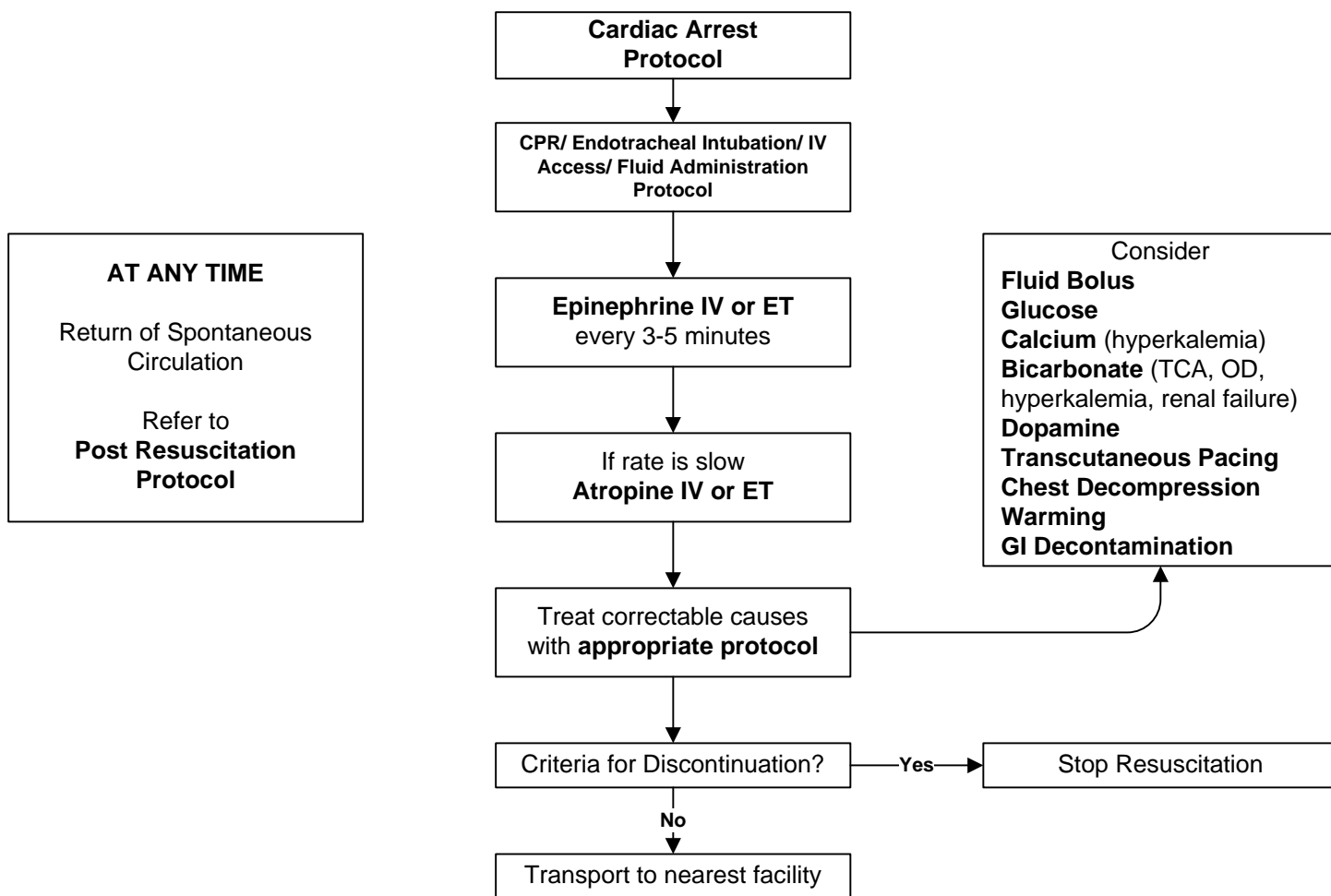


**Indications:**

- Rhythm on monitor with no detectable pulses

**Differentials:**

- Hypovolemia
- Hypoxia
- Hydrogen ion-acidosis
- Hyper/hypokalemia
- Hypothermia
- Tablets (drug OD)
- Tamponade, cardiac
- Tension pneumothorax
- Thrombosis, coronary (ACS)
- Thrombosis, pulmonary (embolism)



**Pearls:**

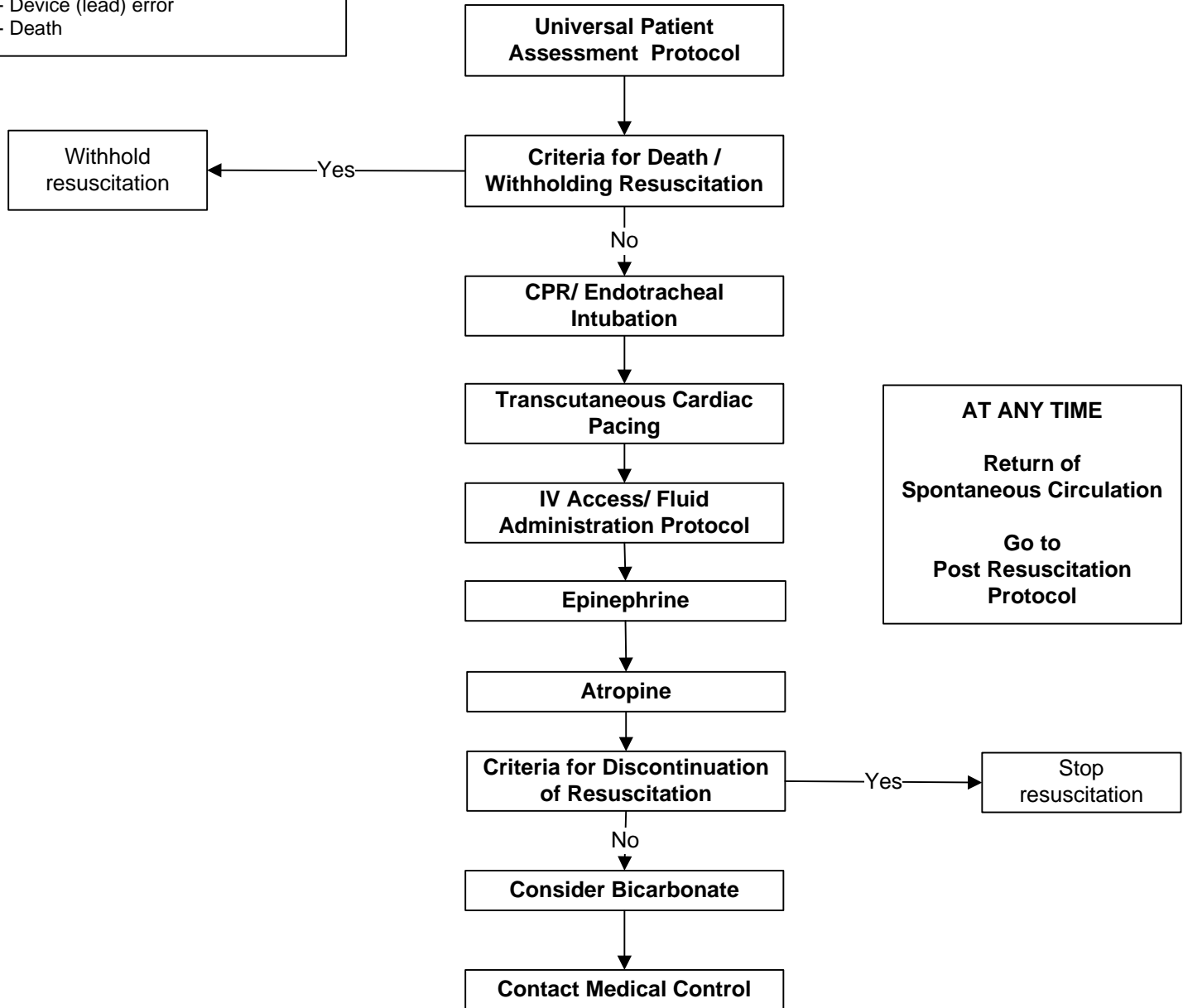
- Consider each possible cause listed in the differential: Survival is based on identifying and correcting the cause.
- During CPR-push hard and fast (100/min), ensure full chest recoili, and minimize interruptions of chest compressions.

**Reference:** (2005, November, 25). Management of Cardiac Arrest. Circulation, 112; IV-58-IV-66, Retrieved February 04, 2008, from [http://circ.ahajournals.org/cgi/content/full/112/24\\_suppl/IV-58](http://circ.ahajournals.org/cgi/content/full/112/24_suppl/IV-58)

# Asystole

**Differentials:**

- Medical or Trauma
- Hypoxia
- Potassium (hypo/ hyper)
- Drug overdose
- Acidosis
- Hypothermia
- Device (lead) error
- Death

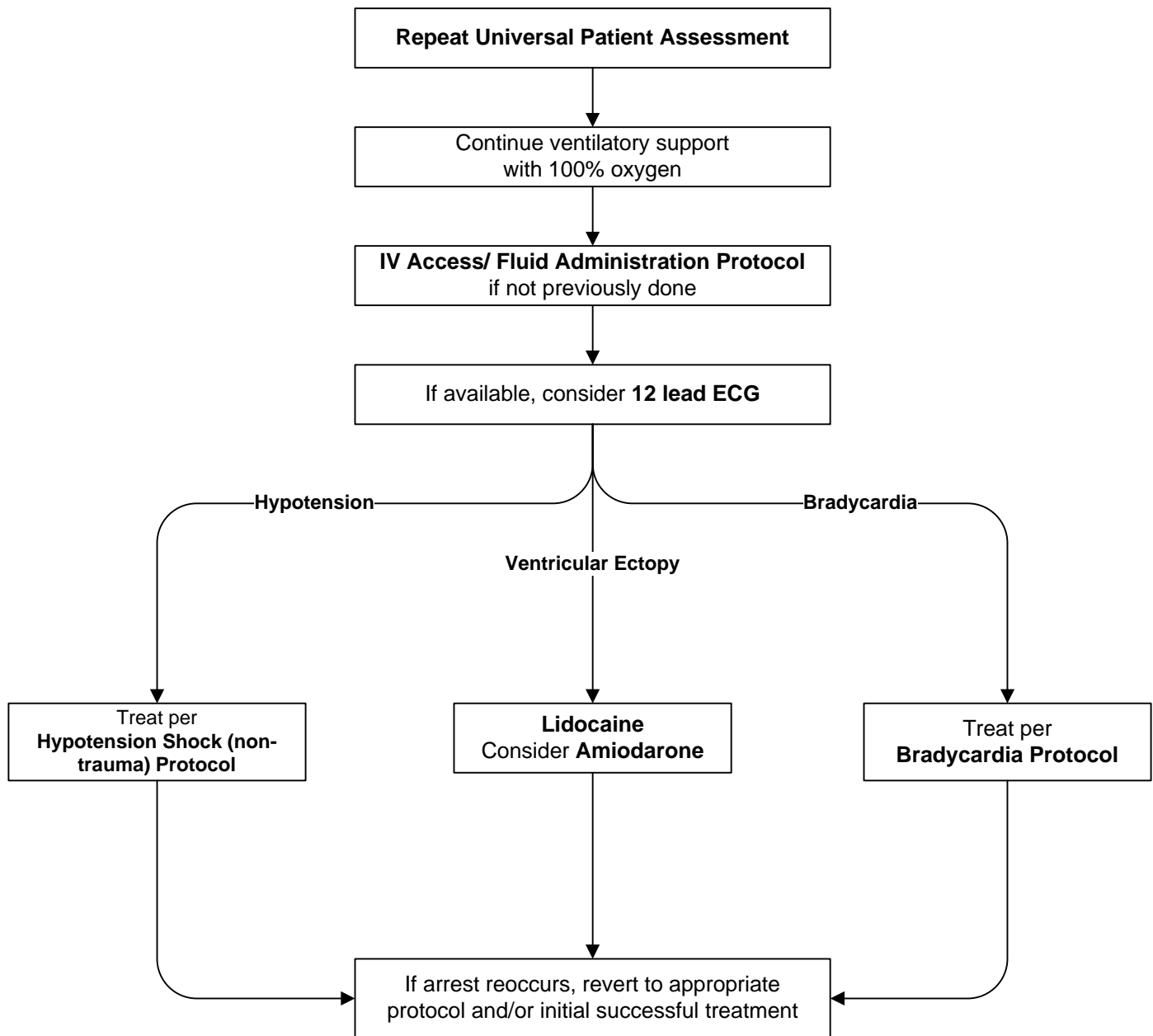


**Pearls:**

- Consider quality of resuscitation.
- Consider differentials and treat accordingly.
- Early Transcutaneous Pacing is recommended.
- Always confirm asystole in more than one lead.

**Reference:** (2005, November, 25). Management of Cardiac Arrest. *Circulation*, 112; IV-58-IV-66, Retrieved February 04, 2008, from [http://circ.ahajournals.org/cgi/content/full/112/24\\_suppl/IV-58](http://circ.ahajournals.org/cgi/content/full/112/24_suppl/IV-58)

# Post Resuscitation



**Pearls:**

- Continue To address specific differentials associated with the original dysrhythmia.
- Patients that convert after specific anti-dysrhythmia, should have that medication started as a maintenance drip.
- The condition of post-resuscitation patients fluctuates rapidly, continuously, and they require close monitoring.
- Appropriate post-resuscitation management can best be planned in consultation with medical control.

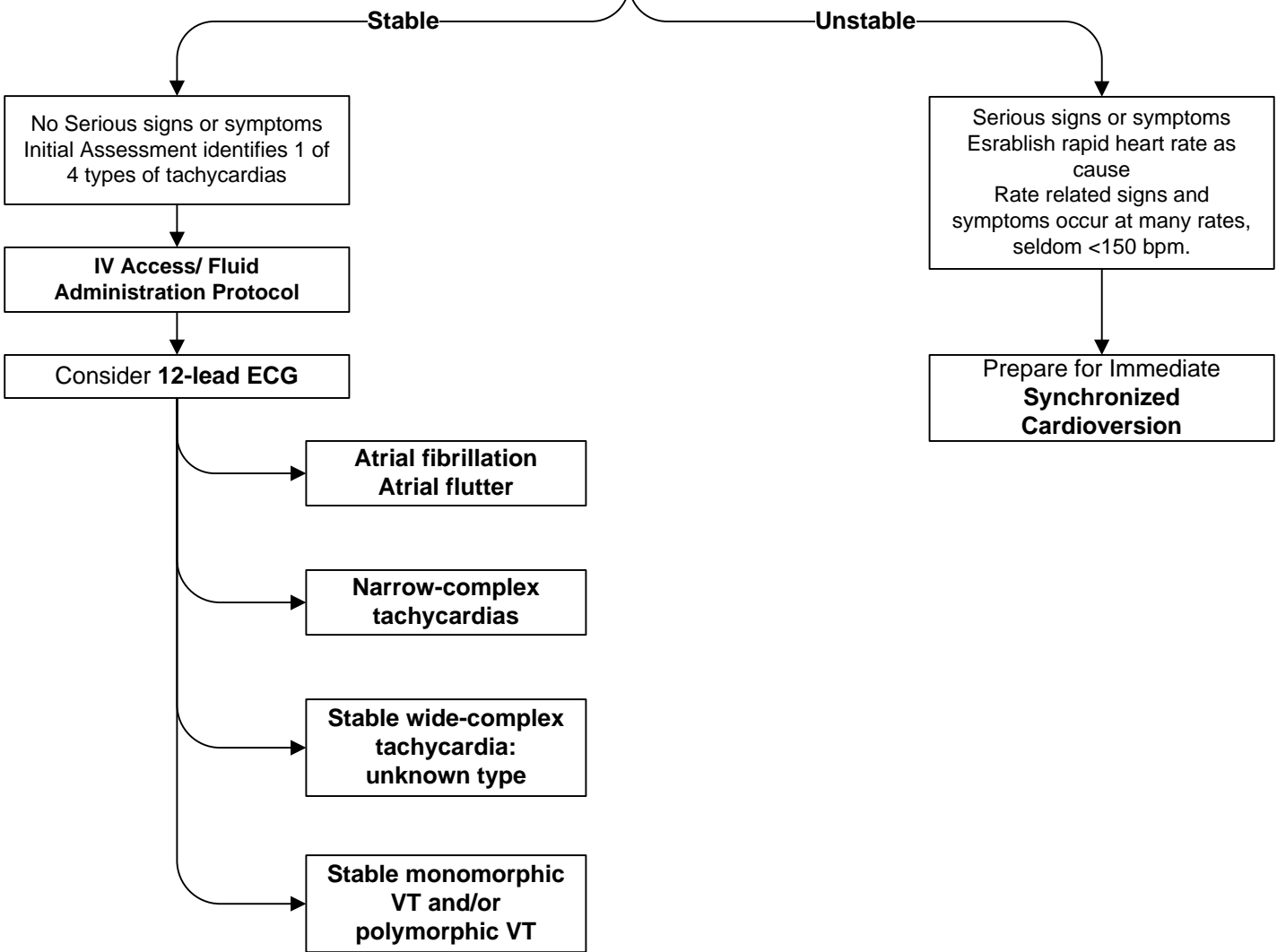
**Reference:** (2005, November, 25). Management of Cardiac Arrest. *Circulation*, 112; IV-58-IV-66, Retrieved February 04, 2008, from [http://circ.ahajournals.org/cgi/content/full/112/24\\_suppl/IV-58](http://circ.ahajournals.org/cgi/content/full/112/24_suppl/IV-58)



**Indications:**  
Heart Rate >150 bpm

**Universal Patient Assessment Protocol**

Evaluate patient:  
Is patient stable or unstable?  
Are there serious signs or symptoms?  
Are signs and symptoms due to tachycardia?



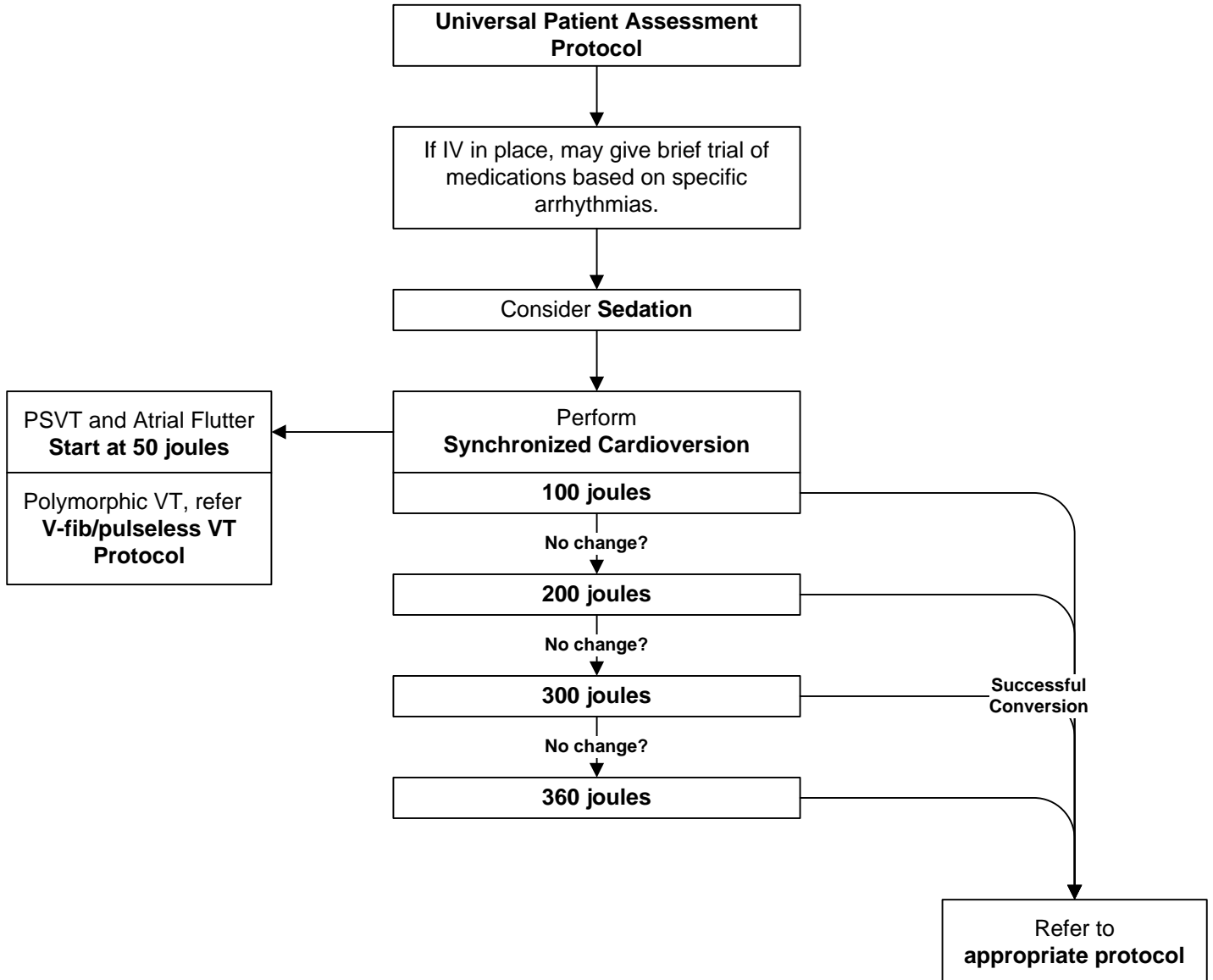
**Pearls:**  
- If the patient is stable, refer to appropriate arrhythmia protocol.

**Reference:** (2005, November, 25). Management of Cardiac Arrest. *Circulation*, 112; IV-58-IV-66, Retrieved February 04, 2008, from [http://circ.ahajournals.org/cgi/content/full/112/24\\_suppl/IV-58](http://circ.ahajournals.org/cgi/content/full/112/24_suppl/IV-58)



**Indications:**

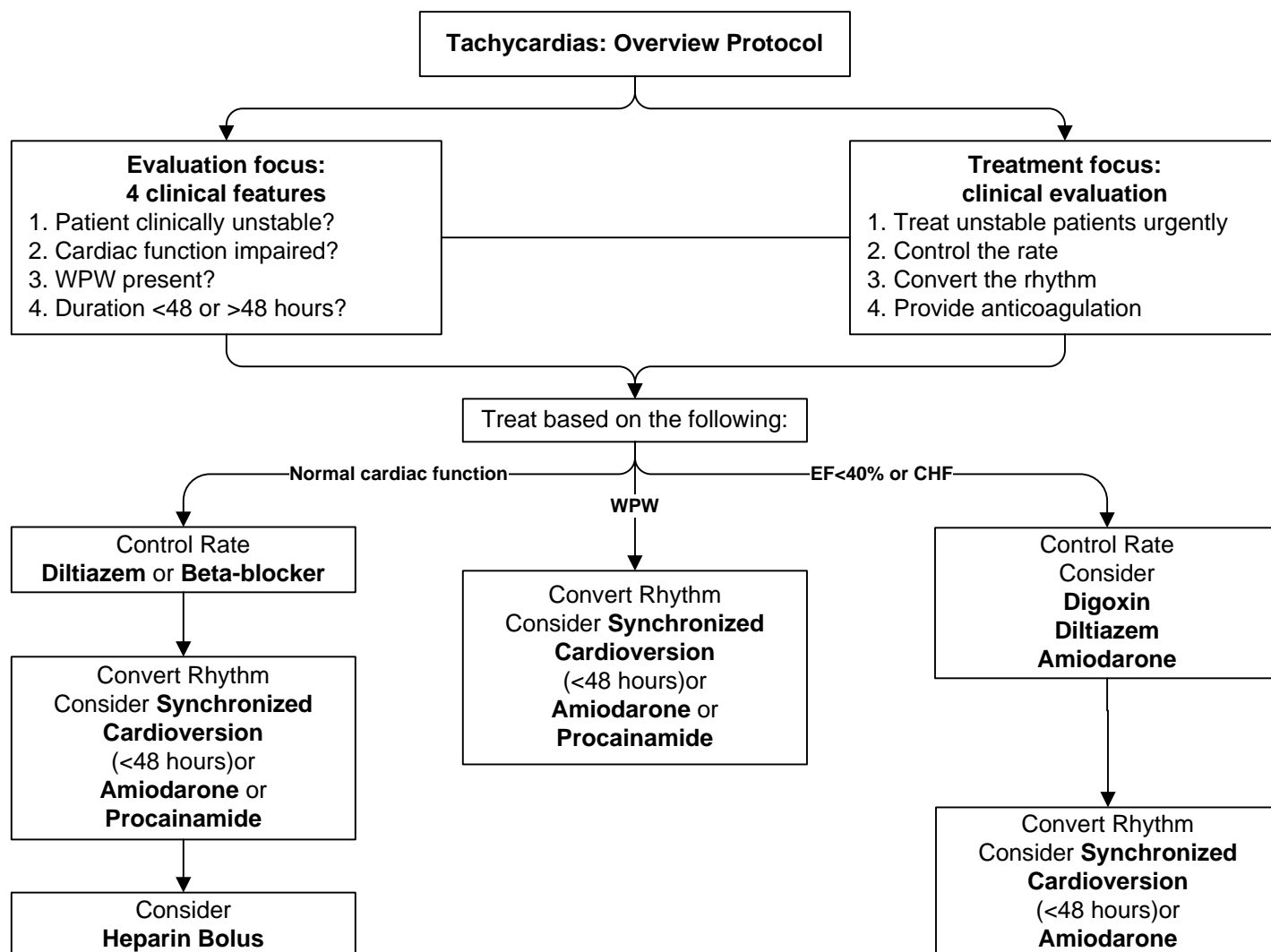
Ventricular Rate >150 bpm  
and/ or with signs and  
symptoms of hypoperfusion.



**Pearls:**

- Use sternum/apex placement- anterior/posterior pad placement is acceptable.
- Note resynchronize after each cardioversion.
- Look for markers on R wave indicating sync mode, adjust monitor gain until markers occur with each R wave.
- If using manual paddles, apply 25 lbs of pressure on both paddles.

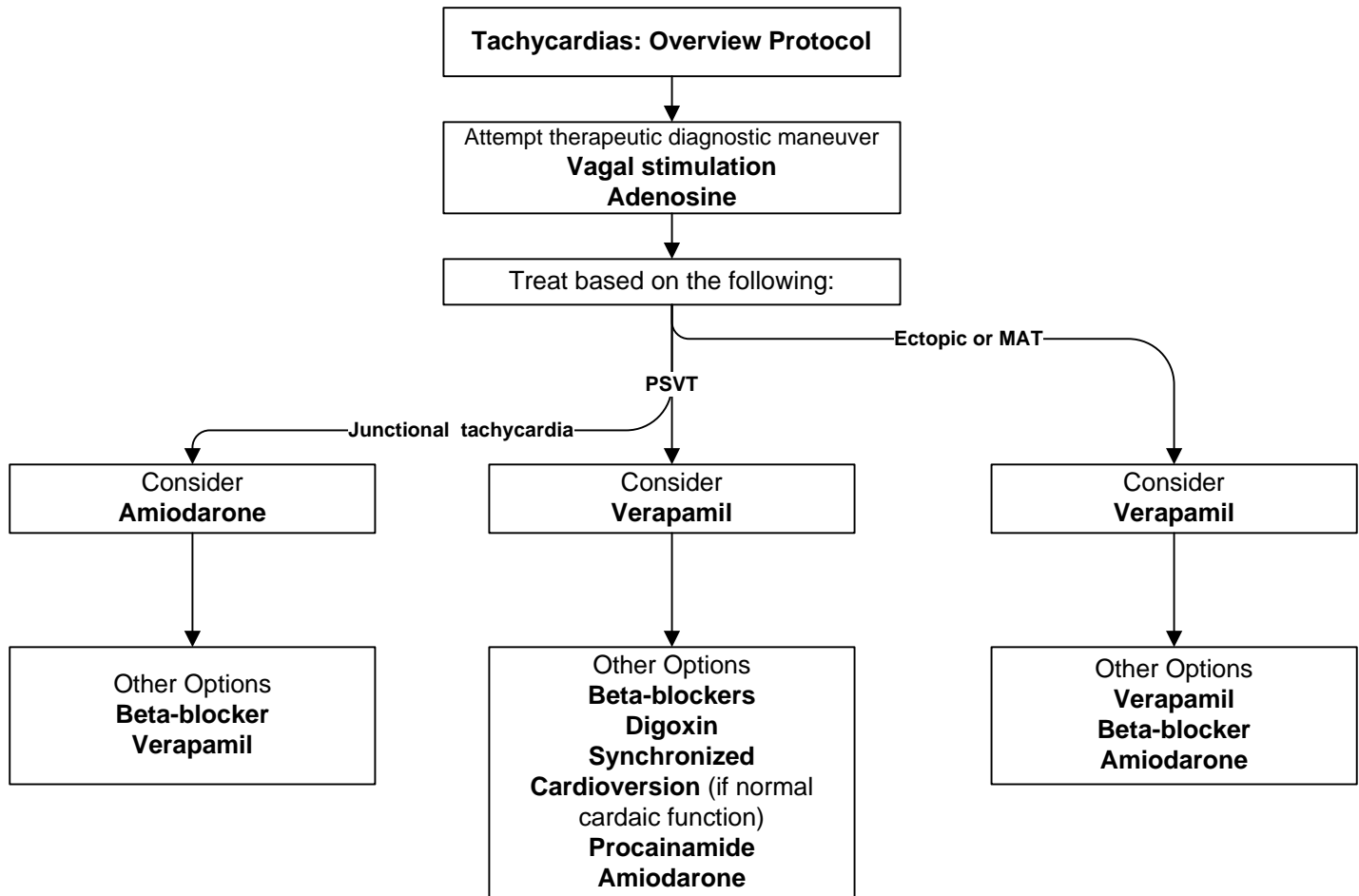
**Reference:** (2005, November, 25). Management of Cardiac Arrest. *Circulation*, 112; IV-58-IV-66, Retrieved February 04, 2008, from [http://circ.ahajournals.org/cgi/content/full/112/24\\_suppl/IV-58](http://circ.ahajournals.org/cgi/content/full/112/24_suppl/IV-58)



**Pearls:**

- Occasionally 2 of the named antiarrhythmic agents may be used, but use of these agents in combination may have proarrhythmic potential.
- Do not use Procainamide in impaired heart function ( EF <40%) or CHF.

**Reference:** (2005, November, 25). Management of Cardiac Arrest. *Circulation*, 112; IV-58-IV-66, Retrieved February 04, 2008, from [http://circ.ahajournals.org/cgi/content/full/112/24\\_suppl/IV-58](http://circ.ahajournals.org/cgi/content/full/112/24_suppl/IV-58)

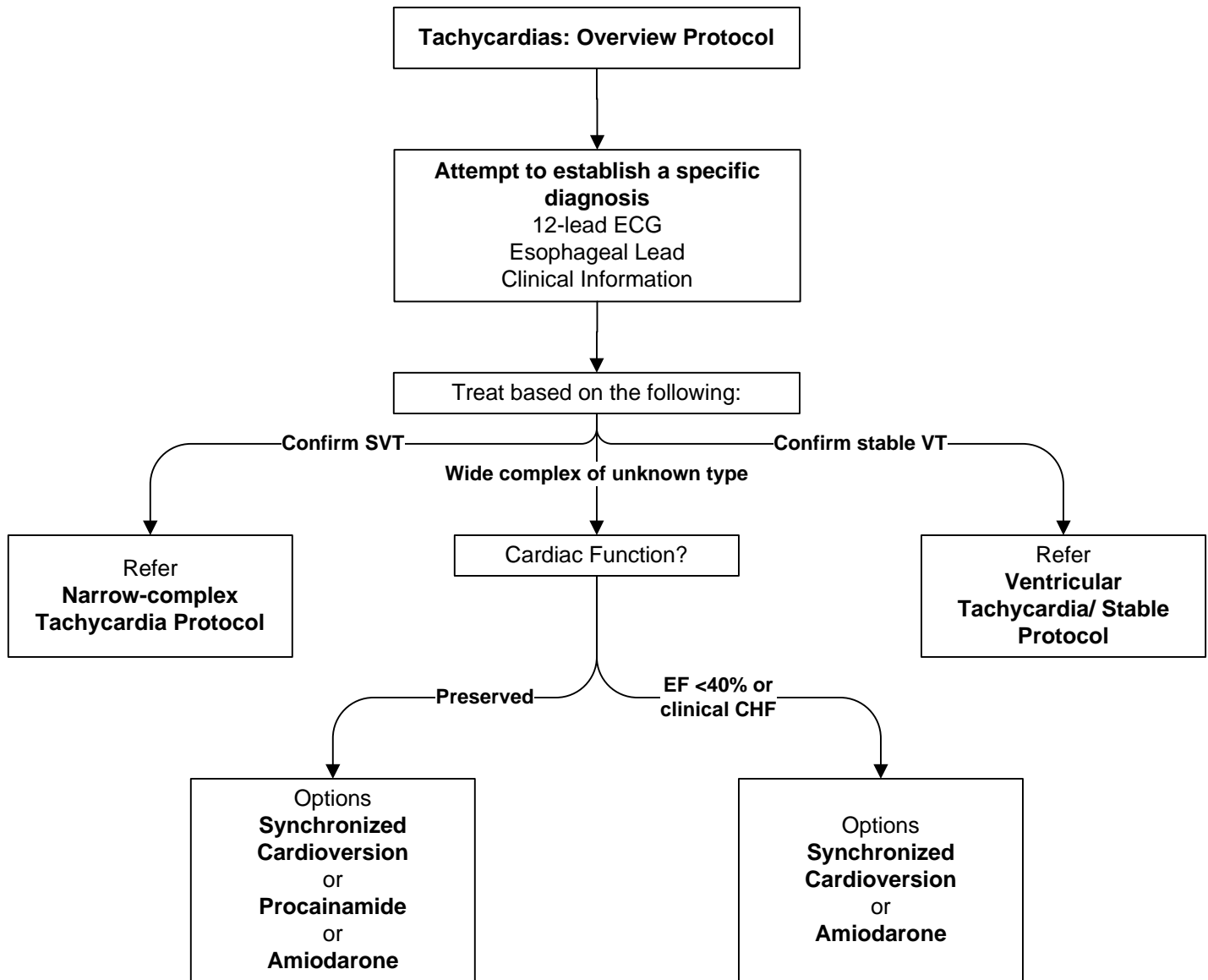


**Pearls:**

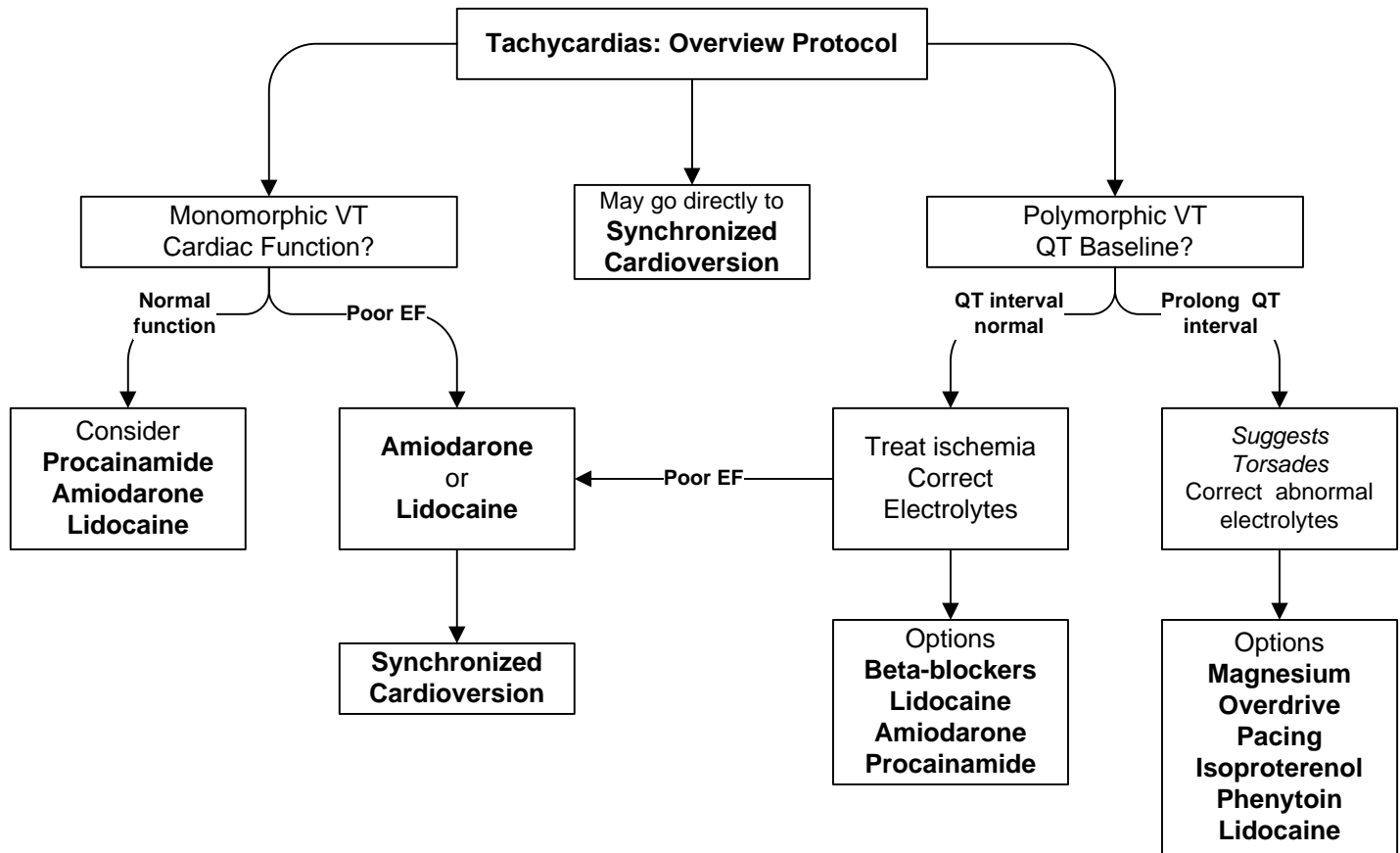
- No Cardioversion for EF <40% or CHF, Junctional Tachycardia, Ectopic or multifocal atrial tachycardia.
- Do not use Beta- Blockers if EF <40% or CHF.

**Reference:** (2005, November, 25). Management of Cardiac Arrest. *Circulation*, 112; IV-58-IV-66, Retrieved February 04, 2008, from [http://circ.ahajournals.org/cgi/content/full/112/24\\_suppl/IV-58](http://circ.ahajournals.org/cgi/content/full/112/24_suppl/IV-58)

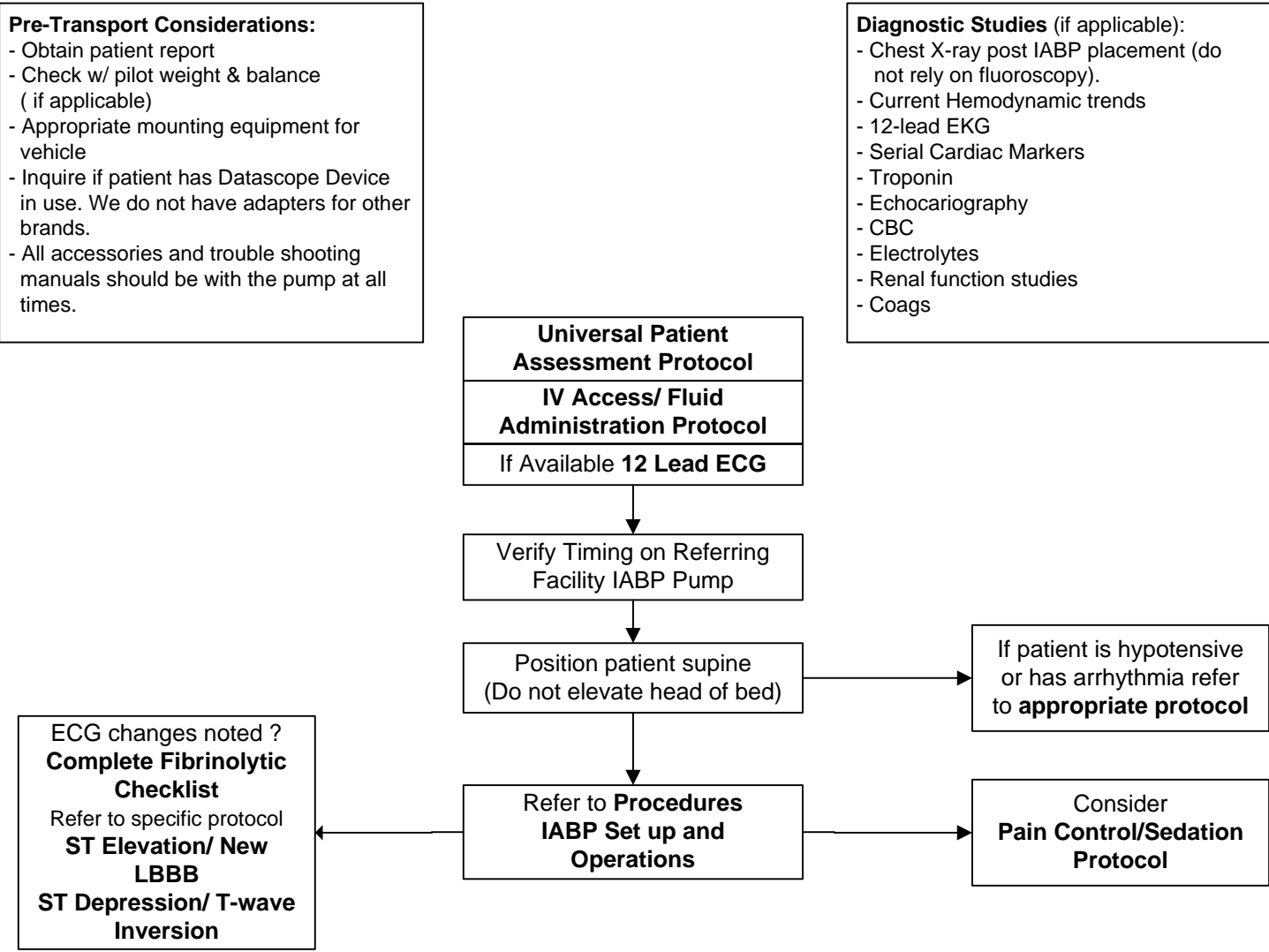
# Wide-Complex Tachycardia/ Stable



**Reference:** (2005, November, 25). Management of Cardiac Arrest. *Circulation*, 112; IV-58-IV-66, Retrieved February 04, 2008, from [http://circ.ahajournals.org/cgi/content/full/112/24\\_suppl/IV-58](http://circ.ahajournals.org/cgi/content/full/112/24_suppl/IV-58)



Reference: (2005, November, 25). Management of Cardiac Arrest. *Circulation*, 112; IV-58-IV-66, Retrieved February 04, 2008, from [http://circ.ahajournals.org/cgi/content/full/112/24\\_suppl/IV-58](http://circ.ahajournals.org/cgi/content/full/112/24_suppl/IV-58)



- Pearls:**
- If patient goes into an arrhythmia, treat the arrhythmia--not the pump.
  - Perform distal pulse checks after every patient re-positioning and/or at least every 15 minutes (document on flow sheet).
  - **Consider Foley Placement** (if not done already), monitor urine output closely as a change could be caused by balloon migration.
  - If Cardiac Arrest occurs, place IABP on **Pressure Trigger Mode** and refer to appropriate protocol(s).
  - Document per **Medical Standards Guidelines: IABP Operational Guideline**.
  - Keep pump on AC power, use battery power only during transfer.
  - During auto-refill, pump will automatically pause as it refills. Pump will start back automatically.
  - The balloon should not be immobile for more than 15 minutes due to the risk of clots.
  - If suspected balloon leak or rupture (i.e. black specks in tubing), turn off pump immediately, disconnect tubing at white connector and **contact MCO immediately** for additional interventions to support patient.
  - Review any known complications during IABP therapy (i.e. CVA, pulseless extremity, decreased urine output, bleeding, etc.)
  - Flight consideration for slow ascent / descent

Reference:

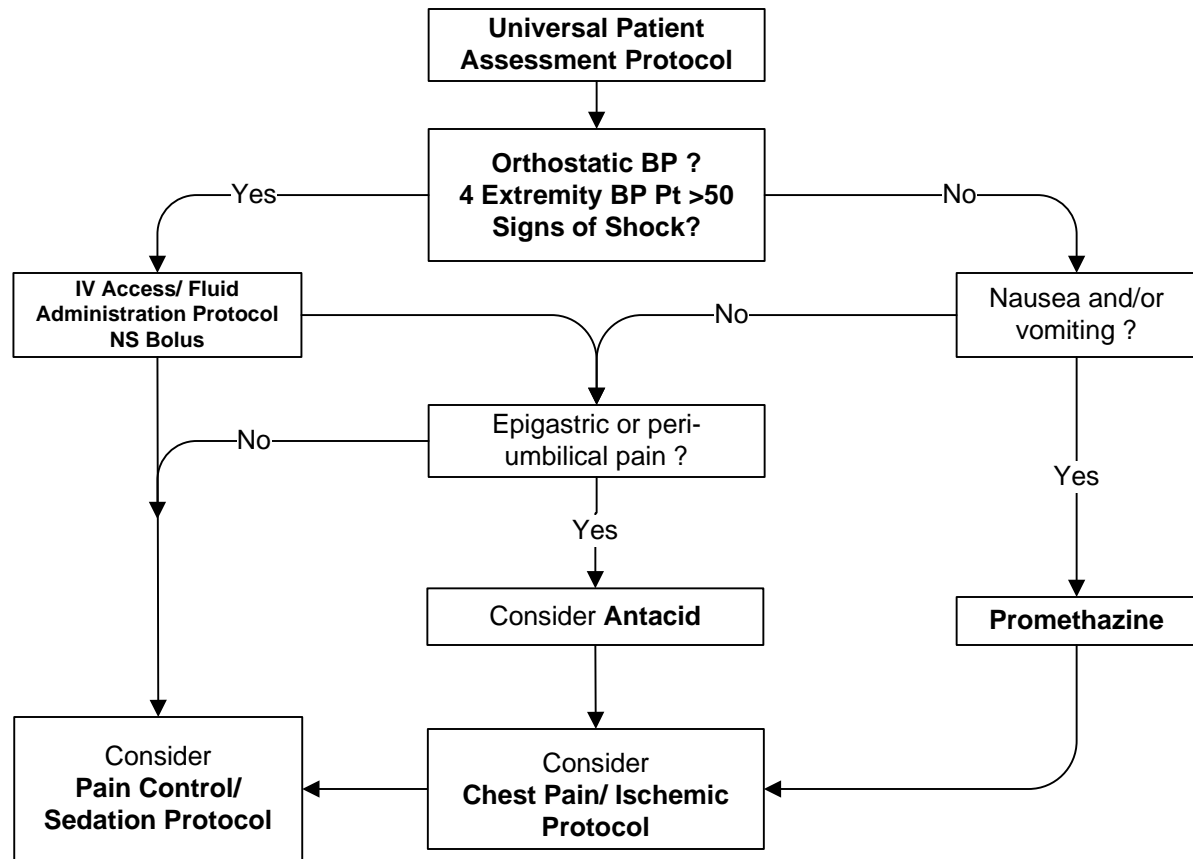


**Differentials:**

- Pneumonia or Pulmonary embolus
- Liver (hepatitis, CHF)
- Peptic ulcer disease / Gastritis
- Gallbladder
- Myocardial infarction
- Pancreatitis
- Kidney stone
- Abdominal aneurysm
- Appendicitis
- Bladder / Prostate disorder
- Pelvic (PID, Ectopic pregnancy, Ovarian cyst)
- Spleen enlargement
- Diverticulitis
- Bowel obstruction
- Gastroenteritis (infectious)

**Diagnostic Studies (if available):**

- Urine Analysis
- Culture and Sensitivity
- Female
  - HcG (child bearing age)
  - Pelvic
- Electrolytes
- Kidney function studies
- Complete Blood Count
- Liver Function Tests
- KUB (flat-plate abdomen)
- Guaiac status
- Abdominal CT
- Chest X-ray
- 12-lead ECG



**Pearls**

- Document the mental status and vital signs prior to administration of **Promethazine**
- Abdominal pain in women of childbearing age should be treated as an ectopic pregnancy until proven otherwise
- Antacids should be avoided in patients with Renal Disease
- The diagnosis of abdominal aneurysm should be considered with abdominal pain in patients over 50
- Appendicitis usually presents with vague peri-umbilical pain which migrates to the RLQ over time
- If giving patient **Antacid**, consider the need for NPO status

**Reference:** Tintinalli, J.E., Krome, R.L., Ruiz, E. Emergency Medicine 5th Ed. 2000, Mcgraw Hill.

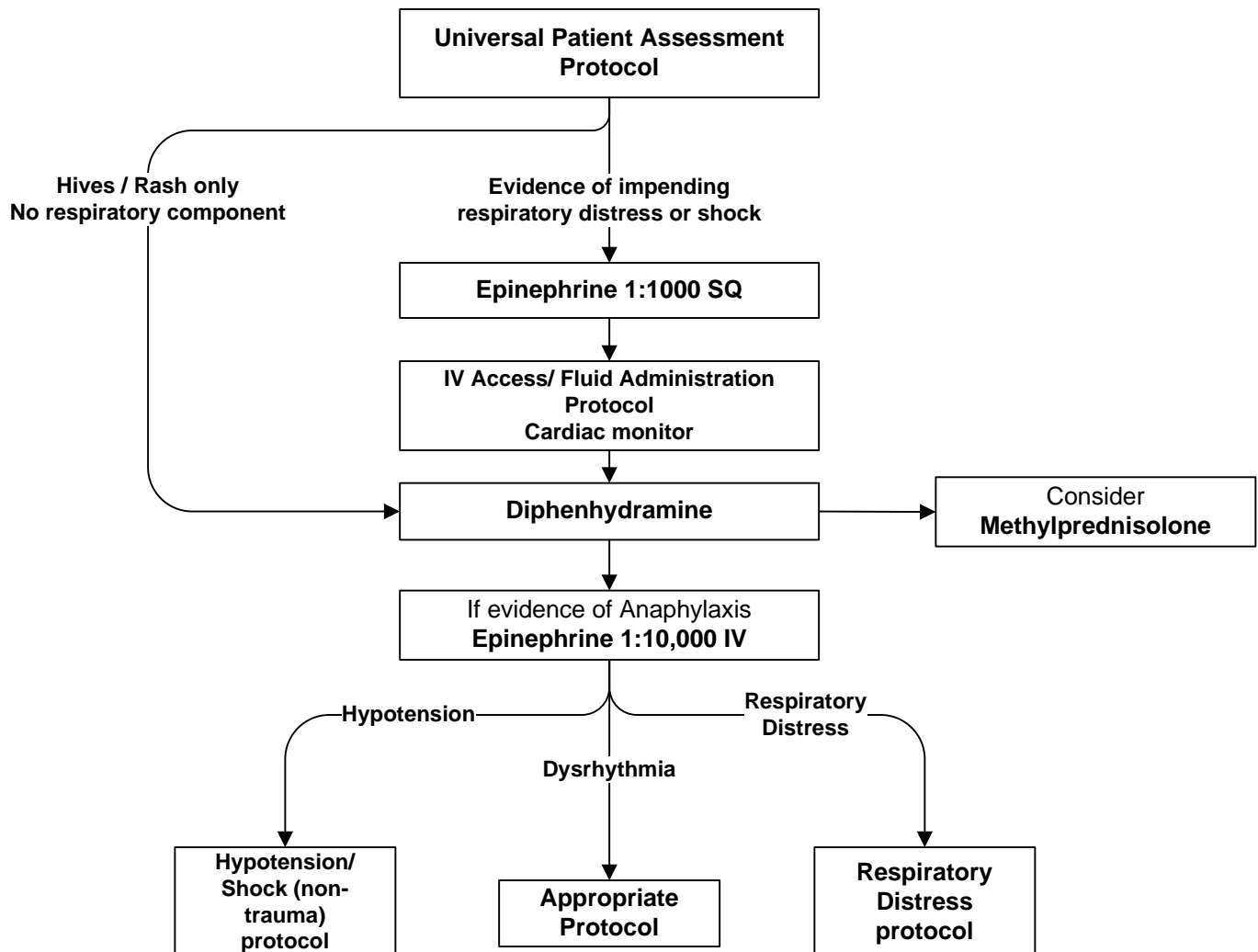
# Allergic Reaction

## Differentials

- Urticaria (rash only)
- Anaphylaxis (systemic effect)
- Shock (vascular effect)
- Angioedema (drug induced)
- Vasovagal event
- Asthma or COPD
- CHF

## Diagnostic Studies

- Chest X-Ray
- 12 Lead ECG
- CBC w/differential
- Electrolytes
- Toxicology Screen
- Known medication levels
- ABG



## Pearls

- Use caution in administering epinephrine in patients who are > 50 years of age have a history of cardiac disease or if the patient's heart rate is > 150. **Epinephrine may precipitate cardiac ischemia.** These patients should receive a 12 lead ECG
- Any patient with respiratory symptoms or extensive reaction should receive IV or IM diphenhydramine
- The shorter the onset from contact to symptoms the more severe the reaction
- Patients receiving Anti-psychotic D2 agonists may exhibit extra pyramidal side effect and should be treated with **Diphenhydramine** (this is not an allergic reaction)

Reference: Tintinalli, J.E., Krome, R.L., Ruiz, E. Emergency Medicine 5th Ed. 2000, Mcgraw Hill.

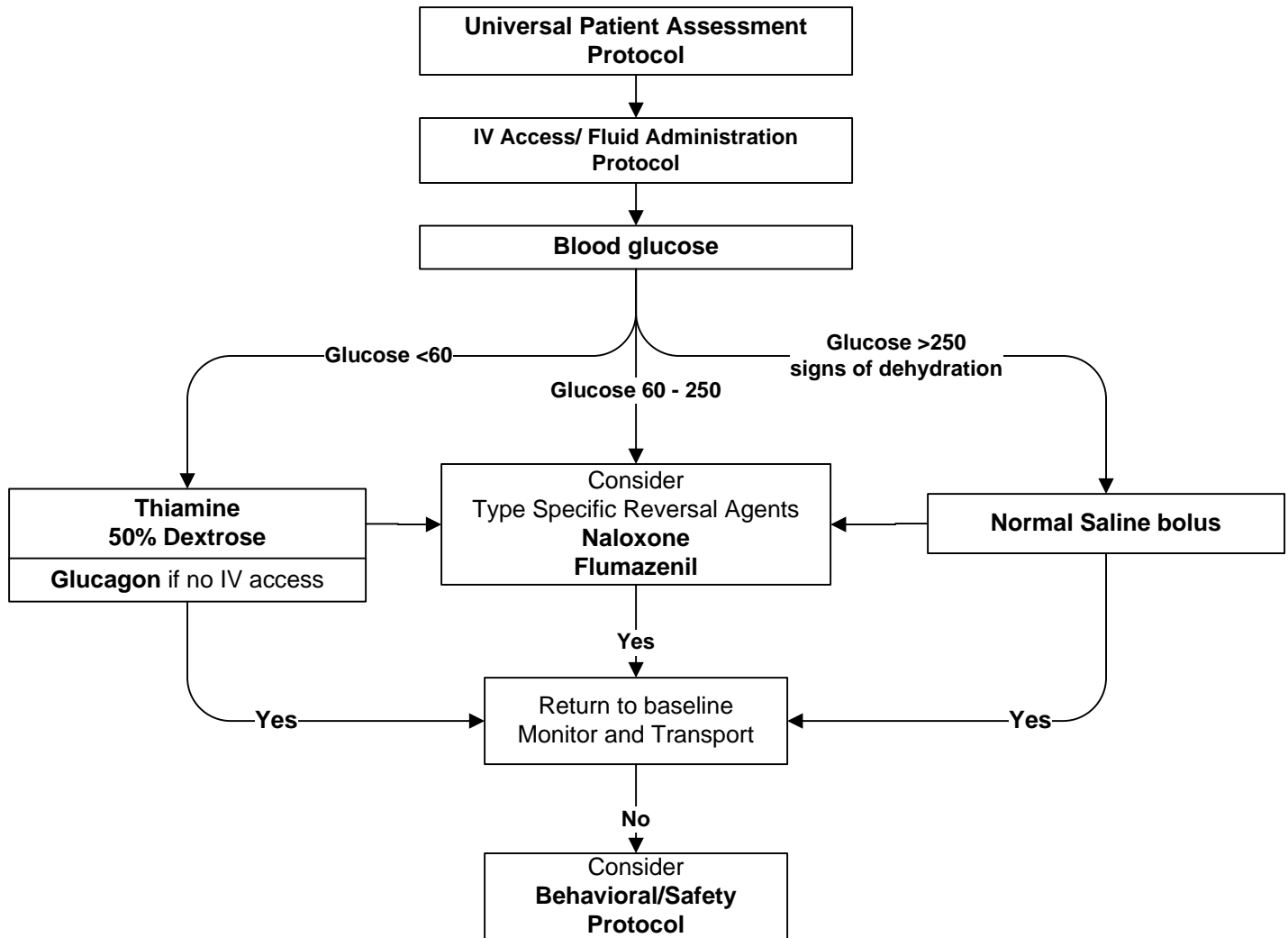


**Differentials:**

- Alcohol/ingested drugs/toxins
- Endocrine/exocrine (liver/electrolytes)
- Infection (neurological/systemic)
- Oxygen and Opiates
- Uremia/renal causes/hypertensive problems
- Trauma/ temperature
- Insulin/diabetes mellitus
- Psychiatric/porphyria
- Space occupying lesions, stroke, SAH, shock, seizures

**Diagnostic Studies (if available):**

- CBG
- Electrolytes
- Kidney function studies
- Liver function tests
- Head CT
- ABG
- Urine toxicology screen
- Ammonia level
- Urine Analysis
- Culture and Sensitivity
- Check known medication levels
- Lumbar Puncture



**Pearls:**

- Be aware of AMS as presenting sign of an environmental toxin or Haz-Mat exposure and protect personal safety.
- It is safer to assume hypoglycemia than hyperglycemia if doubt exists.
- Alcoholics frequently develop hypoglycemia.
- Low glucose (< 60), normal glucose (60 - 120), high glucose (> 250).
- Consider Restraints if necessary for patient's and/or personnel's protection per the restraint protocol/procedure.

**Reference:** Tintinalli, J.E., Krome, R.L., Ruiz, E. Emergency Medicine 5th Ed. 2000, Mcgraw Hill.

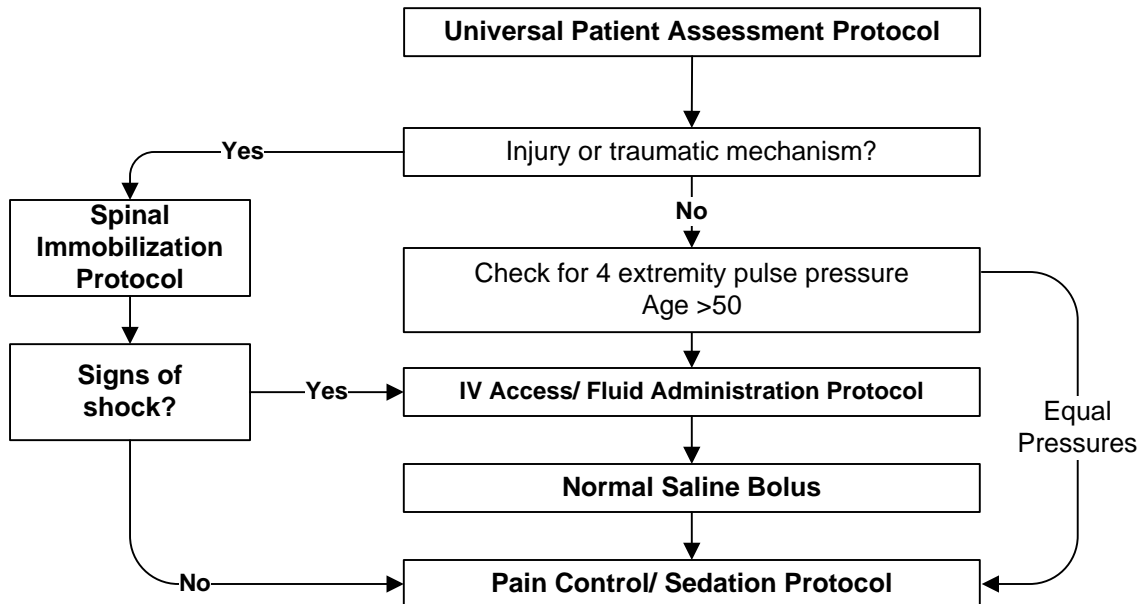


**Differentials:**

- Muscle spasm / strain
- Herniated disc with/ without nerve compression
- Sciatica
- Spine fracture
- Kidney stone
- Pyelonephritis
- Aneurysm
- Pneumonia
- Sickle Cell Crisis
- Retroperitoneal bleeding
- Tumor

**Diagnostic Studies (if available):**

- Urine Analysis
- KUB
- CBC
- Electrolytes
- CT Abdomen
- 12-lead ECG



**Pearls**

- Abdominal aneurysms are a concern in patients over the age of 50 years
- Kidney stones typically present with an acute onset of flank pain which radiates around to the groin area
- Patients with midline pain over the spinous processes should be spinally immobilized
- Any bowel or bladder incontinence is a significant finding which requires immediate medical evaluation.
- Consider need for blood administration for patients not responding to crystalloid boluses

**Reference:** Tintinalli, J.E., Krome, R.L., Ruiz, E. Emergency Medicine 5th Ed. 2000, Mcgraw Hill.

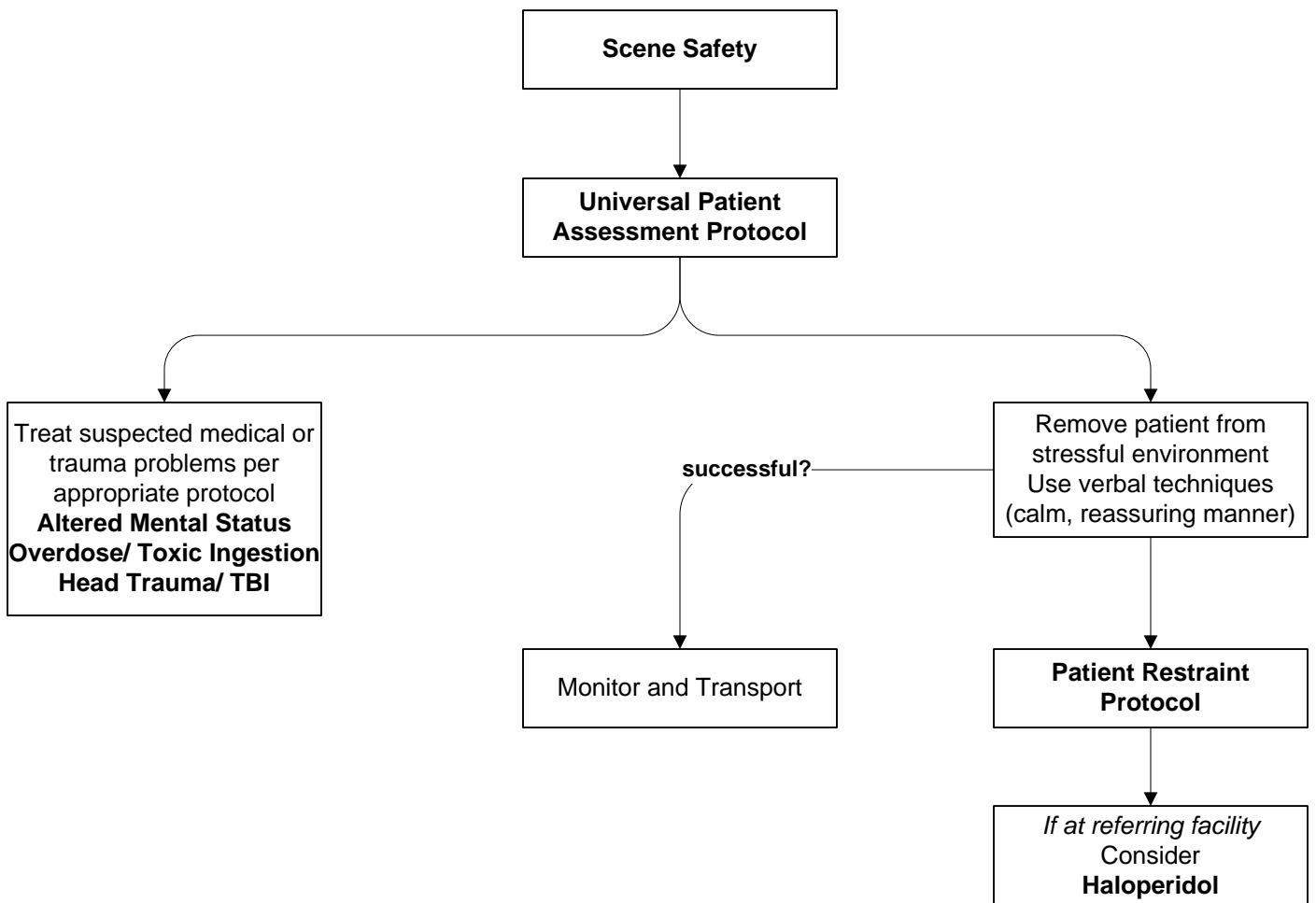


**Indications:**

- Anxiety, agitation, confusion
- Affect change
- Hallucinations
- Delusional thoughts, bizarre behavior
- Combative, violent
- Expression of suicidal/homicidal thoughts

**Diagnostic Studies (if available):**

- CBG
- Electrolytes
- Kidney function studies
- CBC
- Head CT
- ABG
- Ammonia levels
- Liver function tests
- Toxicology
- Known Medication levels



**Pearls:**

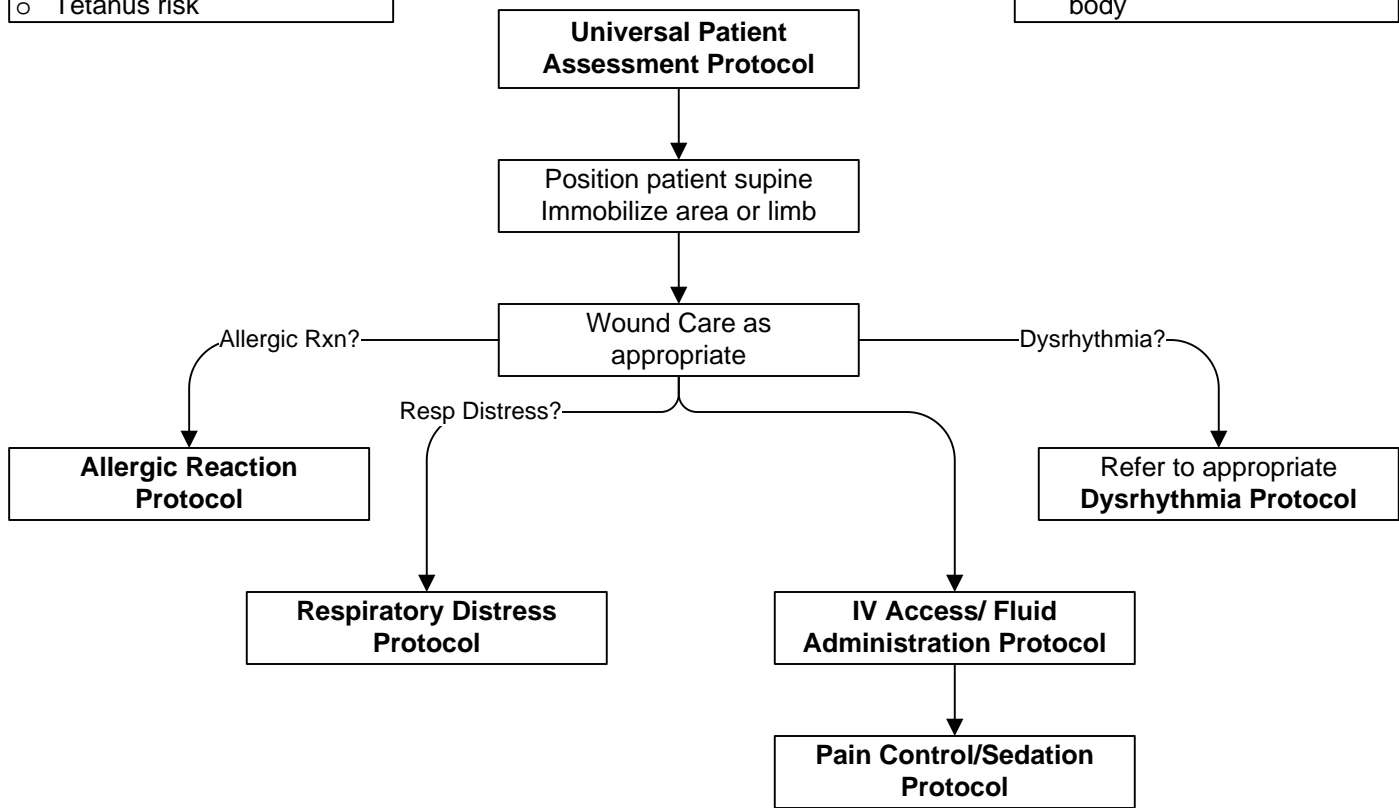
- The decision to physical restrain the patient is at the discretion of the transport team.
- The decision to chemically restrain patient should be based upon medical condition.
- Do not subject the patient to a prolonged medical exam.


**Differentials:**

- Animal bite
- Human bite
- Snake bite (poisonous)
- Spider bite (poisonous)
- Insect sting / bite
- Infection risk
- Rabies risk
- Tetanus risk

**Diagnostic Studies:**

- (if available)
- Coags
  - CBC w/differential
  - Serum electrolytes
  - Kidney function studies
  - 12 lead ECG
  - X-ray if suspect foreign body


**Pearls:**

- Early hospital notification with patients possibly needing antivenom.
- Consider NC Zoological staff for exotic animal identification.
- 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*).
- Poisonous snakes in this area are generally of the pit viper family: rattlesnake, copperhead, and water moccasin.
- 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.
- If no pain or swelling, envenomation is unlikely.
- 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, crepitus, red streaks proximal to wound.
- Immunocompromised patients are at an increased risk for infection: diabetes, chemotherapy, transplant patients.

**Reference:** Tintinalli, J.E., Krome, R.L., Ruiz, E. Emergency Medicine 5th Ed. 2000, Mcgraw Hill.

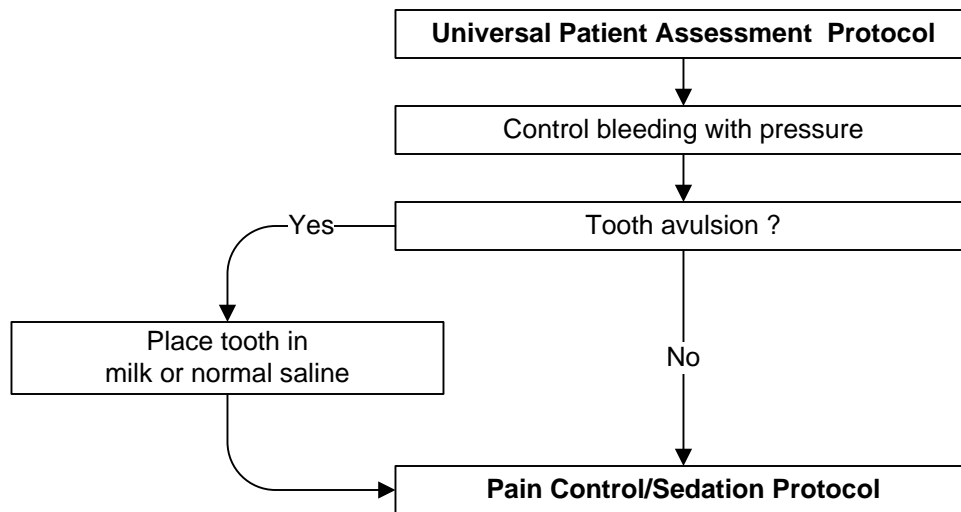


**Differentials:**

- Decay
- Infection
- Fracture
- Avulsion
- Abscess
- Facial cellulitis
- Impacted tooth (wisdom)
- TMJ syndrome
- Myocardial infarction

**Diagnostic Studies:**

- (if available)
- CBC w/ differential
  - Electrolytes
  - X-ray
  - CT face



**Pearls**

- Significant soft tissue swelling to the face or oral cavity can represent cellulitis or abscess.
- Scene and transport times should be minimized in complete tooth avulsions. Reimplantation is possible within 4 hours if the tooth is properly cared for.
- All tooth disorders typically need antibiotic coverage in addition to pain control
- Occasionally cardiac chest pain can radiate to the jaw
- All pain associated with teeth should be associated with a tooth which is tender to touch or sensitivity to cold or hot

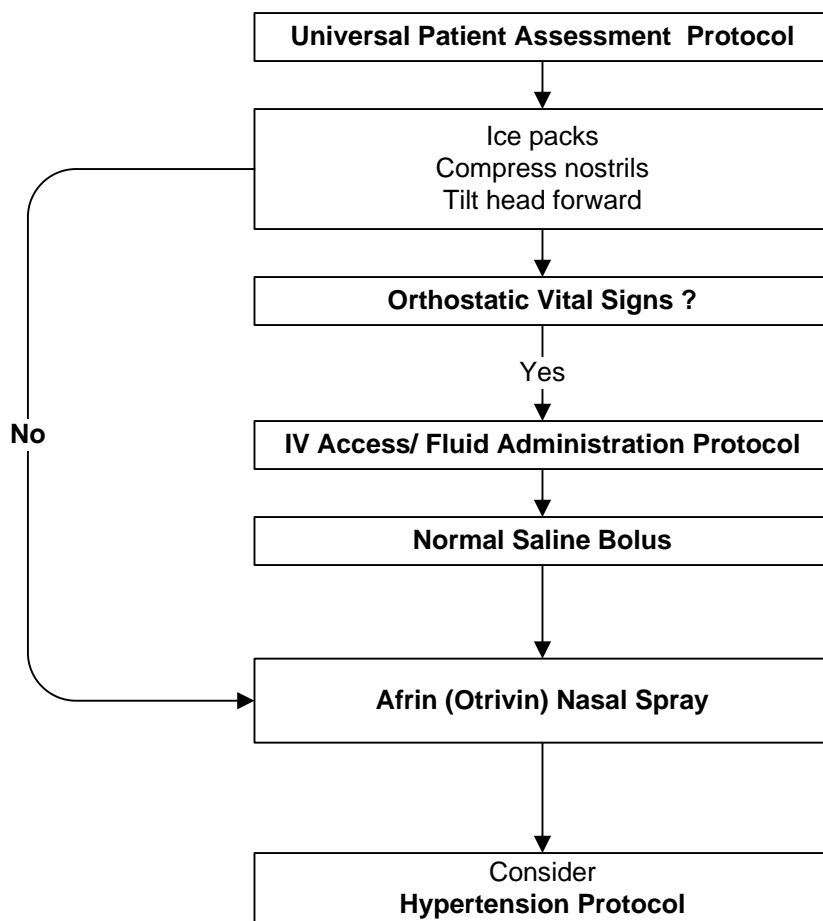
**Reference:** Tintinalli, J.E., Krome, R.L., Ruiz, E. Emergency Medicine 5th Ed. 2000, Mcgraw Hill.


**Differentials:**

- Trauma
- Infection (viral URI or Sinusitis)
- Allergic rhinitis
- Lesions (polyps, ulcers)
- Hypertension
- Cocaine/ Drug Use

**Diagnostic Studies:**

- (if available)
- Coags Studies
  - CBC w/ differential


**Pearls**

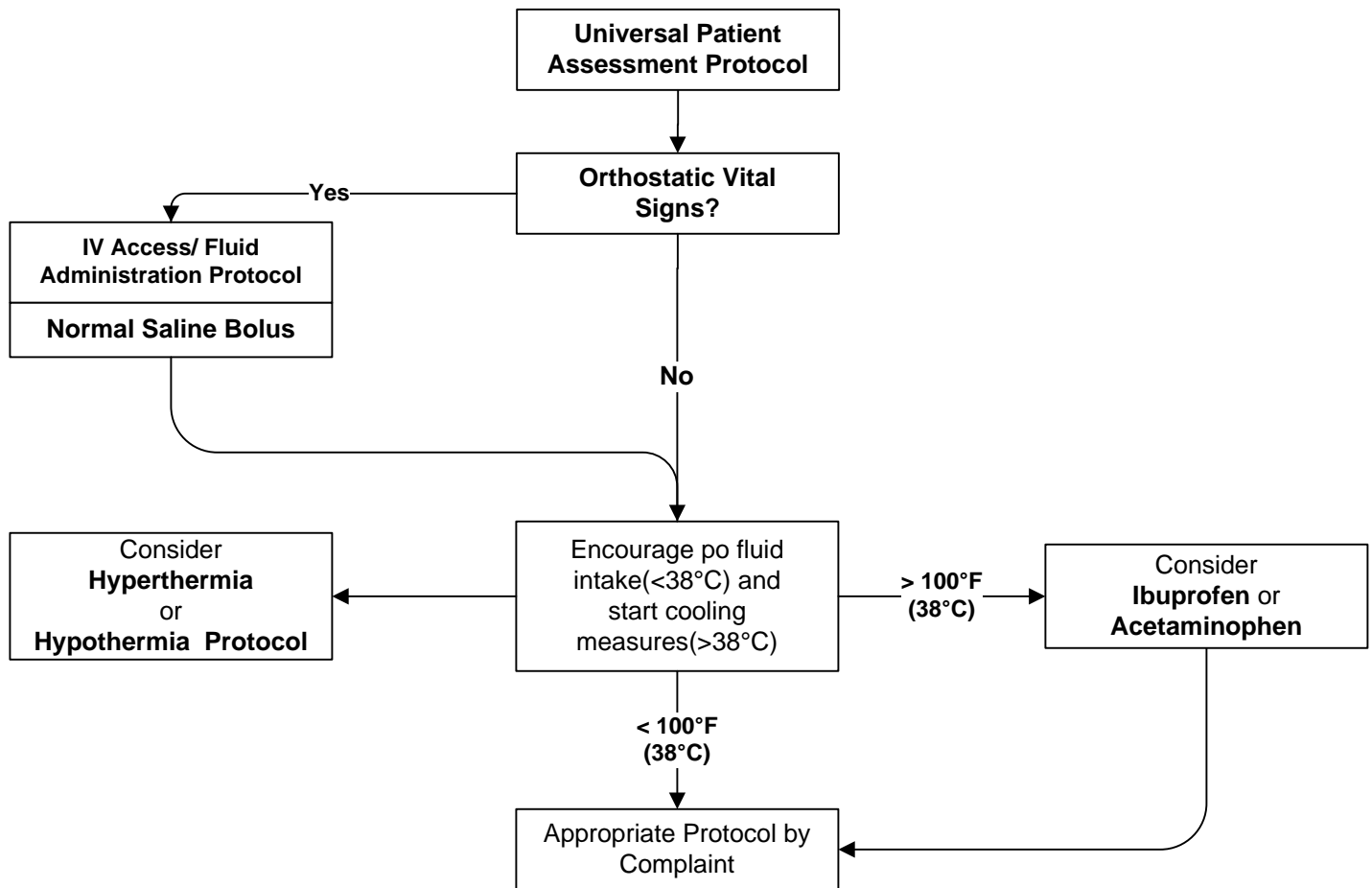
- Avoid Afrin in patients who have a diastolic blood pressure greater than 110 or known coronary artery disease
- Orthostatic vital signs are an increase in pulse 20 beats per minute and/or decrease of 25mmHg in systolic pressure from baseline. Allow for 1-2 minutes between readings
- It is very difficult to quantify the amount of blood loss with epistaxis
- Bleeding may also be occurring posteriorly. Evaluate for posterior blood loss by examining the posterior pharynx
- Anticoagulants include aspirin, coumadine, non-steroidal anti-inflammatory medications (ibuprofen) and many over the counter headache relief powders

**Reference:** Tintinalli, J.E., Krome, R.L., Ruiz, E. Emergency Medicine 5th Ed. 2000, Mcgraw Hill.



- Differentials:**
- Infection/Sepsis
  - Cancer/Tumors/Lymphomas
  - Connective tissue disease
    - Arthritis
    - Vasculitis
  - Hyperthyroid
  - Heat Stroke

- Diagnostic Studies (if available):**
- CBC w/ differential
  - Electrolytes
  - Kidney function studies
  - Urine Analysis
  - Culture and Sensitivity
  - Blood Cultures
  - Chest X-ray



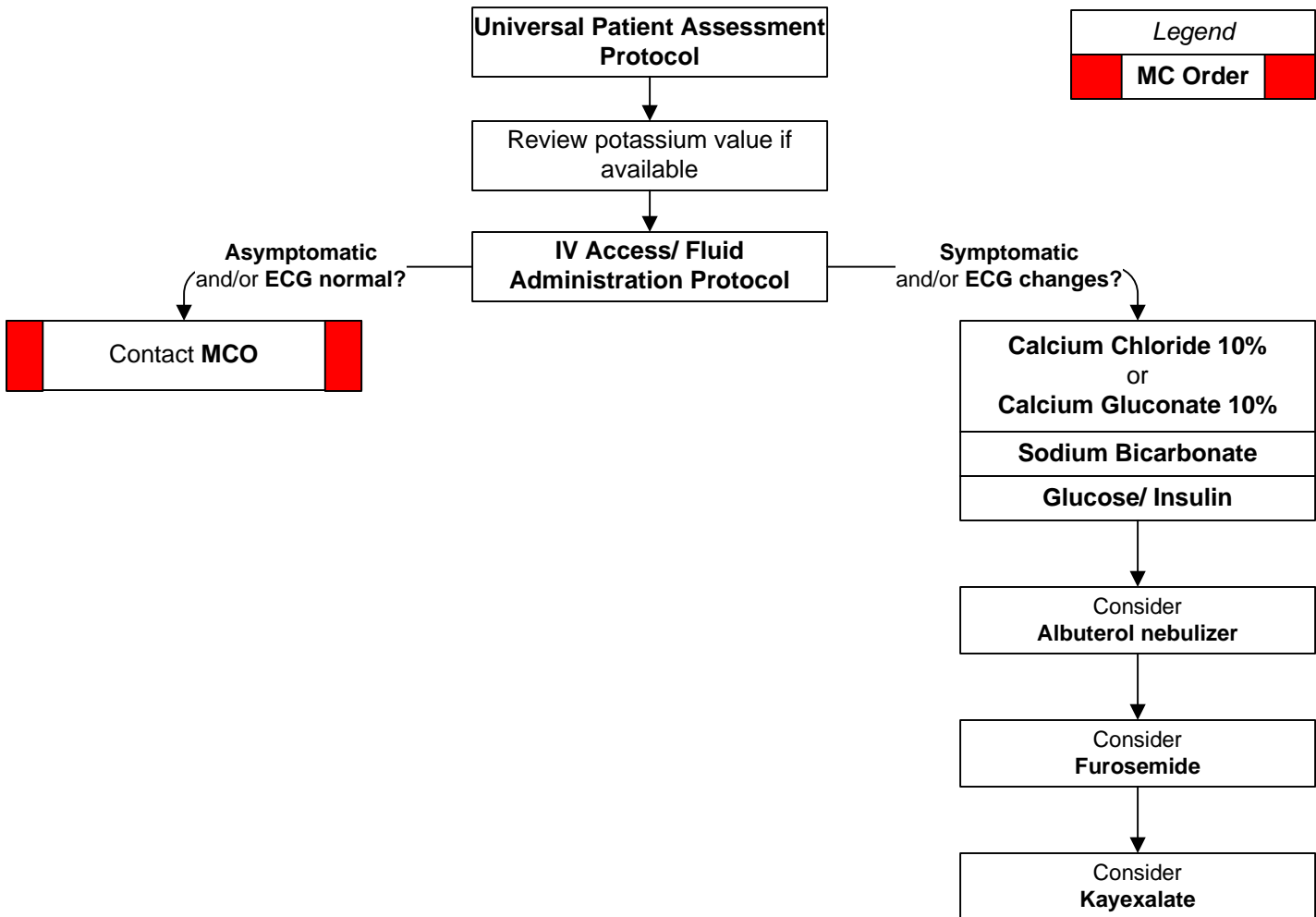
- Pearls:**
- Febrile seizures are more likely in children with a history of febrile seizures and with a rapid elevation in temperature.
  - Orthostatic Vital Signs are an increase in pulse 20 beats per minute and/or decrease of 25mmHg in systolic pressure from baseline. Should allow 1-2 minutes between readings.
  - Temperature may be decreased by a combination of 4 methods:
    - **Radiation:** Heat loss to air (unwrap or remove clothing).
    - **Evaporation:** Heat loss through sweating or liquid on the skin (tepid water bath to skin).
    - **Convection:** Heat loss through movement of air currents over the skin.
    - **Conduction:** Heat loss through contact with solid substances.
  - Rehydration with fluids increases the patients ability to sweat and improves heat loss.
  - If allergic to NSAID's, do not administer Ibuprofen.
  - Acetaminophen/Ibuprofen should not be used in the setting of environmental heat related disorders.

**Reference:** Tintinalli, J.E., Krome, R.L., Ruiz, E. Emergency Medicine 5th Ed. 2000, Mcgraw Hill.



# Hyperkalemia

<b>Differentials:</b> <ul style="list-style-type: none"> <li>○ see Altered Mental Status protocol</li> <li>○ Pseudohyperkalemia- due to hemolysis or blood sampling</li> <li>○ Exogenous: blood, salt substitutes, potassium containing drugs, acute digoxin toxicity, beta-blockers, succinylcholine</li> <li>○ Endogenous acidemia, trauma, burns, rhabdomyolysis DIC, sickle cell crisis, GI bleed, chemotherapy, mineralocorticoid deficiency, congenital (21 hydrxylase deficiency)</li> </ul>	<b>ECG (K+ in mEq/L)</b> <table border="0"> <tr> <td><b>K+</b></td> <td><b>ECG findings</b></td> </tr> <tr> <td>&gt;5.5-6.0</td> <td>Peaked T waves</td> </tr> <tr> <td>&gt;6.0-6.5</td> <td>incr PR &amp; QT intervals</td> </tr> <tr> <td>&gt;6.5-7.0</td> <td>decr P, decr ST segments</td> </tr> <tr> <td>&gt;7.0-7.5</td> <td>incr intraventricular conduction</td> </tr> <tr> <td>&gt;7.5-8.0</td> <td>incr QRS ST&amp;T waves merge</td> </tr> <tr> <td>&gt;10.0</td> <td>sine wave appearance</td> </tr> </table> <p style="text-align: center;"><b>Normal range 3.5-4.5</b></p>	<b>K+</b>	<b>ECG findings</b>	>5.5-6.0	Peaked T waves	>6.0-6.5	incr PR & QT intervals	>6.5-7.0	decr P, decr ST segments	>7.0-7.5	incr intraventricular conduction	>7.5-8.0	incr QRS ST&T waves merge	>10.0	sine wave appearance	<b>Diagnostic Studies (if available):</b> <ul style="list-style-type: none"> <li>○ CBG</li> <li>○ Electrolytes</li> <li>○ Kidney function studies</li> <li>○ Head CT</li> <li>○ ABG</li> <li>○ Urine Analysis</li> <li>○ Check known medication levels</li> </ul>
<b>K+</b>	<b>ECG findings</b>															
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>7.0-7.5	incr intraventricular conduction															
>7.5-8.0	incr QRS ST&T waves merge															
>10.0	sine wave appearance															



**Pearls:**

- **Calcium chloride** is contraindicated in patients that are digitalis toxicity.
- Clinical findings in symptomatic patients-parasthesias, weakness, ascending paralysis sparing head, trunk, and respiration.
- Consider rapid transport to facility capable of emergent dialysis.
- Patients my have symptomatic response at any serum potassium level, treat the patient not the value.

**Reference:** Greenberg, A., Hyperkalemia: Treatment Options, Seminars in Nephrology, 1998. 18(1), 46-57.

# Hypertension

**Indications:**

**One of these:**

- Systolic BP 200 or greater
- Diastolic BP 120 or greater

**AND at least one of these:**

- Headache
- Nosebleed
- Blurred vision
- Dizziness
- Chest Pain
- Respiratory Distress
- Altered Mental Status

**Diagnostic Studies (if available):**

- Chest X-ray
- 12-lead ECG
- Electrolytes
- Kidney function studies
- Coags
- Urine Analysis
- Toxicology Screen

**Universal Patient Assessment Protocol**

**IV Access/ Fluid Administration Protocol**

**Consider 12 Lead ECG**

**Nitroglycerin SL x3 or Nitro Paste**

Symptoms improving?

Still symptomatic?

Observe

*Consider Differentials:*

- Catecholamine-induced hypertension
- Left ventricular failure and coronary insufficiency
- Hypertensive Encephalopathy
- Thoracic dissection
- Renal Failure
- Pregnancy Induced Hypertension (PIH)

**Consider  
Labetalol  
Esmolol  
Nitroprusside  
Nitroglycerin Drip**

**Pearls**

- Avoid Nitroglycerine in any patient who has used Viagra (sildenafil) in the past 24 hours due to potential severe hypotension
- **Hypertensive Emergency** an elevated BP with end-organ damage or dysfunction. Treatment goal is to reduce MAP by 20-25% over 30-60 minutes
- **Hypertensive Urgency** an elevated BP to level that may potentially be harmful is sustained (usually diastolic >120mmHg) without end organ damage. Treatment goal is to reduce pressure gradually within 24-48 hours to normal for patient
- Never treat elevated BP based on one set of vital signs
- Nitroglycerin may be given to lower blood pressure in patients who have an elevated diastolic BP  $\geq$  120 and are symptomatic with chest pain, respiratory distress, syncope, headache or mental status changes
- Symptomatic hypertension is typically revealed through end organ damage to the cardiac, CNS or renal systems
- All symptomatic patients with hypertension should be transported with their head elevated

**Reference:** Tintinalli, J.E., Krome, R.L., Ruiz, E. Emergency Medicine 5th Ed. 2000, Mcgraw Hill.

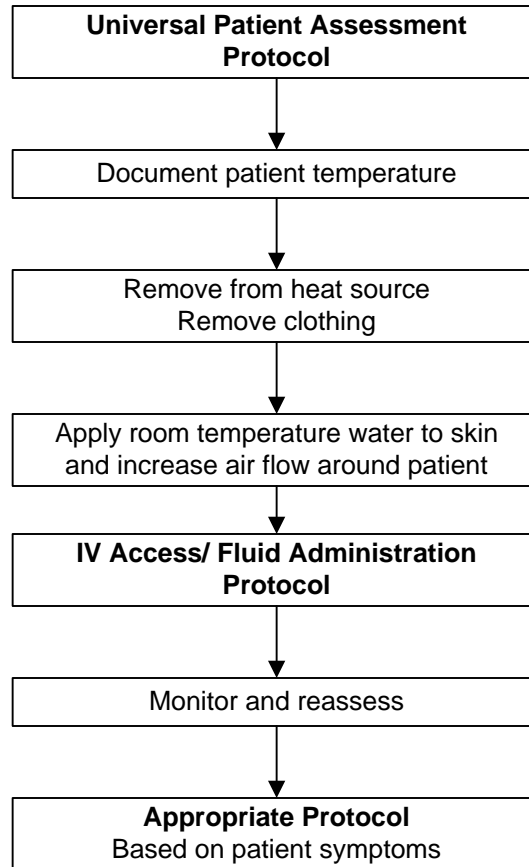


**Differentials:**

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

**Diagnostic Studies (if available):**

- CBC w/ differential
- Electrolytes
- Kidney function studies
- Urine Analysis
- Toxicology Screen



**Pearls**

- Extremes of age are more prone to heat emergencies (i.e. young and old)
- Predisposed by use of: tricyclic antidepressants, phenothiazines, anticholinergic medications and alcohol
- Cocaine, amphetamines and salicylates may elevate body temperatures
- Sweating generally disappears as body temperature rises above 104 degrees F (40 degrees C)
- Intense shivering may occur as patient is cooled
- **Heat Cramps** consist of benign muscle cramping secondary to dehydration not associated with an elevated temperature
- **Heat Exhaustion** consist 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** consist of dehydration, tachycardia, hypotension temperature > 104 degrees F (40 degrees C) and an altered mental status

**Reference:** Tintinalli, J.E., Krome, R.L., Ruiz, E. Emergency Medicine 5th Ed. 2000, Mcgraw Hill.

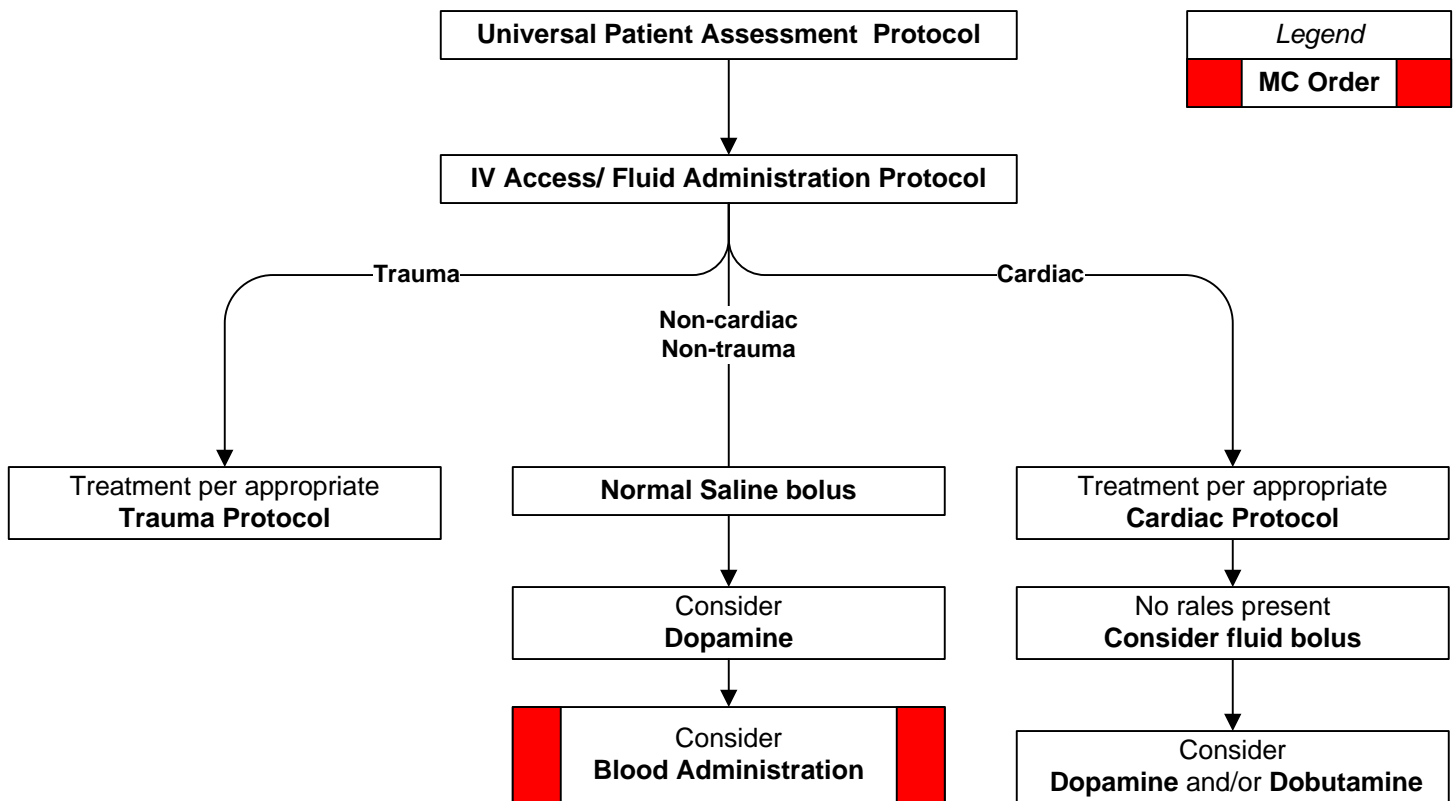
# Hypotension Shock (Non-Trauma)

### Differentials:

- Shock
- Hypovolemic
- Cardiogenic
- Septic
- Neurogenic
- Anaphylactic
- Ectopic pregnancy
- Dysrhythmias
- Pulmonary embolus
- Tension pneumothorax
- Medication effect / overdose
- Vasovagal
- Physiologic (pregnancy)

### Diagnostic Studies (if available):

- CBC w/ differential
- Electrolytes
- Kidney function studies
- Coags
- Toxicology
- Chest x-ray
- 12-lead ECG
- HcG in females



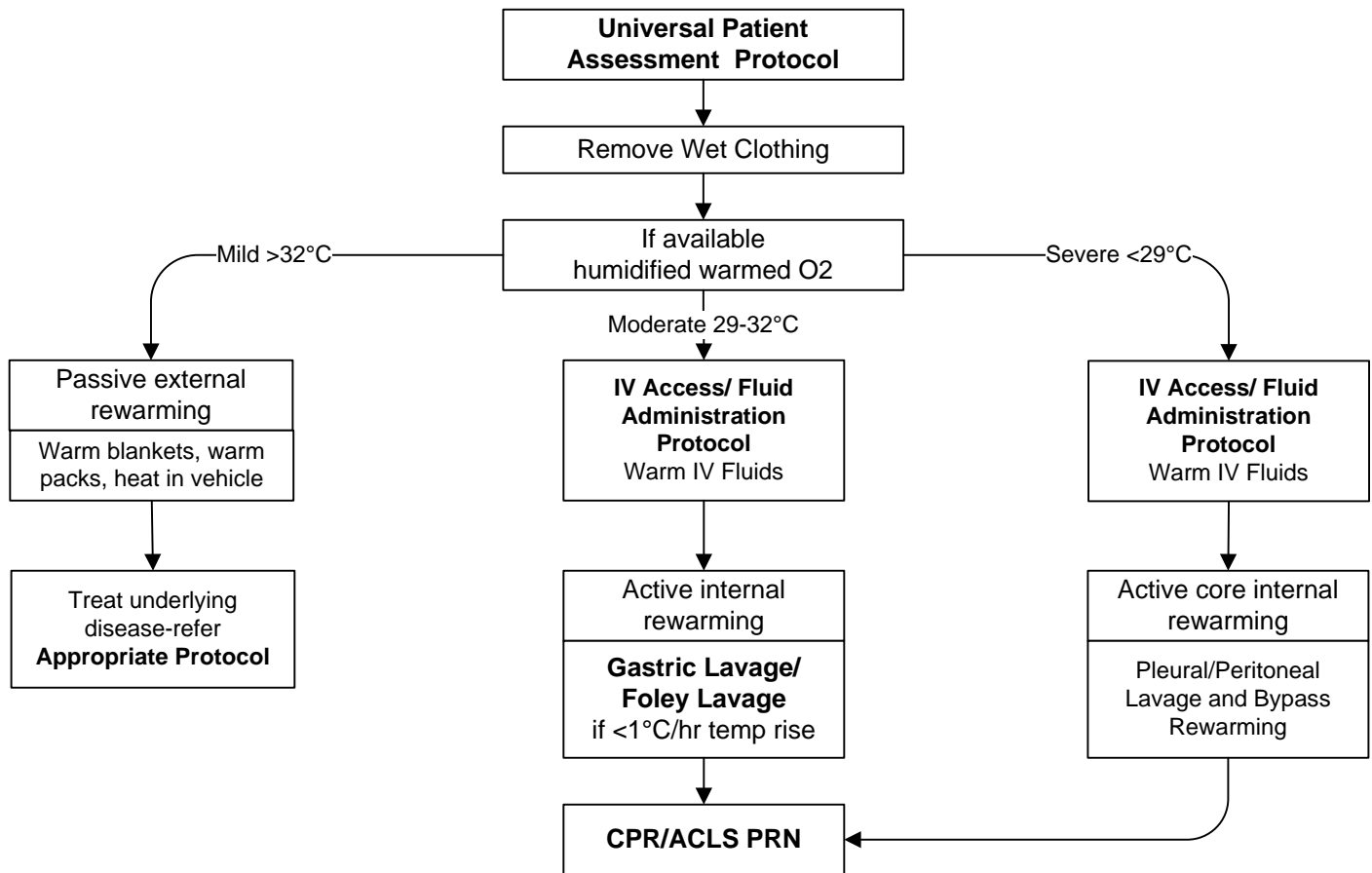
### Pearls

- Hypotension can be defined as a systolic blood pressure of less than 100 with signs and symptoms of hypoperfusion
- Hypoperfusion includes changes in mentation pale cool diaphoretic decreased urinary output cap refill etc.
- Consider performing orthostatic vital signs on patients in non-trauma situations if suspected blood or fluid loss
- Consider all possible causes of shock and treat per appropriate protocol

**Reference:** Tintinalli, J.E., Krome, R.L., Ruiz, E. Emergency Medicine 5th Ed. 2000, Mcgraw Hill.

# Hypothermia

<p><b>Differentials</b></p> <ul style="list-style-type: none"> <li>Sepsis</li> <li>Toxic ingestion / ETOH</li> <li>Head Injury / Trauma</li> <li>Hypoglycemia</li> <li>Hypoperfusion</li> <li>Psych disorders</li> <li>Environmental Exposure</li> <li>Metabolic Disorders (Addison's)</li> </ul>	<p><b>Mild 91-95°F(33-35°C)</b>-Shivering, slurred speech  <b>Moderate 85-90°F(29-32°C)</b>-AMS, mydriasis, shivering ceases, muscles are rigid, bradypnea  <b>Severe &lt;82°F(&lt;28°C)</b>-bradycardia, Osborne waves on EKG, vol. motion stops, pupils dilated  <b>79°F(28°C)</b>-LOC, areflexia, no pain response  <b>77°F(25°C)</b>-Pulmonary edema, No resp, appear dead  <b>68°F(20°C)</b>-Asystole</p>	<p><b>Diagnostic Studies (if available):</b></p> <ul style="list-style-type: none"> <li>Core Temp &lt;35°C(95°F)</li> <li>CBC w/ differential</li> <li>Serum Electrolytes</li> <li>Kidney function studies</li> <li>12-lead ECG</li> <li>Head CT</li> <li>Toxicology Screen</li> </ul>
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<p><b>Pearls</b></p> <ul style="list-style-type: none"> <li>Consider empiric <b>D50, Thiamine, Naloxone and Hydrocortisone</b></li> <li>Consider antibiotics if sepsis is suspected</li> <li>Extremes of age are more susceptible (i.e. very young and old)</li> <li>With temperatures less than 31 degrees C (88 F) ventricular fibrillation is common cause of death. Handling patients gently may prevent this (rarely responds to <b>defibrillation</b>: limit to 3 shocks)</li> <li>Be gentle with advanced airway management</li> <li>Meds should be administered after patient temp is greater than 32 degrees C (90 F)</li> <li>Consider withholding CPR if patient has organized rhythm</li> <li>If patient requires active core rewarming consider stabilizing at referring facility prior to transport</li> </ul>
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Reference: Holleran, R., Flight Nursing-Principles and Practices 2nd Ed. 1996. Mosby.

# Overdose Toxic Ingestion

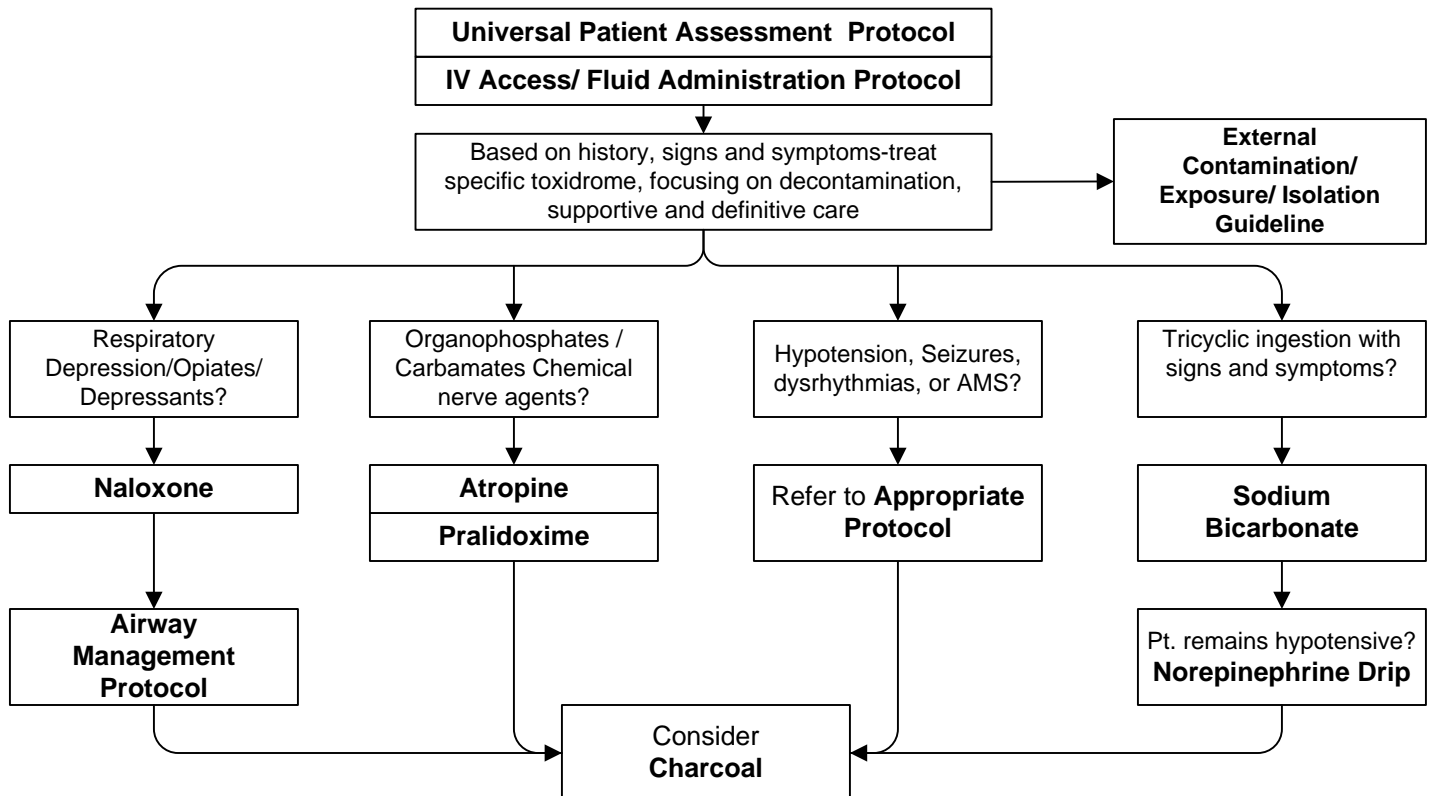


### Differentials:

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

### Diagnostic Studies (if available):

- Urine Drug Screen
- Serum Levels for Specific Agent
- ABG
- Abdominal x-ray
- CBC w/ differential
- Electrolytes
- Kidney function studies
- Glucose
- Organ function studies



### ▪ Pearls

- Do not rely on patient history for ingestion especially in suicide attempts
- Tricyclic: 4 major areas of toxicity: Seizures, dysrhythmias, hypotension, decreased mental status or coma  
Do not treat bradycardia with atropine  
IV Fluid bolus cautiously (pulmonary edema can result) early use of Norepinephrine with hypotension is preferred
- Acetaminophen: Consider **Mucomyst** if serum level is 140ug/ml or above 4 hours post ingestion
- Depressants: Decreased HR decreased BP decreased tempature decreased respirations non-specific pupils
- Cholinergic: **S**alivation **L**acrimation **U**rination **D**efecation **G**I distress **E**xcretion Consider **A**tropine / **P**ralidoxime
- Anticholinergic: Delirium Hot/dry/flushed skin Dilated pupils Seizures Consider **P**hysostigmine
- Digitalis: Dysrhythmias GI distress yellow vision Consider **D**igibind
- Beta / Calcium Blockers: Bradycardia myocardial depression vasodilation Consider **G**lucagon **C**alcium or **T**CP
- Cyanide: AMS respiratory distress Consider **A**myl nitrite **S**odium nitrite **S**odium thiosulfate
- Petroleum based ingestions: Do not induce vomiting

Reference: Tintinalli, J.E., Krome, R.L., Ruiz, E. Emergency Medicine 5th Ed. 2000, Mcgraw Hill.

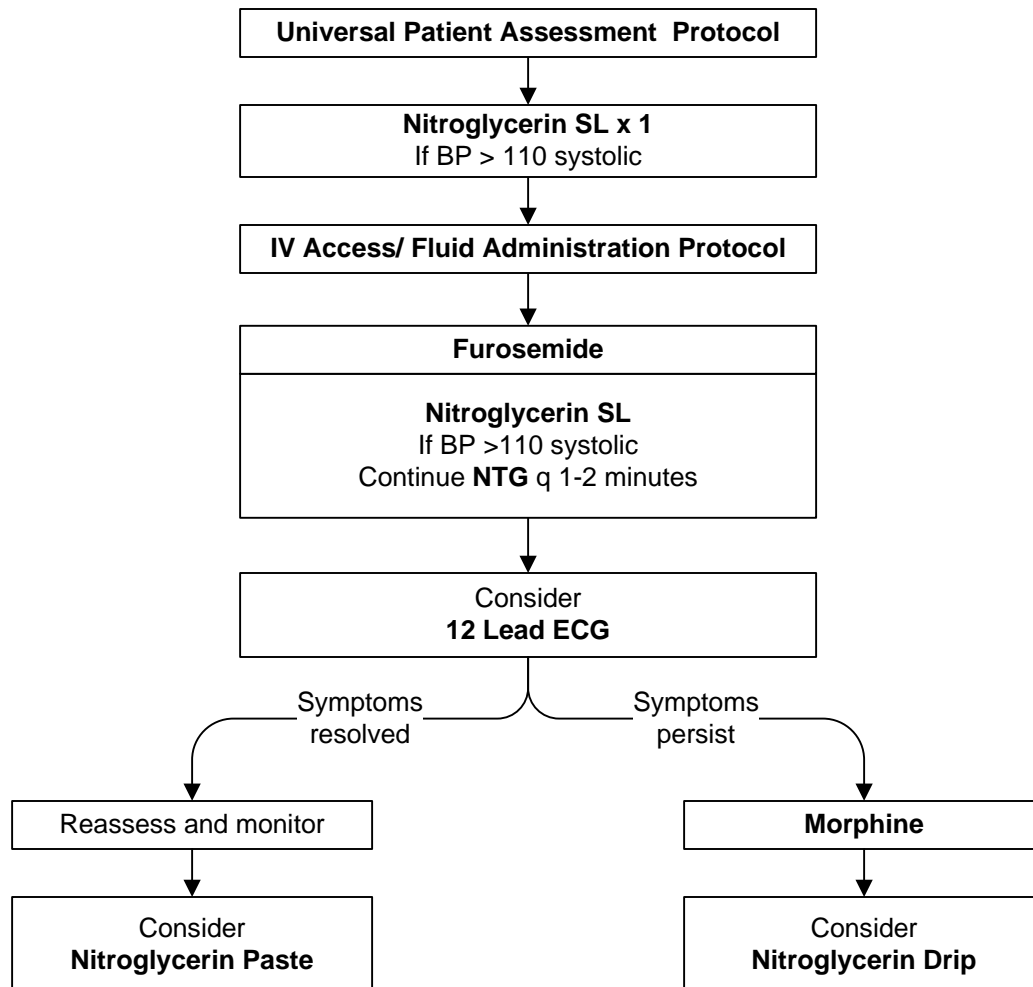


**Indications:**

- Respiratory distress, bilateral rales
- Apprehension, orthopnea
- Jugular vein distention
- Pink, frothy sputum
- Peripheral edema, diaphoresis
- Hypotension, shock
- Chest pain
- Cold, clammy extremities

**Diagnostic Studies (if available):**

- Chest x-ray
- 12-lead ECG
- Serum Cardiac Markers
- Electrolytes
- ABG
- Coags



**Pearls:**

- Avoid Nitroglycerin in any patient who's used Viagra (sildenafil) in the past 24 hours due to possibility for severe hypotension.
- If patient compliant with PO diuretics, they may require higher dosing to achieve desired effects.
- Consider myocardial infarction in all these patients.
- Early aggressive airway management and/or positive pressure ventilation (CPAP/BiPAP) should be considered.
- Diabetics and geriatric patients often have atypical pain, or only generalized complaints.
- Allow the patient to be in their position of comfort to maximize their breathing effort.

**Reference:** American Heart Association in Collaboration with the International Liaison Committee on Resuscitation. Guidelines 2000 for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care-An International Consensus on Science. Circulation 2000; 102(suppl 8): I1-384.

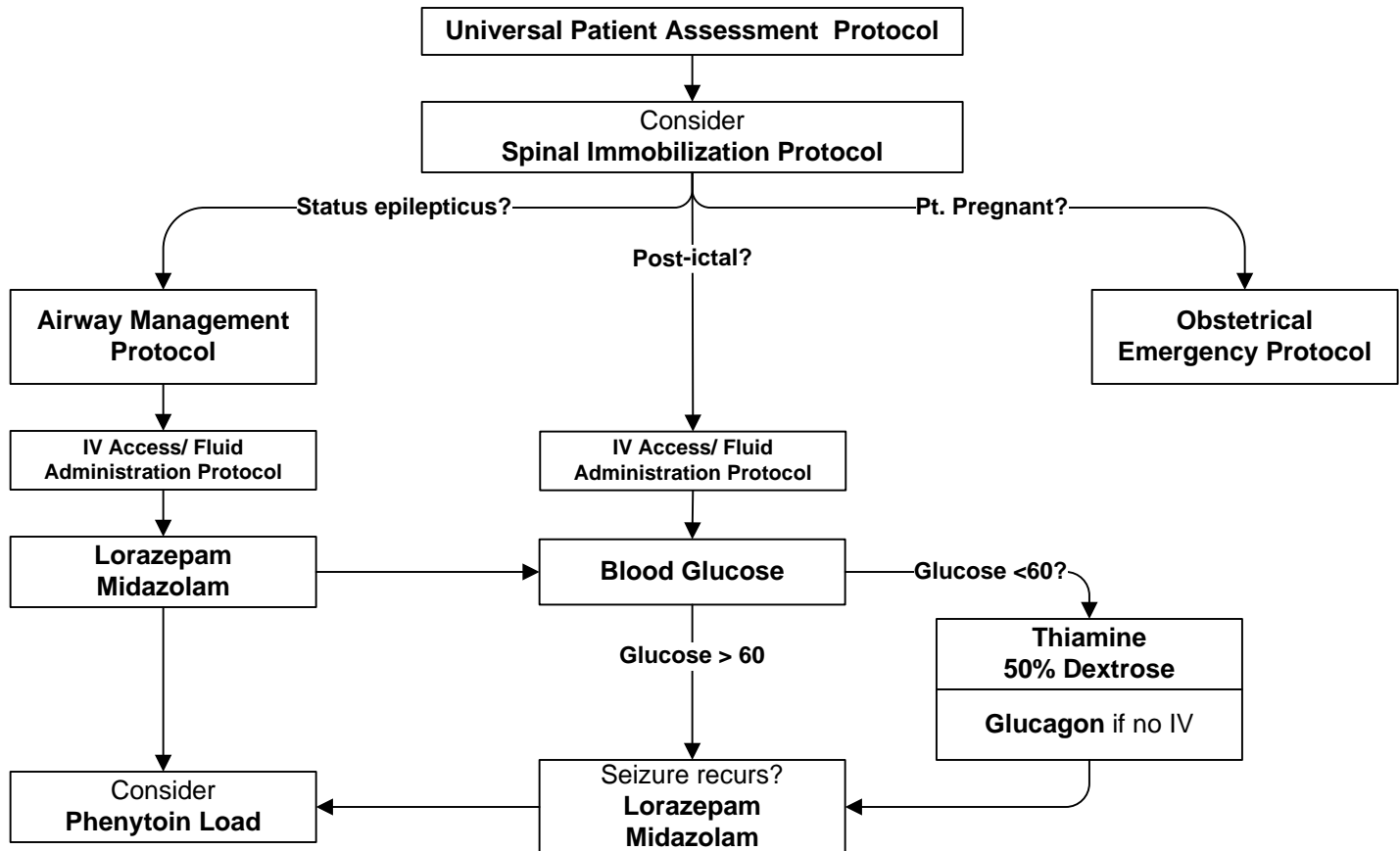


**Differential:**

- CNS (Head) trauma
- Tumor
- Metabolic, Hepatic, or Renal failure
- Hypoxia
- Electrolyte abnormality (Na, Ca, Mg)
- Drugs, Medications, Non-compliance
- Infection / Fever
- Alcohol withdrawal
- Eclampsia
- Stroke
- Hyperthermia

**Diagnostic Studies (if available):**

- Head CT
- Chest X-ray
- Therapeutic Drugs Levels
- Electrolytes
- Kidney function studies
- CBC w/ differential
- Urine Drug Screen



**Pearls**

- Status epilepticus is defined as two or more seizures without a period of consciousness or recovery
- Assess possibility of occult trauma and substance abuse

Reference: Tintinalli, J.E., Krome, R.L., Ruiz, E. Emergency Medicine 5th Ed. 2000, Mcgraw Hill.

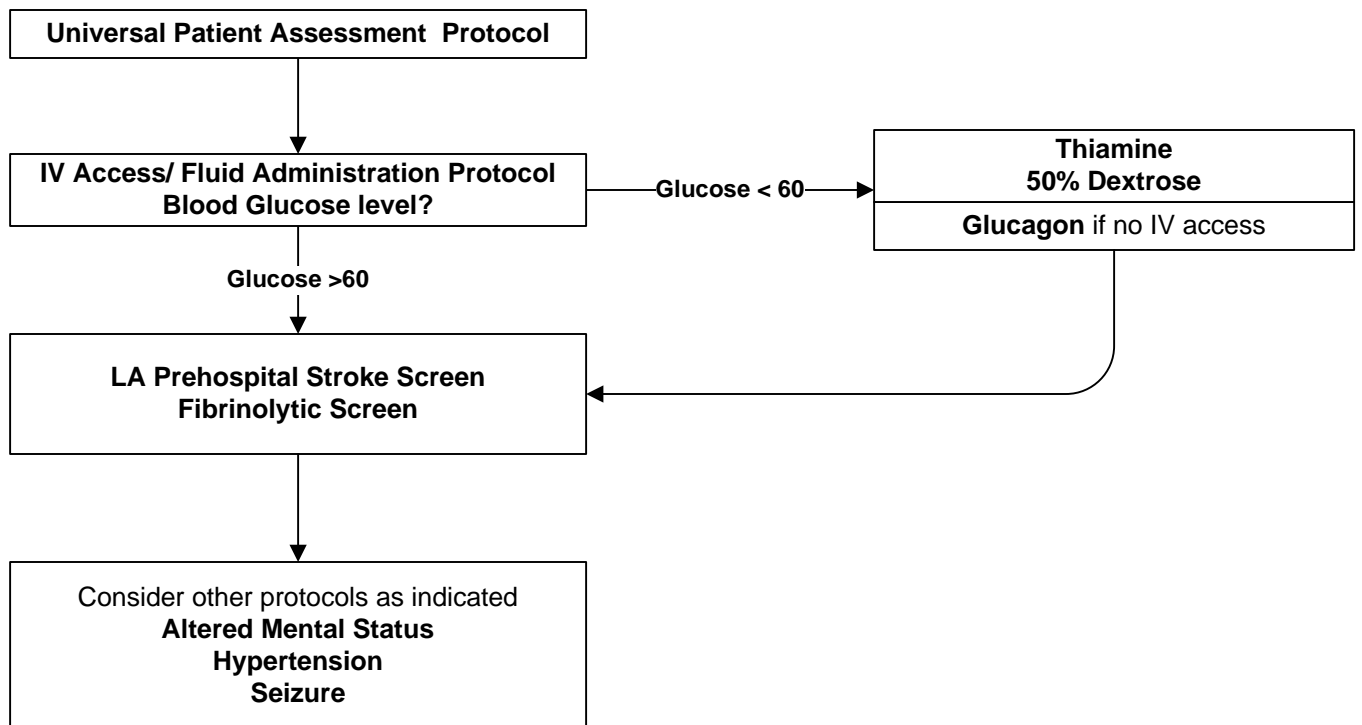


**Differential:**

- See Altered Mental Status
- TIA (Transient ischemic attack)
- Seizure
- Hypoglycemia
- Stroke
  - Thrombotic
  - Embolic
  - Hemorrhagic
- Tumor
- Trauma

**Diagnostic Studies (if available):**

- Head CT scan
- C-spine/skull/chest x-rays
- ABG
- PT/PTT/INR
- Serum electrolytes
- CBC w/ differential
- Type and Screen
- Urine analysis
- Toxicology



**Pearls:**

- **Fibrinolytic Screening Checklist should be completed for any suspected stroke patient. With a duration of symptoms of less than 3 hours, scene times and transport times should be minimized.**
- Onset of symptoms is defined as the last witnessed time the patient was symptom free (i.e. awakening with stroke symptoms would be defined as an onset time of the previous night when patient was symptom free)
- The differential listed on the Altered Mental Status Protocol should also be considered.
- Elevated blood pressure is commonly present with stroke. Consider treatment if diastolic is > 120 mmHg.
- Be alert for airway problems (swallowing difficulty, vomiting).
- Hypoglycemia can present as a localized neurologic deficit, especially in the elderly.

**Reference:** American Heart Association in Collaboration with the International Liaison Committee on Resuscitation. Guidelines 2000 for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care-An International Consensus on Science. Circulation 2000; 102(suppl 8): 11-384.

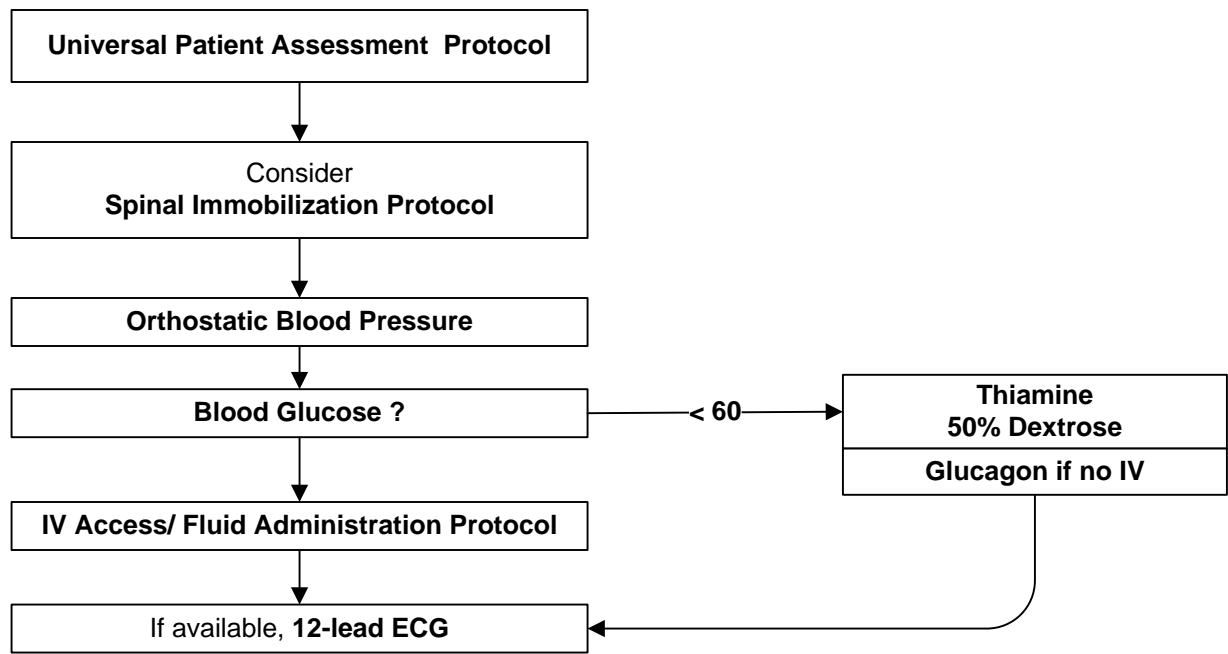


**Indications:**

- Loss of consciousness with recovery
- Lightheadedness, dizziness
- Palpitations, slow or rapid pulse
- Pulse irregularity
- Decreased blood pressure

**Diagnostic Studies (if available):**

- 12-lead ECG
- Chest X-ray
- Urine Analysis
- CBC w/ differential
- Electrolytes
- Kidney function studies
- Liver function tests
- Head CT
- Toxicology Screen



**AT ANY TIME**

If relevant signs / symptoms found go to appropriate protocol:

**Dysrhythmia  
Altered Mental Status  
Hypotension**

**Pearls**

- Assess for signs and symptoms of trauma if associated or questionable fall with syncope
- Consider dysrhythmias GI bleed ectopic pregnancy and seizure as possible causes of syncope
- More than 25% of geriatric syncope is cardiac dysrhythmia based

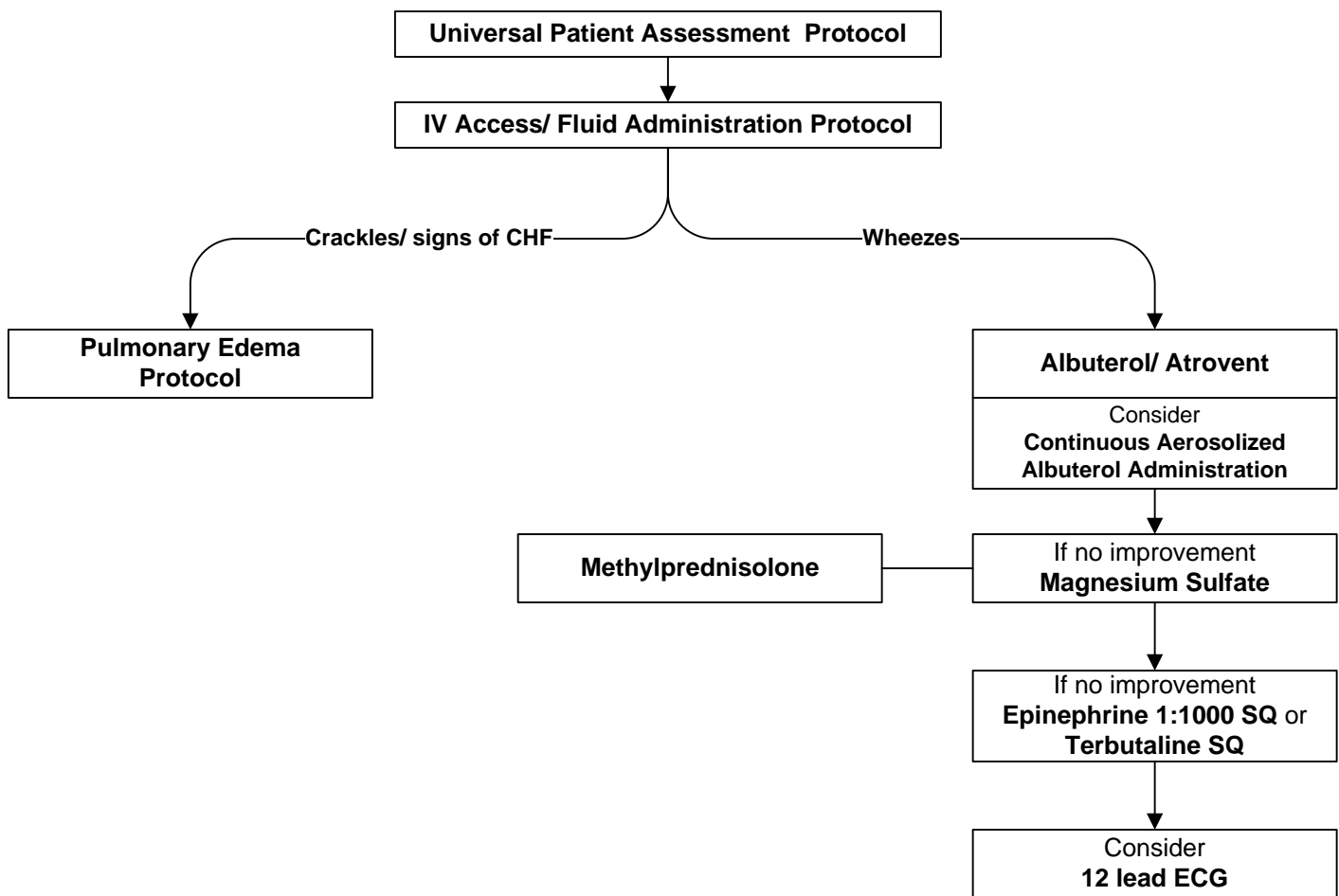


**Differentials:**

- Asthma
- Anaphylaxis
- Aspiration
- COPD (Emphysema, Bronchitis)
- Pleural effusion
- Pneumonia
- Pulmonary embolus
- Pneumothorax
- Cardiac (MI or CHF)
- Pericardial tamponade
- Hyperventilation
- Inhaled toxin (Carbon monoxide, etc.)

**Diagnostic Studies (if available):**

- ABG
- Peak Flow
- Chest X-ray
- 12-lead ECG
- Cardiac Serum Markers
- Electrolytes
- Kidney function studies
- CBC
- Chest CT
- V-Q Scan



**Pearls**

- When possible peak flow measurements should be obtained before and after each nebulized treatment
- Status asthmaticus a sever prolonged asthma attack unresponsive to therapy may benefit from Magnesium
- In patients who are > 40 years of age have a history of cardiac disease or if the patients HR is > 120; Epinephrine may precipitate cardiac ischemia. Terbutaline should be considered
- Patients with spontaneous pneumothorax is associated with tall thin males who smoke and patients with history of COPD and Cystic Fibrosis

Reference: Tintinalli, J.E., Krome, R.L., Ruiz, E. Emergency Medicine 5th Ed. 2000, Mcgraw Hill.

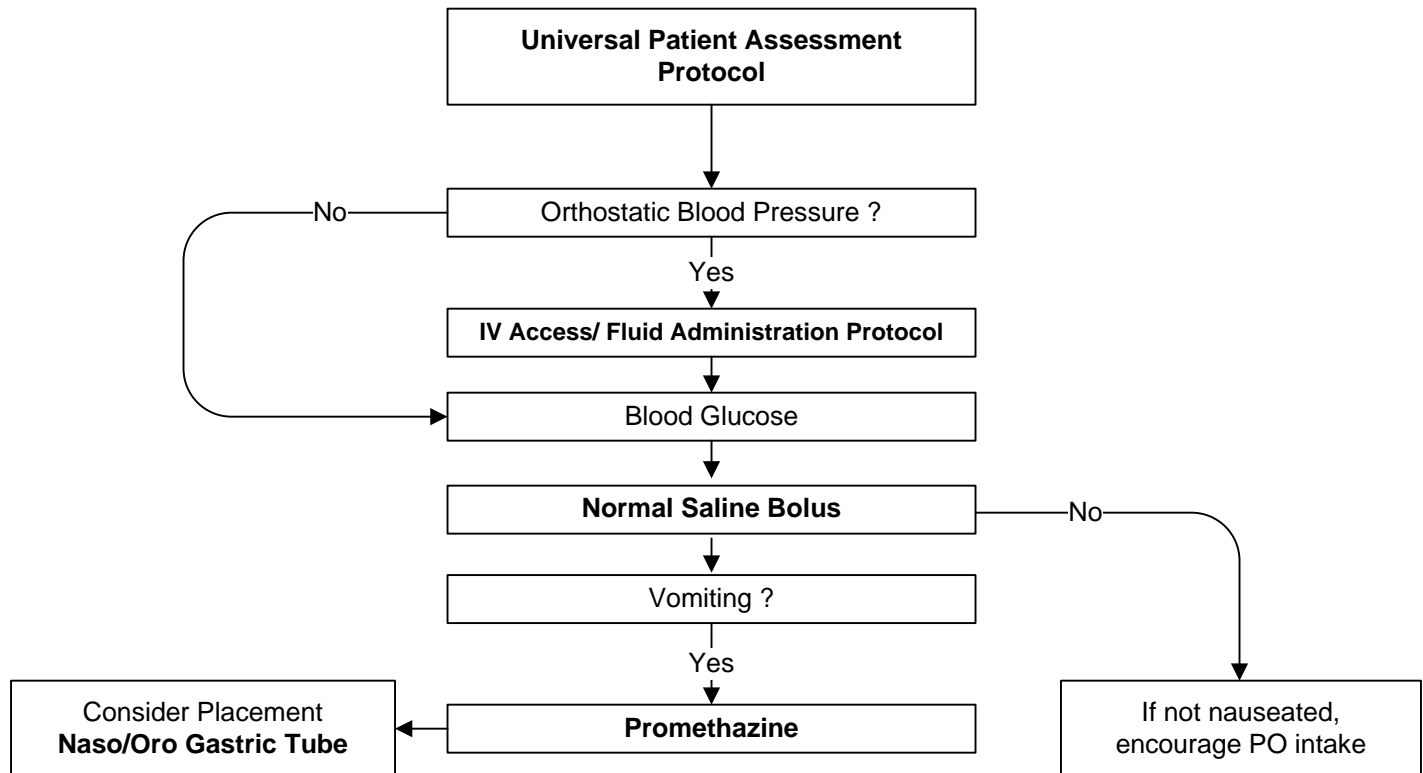


**Differentials:**

- CNS (increased pressure, headache, stroke, CNS lesions, trauma or hemorrhage, vestibular)
- Myocardial infarction
- Drugs (NSAID's, antibiotics, narcotics, chemotherapy)
- GI or Renal disorders
- Diabetic ketoacidosis
- Gynecologic disease (ovarian cyst, PID)
- Infections (pneumonia, influenza)
- Electrolyte abnormalities
- Food or toxin induced
- Medication or Substance abuse
- Pregnancy
- Psychologic

**Diagnostic Studies (if available):**

- Urine Analysis
- Culture and Sensitivity
- CBC w/ differential
- Electrolytes
- Kidney function studies
- Liver function tests
- Toxicology Screen
- KUB
- Guaic Status
- Females
  - HcG status
  - Pelvic Exam



**Pearls:**

- Vomiting and Diarrhea in patients who take Digoxin or Lithium may lead to electrolyte imbalances or toxic drug levels.
- Document the mental status and vital signs prior to administration of **Promethazine**.
- Use **Promethazine** cautiously in elderly patients, consider using smaller doses.

**Reference:** Healy, E.J., Cohen, P.J. A Practice of Anaesthesia 6th Ed. 1995.  
 Marx, J. A. Hockberger, R. S. Walls, R. M., et al. Rosen's Emergency Medicine: Concepts and Clinical Practice 6th Ed. Philadelphia: Mosby 2006.

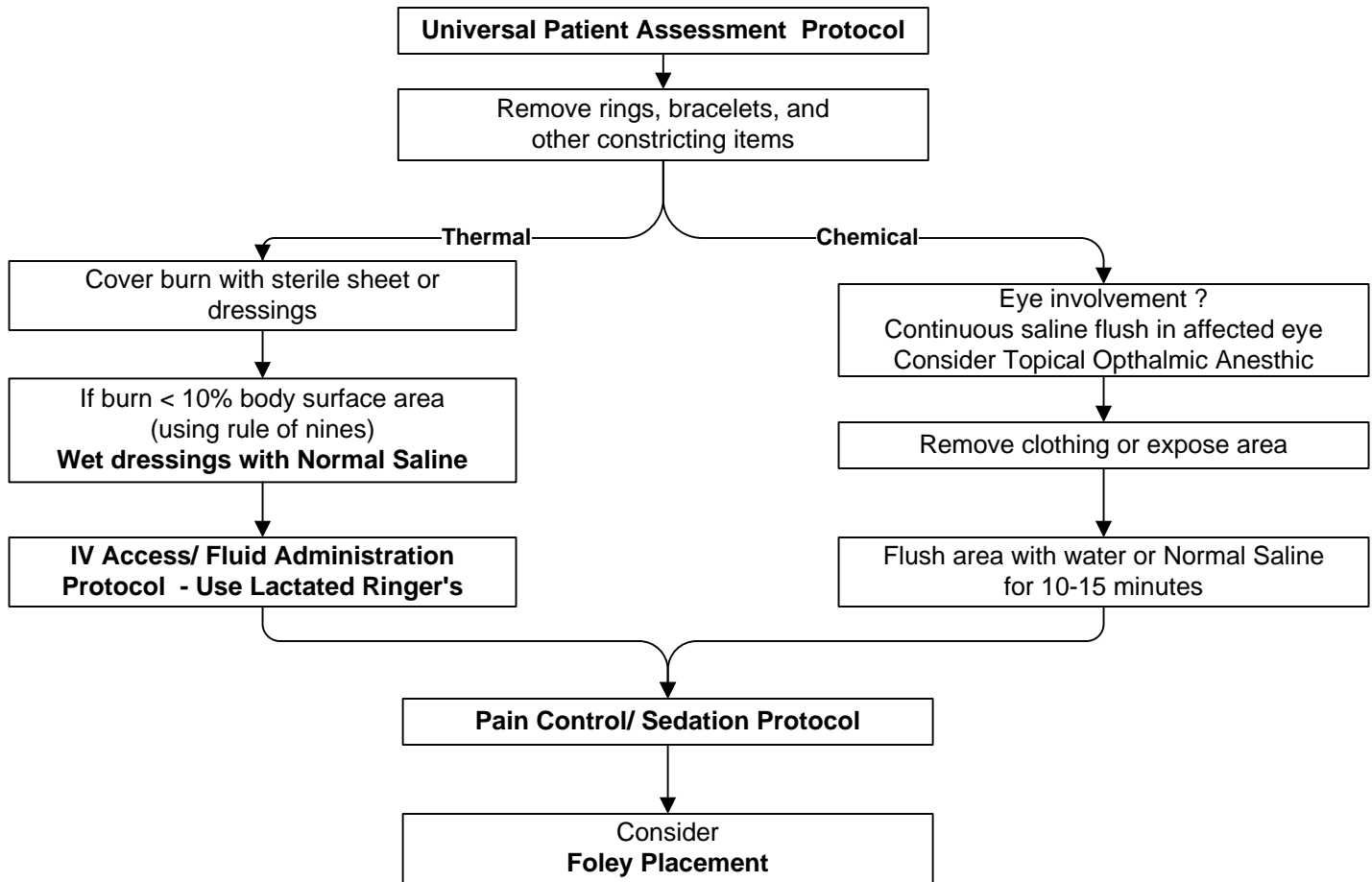


**Indications:**

- Dermal layer disruption
- Type of exposure
  - Thermal, Chemical, Electrical, Radiation
- Inhalation injury
- Time of injury and length of exposure

**Diagnostic Studies (if available):**

- Chest x-ray
- 12-lead ECG
- ABG w/COHgB
- CBC w/ differential
- Serum electrolytes
- Kidney function studies
- Urine Analysis
- CK-MB



**Pearls:**

- **Fluid Resuscitation: Use Parkland Formula 3-4cc/kg/%TBS 2nd/3rd degree burns. 50% of total over first 8 hours.**
- **Critical Burns:** >25% body surface area (BSA); 3° burns >10% BSA; 2° and 3° burns to face, eyes, hands or feet; electrical burns; respiratory burns; deep chemical burns; burns with extremes of age or chronic disease; and burns with associated major traumatic injury.
- Potential CO exposure should be treated with 100% oxygen. With severe cases (mental status changes), consider transport to Duke **after MCO contact** due to availability of hyperbaric oxygen treatment center.
- Circumferential burns to extremities are dangerous due to potential vascular compromise 2° to soft tissue swelling. **Contact MCO if need for escharotomy.**
- Burn patients are prone to hypothermia.
- Do not overlook the possibility of multiple system trauma.
- See appendix for rule of nines.

**Reference:** American College of Surgeons Committee on Trauma: *Advanced Trauma Life Support for Doctors*, course manual, 7<sup>th</sup> ed. Chicago: American College of Surgeons, 2004.



**Indications:**

- Unresponsive
- Mental status changes
- Decreased or absent vital signs
- Vomiting
- Coughing
- Witness exposure to submersion

**Diagnostic Studies (if available):**

- CBC w/ differential
- Electrolytes
- Kidney function studies
- Chest X-ray
- ABG
- Head CT
- 12-lead ECG

**Universal Patient Assessment Protocol**



**Spinal Immobilization Protocol**



**IV Access/ Fluid Administration Protocol**



Consider  
**Naso/Oro Gastric Tube Placement**



Respiratory distress ?

Yes →

**Albuterol**



**Appropriate Protocol based on symptoms**

**Pearls:**

- With cold water no time limit -- resuscitate all.
- All victims should be transported for evaluation due to potential for worsening over the next several hours.
- **Drowning is a leading cause of death among would-be rescuers.**
- **Allow appropriately trained and certified rescuers to remove victims from areas of danger.**
- **With pressure injuries (decompression / barotrauma), consider transport to Duke due to availability of hyperbaric chamber.**

**Reference:** American College of Surgeons Committee on Trauma: *Advanced Trauma Life Support for Doctors*, course manual, 7<sup>th</sup> ed. Chicago: American College of Surgeons, 2004.

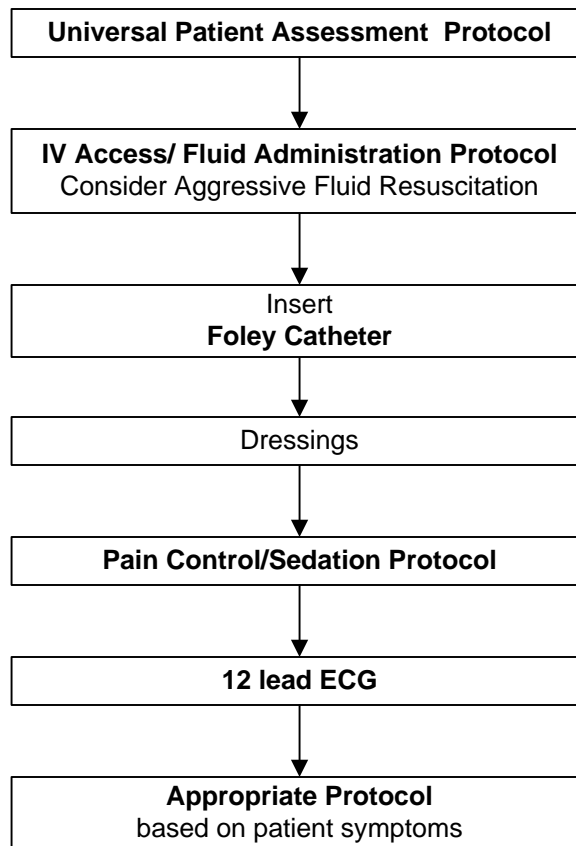


**Indications:**

- Burns
- Pain
- Entry and exit wounds
- Hypotension or shock
- Arrest

**Diagnostic Studies** (if available):

- 12-lead ECG
- Chest X-ray
- CBC
- Electrolytes
- Kidney function studies
- Cardiac Enzymes
- Urine Analysis



**Pearls:**

- Monitor urine output. Goal is at least 100cc/hour.
- Ventricular fibrillation and asystole are the most common dysrhythmias.
- Damage is often hidden; the most severe damage will occur in muscle, vessels and nerves.
- In a mass casualty lightning incident, attend to victims in full arrest first. If the victim did not arrest initially, it is likely they will survive.
- Do not overlook other trauma (i.e. falls).
- Lightning is a massive DC shock most often leading to asystole as a dysrhythmia.
- In lightning injuries, most of the current will travel over the body surface producing flash burns.

**Reference:** American College of Surgeons Committee on Trauma: *Advanced Trauma Life Support for Doctors*, course manual, 7<sup>th</sup> ed. Chicago: American College of Surgeons, 2004.

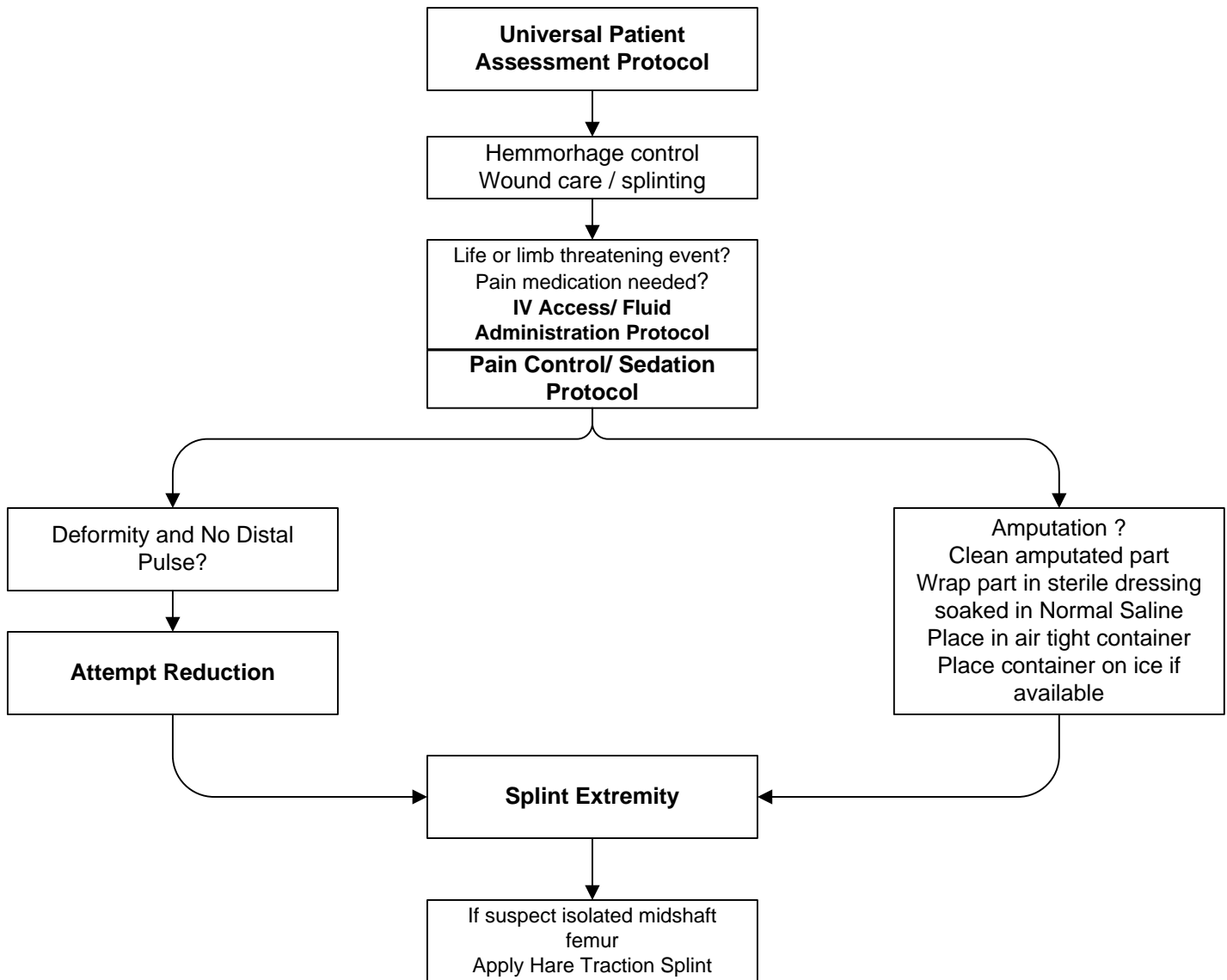


**Indications:**

- Deformity
- Degloving Injury
- Missing
- Pain
- Extremity Dysfunction

**Diagnostic Studies** (if available):

- X-ray
- Doppler
- Neurological Assessment



**Pearls:**

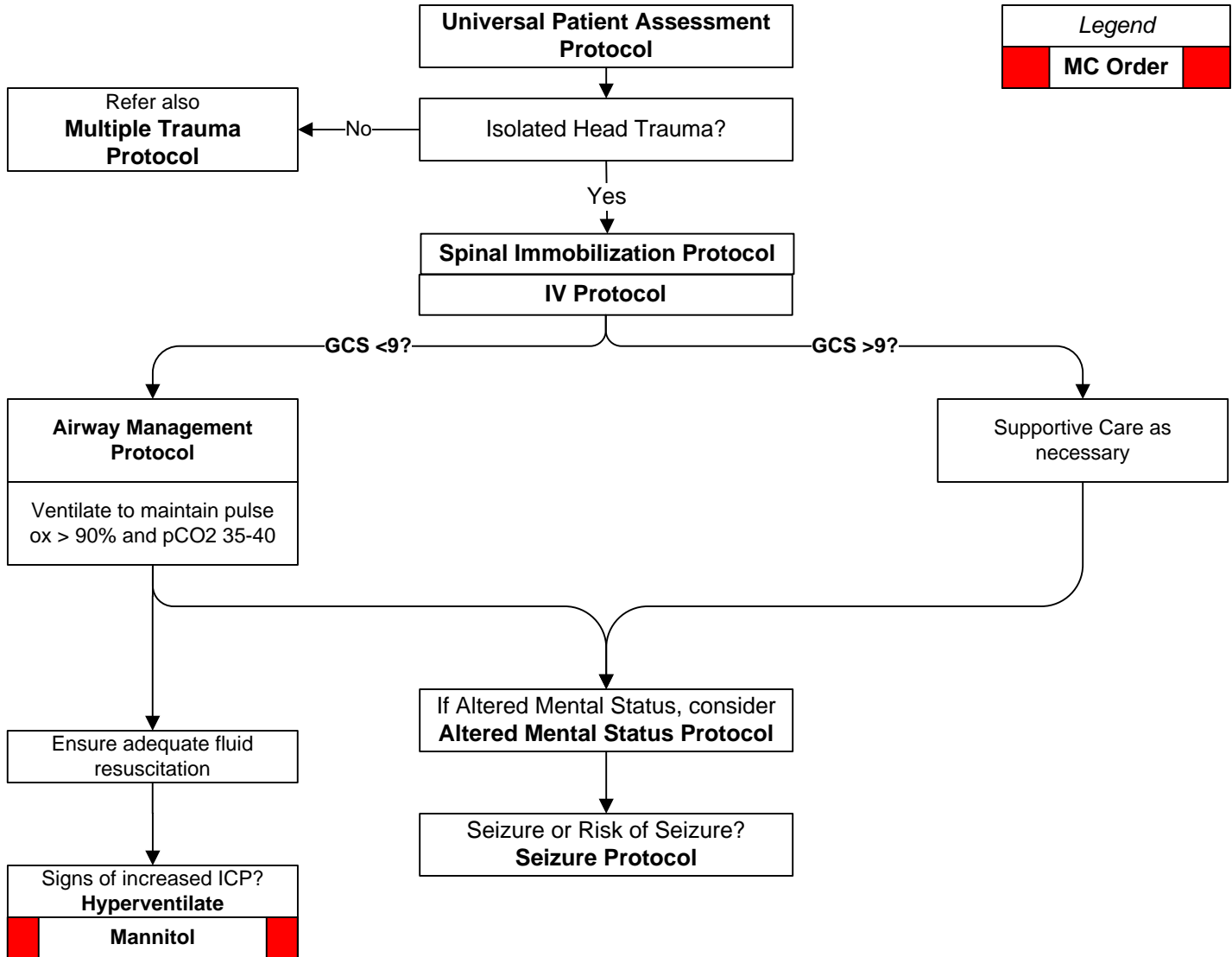
- Be aware of Compartment Syndrome – pain, pallor, pulseless, parasthesia, and paralysis.
- Reduce by applying gentle traction (10 lbs, pressure) along the axis of the extremity, recheck pulse/neuro.
- If attempting to reduce open fracture, thoroughly irrigate exposed bone with **Saline** prior to reduction.
- In amputations, time is critical. Transport and notify medical control immediately, so the appropriate destination can be determined.
- Hip dislocations, knee and elbow fracture/dislocations have a high incidence of vascular compromise.
- Lacerations must be evaluated for repair within 6 hours from the time of injury.
- Consider MAST at low pressure applications for lower extremity/pelvis trauma, reassess frequently.

**Reference:** American College of Surgeons Committee on Trauma: *Advanced Trauma Life Support for Doctors*, course manual, 7<sup>th</sup> ed. Chicago: American College of Surgeons, 2004.



- Indications:**
- o Skull fracture
  - o Brain injury (concussion, contusion, hemorrhage, or laceration)
  - o Epidural hematoma
  - o Subdural hematoma
  - o Subarachnoid hemorrhage
  - o Spinal injury
  - o Abuse

- Diagnostic Studies (if available):**
- o Head CT scan
  - o C-spine/skull/chest x-rays
  - o ABG
  - o PT/PTT/INR
  - o Serum electrolytes/CBC w/ diff
  - o Type and Screen
  - o Urine Analysis
  - o Toxicology



- Pearls:**
- o Increased intracranial pressure (ICP) may cause hypertension and bradycardia (Cushing's Response).
  - o Hypotension usually indicates injury or shock unrelated to the head injury.
  - o The most important item to monitor and document is a change in the level of consciousness.
  - o Limit IV fluids unless patient is hypotensive (systolic BP < 90).
  - o Consider **Patient Restraint Protocol**.

**Reference:** Management and Prognosis of Severe Traumatic Brain Injury. American Association of Neurological Surgeons. Brain Trauma Foundation, 2000.  
 American College of Surgeons Committee on Trauma: *Advanced Trauma Life Support for Doctors*, course manual, 7<sup>th</sup> ed. Chicago: American College of Surgeons, 2004.

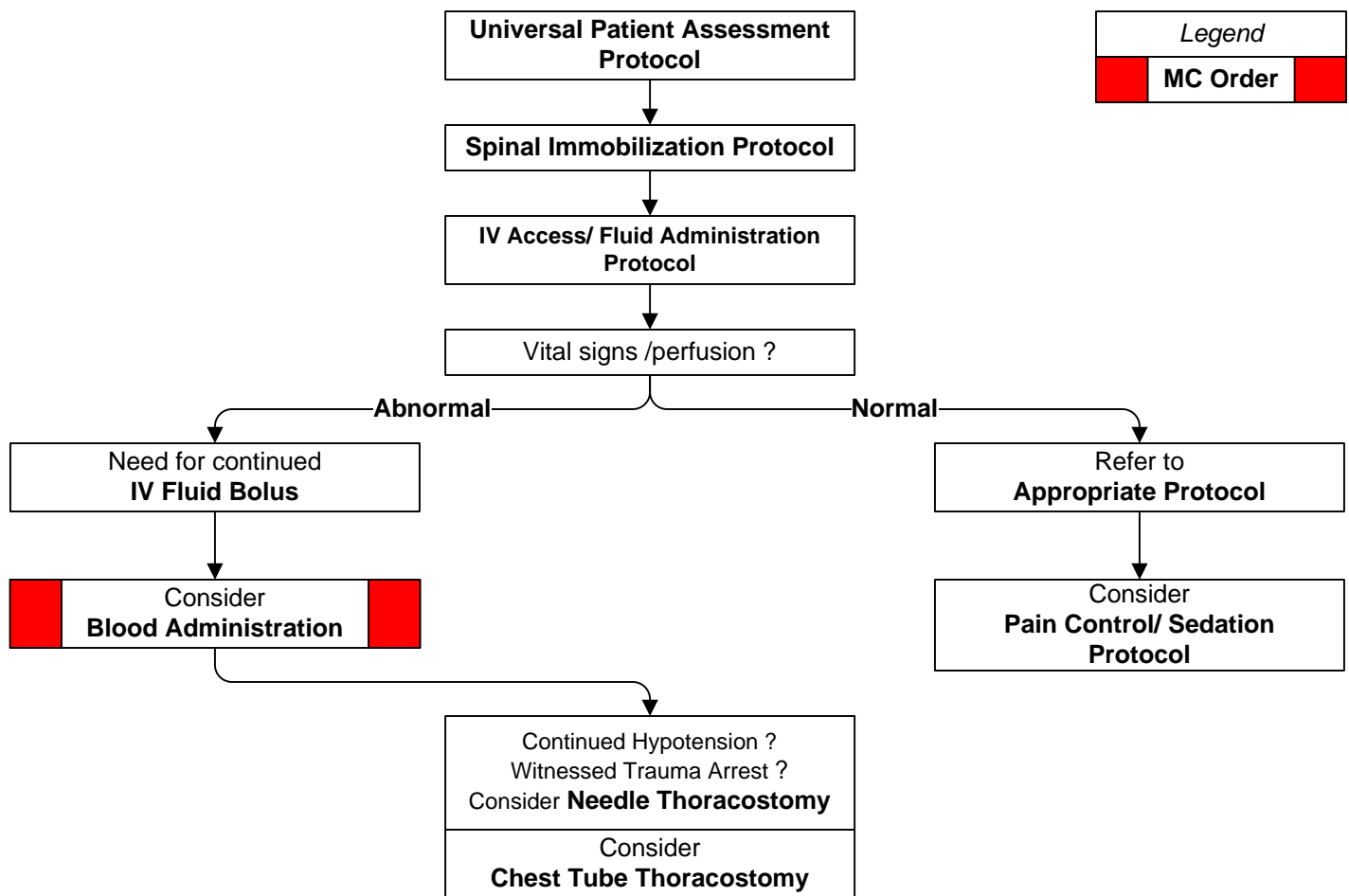


**Indications:**

- 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

**Diagnostic Studies (if available):**

- Head/Neck/Chest/Abd/Pelvis CT scan
- CTLS/chest/abd./pelvic x-rays
- CBC w/ differential
- Coags
- Serum Electrolytes
- Kidney function studies
- Type and Cross
- Urine Analysis
- ABG
- Toxicology
- 12-lead ECG



**Pearls:**

- Consider **Foley Placement**.
- If abdominal trauma and vaginal bleeding or blood at meatus, **Do Not Insert Foley**.
- Consider MAST in "load and go" situations with suspected pelvic or femur fractures.

**Reference:** American College of Surgeons Committee on Trauma: *Advanced Trauma Life Support for Doctors*, course manual, 7<sup>th</sup> ed. Chicago: American College of Surgeons, 2004.



**Indications:**

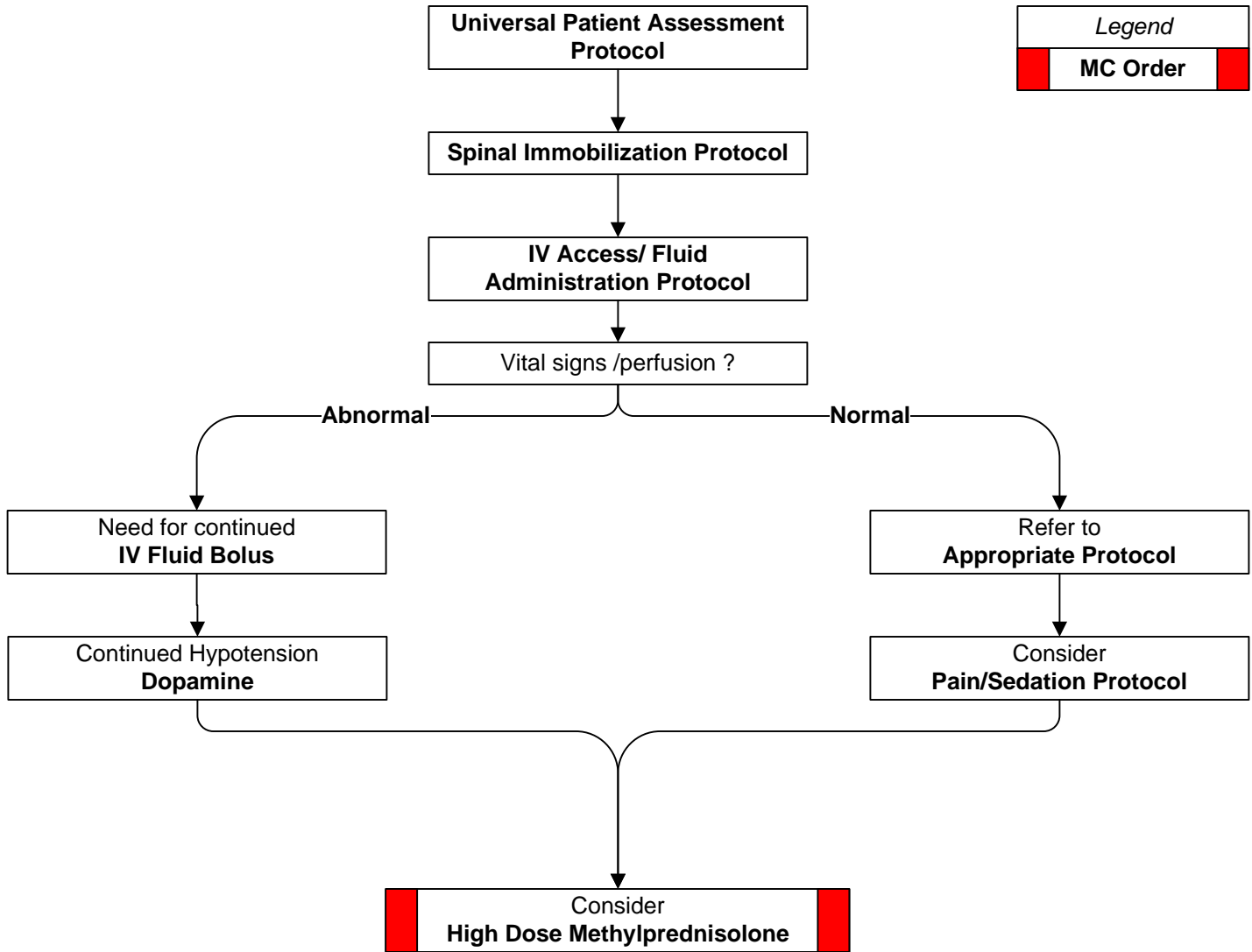
- Spine fracture/Cord injury
- Head injury (see Head Trauma)
- Hypotension
- Priapism
- Decreased/Absent motor/sensation function below level of lesion

**Diagnostic Studies (if available):**

- Head/Neck/Spine CT scan
- CTLS and chest x-ray
- MRI
- Toxicology

*Legend*

**MC Order**



**Pearls:**

- Consider **Foley Placement**.
- Consider continuous **Temperature Monitoring**.

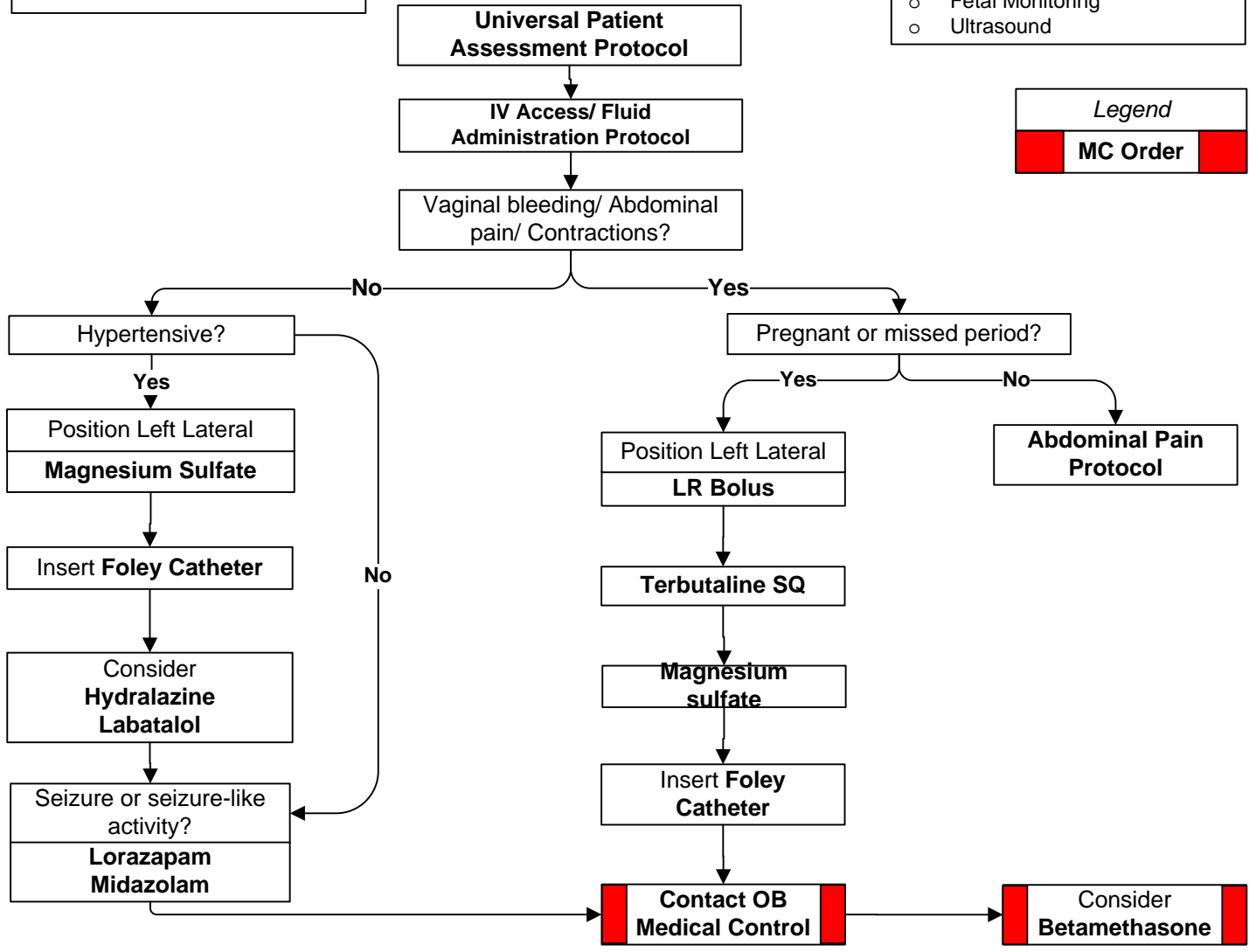
**Reference:** American College of Surgeons Committee on Trauma: *Advanced Trauma Life Support for Doctors*, course manual, 7<sup>th</sup> ed. Chicago: American College of Surgeons, 2004.



- Differentials:**
- Pre-eclampsia / Eclampsia
  - HELLP/DIC
  - Placenta previa
  - Placenta abruptio
  - Ruptured Uterus
  - Spontaneous abortion

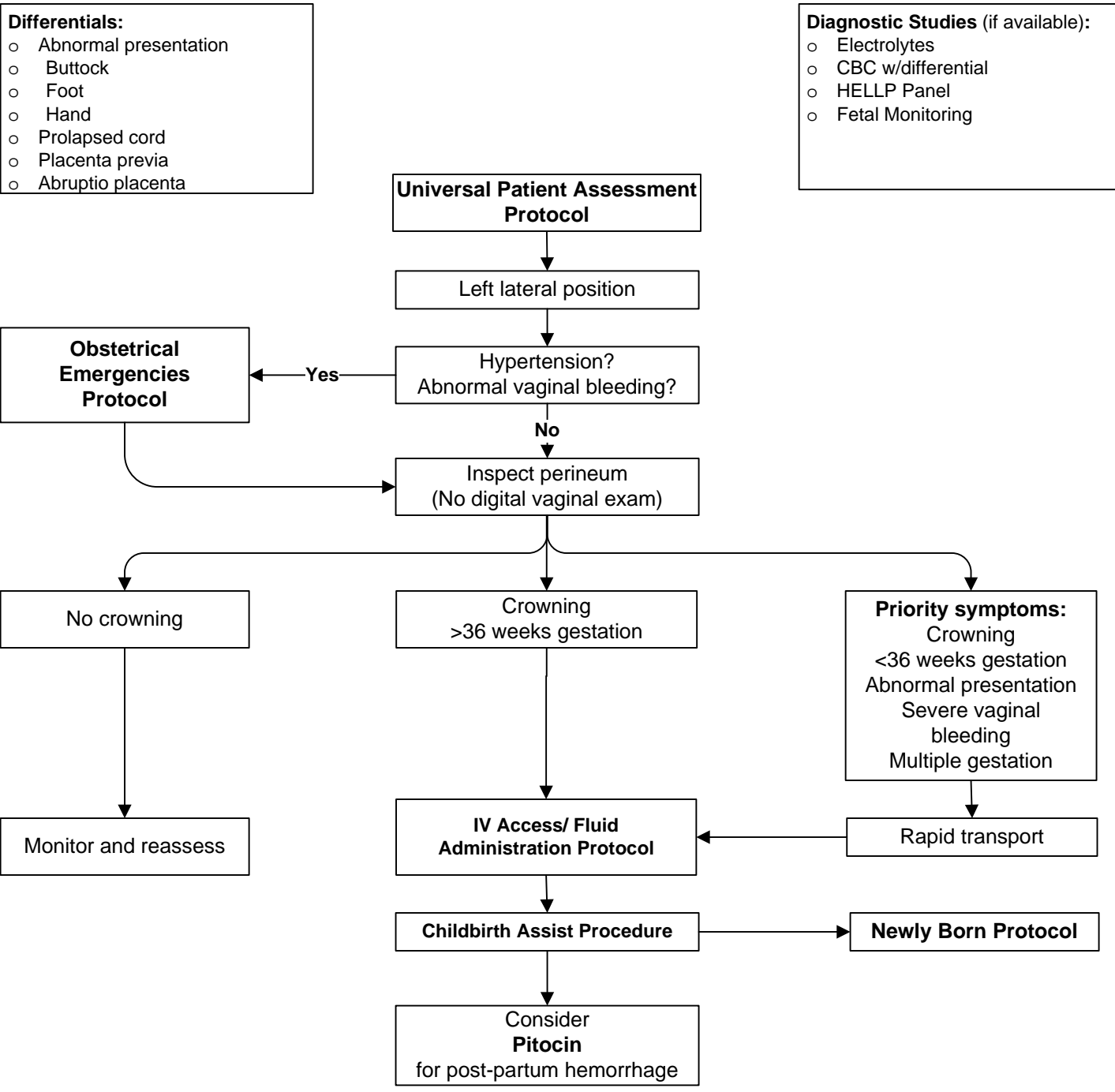
- Diagnostic Studies**
- CBC w/platelets
  - Liver function tests
  - Coags
  - Electrolytes
  - Kidney function studies
  - Urine Analysis
  - Type and Screen
  - Fetal Monitoring
  - Ultrasound

*Legend*  
MC Order



- Pearls:**
- Document **Gravida, Para-Full-term, Pre-term, Abortion, Living Children** and LMP, EDC, ROM (time/color), SVE (dilatation, effacement, station).
  - Estimate gestational age, evaluate location and presence of fetal heart tone.
  - Severe headache, vision changes, or RUQ pain may indicate preeclampsia, HELLP syndrome.
  - Pregnancy-induced hypertension is defined as a BP greater than 140 systolic or greater than 90 diastolic.
  - Pre-term Labor is defined as contractions 10 minutes apart, 34 weeks or less gestation, cervical dilatation 3cm.
  - Maintain patient in a left lateral position to minimize risk of supine hypotensive syndrome.
  - Ask patient to quantify bleeding - number of pads used per hour.
  - Consider **Anitbiotics** if beta strep+ or at high risk.
  - Monitor DTR/clonus during **Magnesium sulfate** administration, administer **Calcium Chloride** or **Ca Gluconate** for toxicity (decrease/absent DTR, altered LOC, abnormal lung sounds/resp. distress/ RR<14 min, chest pain)
  - Monitor Fetal Heart Tones every 15 minutes and document..
  - **Betamethasone** is used for gestation <32 weeks.

**Reference:** Marx, J. A. Hockberger, R. S. Walls, R. M., et al. Rosen's Emergency Medicine: Concepts and Clinical Practice 6th Ed. Philadelphia: Mosby 2006.



**Pearls:**

- **Prolapsed cord**-elevate patient's buttocks, apply manual pressure on infant's head to prevent cord compression.
- Document-EDC, GPPAL, ROM, vaginal bleeding, fetal activity, DTR/ clonus.
- Document all times (delivery, contraction frequency, and length).
- If maternal seizures occur, refer to the **Obstetrical Emergencies Protocol**.
- After delivery, massaging the fundus will promote uterine contraction and help to control post-partum bleeding.
- Some perineal bleeding is normal with any childbirth. Large quantities of blood or free bleeding are abnormal.

**Reference:** Marx, J. A. Hockberger, R. S. Walls, R. M., et al. Rosen's Emergency Medicine: Concepts and Clinical Practice 6th Ed. Philadelphia: Mosby 2006.



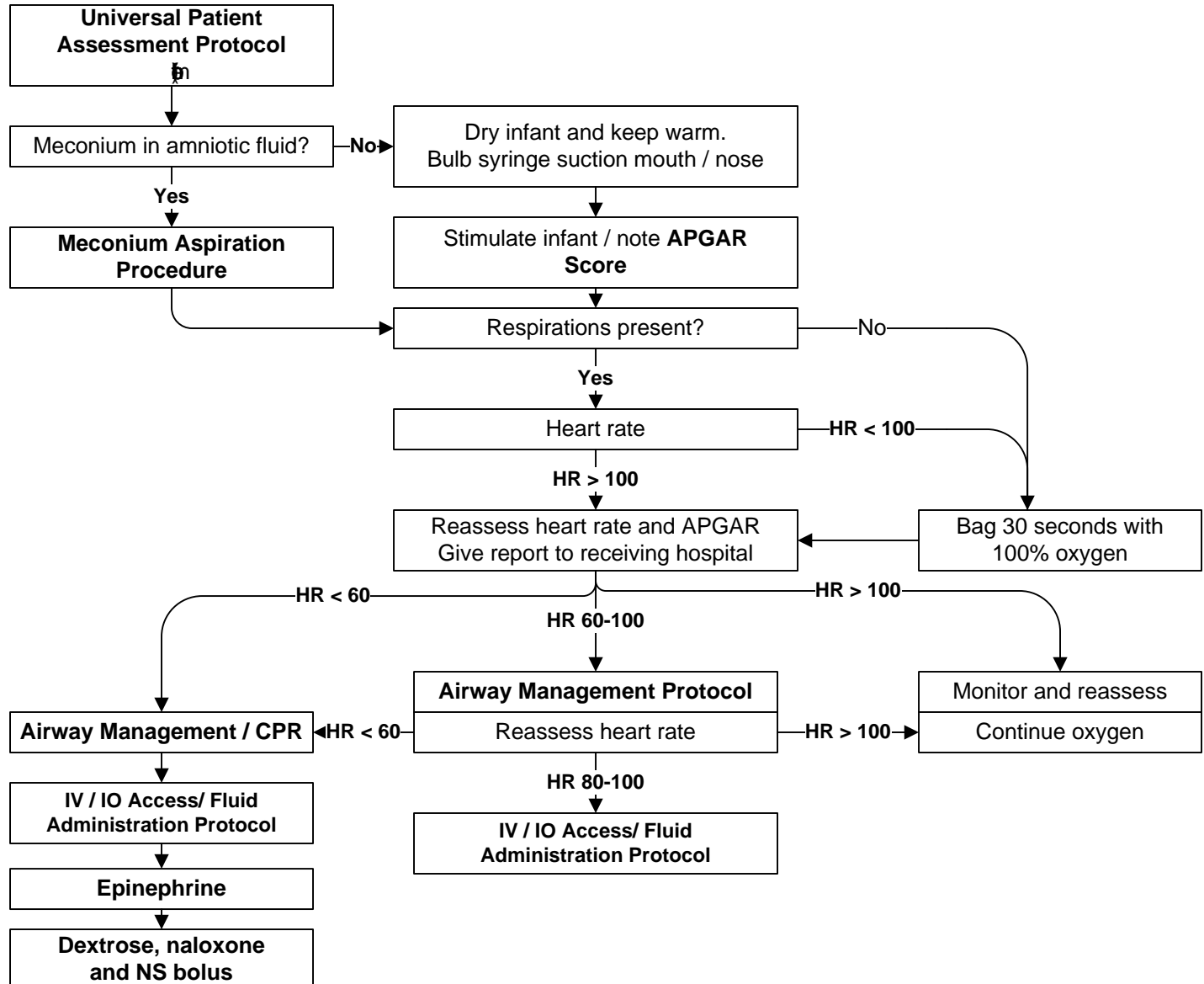
**Indications:**

- Due date and gestational age
- Multiple gestation (twins etc.)
- Meconium / ROM
- Delivery difficulties
- Congenital disease
- Crowning noted

**Diagnostic Studies (if available):**

**Mother:**

- o Ultrasound
- o Fetal monitoring (h/o decelerations)
- o Urine Analysis
- o HELLP Screen



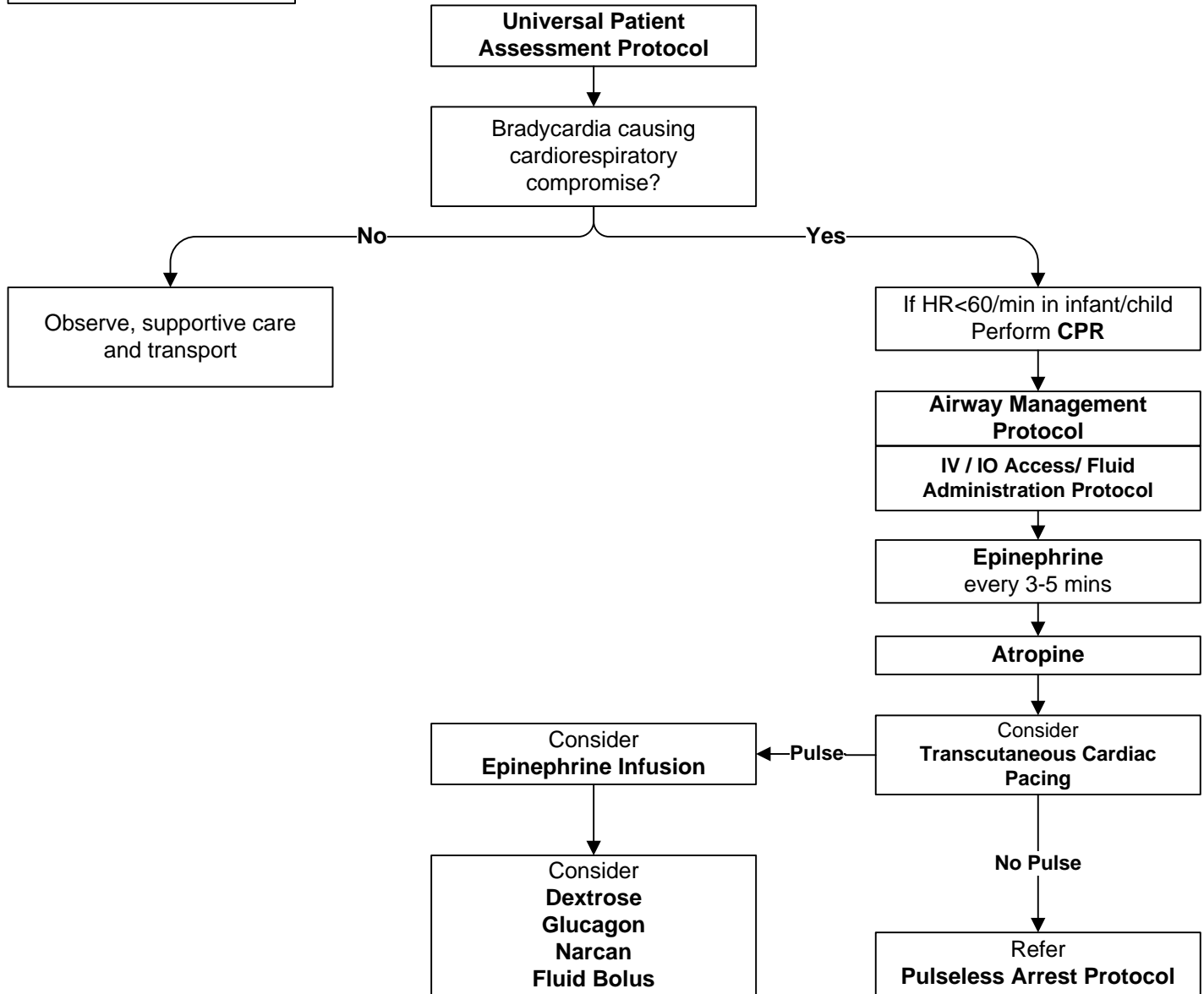
**Pearls:**

- Maternal sedation or narcotics will sedate infant (Naloxone effective).
- Consider hypoglycemia in infant.
- Document 1 and 5 minute APGAR scores (see Appendix).
- Request assistance to helipad with isolette ready to receive infant.
- Document time and county of birth.



**Differentials:**

- Hypoxemia
- Hypothermia
- Head Injury
- Heart Block
- Heart Transplant
- Toxins/poisons/drugs



**Pearls:**

- Cardiorespiratory compromise includes poor perfusion, hypotension, respiratory difficulty, altered consciousness.
- Give **Atropine** first for bradycardia due to suspected increased vagal tone or primary AV block.
- Infant = < 1 year of age.
- Most maternal medications pass through breast milk to the infant.
- The majority of pediatric arrests are due to airway problems.
- Hypoglycemia, severe dehydration and narcotic effects may produce bradycardia.

**Reference:** (2005, November, 25). Management of Cardiac Arrest. *Circulation*, 112; IV-58-IV-66, Retrieved February 04, 2008, from [http://circ.ahajournals.org/cgi/content/full/112/24\\_suppl/IV-58](http://circ.ahajournals.org/cgi/content/full/112/24_suppl/IV-58)

# Pediatric Hypotension Shock (Non-Trauma)

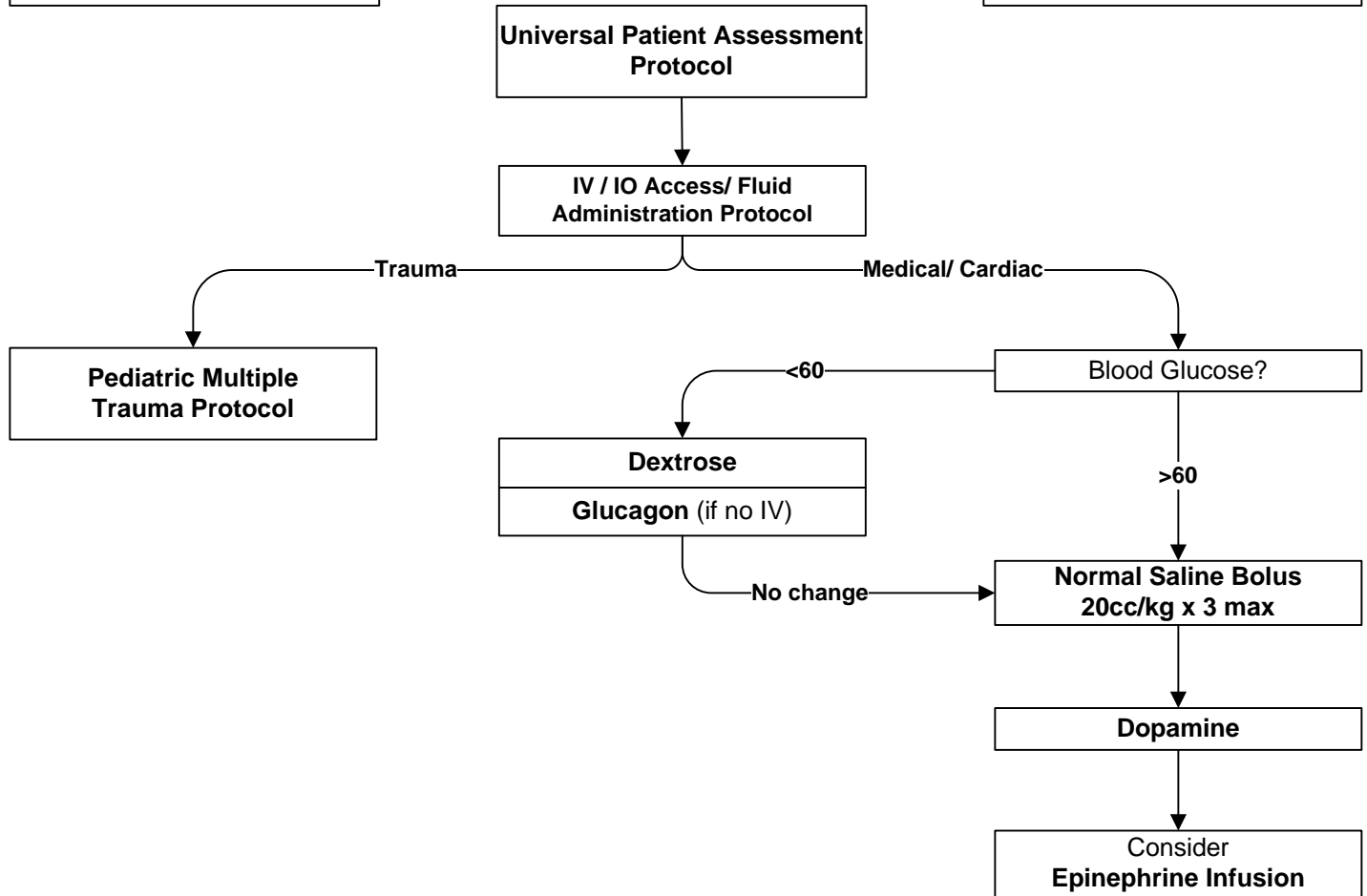


**Differentials:**

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

**Diagnostic Studies (if available):**

- ABG
- Type and Screen
- CBC w/differential
- Electrolytes
- Coags
- Toxicology
- Chest X-ray
- 12-lead ECG



**Pearls:**

- Consider all possible causes of shock and treat per appropriate protocol.
- Decreasing heart rate is a sign of impending collapse.
- Most maternal medications pass through breast milk to the infant. Example: Narcotics and Benzodiazepines.

**Reference:** Tintinalli, J.E., Kelen, G.D., Stapczynski, J.S. Emergency Medicine 6th Ed. 2004, McGraw Hill.

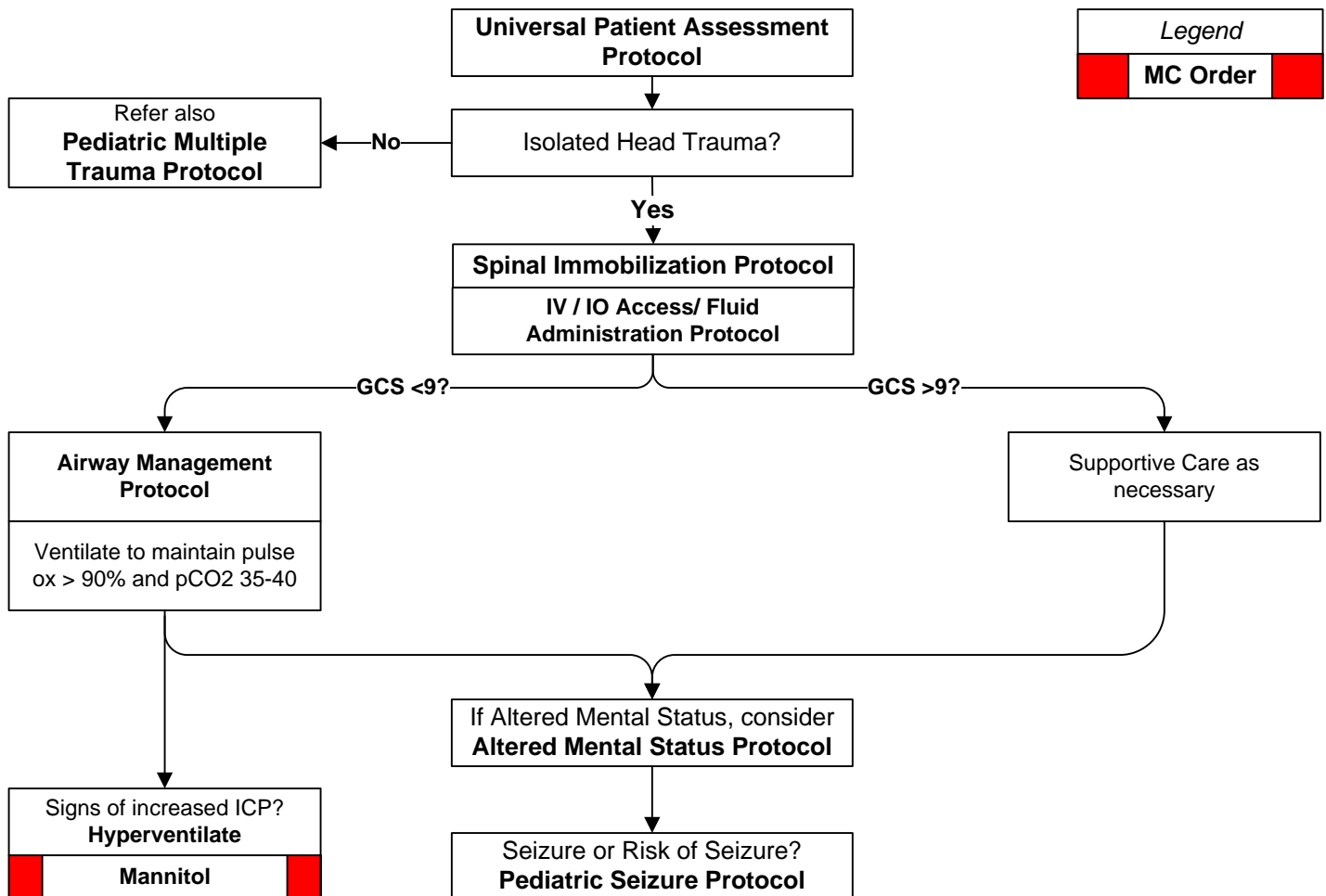


**Indications:**

- Skull fracture
- Brain injury (concussion, contusion, hemorrhage, or laceration)
- Epidural hematoma
- Subdural hematoma
- Subarachnoid hemorrhage
- Spinal injury
- Abuse

**Diagnostic Studies (if available):**

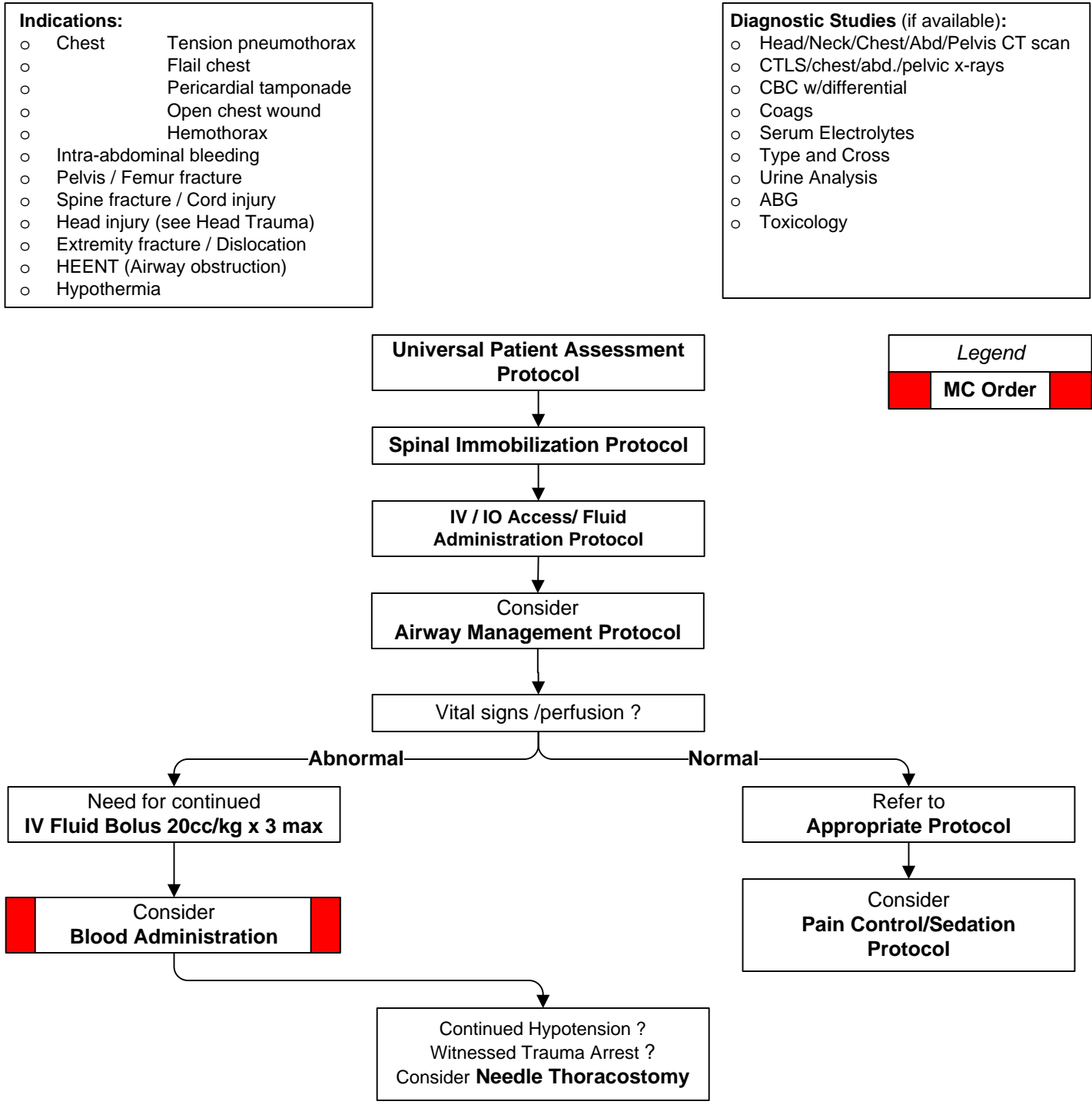
- Head CT scan
- C-spine/skull/chest x-rays
- ABG
- Coags
- Serum electrolytes
- CBC w/differential
- Type and Screen
- Urine Analysis
- Toxicology



**Pearls:**

- 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.
- Limit IV fluids unless patient is hypotensive (systolic BP < 90).
- Consider **Patient Restraint Protocol**.
- Hyperventilate the patient only if evidence of herniation (blown pupil, posturing, bradycardia) to keep capnometer 30-35mmHg.

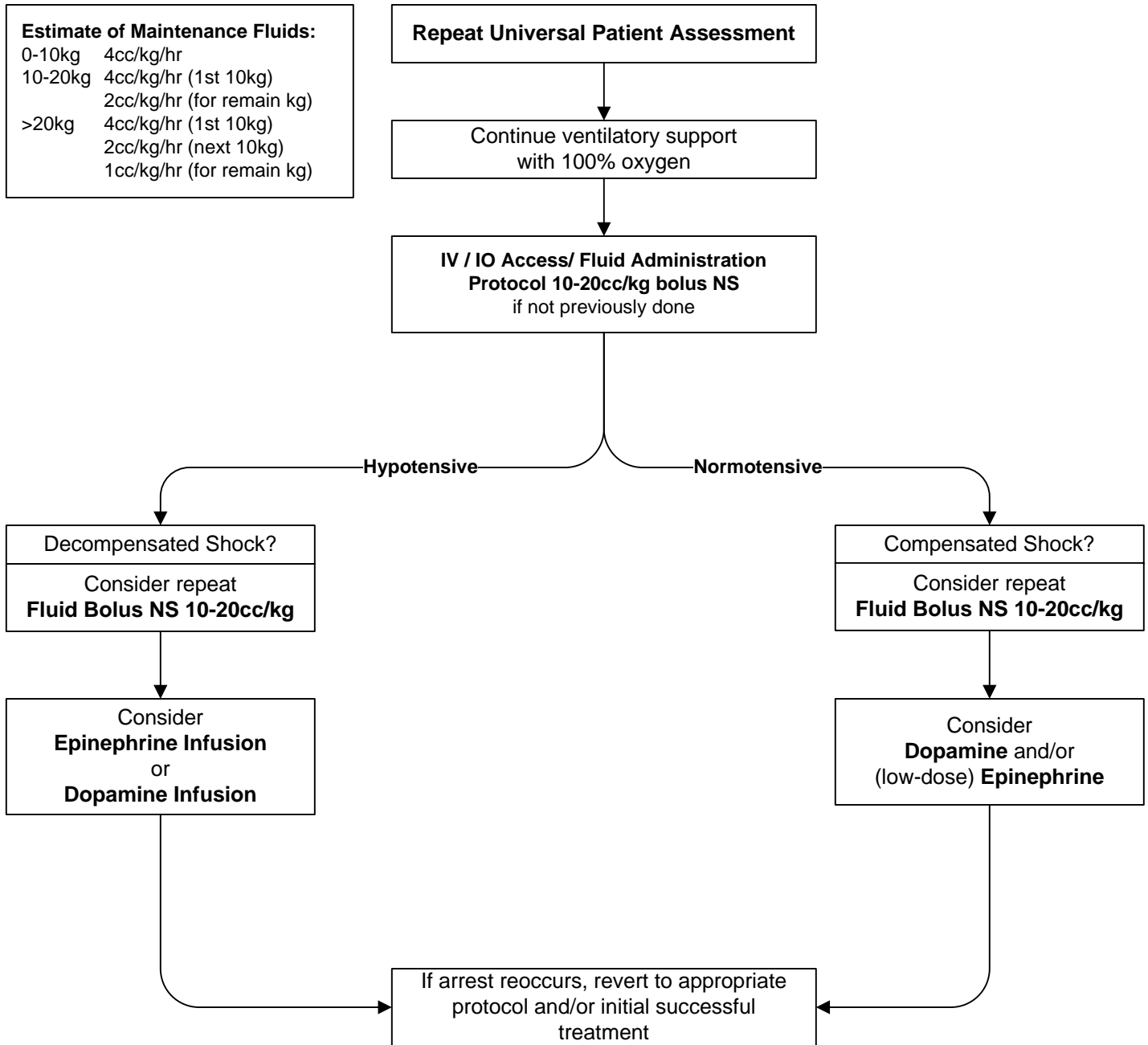
**Reference:** Management and Prognosis of Severe Traumatic Brain Injury. American Association of Neurological Surgeons. Brain Trauma Foundation, 2000.  
 American College of Surgeons Committee on Trauma: *Advanced Trauma Life Support* for Doctors, course manual, 7<sup>th</sup> ed. Chicago: American College of Surgeons, 2004.



**Pearls:**

- Consider **Foley Placement**.
- If abdominal trauma and vaginal bleeding or blood at meatus-DO NOT insert foley.

**Reference:** American College of Surgeons Committee on Trauma: *Advanced Trauma Life Support* for Doctors, course manual, 7<sup>th</sup> ed. Chicago: American College of Surgeons, 2004.  
Pediatric Basic Trauma Life Support course manual. American College of Emergency Physicians, 2001.



**Pearls:**

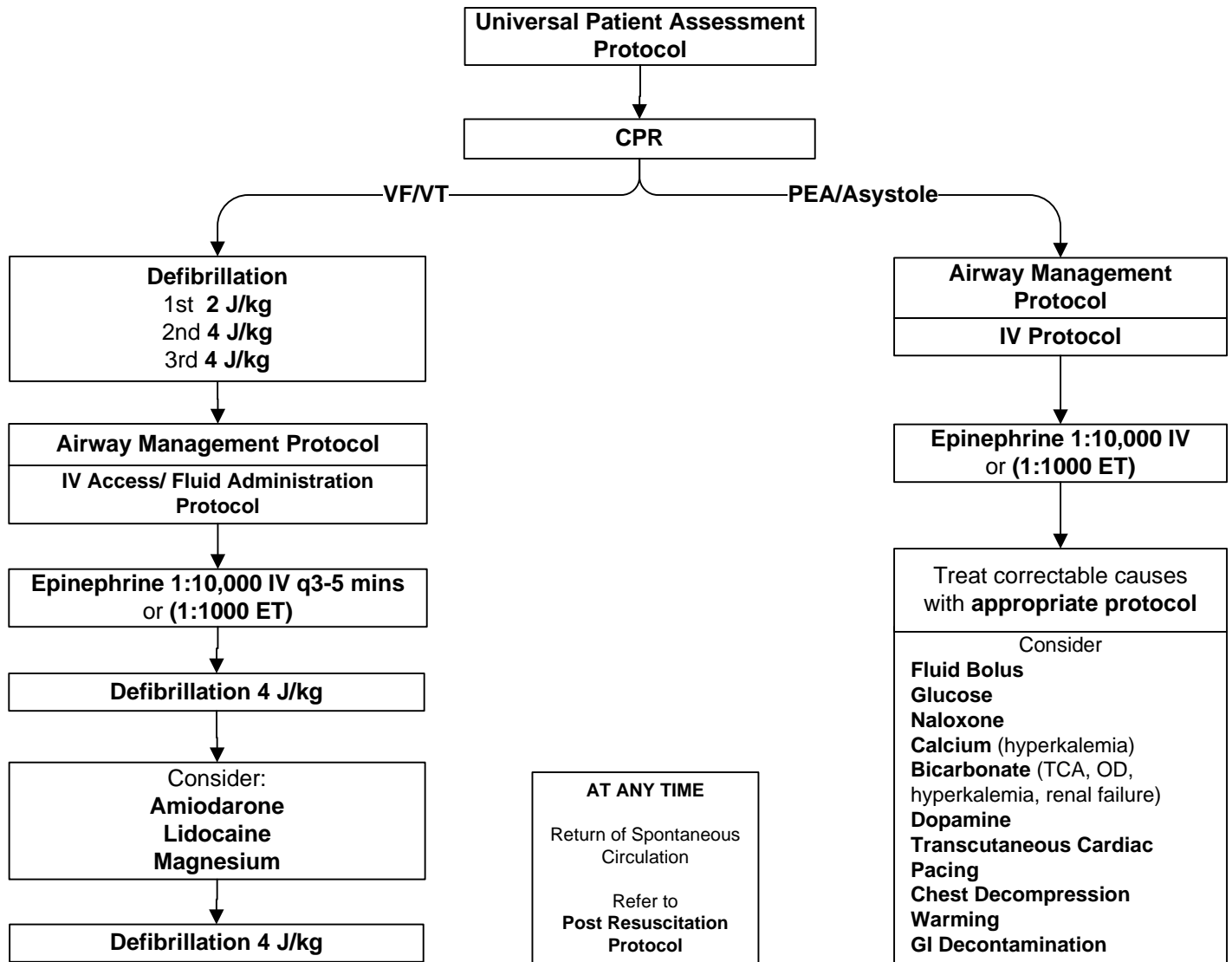
- Continue to reevaluate airway, ventilation and ETCO2.
- Continue to address specific differentials associated with the original dysrhythmia.
- Patients that convert after specific anti-dysrhythmia, should have that medication started as a maintenance drip.
- The condition of post-resuscitation patients fluctuates rapidly and continuously, and they require close monitoring.
- Appropriate post-resuscitation management can best be planned in consultation with **medical control**.
- Adequate urinary output 1 cc/kg/hr.

**Reference:** (2005, November, 25). Management of Cardiac Arrest. *Circulation*, 112; IV-58-IV-66, Retrieved February 04, 2008, from [http://circ.ahajournals.org/cgi/content/full/112/24\\_suppl/IV-58](http://circ.ahajournals.org/cgi/content/full/112/24_suppl/IV-58)



**Indication:**  
Rhythm on monitor with no detectable pulses

- Differentials:**
- Hypovolemia
  - Hypoxia
  - Hydrogen ion-acidosis
  - Hyper/hypokalemia
  - Hypothermia
  - Toxins/poisons/drugs
  - Tamponade
  - Tension Pneumothorax
  - Thromboembolism



**Pearls:**

- In order to be successful in pediatric arrests, a cause must be identified and corrected.
- Airway is the most important intervention. This should be accomplished immediately. Patient survival is often dependent on airway management success.
- Pattern should be CPR-drug- shock (repeat).

**Reference:** (2005, November, 25). Management of Cardiac Arrest. *Circulation*, 112; IV-58-IV-66, Retrieved February 04, 2008, from [http://circ.ahajournals.org/cgi/content/full/112/24\\_suppl/IV-58](http://circ.ahajournals.org/cgi/content/full/112/24_suppl/IV-58)

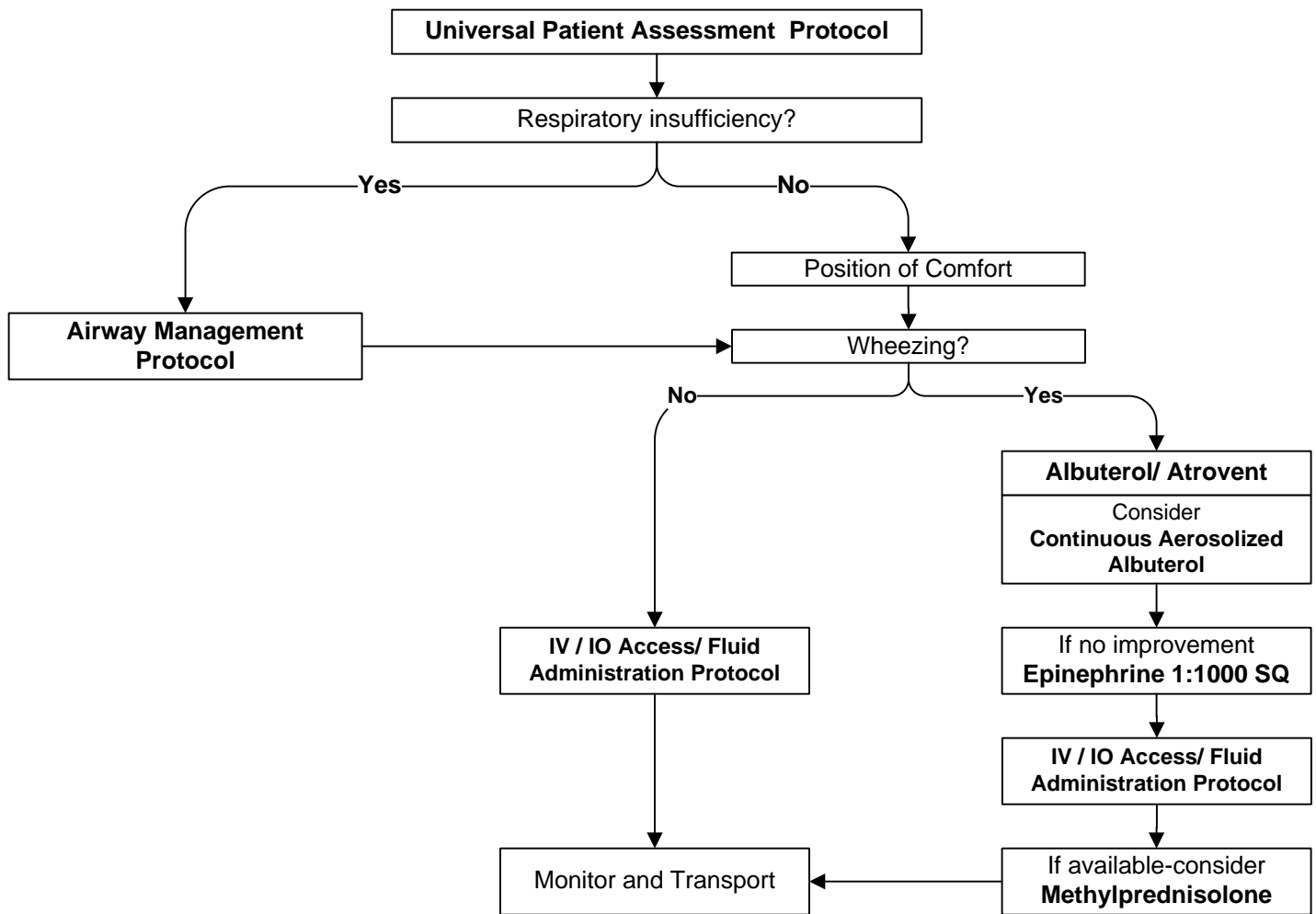


**Differentials:**

- Asthma
- Anaphylaxis
- Aspiration
- Foreign body
- Infection
  - Pneumonia
  - Croup
  - Epiglottitis
- Congenital heart disease
- Trauma
- Inhaled toxin (Carbon monoxide, etc.)

**Diagnostic Studies (if available):**

- ABG
- Peak Flow
- Chest X-ray
- 12-lead ECG
- Cardiac Serum Markers
- Electrolytes
- CBC w/ differential
- Chest CT
- V-Q Scan



**Pearls:**

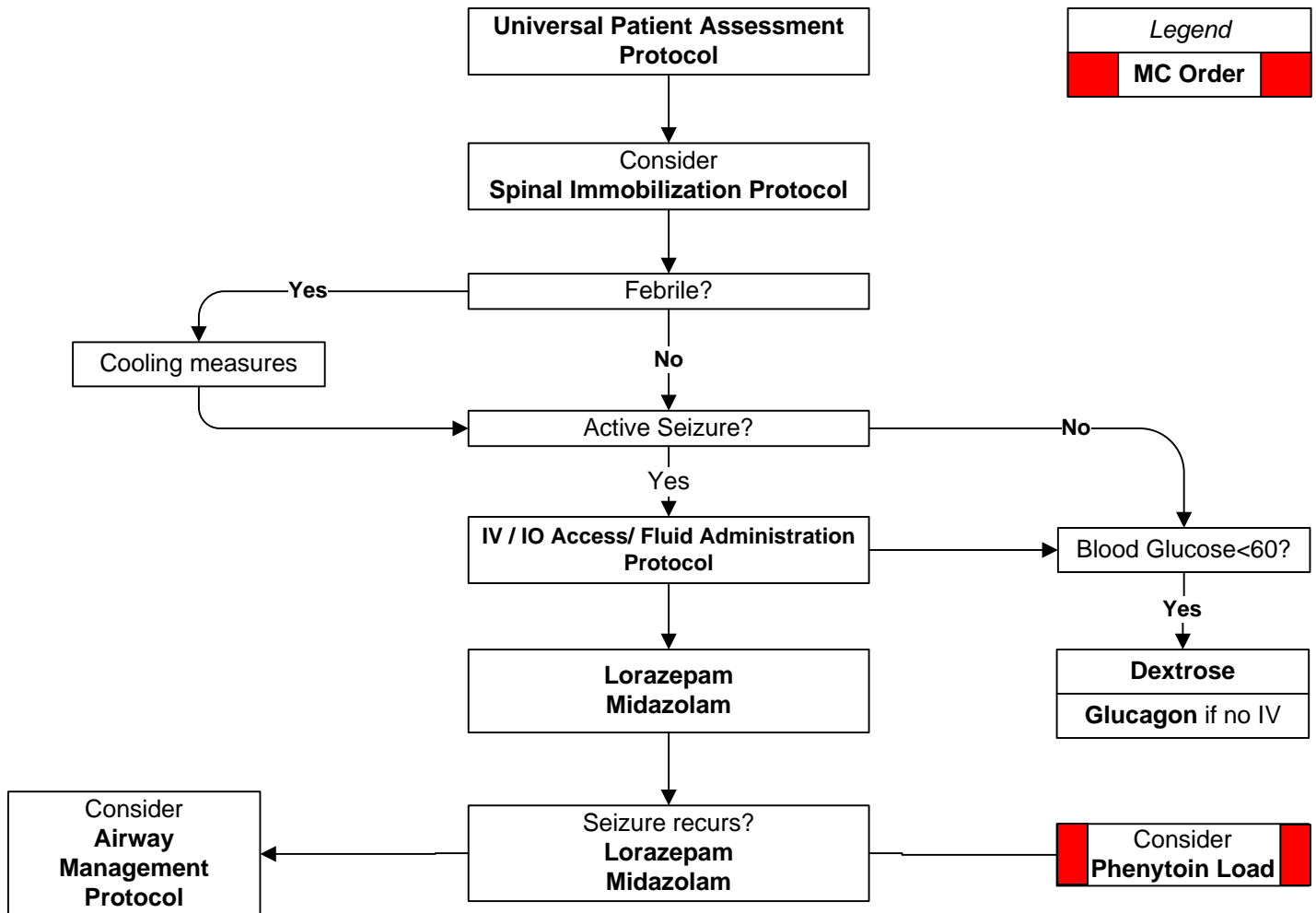
- When possible, peak flow measurements should be obtained before and after each nebulized treatment.
- Croup typically affects children < 2 years of age. Viral with possible fever, gradual onset, no drooling is noted.
- Epiglottitis typically affects children > 2 years of age. Bacterial with fever, rapid onset, possible stridor, drooling is common. Child usually wants to sit up to keep airway open. Do not invasively manipulate the airway as it may worsen condition.

Reference: Tintinalli, J.E., Kelen, G.D., Stapczynski, J.S. Emergency Medicine 6th Ed. 2004, Mcgraw Hill.



- Differentials:**
- Fever
  - Infection
  - Head trauma
  - Medication or Toxin
  - Hypoxia or Respiratory failure
  - Hypoglycemia
  - Metabolic abnormality / acidosis
  - Tumor

- Diagnostic Studies (if available):**
- Electrolytes
  - CBC
  - Head CT
  - Therapeutic Drug Levels
  - Urine Drug Screen



**Pearls:**

- **Status Epilepticus** is defined as two or more successive seizures without a period of consciousness or recovery. This is a true emergency requiring rapid airway control and treatment.
- **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 are not usually associated with a loss of consciousness.
- **Jacksonian Seizures** are seizures which start as a focal seizure and become generalized.
- If IV unobtainable, consider **Midazolam IM**.
- In an infant, a seizure may be the only evidence of a closed head injury.

**Reference:** Tintinalli, J.E., Kelen, G.D., Stapczynski, J.S. Emergency Medicine 6th Ed. 2004, Mcgraw Hill.

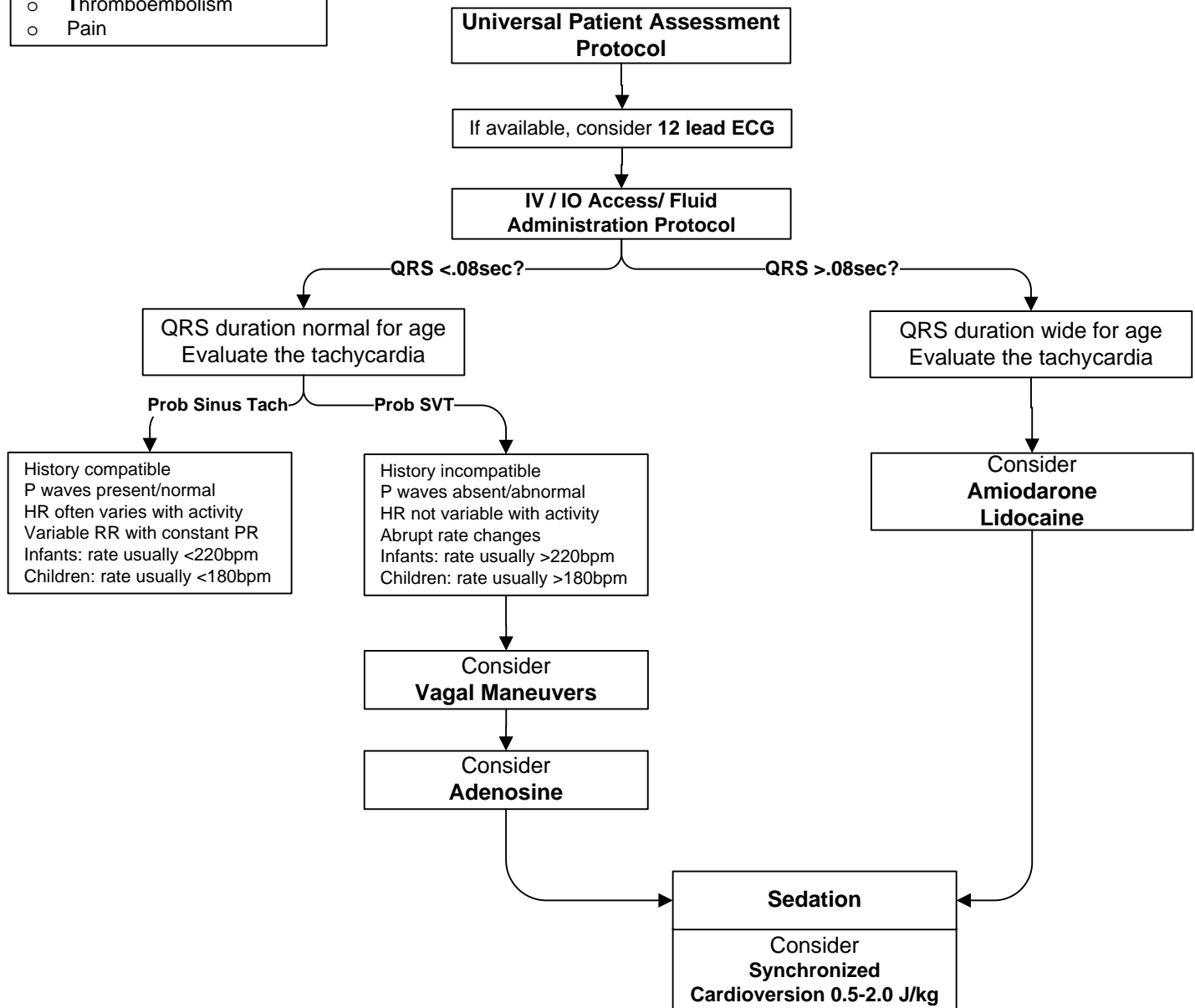
# Pediatric Tachycardia

## Adequate Perfusion



### Differentials:

- Hypovolemia
- Hypoxia
- Hyper/hypokalemia
- Hyperthermia
- Toxins/poisons/drugs
- Tamponade
- Tension Pneumothorax
- Thromboembolism
- Pain



### Pearls:

- Identify and treat possible causes as indicated in the differential.
- Do not use eyes of infants for **vagal maneuvers**.
- Consult pediatric cardiologist.

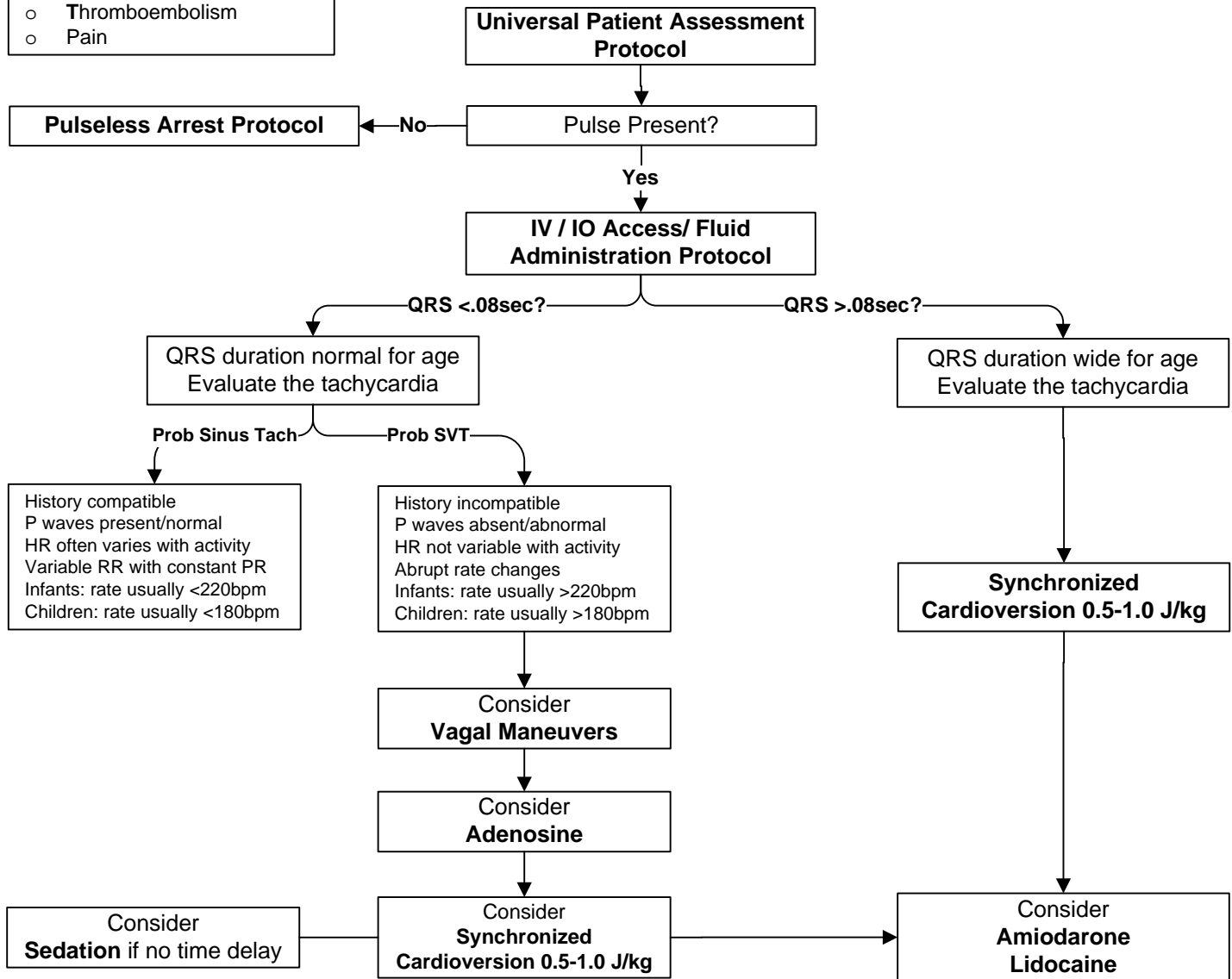
**Reference:** (2005, November, 25). Management of Cardiac Arrest. *Circulation*, 112; IV-58-IV-66, Retrieved February 04, 2008, from [http://circ.ahajournals.org/cgi/content/full/112/24\\_suppl/IV-58](http://circ.ahajournals.org/cgi/content/full/112/24_suppl/IV-58)

# Pediatric Tachycardia Poor Perfusion



**Differentials:**

- Hypovolemia
- Hypoxia
- Hyper/hypokalemia
- Hyperthermia
- Toxins/poisons/drugs
- Tamponade
- Tension Pneumothorax
- Thromboembolism
- Pain



**Pearls:**

- Signs and symptoms of hypoperfusion include mental status changes, pale, cool, diaphoretic, central cyanosis, cap refill > 3 sec, etc.
- Do not routinely administer **amiodarone** and **procainamide** together.
- Administer **lidocaine** in wide-complex only.
- Consider 12 lead EKG.
- Consult pediatric cardiologist.

**Reference:** (2005, November, 25). Management of Cardiac Arrest. *Circulation*, 112; IV-58-IV-66, Retrieved February 04, 2008, from [http://circ.ahajournals.org/cgi/content/full/112/24\\_suppl/IV-58](http://circ.ahajournals.org/cgi/content/full/112/24_suppl/IV-58)

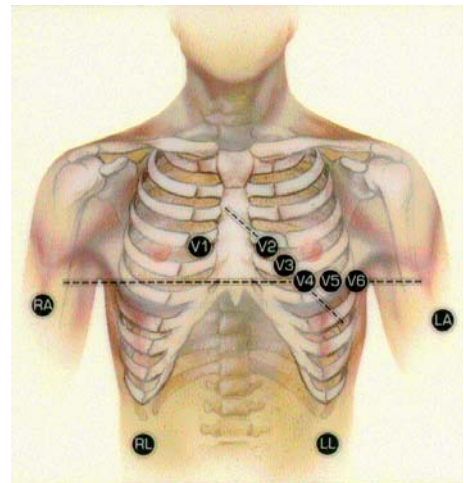
## UNC Carolina Air Care 12 Lead EKG

### Equipment

- ✓ LIFEPAK 12 monitor & EKG electrodes

### Steps

1. Assess patient and monitor cardiac status. Administer oxygen as patient condition warrants.
2. If patient is unstable, definitive treatment is the priority. If patient is stable or stabilized after treatment, perform a 12 Lead EKG.
3. Prepare EKG monitor and connect patient cable with electrodes.
4. Enter the patient's last name into the LIFEPAK 12 by selecting **OPTIONS**, then **PATIENT**, then **LAST NAME**.
5. Expose chest and prep as necessary. Modesty of the patient should be respected.
6. Apply chest leads and extremity leads using the following landmarks:
  - RA -Right arm
  - LA -Left arm
  - RL -Right leg
  - LL -Left leg
    - V1 -4<sup>th</sup> intercostal space at right sternal border
    - V2 -4<sup>th</sup> intercostal space at left sternal border
    - V3 -Directly between V2 and V4
    - V4 -5<sup>th</sup> intercostal space at midclavicular line
    - V5 -Level with V4 at left anterior axillary line
    - V6 -Level with V5 at left midaxillary line
8. Instruct patient to remain still, press 12 Lead to acquire the EKG
9. Contact MCO for any acute changes noted on 12 Lead EKG
10. Attach copy of the 12 Lead to the patients *Documentation Record*





## UNC Carolina Air Care ABG Sampling

### Equipment

- ✓ Antiseptic wipe
- ✓ Pre heparinized syringe set with small bore needle OR butterfly syringe
- ✓ Gauze pad and adhesive bandage / tape

Caution: Patients with medical conditions or medication administration that has put them into an anti-coagulated state have the potential for additional bleeding. Appropriate precautions should be taken.

### Steps

1. Palpate and select the artery to be accessed. May use the **Radial, Ulnar** or **Dorsalis Pedis** (if patient has adequate collateral distal flow to the foot) arteries.
  2. Perform and document a positive Allen's Test (or modified Allen's Test for Dorsalis Pedis) prior to arterial puncture. *See UNC Hospitals, Nursing Procedure Manual: Arterial Blood Sampling" for further information on this procedure.*
  3. Cleanse the area with antiseptic wipe
  4. Locate and stabilize the artery, puncture site and assess for flash / flow into the syringe
  5. Obtain sufficient amount of sample, remove needle and compress the puncture site with gauze pad and direct pressure for a period of time sufficient to prevent bleeding. Apply adhesive bandage / tape to maintain pressure to puncture site for a minimum of 5 minutes.
  6. Remove air bubbles from the syringe and process the blood sample as per routine procedure, physician order.
  7. Dispose of the sharp in the appropriate manner (sharps container or self capping needle and sharps container).
-



## UNC Carolina Air Care Combitube

### Equipment

- ✓ Combitube with syringes, Suction,
- ✓ BVM with attached 100% oxygen source
- ✓ Critical Care Monitoring Equipment: Cardiac monitor, pulse oximetry, NIBP, Capnometry when available.
- ✓ Emergency medications available and ready

### Contraindications / Considerations

Age / size / height of the patient for equipment available

Known esophageal varices

### Steps

1. Preoxygenate the patient.
2. Lubricate the tube.
3. Grasp the patient's tongue and jaw with your gloved hand and pull forward.
4. Gently insert the tube until the teeth are between the printed rings.
5. Inflate line 1 (blue pilot balloon) leading to the pharyngeal cuff with 100 cc of air.
6. Inflate line 2 (white pilot balloon) leading to the distal cuff with 15 cc of air.
7. **Ventilate the patient through the longer blue tube.**  
Auscultate for breath sounds and sounds over the epigastrium. Look for the chest to rise and fall.
8. **If breath sounds are positive and epigastric sounds are negative, continue ventilation through the blue tube. The tube is in the esophagus.** In the esophageal mode, stomach contents can be aspirated through the #2, white tube relieving gastric distention.
9. If breath sounds are negative and epigastric sounds are positive, attempt ventilation through the shorter, #2 white tube and reassess for lung and epigastric sounds. If breath sounds are present and the chest rises, you have intubated the trachea and continue ventilation through the shorter tube.
10. The device is secured by the large pharyngeal balloon.
11. Confirm tube placement using end-tidal CO<sub>2</sub> detector.

### Endotracheal intubation with a Combitube in Place: (Not necessary if the ventilations are adequate with the Combitube.)

- The tube must be in the esophageal mode.
  - Prepare all equipment needed for endotracheal intubation.
  - Decompress the stomach by aspirating contents through the shorter, white tube.
  - Preoxygenate the patient.
  - Deflate the balloons on the Combitube and remove.  
Suction equipment must be ready.
  - Suction the oral pharynx and proceed with oraltracheal intubation procedure
-



## UNC Carolina Air Care Nasotracheal Intubation

### Equipment

- ✓ Appropriately sized ET tube's, nasopharyngeal airways, (BAAM or Beck whistle device)
- ✓ Water soluble lubricant, premixed phenylephrine / lidocaine solution
- ✓ Suction equipment, End-Tidal CO<sub>2</sub> detector
- ✓ Critical Care monitoring equipment: Cardiac monitor, Pulse oximetry, NIBP, in line capnometry when available. (Minimal monitoring equipment for procedure is pulse oximetry).
- ✓ BVM device with attached oxygen source at 100 %

### Steps

1. Pre oxygenate and pre medicate with topical anesthetic vasoconstricting solution and lubricant.
  2. Select the largest and least obstructed nostril and insert a small lubricated NPA. This step may be repeated with increased size NPA to determine largest size ETT that can be accommodated.
  3. Lubricate the tube and add the BAAM device.
  4. Remove the nasal airway and gently insert the tube keeping the bevel of the tube toward the septum.
  5. Continue to pass the tube listening for air movement and looking for to and for vapor condensation in the tube. As the tube approaches the larynx, the air movement gets louder.
  6. Gently and evenly, advance the tube through the glottic opening on the inspiration. This facilitates passage of the tube and reduces the incidence of trauma to the vocal cords. Cricoid pressure may aide in passage of the tube.
  7. Upon entering the trachea, the tube may cause the patient to cough, buck, strain, or gag. Do not remove the tube! This is normal, but be prepared to control the cervical spine and the patient, and be alert for vomiting.
  8. Auscultate the axilla bilaterally for equal breath sounds and absence of sounds of the epigastrium. Observe for symmetrical chest expansion. The 15mm adapter usually rests close to the nostril with proper positioning (cm marking of 26). Additional method to check placement is to inflate cuff with additional 5-7 cc air while palpating over the sternal notch. Inflating and deflating the cuff should be detectable.
  9. Auscultate frequently and after each patient movement.
  10. Inflate the cuff with 5-10 cc of air or minimal amount needed to prevent air leak.
  11. Confirm tube placement using an end-tidal CO<sub>2</sub> monitoring device.
  12. Once placement confirmed secure ETT with twill tie tape or a commercial device.
  13. Consider physical or chemical restraints to protect the established airway
-



## UNC Carolina Air Care Needle Cricothyrotomy

### Equipment

- ✓ 13 or 14 gauge transtracheal catheter with 15 mm adapter, Antiseptic swab
- ✓ Jet insufflation kit and oxygen source
- ✓ ALS airway equipment, Suction and Emergency medications available and ready
- ✓ Critical care monitoring equipment attached to patient. Defibrillator / Pacer available

**Contraindication:** Patient age (relative size) < 8 years

### Steps

1. Locate the cricothyroid membrane utilizing anatomical landmarks.
  2. Prep the area with an antiseptic swab (Betadine).
  3. Insert transtracheal needle with attached syringe perpendicularly through the midline of the cricothyroid membrane with the needle directed posteriorly.
  4. During needle insertion, gentle aspiration should be applied to the syringe. Rapid aspiration of air into the syringe indicates successful entry into the trachea. Do not advance the needle any further. Consider instilling NS into syringe to assess for bubbling of air into fluid to confirm placement.
  5. Attach jet ventilation device with oxygen source to the 15 mm adapter and manually stabilize catheter
  6. Using standard techniques assess catheter placement. If placement is correct, secure with twill tie or suture. If incorrect, remove catheter and repeat steps 3 - 6 as necessary.
  7. Intermittent ventilation can be achieved by occluding the open hole on the jet ventilation device with thumb for 1 second and off for 4 seconds. Assess chest rise.
-



## UNC Carolina Air Care Orotracheal Intubation

### Equipment

- ✓ Appropriately sized ET tube's with stylet, Nasopharyngeal / Oropharyngeal airways
- ✓ Appropriately sized laryngoscope blade and handle
- ✓ Suction equipment, End-Tidal CO<sub>2</sub> detector
- ✓ BVM device with attached oxygen source at 100%
- ✓ Critical Care monitoring equipment: Cardiac monitor, Pulse oximetry, NIBP, In-line Capnometry when available. Minimal monitoring equipment for procedure is pulse oximetry.
- ✓ ALS medications available. Defib / pacer available.

### Steps

1. Pre oxygenate the patient. Have suction readily available
  2. Open the patient's airway and holding the laryngoscope in the left hand, insert the blade into the right side of the mouth and sweep the tongue to the left.
  3. Use the blade to lift the tongue and epiglottis (either directly with the straight blade or indirectly with the curved blade).
  4. Once the glottic opening is visualized, slip the tube through the cords and continue to visualize until the cuff is past the cords.
  5. Remove the stylet and inflate the cuff with a minimum of 5-10cc of air (minimal inflation to prevent air leak.)
  6. Frequently auscultate the axilla bilaterally for equal breath sounds and after movement or manipulation of the ETT.
  7. Confirm the placement using end-tidal CO<sub>2</sub> monitoring device.
  8. If correct, tube placement, secure the tube with twill tie, tape or a commercial device.
  9. Note the cm marking at the patient's lip or teeth. Normal for males is 22 cm at the teeth. Normal for Females is 20 cm at the teeth.
  10. Consider physical or chemical restraints to protect the established airway
-



## UNC Carolina Air Care RSI

### Equipment

- ✓ Appropriately sized ET with stylet, Nasopharyngeal / Oropharyngeal airways available
- ✓ Appropriately sized laryngoscope blade and handle
- ✓ Suction Equipment, End-Tidal CO<sub>2</sub> detector, Critical Care monitoring equipment: Cardiac Monitor, Pulse Oximetry, NIBP, In-line Capnometry when available. Minimal monitoring equipment is pulse oximetry
- ✓ BVM device with attached oxygen source at 100%
- ✓ ALS medications and Defibrillator / Pacer available
- ✓ Patient IV if possible (Succinylcholine may be given IM if needed and no IV access currently available).

### Contraindications / Considerations for use of NMB

- Known neuromuscular disease such as myasthenia gravis, amyotrophic lateral sclerosis, muscular dystrophy, Guillain-Barre syndrome
- Patient or family history of malignant hyperthermia (May substitute Vecuronium or Rocuronium for Succinylcholine)
- Any patient for which a surgical airway is a contraindication

### Steps:

1. Evaluate **LEMON** (see appendix form 903)
2. Preoxygenate patient with 100% oxygen via NRB mask or BVM
3. Monitor oxygen saturation with pulse oximetry and heart rhythm with EKG
4. Ensure functioning IV access, if able
5. Prepare equipment (Intubation kit, BVM, suction, combitube, cricothyrotomy kit, capnograph, oral / nasal airway)
6. Prepare medications
7. Pre medicate as appropriate
  - ✓ Atropine for bradycardic or pediatric patients or administering second dose of succinylcholine).
  - ✓ Lidocaine for CHI, Reactive airway disease
8. Sedation and /or Analgesia: Versed, Fentanyl, Morphine, Ativan
9. Apply cricoid pressure
10. Administer paralytic succinylcholine
11. Wait for relaxation of patient. (60-90 s for adults / 30-45 s for children)
12. Intubate trachea
13. Verify ET placement
  - ✓ Auscultation
  - ✓ ET CO<sub>2</sub> device



## UNC Carolina Air Care Suction

### Equipment

- ✓ Functional suction unit with tubing
- ✓ Yaunker
- ✓ Appropriate size suction catheter
- ✓ Sterile Saline
- ✓ Pulse oximetry or Cardiac monitor with pulse oximetry

### Steps

#### Upper airway suction: All medical providers

1. Attach Yaunker to suction tubing
2. Insert tip of younker into oral cavity with thumb hole open. Do not extend tip of younker beyond the posterior pharynx
3. Occlude thumb hole to apply suction while removing yanuker from oral cavity. Suction for a maximum of 15 seconds for each insertion.
4. Repeat process as needed. Use saline to clear suction tubing of secretions as needed
5. Administer supplemental oxygen after suctioning as needed

#### Tracheostomy tube suction of the upper airway: All medical providers

1. Attach appropriate suction catheter to suction tubing
2. Insert suction catheter through tracheostomy tube with thumb hole open.
3. Do not insert catheter beyond the end of the tracheostomy tube
4. Occlude thumb hole to apply suction intermittently while withdrawing the suction catheter using a circular motion. Suction for a maximum of 15 seconds for each insertion
5. Repeat process as needed. Use saline to clear suction tubing of secretions as needed.
6. If patient's secretions are thick 0.5 cc of sterile saline may be inserted into the tracheostomy prior to suction.
7. Administer supplemental oxygen as needed

#### Suction of the lower airway: ALS medical providers only

For patients who require deep suction of the lower airway via nasal passage, ETT or tracheostomy tube.

1. Patient to be attached to cardiac monitor and / or pulse oximetry with numerical reading of patients heart rate
2. Attach suction catheter to suction tubing. Maintain sterile technique throughout the procedure
3. Insert suction catheter into airway with thumb hole open. Insert until resistance is felt.



## UNC Carolina Air Care Airway Surgical Cricothyrotomy

### Equipment

- ✓ Surgical Airway prepack with antiseptic swab (Betadine)
- ✓ 18 gauge 1 ½ inch needle with 5 cc syringe
- ✓ ALS airway equipment, End-tidal CO2 detector, Suction
- ✓ ALS medications available, patient IV if able
- ✓ Critical Care monitoring equipment: Cardiac monitor, Defibrillator / Pacer, Pulse oximetry, NIBP, In-line Capnometry when available

**Contraindication:** Patient age (relative size) < 10 years

### Steps

1. Locate the midline cricothyroid membrane utilizing anatomical landmarks. Prep area with antiseptic swab (Betadine).
  2. Attach a 5-cc syringe to an 18G - 1 & 1/2-inch needle.
  3. Insert the needle (with syringe attached) perpendicularly through the cricothyroid membrane with the needle directed posteriorly. Consider instilling NS into syringe to assess for bubbling of air to indicate correct placement.
  4. During needle insertion, gentle aspiration should be applied to the syringe. Rapid aspiration of air into the syringe indicates successful entry into the trachea. Do not advance the needle any further. Attach forceps and remove syringe.
  5. With the needle remaining in place, make a 1-inch vertical incision through the skin and subcutaneous tissue above and below the needle using a scalpel. Using blunt dissection technique, expose the cricothyroid membrane.
  6. With the needle still in place, make a horizontal stabbing incision approx. 1/2 inch through the membrane on each side of the needle. Remove the needle.
  7. Using (skin hook, tracheal hook, or gloved finger) insert the cuffed tube into the trachea. (Cric tube from the kit or a #6 endotracheal tube is usually sufficient).
  8. Inflate the cuff with 5-10cc of air and ventilate the patient while manually stabilizing the tube.
  9. Using standard techniques assess tube placement. If placement is correct, secure the tube. If incorrect, remove tube and repeat steps 8-10 as necessary.
-



## UNC Carolina Air Care Blood Glucose Sampling

### Equipment

- ✓ Glucometer with appropriate in date code strips
- ✓ Antiseptic wipe
- ✓ Lancet

### Steps

1. Gather and prepare equipment.
2. Blood samples for performing glucose analysis should be obtained simultaneously with intravenous access when possible.
3. Place correct amount of blood on reagent strip or site on glucometer per the manufacturer's instructions.
4. Time the analysis as instructed by the manufacturer.
5. Document the glucometer reading and treat the patient as indicated by the analysis and protocol.
6. Repeat glucose analysis as indicated for reassessment after treatment and as per protocol.

**Glucometer maintenance and routine equipment checking is to be done as per the specific glucometer manufacturers and UNC Hospitals recommendations and policy's**

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## UNC Carolina Air Care Blood Procurement

### Equipment

- ✓ Approved CAC blood bank carrier
- ✓ 2 units uncrossmatched O Negative Blood from CAC blood bank refrigerator
- ✓ Double bagged wet ice
- ✓ Absorbent pads

### Steps

1. Each morning the blood bank refrigerator will be checked and the temperatures documented on the refrigerator temp log.
2. Each morning the available units of blood will be checked against the log by CAC team members. Units will be checked to ensure that unit pool numbers, blood product type and expiration dates are all correct.
3. The blood bank will be notified by CAC if any of the information is incorrect.
4. Blood bank will be notified when additional stock is needed.
5. Blood products will be removed from the refrigerator and transported in the appropriate manner for all CODE 1 transports and any CODE 2 or CODE 2 STAT transports which the CAC team members feel that blood administration may be required.
6. When removing blood from the refrigerator for transport the following procedures should be followed:
  - a. The units will be grouped in sets of 2
  - b. Review unit pool numbers, and expiration dates
  - c. Sign blood products out on the log with date, time and name of CAC team member removing the blood products
  - d. Place blood products in the approved receptacle, cover with the absorbent pad and place bagged ice on the top of the pad before closing the container
7. If blood products are not used, remove from the transport container, place back in the appropriate bin and place the bin on the lower shelf. Sign log with date and time returned.
8. If blood products **ARE USED** leave all additional products with the patient at their final destination. Note location and time products were left on the blood bank log.
9. If blood products **ARE USED** for a patient transported to UNC-ED, follow the above procedure and leave any unused products in the ED in an approved container. Notify ED clerk and the nurse responsible for the patient's care that the blood has been placed in the ED container.
10. If blood products **ARE NOT USED** for a CODE 1 that results in a transport to the UNC-ED but the potential exist for the patient to require blood product administration before Type & Crossed blood can be obtained then follow the above procedure. For steps 9 & 10, note location of and time products were left on the blood bank log.



## UNC Carolina Air Care Carotid Sinus Massage

### Equipment

- ✓ Patient on a Cardiac Monitor with patient IV access prior to procedure
- ✓ Emergency equipment Defibrillator / Pacer and medications available and ready for use

### Steps

1. Oxygen, EKG monitoring, and IV therapy must be established prior to performing carotid sinus massage. Emergency medications and equipment should be immediately available.
  2. Record the EKG rhythm continuously while performing all vagal maneuvers.
  3. Try Valsalva maneuver first if patient is able to cooperate.
  4. Gently palpate both carotid arteries separately to assess the quality of the carotid pulses. Auscultate both carotid arteries for the presence of bruits. If the pulses are grossly unequal, consult with medical control prior to performing carotid sinus massage. If a bruit is detected, use the opposite artery (if bruit free) for this procedure.
  5. Locate the carotid pulse near the angle of the jaw using the flat side of two fingers and press firmly against the carotid artery toward the cervical vertebrae.
  6. Massage the area using either a circular or vertical motion until the heart rate starts to slow or for a maximum of 1-2 minutes. **Never** massage both carotid arteries at the same time.
  7. Continuously monitor the EKG rhythm visually.
  8. If unsuccessful, administer an appropriate pharmacological agent as per protocol, and if necessary, repeat carotid sinus massage on the same side.
  9. The maximum number of attempts using carotid sinus massage is three - using the same side only.
  10. Patients with known history of CVA and residual weakness to one side should have massage attempted, if at all, only on the contra side of the weakness.
-



## UNC Carolina Air Care Chest Tube Placement

### Equipment

- ✓ CAC SURGICAL SET: Includes the following items. Tracheal hook, Trousseau dilator, # 10 & 11 disposable scalpels, 10cc syringe, I-0 Black silk suture with needle, Straight scissors, Curved hemostat, (10) 4X4 gauze sponges, 2 towel clips
- ✓ Chest tube (size appropriate for patient)
- ✓ Petroleum Gauze
- ✓ Sterile gloves and face shield PPE

### Indications / Contraindications:

IF the indications for chest Thorocostomy are met [ex. Tension pneumothorax, Pneumothorax with respiratory compromise, Open pneumothorax, Penetrating thoracic injury with respiratory compromise or Hemothorax.

THEN if in the prehospital setting a needle Thorocostomy may be preformed.

If transporting from another facility, Chest Tube Thorocostomy may be preformed prior to departure. Any delay of transport in performing this procedure must be weighted on a case-by-case basis. MCO should be consulted when appropriate.

### Steps

1. Select tube size according to patient size and thoracostomy use. Gather and prepare all equipment prior to beginning.
2. Determine and prep the insertion site: 4<sup>th</sup> or 5<sup>th</sup> intercostal space on the anterior midaxillary line just behind the lateral edge of the pectoralis major muscle. In pregnancy the tube should be placed in the 3<sup>rd</sup> intercostals space due to the elevated diaphragm
3. Anesthetize site with 1% Lidocaine from the subcutaneous tissue through muscle, periosteum, anterior rib margin to the pleura. Lidocaine dose is 0.5cc/kg (4 mg/kg)
4. Estimate the length of tube to be inserted into the chest and occlude with large hemostat
5. Make a 2-3 cm horizontal incision over the 5<sup>th</sup> rib and anterior to the midaxillary line
6. Insert curved clamp and bluntly dissect through the tissue making a tunnel towards the 3<sup>rd</sup> intercostal space. Separate the clamp to separate the tissue.
7. Puncture the parietal plura using a gentle but forcible manner with the tip of the closed clamp holding it close to the upper rib margin as it goes through. Enlarge the opening by opening the clamp. Anchor the clamp with your hand during this process to prevent the clamp from entering the plural cavity too far.
8. Insert finger along side the clamp and into the plural cavity making a 360-degree sweep of the interior wall to remove any excess debris from around the puncture site. Maintain the site patency until the chest tube is inserted.



## UNC Carolina Air Care Child Birth Assist

### Equipment

- ✓ OB Kit, Blankets bulb or vacuum suction
- ✓ Emergency airway equipment for neonate patient
- ✓ Monitoring equipment: Cardiac monitor, pulse ox, ETCO2
- ✓ Emergency Drugs available and ready

### Steps

1. Delivery should be controlled so as to allow a slow delivery of the infant. This will prevent injury to the mother and infant.
  2. Support the infant's head as needed.
  3. Check the umbilical cord surrounding the neck. If it is present, slip it over the head. If unable to free the cord from the neck, double clamp the cord and cut between the clamps.
  4. Suction the airway with a bulb syringe.
  5. Grasping the head with hands over the ears, gently pull down to allow delivery of the anterior shoulder.
  6. Gently pull up on the head to allow delivery of the posterior shoulder.
  7. Slowly deliver the remainder of the infant.
  8. Clamp the cord 2 inches from the abdomen with 2 clamps and cut the cord between the clamps.
  9. Record APGAR scores at 1 and 5 minutes.
  10. Follow the *Newly Born Protocol* for further treatment.
  11. The placenta will deliver spontaneously, usually within 5 minutes of the infant. Do not force the placenta to deliver.
  12. Massaging the uterus may facilitate delivery of the placenta and decrease bleeding by facilitating uterine contractions.
  13. Continue rapid transport to the hospital.
-



## UNC Carolina Air Care Continuous Albuterol

### Equipment

- ✓ Nebulizer kit with oxygen supply tubing
- ✓ "T" adapter or stopcock inserted into nebulizer bowel
- ✓ Face mask
- ✓ 60cc syringe with Luerlock
- ✓ Syringe pump with tubing
- ✓ Albuterol 100 mg multidose vial & NS Injectable

### Steps

- I. Calculate needed medication dose by using the following formula
  - a.  $0.5 \text{ mg} \times \text{pt. Weight in Kg} = \text{dose in mg/hr of albuterol}$
  - b.  $\text{Mg / hr divided by } 15 \times 50\text{cc} = \text{total mg Albuterol for the specific pt.}$
  - c.  $\text{Total mg needed divided by } 5 \text{ mg/cc} = \text{cc of Albuterol needed}$
  - d.  $50 \text{ cc} - \text{cc of Albuterol needed} = \text{cc of NS required to make total fluid volume of } 50\text{cc.}$

**Example:**  $70 \text{ kg} \times 0.5 \text{ mg} = 35 \text{ mg}$

$$35 / 15 \times 50 = 116.6 \text{ mg}$$

$$116.6 \text{ mg} / 5 \text{ mg per cc} = 23.32 \text{ cc of medication}$$

$$50 - 23.32 \text{ cc} = 26.68 \text{ cc of NS for total fluid volume } 50\text{cc}$$

2. Mix Albuterol and NS in 60 cc syringe, place 3cc in nebulizer bowel then prim syringe tubing and connect tubing to stopcock inserted into nebulizer bowel. Set syringe pump at 15 cc/hr
  3. Connect oxygen supply tubing to oxygen source at sufficient flow rate to create mist
-



## UNC Carolina Air Care Foley Cath Insertion

### Equipment

- ✓ Foley Catheter insertion tray pre pack
- ✓ Appropriate sized foley catheter
- ✓ Drainage device

### Steps

1. Position the patient and set up foley insertion tray using aseptic technique.
  2. Test the patency of the balloon by instilling 2-3 cc of NS solution into the balloon port, then remove the NS prior to insertion of the foley into the patient.
  3. Cleanse the foley insertion site with betadine solution using aseptic technique and in the appropriate manner for **male** v. **female** patients. *See UNC Hospitals, Nursing Procedure Manual: Urinary Catheter, Catheterization with indwelling urethral catheter* for further information on this procedure.
  4. Lubricate the end of the catheter with the included lubricant. Topical anesthetic gel may be used with a physicians order.
  5. Insert the foley using aseptic technique and appropriate procedure for **male** v. **female** patient. Assess for urine flow from the catheter and insert the catheter a few more cm to insure passage of the balloon beyond the urethral sphincter and into the bladder.
  6. Inflate the balloon with 5-10 cc NS
  7. Attach foley catheter to drainage system (if not previously done) using aseptic technique. Check for continued flow by placing the drainage bag below the level of the bladder.
  8. Secure the catheter to the patient's leg to prevent pulling or accidental dislodgment of the catheter tip from the bladder.
-

**Equipment**

- ✓ Patient IV access
- ✓ Methylprednisolone add mix (3 grams)
- ✓ 100 cc bag NS IVF and IV tubing
- ✓ Infusion pump if need to administer 23 hour maintenance dose

**Steps**

1. Assess patient for signs of spinal cord injury with deficits
    - Decreased or absent sensory and motor function below the level of the lesion
  2. Contact MCO with patient report and request order for administration of high dose steroids procedure.  
Review patients PMH and Allergies.
  3. Mix and infuse bolus dose by the following formula:
    - 30 mg / kg in 100 cc NS. Infuse over 15 minutes
  4. Follow bolus with NS IVF at 50 cc / hr x 45 minutes
  5. If patient is an inter facility transfer and transport will take longer than 45 minutes after bolus has infused then request maintenance infusion be mixed at sending facility to be taken with the transport team. (*see Administration of Non-stocked Medications Medical Standards Guideline*)
  6. After 45 minute NS infusion, begin Methylprednisolone maintenance infusion at 5.4 mg / kg / hour mixed in 500 cc NS x 23 hours. Note time the infusion began
  7. Note any changes in the patient's neuro muscular status with infusion.
-



## UNC Carolina Air Care IABP Operations

### Equipment

- ✓ System 98 XT operations manual
- ✓ Helium tank at least 100 psi
- ✓ IABP Cables / Transducer Cables
- ✓ Catheter extension tubing
- ✓ Helium “O” ring seals
- ✓ 60cc syringe w/3-way stopcock
- ✓ Doppler and gel

### Steps

1. Plug IABP into electrical outlet to protect battery life
2. **Verify** IABP placement by CXR. Balloon should be at approximately the 4<sup>th</sup> intercostal space, 2 cm distal or below the left sub-clavian artery and Aortic arch
3. **Verify** that the IABP is sutured in-place
4. **Verify** timing settings on referring facility IABP
5. Turn on Transport IABP, open helium tank, place timing slide knobs in midpoint “0” position, increase augmentation to maximum.
6. Attach IABP EKG cable and pressure transducer to the patient, select EKG trigger and I:I frequency.
7. **Zero** transducers
8. Slow gas loss alarm “ON”
9. IABP fill “AUTO”
10. IABP timing “**Auto: R Trace ON**”
11. ECG gain “**NORMAL**”
12. Adjust **IABP INFLATION** and **IABP DEFLATION**, the arterial wave form should begin at the diastolic notch and end before the systolic up-stroke
13. Place referring facility IABP on “**STAND BY**” and switch helium tubing to the transport IABP
14. Press “**ASSIST STANDBY**” button to fill the transport IABP: There will be a pause for several seconds while the balloon fills. Once the “Auto Filling” message clears the pumping will begin.
15. **Zero** the transducer on the arterial line
16. Ensure optimal augmentation during diastole by fine tuning IABP timing
17. Verify Augmentation alarm:
  - Augmentation alarm is approx 10mmHg less than the patients diastolic augmentation pressure
  - Adjust if needed by pressing AUG ALARM and using arrow keys to change the value displayed on the screen.
  -



## UNC Carolina Air Care Invasive Pressure Monitoring

### Equipment

- ✓ Transducer line and corresponding pressure monitoring cable
- ✓ Monitoring device that accepts pressure monitoring cable
- ✓ Bag of NS fluid
- ✓ Infusion pressure bag

### Steps

1. Inspect the current transducer line (if pre existing) to check for compatibility with UNC Hospitals pressure monitoring cable.
  2. If required, convert transducer line to UNC Hospitals system by spiking the bag of NS with the line and flushing the line with NS. Be sure to remove **ALL AIR** from the tubing and stopcocks and the bag of NS.
  3. Place NS bag in sleeve of infusion pressure bag and inflate the infusion pressure bag to 200 mmHg (or level greater than the top numerical value of the invasive pressure line that is to be transduced / monitored).
  4. If required, place and secure the transducer component at the appropriate anatomical location prior to zeroing the monitor.
  5. Plug the pressure monitoring cable into the monitoring device and the transducer line into the pressure monitoring cable.
  6. Hang the bag of NS higher than the level of the heart and turn the transducer stopcock open to air and closed to the patient.
  7. Zero the monitoring device in the appropriate manner. Once zeroed, turn the transducer stopcock back to the open position between the patient and the monitoring device.
  8. Assess the waveform on the monitoring device. Troubleshoot any problems as per *UNC Hospitals Nursing Procedure Manual: Catheter, Pulmonary Artery, Troubleshooting*. Re-zero as required.
-



## UNC Carolina Air Care I/O Placement

### Equipment

- ✓ EZ-IO kit (Adult/ Peds Needle, Driver, EZ Connect device)
- ✓ Antiseptic swab
- ✓ 1% or 2% Lidocaine (preservative free)
- ✓ Flushed IV line with pressure bag and 3 way stopcock attached

### Steps

1. Locate appropriate insertion site (proximal tibia, distal tibia or proximal humerus).
    - I.1. Proximal tibia—identify tibial tubercle on the proximal tibia, moved 2 cm below and 2 cm medially.
    - I.2. Distal tibia—externally rotate chosen leg and locate the medial malleolus, move 1-2 cm anteriorly and 1-2 cm proximally (flat area of tibia just medial to tibial crest). Angle insertion 15-30 degrees caudally.
    - I.3. Proximal humerus—adduct and internally rotate the humerus (the patient's hand should be position on the umbilicus). Palpate the tubercles of the humeral head. Insert just distal of the greater tubercle while keeping finger on humeral head to assure midline insertion. Note do not attempt insert medial to the greater tubercle.
  2. Prepare insertion site using aseptic technique.
  3. Prepare the EZ-IO driver and appropriate sized needle.
  4. Stabilize site and insert needle using the EZ-IO driver at the appropriate angle to the bone.
  5. Remove EZ-IO driver from needle set while stabilizing catheter hub.
  6. Remove stylet from catheter and dispose in an approved sharps container.
  7. Connect primed EZ Connect.
  8. Confirm placement by gentle aspiration
  9. If patient conscious, slowly push Lidocaine (20-40 mg adults/ 0.5 mg/kg for peds) to decrease infusion discomfort.
  10. Flush of the EZ-IO catheter with normal saline (min. of 5ml for peds/ 10ml for adults).
  11. Connect IV set and infuse solutions under pressure bag or infusion pump.
  12. Dress site and secure tubing.
  13. Monitor the insertion site for any extravasation of fluid into surrounding tissue.
-



## UNC Carolina Air Care Manual Defibrillation

### Equipment

- ✓ LIFEPAK I2 Monitor with external hands free defib / pacer pads

### Steps

1. Clinically confirm the diagnosis of cardiac arrest and identify the need for defibrillation.
  2. Apply defibrillation hands free pads to the patient's chest in the proper position (right of the sternum at 2<sup>nd</sup> intercostals space and anterior axillary line at 5<sup>th</sup> intercostals space).
  3. Set the appropriate energy level for the type of defibrillator / age of the patient as per current ACLS guidelines (monophasic or bi-phasic: peds – 2 joules/kg initially with repeat at 4 joules/kg)
  4. Charge the defibrillator to the selected energy level.
  5. Assure proper placement of the pads making sure good skin contact is achieved.
  6. **Assertively state, "CLEAR" and visualize that no one, including yourself, is in contact with the patient.**
  7. Deliver the countershock by depressing the **shock button** for hands free operation.
  8. Assess the patient's response.
  9. Continue to deliver counter shocks as appropriate per the current ACLS guidelines
  10. Document the events by running a code summary from the LIFEPAK I2 monitor
-



## UNC Carolina Air Care Meconium Aspiration

### Clinical Indications:

Meconium is present in the amniotic fluid of a baby being delivered and the infant is not vigorous.

### Procedure:

1. If amniotic fluid is known to contain meconium prior to delivery, prepare all equipment beforehand. If meconium is discovered at the time of delivery, you must work quickly to reduce the chance of meconium aspiration syndrome.
2. If the meconium is thick (pea soup) rather than thin (watery), then the infant should be orally intubated. A meconium aspirator should be attached to the endotracheal tube and connected to suction. The hole in the aspirator should be covered to apply suction to the ETT, and the ET should be slowly withdrawn from the trachea under continuous suction.
3. If the infant has been intubated and suctioned, a repeat intubation and suction with an ETT may be necessary if there is copious thick meconium present.
4. When the infant's condition is unstable, it may not be possible to clear the trachea of all meconium before positive pressure ventilation must be initiated.

### Certification Requirements:

- Maintain knowledge of the indications, contraindications, technique, and possible complications of the procedure. Assessment of this knowledge may be accomplished via quality assurance mechanisms, classroom demonstrations, skills stations, or other mechanisms as deemed appropriate
-



## UNC Carolina Air Care Needle Thoroacostomy

### Equipment

- ✓ 14 gauge 3 ¼ inch or 16 gauge 2 inch angiocath for adults
- ✓ 18 gauge 1 ¼ inch angiocath for patients < 8 years of age
- ✓ Betadine or antiseptic wipe
- ✓ 10 cc syringe
- ✓ Optional flutter valve

### Steps

1. Confirm presence of a tension pneumothorax or identify strong clinical evidence in a rapidly deteriorating patient in the setting of major trauma. Consider in the setting of refractory PEA or patients with a history of COPD / Emphysema.
  2. In intubated patients, signs and symptoms of left-sided tension pneumothorax may be caused by right mainstem endotracheal tube placement. Consider adjustment of ET tube first.
  3. Locate the insertion site at the second intercostal space at the midclavicular line on the affected side of the chest.
  4. Prep the insertion site and insert the angiocath with a 10cc syringe attached, by directing the needle just over the top of the third rib (2nd intercostal space) to avoid intercostal nerves and vessels, which are located on the inferior rib borders.
  5. Advance the catheter 1-2 inches (3/4 - 1 inch in patients less than 8 years) through the chest wall. Pull back on the plunger of the syringe as the needle is advanced. Tension should be felt until the needle enters the pleural space. A “pop” or “give” may also be felt. Do not advance the needle any further.
  6. Withdraw the needle and advance the catheter until flush with the skin. Listen for a gush or “hiss” of air, which confirms placement and diagnosis. Caution: this is frequently missed due to ambient noise.
  7. Secure the catheter and dispose of the needle properly, **never reinsert into the catheter**
-



## UNC Carolina Air Care NG / OG tube insertion

### Equipment

- ✓ Gastric Tube with water soluble lubricant
- ✓ 60cc catheter tip syringe
- ✓ Suction available

### Steps

1. Estimate insertion length by superimposing the tube over the body from the nose to the stomach.
  2. Flex the neck **if not contraindicated** to facilitate esophageal passage.
  3. Liberally lubricate the distal end of the tube and pass through the patient's nostril along the floor of the nasal passage. Do not orient the tip upward into the turbinates. This increases the difficulty of the insertion and may cause bleeding.
  4. In the setting of an unconscious, intubated patient or a patient with facial trauma, oral insertion of the tube may be considered or preferred.
  5. Continue to advance the tube gently until the appropriate distance is reached.
  6. Confirm placement by injecting 20cc of air and auscultate for the swish or bubbling of the air over the stomach. Additionally, aspirate gastric contents to confirm proper placement.
  7. Secure the tube with tape or NG strip holder.
  8. Decompress the stomach of air and food either by connecting the tube to suction or manually aspirating with the large catheter tip syringe.
-



## UNC Carolina Air Care Synchronized Cardioversion

### Equipment

- ✓ LIFEPAK 12 monitor with External hands free Pacing / Defib pads
- ✓ Patient IV if able before delivering electricity
- ✓ ALS equipment & medications available and ready

### Steps:

1. Confirm the presence of the dysrhythmia and evaluate the patient's hemodynamic status.
  2. Premedicate with sedation as needed and able. Be prepared to assist ventilation's if necessary.
  3. Apply defibrillation pads to the patient's chest assuring good skin contact is achieved.
  4. Set the defibrillator to the cardioversion mode by depressing the **SYNC** button.
  5. Set the appropriate energy level per current ACLS guidelines.
  6. Charge the capacitor to the appropriate energy level.
  7. **Assertively state "CLEAR" and visualize that no one, including yourself, is in contact with the patient.**
  8. Deliver the countershock by depressing the **shock** button. **There may be a momentary delay while the machine detects the R wave.**
  9. Assess the patient's response to the cardioversion.
  10. Continue to deliver countershocks as per the current ACLS guidelines
  11. Document the events by running a code summary from the LIFEPAK 12 monitor
  12. If the patient deteriorates into ventricular fibrillation or pulseless ventricular tachycardia, prepare for immediate defibrillation!! (unsynchronized shock!!)
-



## UNC Carolina Air Care Transcutaneous Cardiac Pacing

### Equipment

- ✓ LIFEPAK 12 monitor with attached External Hands Free Pacing / Defib pads
- ✓ LIFEPAK 12 3 lead EKG cable attached to patient
- ✓ Patient IV access
- ✓ ALS equipment & medications available and ready

### Steps

1. Oxygen, EKG monitor, IV should be in place prior to pacing.
  2. Confirm the presence of the dysrhythmia (include a copy of the EKG strip) and evaluate the patient's hemodynamic status.
  3. Adjust the QRS amplitude so the machine can sense the intrinsic QRS activity.
  4. Apply pacing pads to the patient's chest in either of the following positions - anterior-anterior or anterior-posterior.
  5. Turn the pacer on.
  6. Observe the EKG screen for a "sense" marker on each QRS complex. If a "sense" marker is not present, readjust EKG size or select another lead.
  7. Set the desired pacing rate at 60 or 20 beats per minute over the patient's intrinsic rate
  8. Start at the lowest setting and increase the current slowly while observing the EKG screen for evidence of electrical pacing capture.
  9. Assess the patient's response to the pacing therapy.
  10. Consider the use of sedation or analgesia if patient is uncomfortable.
  11. Document the events by running a code summary from the LIFEPAK 12 monitor
-



## UNC Carolina Air Care Transvenous Cardiac Pacing

### Equipment

- ✓ External transvenous pacing unit
- ✓ Cardiac monitor

### Steps

1. Ensure proper functioning of the external transvenous pacing unit. Set unit to “asynchronous” and rate to 60, turn power on and check for presence of pacing light. Turn unit off
  2. Have patient attached to cardiac monitoring device
  3. Set sensitivity / mA of external transvenous unit below 1.5 mA
  4. Attach temporary wires to external unit and secure. Turn pacer on.
  5. Perform threshold check. *See UNC Hospitals Nursing Procedure Manual: Pacemaker, Temporary Transvenous and Epicardial Threshold Check.* Turn mA up until 100% capture is observed on the cardiac monitor, note the mA level and then turn mA up to preset maintenance output **OR** 3 times the minimal mA level
  6. Set rate to that ordered by physician if patient is 100% paced or to 10 beats greater than patients inherent rate. Monitor patients hemodynamic status and adjust pacer settings accordingly.
  7. Obtain rhythm strip and document mA setting, mA threshold and rate.
  8. Secure box.
  9. If this is new insertion of pacing wires, obtain a chest x-ray prior to transport
-



## UNC Carolina Air Care Venous Access EJ Placement

### Equipment

- ✓ Large gauge IV catheter (I4 or I6) for trauma patients is the standard
- ✓ IV catheter any size
- ✓ IV Tubing, primed
- ✓ Antiseptic wipe
- ✓ Tourniquet

### Steps

1. Place tourniquet on upper extremity limb to assist with location of vein. Same process for starting IV on lower extremity however **a written physicians order is required to establish venous access on a lower extremity.**
2. Cleanse the site with an antiseptic swab.
3. Insert the IV catheter needle with the bevel edge up, into the vein, assessing for flashback into the catheter chamber. Slide the catheter up the needle introducer into the vein until the entire catheter is in the vein.
4. Remove the needle introducer being cautious to occlude the vein above the level of the IV catheter to prevent blood leakage when removing the needle.
5. Attach flushed IV tubing and instill additional solution to ensure patency of the venous access. Look for signs of infiltration. If present then remove the IV catheter. If the line flushes easily then secure the IV access site.

### FOR EXTERNAL JUGULAR VENOUS ACCESS:

1. Place patient in supine & trendelenburg position with the head turned to the contra-lateral side
  2. Locate the vein and occlude at the level of the clavicle
  3. Cleanse the site with an antiseptic swab
  4. Insert the IV catheter needle with the bevel edge up, into the vein, assessing for flashback into the catheter chamber. Slide the catheter up the needle introducer into the vein until the entire catheter is in the vein.
  5. Remove the needle introducer being cautious to occlude the vein above the level of the IV catheter to prevent blood leakage when removing the needle or air entry into the vein.
  6. Attach flushed IV tubing and instill additional solution to ensure patency of the venous access. Look for signs of infiltration. If present then remove the IV catheter. If the line flushes easily then secure the IV access site.
  7. If infusing IV fluid via external jugular venous access then place on infusion pump or pressure bag
-



## UNC Carolina Air Care Venous Access Femoral Line Placement

### Equipment

- ✓ 8 fr. Cordis introducer kit OR 5 ¼" 14 gauge IV catheter
- ✓ IV Tubing, primed
- ✓ Antiseptic wipe

### Steps

1. Locate femoral vein medial to the femoral artery. If no palpable pulse then locate mid point between symphysis pubis and the anterior superior iliac crest
  2. Prep site. Shave hair if necessary
  3. Make puncture with needle and attached 10cc syringe approximately 2 fingers below the inguinal ligament with needle directed cephalad at 45 degrees
  4. Advance needle while maintaining gentle suction on the 10cc syringe until blood appears in the syringe
  5. Lower the needle to a more parallel angle and continue to aspirate to confirm placement, advance the catheter over the needle into the vein to the level of the hub
  6. If using cordis advance guide wire into the vein before removing needle, **DO NOT LET GO OF THE GUIDE WIRE**. Use scalpel to make small incision at the insertion site and advance dilator and introducer over the guide wire. Advance introducer to the level of the hub. Expect some resistance; use a slight twisting motion to advance introducer. If significant resistance, remove and start over
  7. Aspirate again to confirm placement
  8. Attach IV tubing and open tubing regulator to check forward flow and absence of infiltrate
  9. Secure site as appropriate for the type of IV catheter used
  10. Place IV fluid on an infusion pump or pressure bag.
-



## UNC Carolina Air Care Orotracheal Intubation of Infants

To establish an airway for:

- assisted ventilation
- continuous positive airway pressure
- emergency resuscitation
- temporary access for suctioning, culturing secretions and installation of drugs

Equipment

Laryngoscope and blade

- > than 2500g - Miller I

- < than 2500g - Miller 0

Endotracheal tube of appropriate size

Size Weight

2.5 <1000 grams

3.0 1000-2000 grams

3.5 2000-4000 grams

4.0 >4000 grams

Stylet

Suction

Oxygen delivery system

Self-inflating manual ventilation bag and mask

Note: The operator should have tubes available one size smaller and one size larger than the size estimated. It is safer to use a tube which is too small than one that is too large as trauma and tissue ischemia are less likely to occur with a small tube.



## UNC Carolina Air Care Umbilical Artery Catherization

To provide vascular access when a peripheral intravenous line cannot be placed to provide central access, or to provide arterial access for continuous blood pressure monitoring and/or arterial blood gas monitoring

I. Catheter position:

- A. Low line position-between lumbar vertebrae 3 and 5
- B. High line position-between thoracic vertebrae 6 and 9

2. Catheter length:

- A. Use 2/3 of the distance from the shoulder to the umbilicus
- B. Refer to graph low line-tip of the catheter should lie just above the aortic bifurcation high line-tip should be above the diaphragm

3. Equipment:

- Umbilical catheterization tray
- Umbilical catheters(size 3.5 F and 5.0 F)
- Betadine/sterile water
- Saline flush
- 3 cc syringes
- Stopcock

4. Equipment preparation:

- A. The instrument tray is opened and a stopcock, umbilical catheter and a 3cc syringe is added. Use a 3.5 F for infants < 1000 grams, a 5.0 F for larger infants.
- B. 3cc of saline flush solution are drawn up into the 3 cc syringe which is connected to the side of the 3-way stopcock. The catheter is connected to the stopcock and filled with flush solution from the syringe.
- C. The suture and needle are mounted in the needle holder.

### TREATMENT

1. The patient should be supine and in an environment to support his temperature.
  2. Restrain infant.
  3. Prepare and drape umbilical cord and adjacent skin using sterile technique.
  4. Place sterile umbilical tape around the base of cord.
  5. Cut through cord horizontally approximately 1-2.0 cm from skin, tighten umbilical tape to prevent bleeding.
  6. Identify the large, thin-walled umbilical vein and smaller thick walled arteries.
  7. Use one tip of open curved iris forceps to gently probe and dilate one artery, then gently probe with both points of closed forceps and dilate artery by allowing forceps to open gently.
  8. Grasp catheter 1 cm from tip with toothless forceps and insert catheter into lumen of artery, aim the tip towards the feet, and gently advance catheter to desired distance. If resistance is encountered, try loosening umbilical tape, apply steady gentle pressure, or manipulate angle of umbilical cord to skin.
  9. DO NOT FORCE.
  10. Secure catheter with purse-string suture.
  11. Loop the catheter over the lower abdomen and secure with tape.
  12. Confirm the position of the catheter tip with x-ray.
  13. Infuse heparinized fluid.
  14. Look for complications to catheter placement: blanching or cyanosis of lower extremities, perforation, thrombosis, embolism and infection
-



## UNC Carolina Air Care Umbilical Vein Catheterization

To provide vascular access in newborn resuscitation or when peripheral intravenous line cannot be established. To provide vascular access when central access is necessary but when arterial access is not available and/or necessary.

### I. Catheter position:

A. Placement should be in the inferior vena cava above the level of the ductus venosus and the hepatic veins.

### 2. Catheter length:

A. Determine the shoulder-umbilical length by measuring the perpendicular line dropped from the tip of the shoulder

to the level of the umbilicus.

B. Refer to the graph-determine the catheter length needed to place the tip between the diaphragm and left atrium,

add length for the height of the umbilical stump.

C. Alternative method: UV catheter length (cm) =  $[0.5 \times \text{the low line UA catheter length(cm)}] + 1$ .

### 3. Equipment:

- Umbilical catheterization tray
- Umbilical catheters (size 3.5 F and 5.0 F)
- Betadine/sterile water
- Saline flush
- 3cc syringes
- Stopcock

### 4. Equipment preparation: (refer to Umbilical Artery Catheterization Protocol.)

## TREATMENT

1. The patient should be supine and in an environment to support his temperature.

2. Restrain infant.

- Prepare and drape umbilical cord and adjacent skin using sterile technique.

4. Place sterile umbilical tape around the base of the cord.

5. Cut through cord horizontally approximately 1.5-2.0 cm from skin, tighten umbilical tape to prevent bleeding.

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- Identify the large, thin-walled umbilical vein and smaller thick-walled arteries.
- Clear thrombi with forceps and insert catheter aiming the tip toward the right shoulder.

8. DO NOT FORCE.

9. Gently advance catheter toward the desired distance.

10. Secure catheter with purse-string suture.

11. Loop the catheter over the lower abdomen and secure with tape.

- If a UAC is also in place, clearly specify each line.

13. Confirm the position of the catheter tip with xray.

14. Infuse heparinized fluid.

15. Look for complications to catheter placement: changes in heart rhythm or rate, extra beats



To remove air from the pleural space when placement of a thoracostomy tube is not indicated (see Specific Problems: Pneumothorax)

I. Assemble equipment

- 3-way stopcock
- 20cc syringe
- 23G butterfly needle or 18G angiocath
- Betadine
- Sterile water or alcohol

2. Preparation of equipment

- A. Connect the 3-way stopcock to the syringe
- B. Connect the tubing of the butterfly needle or angiocath to the 3-way stopcock
- C. Turn the stopcock “off” to the remaining outlet (to the atmosphere)

TREATMENT

A. Performing the procedure

- Place the infant in a supine position (air rises to the top).

B. Prepare the 3rd to 5th interspace-anterior axillary line (AAL) or above the second intercostal space in the midclavicular region with betadine and sterile water.

C. Angle the needle 45 degrees toward the mediastinum.

D. Enter the pleural cavity through the 3rd, 4th, or 5<sup>th</sup> interspace in the AAL, above the rib.

E. After entry into the pleural space, the needle should not be advanced further.

F. Withdraw the plunger of the syringe, if air is present in the pleural space, there will be free withdrawal, continue until resistance is met.

G. If no resistance, the tap should be turned “off” to the patient and the contents of the syringe emptied into the atmosphere. V-44

H. The tap is turned “off” to the atmosphere and withdrawal is repeated, repeat this process until resistance is met.

I. At this point, slowly remove the needle while maintaining suction on the syringe. If using an angiocath, the trocar needle should be removed prior to complete emptying of the pleural space. The plastic sheath may be left in place and used as a catheter until a chest tube is placed.

J. After needle removal, place dressing over the thoracentesis site.

K. Obtain chest x-ray.

L. Monitor patient

---



To provide definitive treatment for a pneumothorax

### ASSESSMENT

#### I. Refer to Assessment Protocol

- Chest x-ray or transillumination is necessary to confirm diagnosis.

#### I. Equipment

- Mask and sterile gloves
- Procedure tray
- #10 French or #12 French chest tube with trocar
- Preparation solutions—betadine and sterile water
- Heimlich valve
- 1% lidocaine

### TREATMENT

1. Restrain patient and place small cloth roll under affected side.

2. Put on mask and sterile gloves.

3. After sterile preparation and draping, locate the insertion site along the anterior axillary line at approximately the 4<sup>th</sup> or 5<sup>th</sup> interspace.

- If the patient is awake and is likely to experience pain, infiltrate the skin and underlying tissue with lidocaine.

5. Consider systemic pain management.

6. Make a small incision parallel to the ribs, one or two ribs below the intended insertion site.

7. Spread the incision and free up the connective tissue with a hemostat, until the chest tube can be maneuvered into the insertion site.

#### A. Hemostat method:

- Make a hole in the chest wall with a mosquito hemostat.
- Remove the trocar and hold the chest tube with the hemostat, then place it through the chest wall hole.
- Refer to diagram.

#### B. Trocar method:

- Place a hemostat securely on the chest tube about 1.5cm from the tip.
- Tunnel under the skin to the intended insertion site.
- Holding both the tube and the hemostat securely, slide the tube over the top of the rib and rotate the tip applying steady pressure until a “pop” is felt.
- Hold the tube firmly, remove the hemostat, and then the trocar.
- Refer to trocar technique diagram.
- Advance the tube a few centimeters, running superiorly and anteriorly.

9. All the holes in the chest tube must be in the chest.

10. The presence of condensation within the tube suggests positioning in the pleural space as desired.

- If the patient is on a ventilator, the chest may be left open to the atmosphere while the incision is being closed.
- If the patient is breathing spontaneously, the tube should be connected to the Heimlich valve.

13. Suture the chest tube securely, using a purse-string tie.

14. The tube may then be taped to the chest over the lower ribs.

15. Attach tube to the Heimlich valve and reassess the patient's condition.

16. Obtain x-ray



## UNC Carolina Air Care iNO

To provide continued therapy for neonates currently receiving inhaled nitric oxide for persistent pulmonary hypertension (FDA approved indication only).

### EQUIPMENT

- Transport isolette with continuous flow ventilator
- iNOvent
- Nitric oxide compressed gas cylinder
- Calibration gases

### TREATMENT

Patient treatment consistent with treatment for persistent pulmonary hypertension of the newborn (PPHN). Prior to departure from home base, the Transport Respiratory Therapist will set up the ventilator/iNOvent and perform a system calibration (this may cause an acceptable delay in mission departure). Patient will be placed on the same dose in parts per million (ppm) as is currently being delivered by the referring facility. Changes to the delivered ppm will be done only after conferring with the mission MCO. An arterial blood gas (ABG) will be obtained after the transfer to the transport iNOvent system.

### SAFETY

- Transport iNO is for use in FDA approved neonatal patients under the direction of the MCO.
- Follow PPHN protocols. An ABG should be obtained after transferring the patient to the transport iNO system.
- All iNO system components should be secured throughout the transport.

### DOCUMENTATION

Indicate in chart:

- Operator (RRT) by signature
  - Dose of iNO (ppm).
  - ABG results after transfer to transport system.
  - Patient response to transfer to transport system.
-



### UNC Carolina Air Care I - Stat

1. The I-Stat is utilized by the pediatric transport team for blood gas and glucose monitoring.
  2. There are two machines located in the pediatric narcotic cabinet.
  3. The team uses machine #1. Machine #2 is for back-up.
  4. McLendon Laboratories calibrates the machine; and maintains the records. Contact numbers are: phone—966-2449, pager—216-2070.
  5. Supplies are ordered by McLendon Lab. They monitor supply levels and order when stock is low.
    - a. Pay attention to lot number and expiration date.
    - b. Supplies that are needed: control ampules 1, control ampules 3, and cartridges for blood gases and glucose monitoring.
  6. The machine is self-calibrated, however, if the internal device should fail, an electronic simulator is located in the pediatric team narcotic cabinet and should be used to calibrate the machine until it can be repaired.
  7. Control level 1 and control level 3 are run every Monday morning for blood gases and glucose. Results are recorded on the QC log.
  8. McLendon Lab reviews the QC log and maintains records in their office.
  9. The I-Stat Transport Form **MUST** be completed if the I-Stat is used on transport. The form is part of the permanent patient medical record.
-



## UNC Carolina Air Care Administration of Non Stocked Medications

**Note:** Medications that are listed in the *Air Care Drug Formulary* are routinely used but not all inclusive of authorized medications that may be administered by health care providers within their scope of practice.

### Guideline

Patients receiving appropriate CAC non-stocked medications prior to assumption of care by CAC team members will continue to receive those medications if:

- ✓ The team members are familiar with the medications,
- ✓ The patients condition warrants continued administration of the medication and / or
- ✓ There are no other suitable medications available as a substitution.

### Purpose

- ✓ To maintain the administration of appropriate medications to patients during transport.
- ✓ To allow CAC team members to administer medications appropriate to the patients condition but which may not be available from the Air Care stock.

### Procedure

1. Patients receiving medications prior to the CAC teams arrival will be assessed for the appropriateness, efficacy and need for continued administration of the medication.
2. If continued administration of the medication is deemed to be appropriate but is not available from the Air Care stock, the medication may be obtained from the referring facility or agency.
3. Medications currently not being administered to the patient but would be considered to be of benefit to the patients care during transport and are not available from the Air Care stock, may be requested from the referring facility or agency.
4. Documentation of medications administered, be they stock or non-stock shall be as per the CAC documentation guidelines.



## UNC Carolina Air Care Continuity of Care

### Guideline

CAC team members will continue to provide care for the patients they transport that is appropriate and consistent with the medical care in progress prior to the team's arrival.

Continued and appropriate care may include the administration of medications not included with in the Air Care routine stock or *Drug Formulary* but may be considered standard medications of which the team members are familiar and / or experienced with.

Continued and appropriate medical care may also include the carrying out of advanced skills to the level of the team member's licensure and for which the CAC team member has been trained and authorized to carry out under the MCO's and / or Service Medical Directors order.

### Purpose

To provide appropriate and / or continued medical care for the patients while in the transport environment.

### Procedure

1. All patients accepted for transport by CAC will be evaluated by team members as per the Universal Assessment Protocol.
2. Patient's will be provided medical care as per the appropriate patient complaint and general CAC protocols
3. Patients whose presentation / assessment indicates a situation that does not meet a specific CAC protocol criteria will be treated as per the *Patient Without A Protocol Guideline*.
4. Patient's whose current appropriate medical care includes medications and / or practices that do not meet specific CAC protocol criteria but with which the team members are familiar with or trained in, will continue to receive that care during transport until such time as it is no longer appropriate to do so.
5. Patients whose medical care during transport may require a deviation from specific CAC Protocols or Guidelines, will have care provide by the CAC team members that is appropriate and available.
6. Any care provided by CAC team members that deviates from CAC protocols will be documented on as to the specific deviation and the reason for the deviation from protocol. The MCO will be made aware of the protocol deviation in a timely manner as the specific situation allows.



## UNC Carolina Air Care Criteria for Death / Withhold Resuscitation

**Guideline**

CPR and ALS treatment are to be withheld only if the patient is obviously dead or a valid North Carolina *Do Not Resuscitate* form (see separate policy) is present.

**Purpose**

- ✓ Honor those who have obviously expired prior to the transport teams arrival.

**Procedure**

- I. If the patient is in complete cardiopulmonary arrest (clinically dead) and meets one or more of the criteria below, CPR and ALS therapy need not be initiated.
  - Body Decomposition
  - Rigor Mortis
  - Dependent Lividity
  - Blunt force Trauma
  - Injury not compatible with life (i.e., decapitation, burned beyond recognition, massive open or penetrating trauma to the head and chest with obvious organ destruction).
  - Extended down time with Asystole on the ECG.
2. If a bystander or First Responder has initiated CPR or Semi-Automatic defibrillation prior to the transport teams arrival and any of the above criteria (signs of obvious death) are present, CPR and ALS therapy may be discontinued. The MCO must be contacted and notified that CPR is being discontinued prior to the teams leaving the scene.
3. If doubt exist, start resuscitation immediately. Once resuscitation is initiated, continue resuscitation efforts until either:
  - Resuscitation efforts meet the criteria for implementing the *Discontinuation of Pre Hospital Resuscitation Guideline* (see separate Guideline).
  - Patient care responsibilities are transferred to the destination hospital staff or local EMS agency.



## UNC Carolina Air Care Deceased Subjects

### **Guideline**

EMS or the requesting hospital personnel will handle the disposition of deceased subjects in accordance with their policy and procedures.

### **Purpose**

- ✓ Organized a timely disposition of any deceased subject
- ✓ Maintain respect for the deceased and family
- ✓ Allow the transport team members to return to service in a timely manner.

### **Procedure**

1. Do not remove lines or tubes from unsuccessful codes unless directed below.
2. If responding to a scene call, notify the law enforcement agency with jurisdiction.
3. If subject was found deceased by EMS, the scene is turned over to law enforcement.
4. If EMS has unsuccessfully attempted resuscitation, then the local EMS service medic should contact the family physician (medical cases) or medical examiner (traumatic cases or family physician unavailable) or their MCO to provide information about the resuscitative efforts.
5. Transport arrangements of the deceased should be made by local EMS or law enforcement.
6. Documentation shall include the situation, the name of MCO or Medical Examiner contacted and the agency arranging for the disposition of the deceased subject.



## UNC Carolina Air Care Discontinuation of Resuscitation

### Guideline

Unsuccessful cardiopulmonary resuscitation (CPR) and other advanced life support (ALS) interventions may be discontinued prior to transport or arrival at the hospital when this procedure is followed.

### Purpose

Allow for discontinuation of resuscitation after delivery of adequate and appropriate ALS therapy.

### Procedure

Discontinuation of CPR and ALS intervention may be implemented **prior to contact with Medical Control** if **ALL** of the following criteria have been met:

- ✓ Adequate CPR has been administered
  - ✓ Patient must be of 18 years or older
  - ✓ Airway has been successfully managed with verification of device placement.
    - Acceptable management techniques include orotracheal intubation, nasotracheal intubation, combitube placement, or cricothyrotomy
  - ✓ IV access has been achieved
  - ✓ No evidence or suspicion of any of the following:
    - Drug/toxin overdose, Active internal bleeding, Hypothermia, Preceding trauma
  - ✓ Rhythm appropriate medications and defibrillation have been administered according to ACLS Guidelines for a total of 3 cycles of drug therapy without return of spontaneous circulation (palpable pulse)
  - ✓ All personnel involved in the patients care agree that discontinuation of prehospital resuscitation is appropriate and desired. If this is a scene call then contact with the MCO should be made prior to leaving the scene.
- I. If not all of the above criteria are met and discontinuation of prehospital resuscitation is desired, **contact Medical Control**.
  2. The *Deceased Subjects Policy* should be followed.
  3. Document all patient care and interactions with the patient's family, personal physician, medical examiner, law enforcement and medical control.

**Guideline**

All patients being transported by CAC will be evaluated for possible external contamination / exposure or need for isolation of substances that may be harmful to the transport crew.

**Purpose**

- ✓ To maintain a safe, contamination free work environment for CAC transport team members.

**Procedure**

1. Obtain a patient report from the referring agency regards any possible patient external contamination / exposure or need for patient isolation.
2. The transport crew will determine if the patient can be safely decontaminated or covered to prevent further contamination of either the patient or the crewmembers during transport.
3. If the patient has been exposed to an external contaminate that can be adequately decontaminated, decon will take place prior to the patient being placed in a CAC vehicle.
4. If the patient **CAN NOT** be adequately decontaminated the patient **WILL NOT** be transported in a CAC vehicle.
5. If the source of the contaminate **CAN NOT** be identified the patient **WILL NOT** be transported in a CAC vehicle.



## UNC Carolina Air Care IABP Operations

### **Guideline**

UNC Air Care will transport patients who are receiving IABP therapy utilizing the following guidelines for documentation, operations of the pump and trouble shooting

### **Purpose**

To provide a clear and consistent method for the care and transport of patients receiving IABP therapy.

### **Procedure**

- ✓ Due to the infrequency of IABP transports, crewmembers are strongly encouraged to access identified resource personnel to assist with the transport when available and / or consider having a 3<sup>rd</sup> provider whose function is to oversee operations of the Balloon pump.
- ✓ Setting up of the Balloon pump shall be as per the identified procedure located in CAC Procedure *IABP Setup and operation sheet*.
- ✓ Patients will be transported by either Air or Ground based upon established criteria for determining mode of transport. The IABP will be secured in the vehicle of choice as per the established procedures for each vehicle.
- ✓ The IABP troubleshooting guide and System 98XT manual should be attached to the Balloon pump machine and be available to crewmembers during the transport.
- ✓ Crewmembers shall maintain competencies and familiarity with the operations of IABP therapy as per departmental policies and regular clinical exposure to patients receiving IABP while inpatient at UNC Hospitals.



## UNC Carolina Air Care Infant Abandonment

### Guideline

The North Carolina Infant Protection Act provides a mechanism for unwanted infants to be taken under temporary custody by a law enforcement officer, social services worker, healthcare provider, or EMS personnel if an infant is presented by the parent within 15 days of birth. Emergency Medical Services will accept and protect infants who are presented to EMS in this manner, until custody of the child can be released to the Department of Social Services.

*"A law enforcement officer, a department of social services worker, a health care provider as defined in G.S. 90-21.11 at a hospital or local or district health department, or an emergency medical technician at a fire station shall, without a court order, take into temporary custody an infant under 15 days of age that is voluntarily delivered to the individual by the infant's parent who does not express an intent to return for the infant. An individual who takes an infant into temporary custody under this subsection shall perform any act necessary to protect the physical health and well-being of the infant and shall immediately notify the department of social services. Any individual who takes an infant into temporary custody under this subsection may inquire as to the parents' identities and as to any relevant medical history, but the parent is not required to provide this information."*

### Purpose

To provide

- ✓ Protection to infants that are placed into the custody of EMS under this law
- ✓ Protect EMS systems and personnel when confronted with this issue

### Procedure

1. Initiate the Initial Assessment - Pediatric Procedure.
2. Initiate the Newly Born Protocol as appropriate.
3. Initiate other treatment protocols as appropriate.
4. Keep the infant warm.
5. Call the Local Department of Social Services as soon as the infant is stabilized.
6. Transport the infant to the appropriate medical facility based on any medical needs.
7. Turn the infant over to the Department of Social Services with proper documentation.



## UNC Carolina Air Care Level of Care

### Guideline

Air Care will dispatch a medical crew and appropriate transport vehicle that is commensurate for the level of medical care required by the patient being transported.

### Purpose

- ✓ Provide a method to dispatch a transport crew whose scope of practice is equal to the level of medical care appropriate to meet the patients needs
- ✓ Define for UNC Air Care: Specialty Care Transport Single provider vs. Two provider or Basic Life Support

### Definitions

Specialty Care Transport: Two Medical Providers as defined by Air Care is a patient who's medical condition warrants two medical providers in the patient care compartment at all times during transport of which one of the providers scope of practice is at the level of registered nurse authorized to provide advance practice skills as defined by the North Carolina Board of Nursing. The ambulance must be operated by a minimum of an EMT-Basic. Patients may meet but are not limited to the following criteria.

- \* Hemodynamic instability, labile blood pressure, use of IV medication or administration of blood products to maintain blood pressure or hemodynamic status.
- \* Use of advanced medical equipment such as Trans-venous or Trans-cutaneous pacer, IABP, Isolette, Invasive pressure monitoring
- \* Administration of a continuous intravenous medication during the transport that is classified as vasoactive and or requiring frequent monitoring and titration.
- \* Rapid and significant alteration [decline] in mental status prior to the arrival of the transport team
- \* Any medical condition classified as life threatening or critical by the referring physician

Specialty Care Transport: One Medical Provider as defined by Air Care is a patient who's medical condition and care required during transport is commensurate with the scope of practice of an EMT-Paramedic with additional training in North Carolina or a registered nurse authorized to provide advance practice skills as defined by the North Carolina Board of Nursing. Specialty Care Transport: One Medical Provider patients that meet the criteria may be transported with one or more of either an EMT-Paramedic or a registered nurse in the patient care compartment. The ambulance must be operated by a minimum of an EMT-Basic. Patients may meet but are not limited to the following criteria.

- \* Hemodynamically stable, no significant changes in blood pressure in the preceding 4 hours, no use of IV medications to achieve a stable blood pressure in the preceding 4 hours. Patients who have received blood products for a purpose other than supporting hemodynamic status prior to transport.



## UNC Carolina Air Care Los Angeles Pre-hospital Stroke Screen

### Guideline

Patients who present with any clinical signs and symptoms that may indicate an acute stroke should be evaluated for inclusion criteria and possible early thrombolytic treatment. The *LAPSS* form may be utilized to perform the screening.

### Purpose

- ✓ To provide a standardized method of screening patients as potential candidates for thrombolytic therapy in the event of an embolic stroke
- ✓ To provide early intervention / medical treatment for patients who meet inclusion criteria for embolic stroke therapy.

### Procedure

1. Treat patient's medical condition as per the appropriate protocol. Any patients who also present with signs and symptoms of possible stroke should be evaluated for possible thrombolytic therapy.
2. Use the *LAPSS* format when assessing patients for inclusion criteria for thrombolytic therapy, areas of assessment include:
  - ✓ Age relative to 45 years
  - ✓ No history of a seizure disorder
  - ✓ New onset of symptoms with in the last 24 hours
  - ✓ Patient ambulatory prior to the event
  - ✓ Blood glucose between 60-400
  - ✓ Physical exam assessing strength and symmetry
3. If all *LAPSS* screening criteria are met, alert the receiving hospital of a possible stroke patient as soon as possible.
4. *LAPSS* score should be included in the transport documentation or a *LAPSS* form should be filled out and attached to the documentation record.



## UNC Carolina Air Care Mechanical Ventilation

### Guideline

Patients receiving mechanical ventilation therapy prior to transport will continue to receive mechanical ventilation during transport. Patients who would benefit from mechanical ventilation during transport may be placed on the ventilator by the CAC team members.

### Purpose

- ✓ To maintain continuity of care and continue mechanical ventilation of patients receiving such therapy.
- ✓ To enhance patients respiratory function during transport.

### Procedure

1. Assess patients respiratory status on the current mode of ventilation:
  - a. Work of breathing, Respiratory rate, Breath sounds
  - b. Pulse oximetry, ETCO<sub>2</sub>, PIP's
  - c. Recent ABG if available
2. If patient's respiratory status is adequate then set the transport ventilator as close to current ventilator settings as possible.
3. If the patient has only received manual ventilation **AND DOES NOT** have any thoracic injuries, the patient may be placed on the transport ventilator with an initial setting of TV 8-10 cc / kg of lean body weight.
4. After placing the patient on the transport ventilator, reassess the patient's respiratory status.
5. Adjust ventilator settings as needed to achieve adequate respiratory function prior to departure.
6. If unable to achieve adequate respiratory function on the transport ventilator then place the patient back on the stationary ventilator at the previous settings and contact MCO.
7. Sedate patients as need to maintain adequate respiratory function during transport.
8. Once adequate respiratory function has been achieved, transport may conclude. Patients are to be placed on continuous ETCO<sub>2</sub> monitoring during transport.
9. Continue to assess patient's respiratory function, adjust ventilator settings and administer sedation as needed during transport.



## UNC Carolina Air Care North Carolina DNR

### Guideline

Any patient presenting to CAC team members with a completed North Carolina *Do Not Resuscitate* (DNR) form (yellow form) shall have the form honored and CPR and ALS therapy withheld in the event of cardiac arrest

### Purpose

- ✓ To honor the terminal wishes of the patient
- ✓ To prevent the initiation of unwanted resuscitation

### Procedure

1. When confronted with a patient or situation involving DNR, the following conditions must be present in order to honor the DNR form and withhold CPR and ALS therapy:
  - Original North Carolina DNR form (yellow form - not a copy)
  - Effective date and expiration date filled out and current
  - Form signed by family physician
  - Patient in cardiac arrest
  
2. A valid DNR form may be overridden by the request of:
  - The patient
  - The guardian of the patient
  - An on-scene physician
  
3. A living will or other legal document that identifies the patient's desire to withhold CPR or ALS therapy may be honored with the approval of **Medical Control**. This should be done when possible in consultation with the patient's family and personal physician.



## UNC Carolina Air Care Patient Assessment Interfacility

### Equipment (case dependent)

- ✓ Stethoscope
- ✓ Monitoring equipment for the following: ECG Rhythm identification, NIBP, SAO<sub>2</sub>, ETCO<sub>2</sub>, Glucometer, Invasive pressure monitoring cables and transducers, Doppler.
- ✓ Equipment available for use as needed: BVM & advanced airway management, Ventilator, Infusion pump, Central line placement

### Steps

1. Perform a primary assessment stopping only to address and treat life threaten problems.
2. Initial patient priority determination is based upon information from the primary exam.
3. The decision to continue with the secondary assessment and focused exam or beginning treatment before beginning transport will be based upon patients presentation and at the discretion of the transport team.
4. Primary assessment to include
  - **Airway:** Patency and need for adjuncts to maintain patency
  - **Breathing:** Rate, depth, quality, rhythm, breath sounds (or absence of), Tracheal position.
  - **Circulation:** Presence of central / peripheral pulses, presence of JVD, gross hemorrhage, capillary refill, skin color, temperature, condition, heart tone
  - **Deficits:** Level of consciousness using the AVPU scale
5. Determine need for rapid transport with additional treatment in route v. initial treatment and a more detailed exam prior to starting transport
6. Perform a secondary assessment and focused exam based upon patient's chief complaint or problem of presentation. Secondary assessment repeats the primary assessment steps with a more in depth exam.
  - **Airway:** establish definitive airway if unable to maintain adequate patency with adjuncts and positioning
  - **Breathing:** monitor pulse oximetry and / or ETCO<sub>2</sub> as required
  - **Circulation:** Establish adequate IV access and administer fluids / blood as patients condition requires, reinforce measures for hemorrhage control.
    - ✓ Obtain vital signs and place patient on Cardiac monitor to assess rhythm and rate.
    - ✓ Pain scale is considered a vital sign and may be assessed by monitoring hemodynamic status in patients who are unable to verbalize
  - **Deficits / Neurologic Exam:** Obtain Glasgow Coma scale, examine patients ability to interact with external environment, speech, assess pupil response, note gross motor and sensation of extremities,
  - **Expose:** remove necessary clothing to obtain full view of patient
  - **Fahrenheit:** assess patients temperature by direct measurement or feel and expose or cover accordingly
7. Obtain an **I- SAMPLE** history:



## UNC Carolina Air Care Patient Assessment Obstetrical

### Equipment (case dependent)

- ✓ Stethoscope, Doppler
- ✓ Monitoring Equipment for the following: ECG rhythm identification, NIBP, SAO<sub>2</sub>, ETCO<sub>2</sub>, Glucometer, Invasive pressure monitoring cables and transducers
- ✓ Equipment available for use as needed: BVM & advanced airway management, Ventilator, Infusion pump, Central Line placement

### Steps

1. Perform a primary assessment as per universal patient assessment procedure stopping only to address and treat life threaten injuries or problems.
  - OB patients should be considered to be 2 patients, mother and unborn child
  - Positive outcomes for the unborn child are directly related to the ability of the maternal circulation to supply adequate oxygen to the fetus
  - Special attention to the primary ABC exam of the mother should be noted to ensure adequate oxygen is supplied to the fetus
2. Initial patient priority determination is based upon information from the primary exam.
3. The decision to continue with the secondary assessment and focused exam or beginning treatment before beginning transport will be based upon patients presentation and at the discretion of the transport team.
4. Primary assessment to include
  - **Airway:** Patency and need for adjuncts to maintain patency
  - **Breathing:** Rate, depth, quality, rhythm, breath sounds (or absence of), Tracheal position.
  - **Circulation:** Presence of central / peripheral pulses, presence of JVD, gross hemorrhage, capillary refill, skin color, temperature, condition, heart tones
  - **Deficits:** Level of consciousness using the AVPU scale
5. Determine need for rapid transport with additional treatment in route v. initial treatment and a more detailed exam prior to starting transport. OB patients are to be transported in left lateral recumbent position or tilted to the left if secured to a LSB.
6. Perform a secondary assessment and focused exam based upon patient's chief complaint or problem of presentation. Secondary assessment repeats the primary assessment steps with a more in depth exam.
  - **Airway:** establish definitive airway if unable to maintain adequate patency with adjuncts and positioning
  - **Breathing:** monitor pulse oximetry and / or ETCO<sub>2</sub> as required
  - **Circulation:** Establish adequate IV access and administer fluids / blood as patients condition requires, reinforce measures for hemorrhage control.
    - ✓ Obtain vital signs and place patient on Cardiac monitor to assess rhythm and rate. Additional vs. for OB patients include fetal movement and/or fetal heart tones



## UNC Carolina Air Care Patient Assessment Pain

### Clinical Indications:

Any patient being transported by UNC Air Care team members

### Definitions:

Pain is defined as any unpleasant sensory and / or emotional experience associated with actual or potential tissue damage. Pain is subjective and is documented as whatever the patient says it is.

### Procedure:

1. Initial and ongoing assessment of pain intensity and character is accomplished through the patient's self report.
2. Pain should be assessed and documented during initial assessment and ongoing during transport. Additionally pain should be assessed before starting pain control treatment and after any interventions to treat pain.
3. Pain should be assessed using the appropriate approved scale.
4. Two pain scales are available: the 0 - 10 and the Wong - Baker "faces" scale.

0 – 10 Scale: Primarily for adults it is based on the patient being able to express their perception of the pain as related to numbers. Avoid coaching the patient; simply ask them to rate their pain on a scale from 0 to 10, where 0 is no pain at all and 10 is the worst pain ever.

Patients who are unable to verbalize should be assessed and treated for pain based upon CAC team member's interpretation of the patient's hemodynamic responses.

5. Wong – Baker "faces" scale: Primarily for use with pediatrics but may also be used with geriatrics or any patient with a language barrier. The faces correspond to numeric values from 0-10. This scale can be documented with the numeric value or the textual pain description.





## UNC Carolina Air Care Patient Assessment Pediatric

### Clinical Indications:

Pediatric patients in need of medical evaluation can be assessed in much the same way as adults but their are special concerns that should be considered.

### Equipment:

- ✓ Stethoscope
- ✓ Bristow tape, Size specific monitoring equipment for the following: ECG rhythm identification, NIBP, SAO<sub>2</sub>, ETCO<sub>2</sub>, Glucometer, Invasive monitoring cables and transducers, Doppler
- ✓ Equipment available for use as needed: BVM & Advanced airway management, Ventilator (non chest trauma), Infusion pump, Central line placement

### Steps:

1. Utilize the Broslow tape to determine the appropriate color code for the patient. Document as a vital sign.
2. When assessing circulatory status, check the brachial pulse in an infant and assess the capillary refill for all pediatric patients. Patients who are cold may have a delayed capillary refill time. Keep the patient warm.
3. Explain the assessment to an alert child and try to go from trunk to head to avoid frightening the child.
4. When assessing the head of an infant, avoid applying pressure to the fontanel, but note if they are bulging or sunken.
5. Remember that children are nose breathers and nasal obstructions make it difficult for them to breathe.
6. Children are vulnerable to spinal cord injuries due to their head being proportionately larger and heavier than their trunk.
7. Keep a child's head in a neutral or "sniffing" position. Hyperflexion or hyperextension can occlude the airway.
8. Blood pressures are difficult to take on pediatric patients. Only take a BP on patients 3 years old or greater. Rely on capillary refill for others. With a notation to item # 2 above.
9. Remember to position yourself at the level of the child when at all possible. This will help reduce the anxiety for the patient.



## UNC Carolina Air Care Patient Assessment Scene Response

### Equipment (case dependent)

- ✓ Stethoscope
- ✓ Monitoring equipment for the following: ECG Rhythm identification, NIBP, SAO<sub>2</sub>, ETCO<sub>2</sub>, Glucometer, Doppler
- ✓ Equipment available for use as needed: BVM & advanced airway management, Infusion pump, Central line placement
- ✓ Uncrossed matched O Negative blood available

### Steps

- I. The same general principals for patient assessment should be followed as for Interfacility transports however scene transports should also include the BTLS format for approaching the situation and the patient.
  - Scene safety
  - Scene size up
  - Mechanism of injury
  - Number of patients that you will / may have contact with (Code I MCI?)
  - Need for additional resources
2. Initial patient contact and transport decisions should also follow BTLS guidelines
  - General impression of the patient
  - Determine level of consciousness
  - A,B,C
  - Determine if patient requires a rapid trauma survey per BTLS guidelines or a focused exam
  - Decision for on scene care / stabilization vs. immediate transport with additional care in route is based upon information obtained from the initial assessment
    - “Stay and Play or Load and Go”
  - Secondary and ongoing assessments as per the *Patient Assessment, Interfacility*.



## UNC Carolina Air Care Patient Safety for Transport Restraints

### Guideline

Patients being transported by CAC will be transported in a safe manner utilizing any combination of Safety Devices / Restraints (Physical or Chemical) in order to achieve this. The *Patient Restraint Protocol* may be instituted at any point during the transport as deemed necessary by the transport team.

*“A Restraint is defined as a device used to restrict movement of a whole or part of a patients body part to protect the patient or others from injury. Restraints are considered involuntary”*

*[http:// www.unch.unc.edu/hospolicy/policy86.htm](http://www.unch.unc.edu/hospolicy/policy86.htm)*

*A Safety Device is an item whose general and customary use is for immobilization in accordance with standard practice for a procedure or as mandated by regulatory agencies.*

*A Safety Device does not require a physicians order.*

Restraints may be either Physical or Chemical as defined in the Pearls section of the *Patient Restraint Protocol*

### Purpose

- ✓ To protect patients and transport team members from actual or potential danger / harm while in the transport environment

### Procedure

1. Evaluate the patient for need and type of restraint required during transport. Restraints should be considered as a last resort after verbal techniques have failed (*see Behavioral / Safety Protocol*).
2. The least amount of restraint necessary to accomplish the desired purpose should be used.
3. Physical restraints should not be limiting to the patients peripheral or central circulation or respiratory status.
4. Items such as commercial soft restraints, cravats or roller bandages can be used for extremity restraints.
5. Physical restraints should be frequently monitored during transport with neurovascular status of the restrained parts assessed and documented as per UNC Hospitals policy on restraint usage.
6. Patient care documentation should include the reason for the use of restraints; type of restraints used and the time restraints were placed.



## UNC Carolina Air Care Patient Transport Record

### Guideline

For each patient contact which results in some assessment component, a documentation record will be generated. Documentation of care rendered by the transport team will be completed accurately and legibly to reflect the patient assessment, patient care and interactions between the transport team and the patient.

### Purpose

To document the total patient care provided, information to include the following:

- ✓ Dispatch information regarding the dispatch complaint and the requesting provider
- ✓ Care provided prior to transport team arrival
- ✓ Exam of the patient as per the patient assessment procedures
- ✓ Past medical history, medications, allergies
- ✓ All times related to the event
- ✓ All procedures and their associated time
- ✓ All medications administered with their associated time & response
- ✓ Disposition and / or transport information
- ✓ All communication with medical control including signatures for orders received and / or carried out as per protocol
- ✓ Signature of team members providing care
- ✓ Signature of treatment authorization if any deviation from protocol
- ✓ Reason for inability to complete or document any above item

### Procedure

1. The *Patient Transport Record* should be completed as soon as possible after the time of the patient encounter.
2. All patient interactions are to be recorded using EMSCharts or Paper documentation if required.
3. The *Patient Transport Record* must be completed with the above information.
4. A copy of the *Patient Transport Record* form will be placed with the patient's permanent UNC Medical record.
  - ✓ Documentation for transports will include an *Authorization for Treatment and / or Transport* & a *Medical Necessity* form.



## UNC Carolina Air Care Patient Without a Protocol

### Guideline

Anyone requesting EMS service will receive emergent evaluation, care, and transportation (if needed) in a systematic, orderly fashion regardless of the patient's problem or condition.

### Purpose

- ✓ To ensure the provision of appropriate medical care for every patient regardless of the patient's problem or condition.

### Procedure

- I. Treatment and medical direction for all patient encounters which can be triaged into a patient care protocol are to be initiated by standing AirCare protocols.

When confronted with an emergency or situation which does not fit into a AirCare patient care protocol, the patient should be treated by the *Universal Patient Assessment Protocol* and a **Medical Control Physician** should be contacted for further instructions



## UNC Carolina Air Care Recognition of Abuse Child / Elder

### Guideline

Child / Elder abuse is the physical and/or mental injury, sexual abuse, negligent treatment, or maltreatment of a child / elder by a person who is responsible for the child / elder's welfare. The recognition of abuse and the proper reporting is a critical step to improve the safety of children / elder adults and further abuse.

### Purpose

Assessment of a child / elder abuse case is based upon the following principles:

- ✓ **Protect** the life of the child / elder from harm, as well as the EMS team from undue liability.
- ✓ **Suspect** that the child / elder may be a victim of abuse, especially if the injury/illness is inconsistent with the reported history.
- ✓ **Respect** the privacy of the child / elder and the family.
- ✓ **Collect** and document as much information as possible, and preserve physical evidence.

### Procedure

1. With all children / elders, assess for and document psychological signs of abuse, including excessive passivity, compliant or fearful behavior, excessive aggression, violent tendencies, (in children) excessive crying, fussy behavior, hyperactivity, or other behavioral disorders.
2. With all children / elder, assess for and document physical signs of abuse, including especially any injuries that are inconsistent with the reported mechanism of injury. The back, buttocks, genitals, and face are common sites for abusive injuries in children.
3. With all children / elder, assess for and document signs or symptoms of neglect, including inappropriate level of clothing for weather, inadequate hygiene, absence of attentive caregiver(s), or physical signs of malnutrition.
4. With all children/ elder, assess for and document signs of sexual abuse, including torn, stained, or bloody underclothing, unexplained injuries, (in children) pregnancy, or sexually transmitted diseases.
5. Immediately report any suspicious findings to both the receiving hospital (if transported to a hospital other than UNC) OR to the receiving physician at UNC Hospital.
6. Follow the UNC Hospitals policy for the reporting of suspected Child / Elder Abuse.



## UNC Carolina Air Care Review of Labs

### Guideline

Patients received from a medical facility for transport to another medical facility will have all current lab values evaluated by the transport crew prior to departure. Any critical, abnormal lab values that require administration of medication / blood for correction will be addressed by the transport crew.

### Purpose

- ✓ To correct any critically abnormal lab values in a timely manner.
- ✓ To prevent a worsening of the patient's condition related to critically abnormal lab values.

### Procedure

1. All current lab values available will be reviewed by the transport crew after making patient contact.
2. Any lab values deemed to be critical and potentially detrimental to the patient's condition will receive appropriate medical therapy as available in an attempt to correct abnormal values prior to departure from the referring facility.
3. If required medical therapy is not included in the *Air Care Drug Formulary*, medications may be obtained from the referring facility as per the *Air Care Non-Stocked Medications* medical standards guideline.
4. The transport crew shall document any specific interventions provided to attempt to correct abnormal lab values as per the *Documentation of Care* medical standards guideline.



## UNC Carolina Air Care Transport of Psychiatric Patients

### Guideline

Patients being transported to UNC Hospitals for psychiatric evaluation and / or in-patient admission have additional items that need to be considered.

Any patient intended for admission to an in-patient psychiatric unit must be medically cleared and have the correct documents filled out appropriately. If these steps have not been completed prior to the patient's arrival, the patient will be required to be seen at either the UNC Emergency Department or the Psychiatric Admissions office.

Patients coming to UNC for evaluation may be considered either voluntary or involuntary. Involuntary admissions must be accompanied by a Law Enforcement Official (LEO). Voluntary admissions patients may choose to terminate the transport at any time however appropriate steps will be taken to discharge the patient at a safe location.

### Purpose

To establish a clear and consistent process to be used by UNC Air Care personnel for the transport of patients requiring psychiatric evaluation or admission.

### Procedure

- I. Determine the patients status Involuntary vs. Voluntary
  - a. Voluntary admissions patients must have signed documents for UNC
    - i. General Consent for Treatment – MIM # 129-S (2 page document form HD 3560).
    - ii. Inpatient Release of Confidential Information (form HD 4127).
    - iii. Adult Request for Admission (form HD 3465)
    - iv. Routine Air Care transport documents must also be obtained.
  - b. Involuntary admissions should have the routine Air Care documents signed if able to obtain. LEO accompaniment needs to be confirmed. LEO can not be township police if the patient is being transported outside county limits.
    - i. LEO may not carry a loaded weapon in the transport vehicle
2. Confirm the patient's destination, In-patient or Emergency Department.
  - a. Patient care must be handed over to another health care provider. Patients may not be left with admissions office personnel.
3. Two personnel are to be in the patient care area with the patient at all times. Personnel may be either 2 health care providers or a health care provider and an LEO.
  - a. Patients family **MAY NOT** be seated in the patient care compartment nor considered to be one of the 2 required accompanying personnel



## UNC Carolina Air Care Hyperkalemia

To identify and treat life-threatening hyperkalemia

**DEFINITION** The likelihood of developing significant alterations in physiology from elevations of serum potassium are a function of both the absolute level and the rate of rise. Very high levels may not result in adverse effects if the level rises over a prolonged period of time. The lowest levels associated with risk are  $> 6.5$  mEq/L in neonatal patients and  $> 5.5$  mEq/L in older pediatric patients.

History: Patients at Risk:

- patients with renal failure
- extremely premature infants
- patients receiving nephrotoxic drugs
- profound dehydration
- cardiac patients

Symptoms:

- muscle weakness
- parasthesias
- tetany

**PHYSICAL EXAM** No specific physical findings are associated with hyperkalemia, unless there is an associated arrhythmia or cardiovascular collapse.

**LABORATORY DATA** Serum potassium levels above 6.0mEq/L.

- \_ Level must be obtained from a specimen without hemolysis. Capillary specimens should always be suspected of being hemolyzed even if hemolysis is not present by visual inspection.
- \_ Results from capillary specimens should be confirmed by repeat analysis of venous or arterial blood before definitive therapy is initiated.
- \_ Progression of ECG changes:
  - T-wave elevation
  - Loss of P-wave
  - Widened QRS
  - Depressed S-T segment
  - Aberrant ECG complexes
  - Dysrhythmias: bradycardia, ventricular tachycardia, and ventricular fibrillation

### TREATMENT

For levels  $>6.0$  mEq/L: Remove potassium from all IV fluids.

For levels  $>6.5$  mEq/L (may be lower for neonates) Remove potassium from the body:

- Kayexalate: 1gm/kg PO or NG q 2-6 hours or 1gm/kg PR q 2- 6 hours as a retention enema. The enema should be retained for at least 60 minutes. 1gm/kg should lower potassium by 1 mEq/L.
- Diuresis when kidneys are functioning; Lasix 1mg/kg IV For hyperkalemia associated with ECG changes: Shift potassium from extracellular to intracellular spaces rapidly but temporarily by the following therapies:
  - Sodium Bicarbonate 1-2 mEq/kg IV over 5-10 minutes
  - Calcium gluconate 10%, 0.5-1.0ml/kg IV over 5-10 minutes to correct cardiac changes if sodium bicarbonate not successful. Maximum single dose: 20ml (2.0g of calcium gluconate)
  - Glucose/insulin drip may be needed if desired results have not been obtained. Mix 0.5 gm/kg glucose with 0.3 units insulin, infuse over 2 hours. (Contact MCO before beginning this therapy).



## UNC Carolina Air Care Hypernatremia

To identify and treat hypernatremia

**DEFINITION** Hypernatremia is defined as a serum sodium level of greater than 145 mEq/L. Hypernatremia results from either sodium overload or free water depletion.

**HISTORY** Infants at Risk:

Free water depletion

- extremely premature infant
- conditions characterized by water depletion (e.g., vomiting, diarrhea, etc.)
- diseases associated with excessive urine production (e.g. diabetes)
- conditions which may limit water intake (e.g. dependency states)

Sodium overload

- iatrogenic sodium intoxication; infants receiving medications containing sodium
- improper mixing of formula

**PHYSICAL EXAM** Free water depletion; signs of dehydration:

- tachycardia
- hypotension
- decreased urine output
- metabolic acidosis

General signs and symptoms:

- irritability
- lethargy alternating with marked hyperirritability when stimulated and awake
- hyperreflexia
- hypertonicity
- high-pitched cry

**LABORATORY DATA** Serum sodium >145 mEq/L Often accompanied by other abnormal serum levels (e.g., low bicarbonate, high BUN and creatinine, hyperglycemia, hypocalcemia)

**TREATMENT**

1. Restore vascular volume if volume depleted:

- Administer 10-20 ml/kg LR, NS, or 5% albumin solution (LR is preferable)
- Repeat once if evidence of volume depletion persists.
- Consult MCO if evidence of volume depletion persist after administering a fluid bolus twice.

2. After restoration of vascular volume, administer maintenance IV fluids. The concentration of sodium in the fluid should be adjusted to correct serum sodium over approximately 48 hours.

3. If sodium >150, contact MCO.

4. Replace ongoing gastrointestinal, urinary and insensible losses.

5. Monitor BP closely.

6. Quantitate urine output



## UNC Carolina Air Care Hyponatremia

To identify and treat hyponatremia

### DEFINITION

Hyponatremia is defined as a serum sodium level of less than 135 mEq/L. In newborns, hyponatremia may be defined as a serum sodium level of <130 mEq/L. Hyponatremia results from either sodium depletion secondary to inadequate sodium intake or excessive Na losses or dilution secondary to the presence of excess free water.

History Risk Factors:

Sodium depletion

- Abnormal losses through GI tract as with diarrheal illness or patients with ostomies
- Medications causing urinary loss of sodium (e.g., diuretics, methylxanthines)
- Cystic fibrosis (particularly during summer months)
- Inadequate dietary intake (e.g. improper mixing of infant formula)

Free water intoxication

- Renal failure
- Syndromes of inappropriate ADH secretion (e.g., asphyxia, meningitis)
- Congestive heart failure
- Congenital adrenal hyperplasia
- Iatrogenic free water overload

Historical Clues:

Sodium depletion

- Poor weight gain
- Non-specific symptoms such as anorexia, nausea and irritability

Free water intoxication

- Decreased urine output
- Rapid weight gain not attributable to increased caloric intake

PHYSICAL EXAM General signs and symptoms:

Appearance of central nervous systems signs somewhat dependent upon rapidity of decline of sodium level. Signs do not generally appear except at extremely low levels (< 120 mEq/L). Signs include irritability, altered level of consciousness and seizures. Free water intoxication: Peripheral edema but with minimal pitting

LABORATORY DATA Serum sodium < 135 mEq/L Other electrolytes and metabolites often abnormal; particular abnormality dependent upon etiology

### TREATMENT

If the serum sodium level is low enough to cause significant CNS symptoms, the serum sodium needs to be increased by 5-10 mEq/L acutely:

- Administer Lasix 0.5-1.0 mg/kg IV
- Administer concentrated NaCl solution IV (conc. NaCl = 4 mEq NaCl/ml)

To increase serum sodium by 5 mEq/L

0.75ml/kg IV add this amount to the volume of maintenance solution to be infused in one hour

To increase serum sodium level by 10 mEq/L

1.50ml/kg IV add this amount to the volume of maintenance solution to be infused in one hour

Specific therapy for free water intoxication

- Administer diuretic if urine output is low and circulation is compromised by volume overload (i.e. congestive heart failure).
- Restrict fluids to 60% of maintenance rate.

## UNC Carolina Air Care Hypocalcemia

To identify and treat the physiologic consequences of hypocalcemia

**DEFINITION** For the purposes of this protocol, hypocalcemia will be defined as a serum ionized calcium level of less than 4.0 mg/dL. If ionized calcium levels are not available, hypocalcemia may be defined as a total serum level of less than 8.0 mg/dL. This protocol will deal primarily with the identification and treatment of infantile hypocalcemia.

### History Risk Factors:

- Prematurity
- Birth asphyxia
- Maternal diabetes
- Maternal hyperparathyroidism
- Exchange transfusion
- Infantile hypoparathyroidism (e.g. with DiGeorge syndrome)
- Alkalosis

### Signs and Symptoms:

- Vomiting
- Apnea
- Seizures

### PHYSICAL EXAM

- Irritability
- Tremors
- Lethargy
- Tetany
- Laryngospasms
- Evidence of poor cardiac output (e.g. diminished pulses, poor capillary refill, low blood pressure)

**LABORATORY DATA** Calcium levels below 4.0 mg/dL (ionized) associated with symptoms should be treated. Calcium levels below 3.0 mg/dL (or below 6.0 mg/dL total) should be treated even in the absence of symptoms. Prolonged QT interval on ECG indicates physiologic effect.

### TREATMENT

For seizures and tetany:

Administer Calcium gluconate:

- Dose: 100mg/kg, max 2,000mg/dose
- Site: for peripheral IV, dilute 1:1 with sterile water
- Infuse carefully, infiltration produces severe necrosis
- Rate: administer over 10 minutes
- Monitor ECG complexes and rhythm

For shock and hypocalcemia in infants with severe systemic illness: Administer Calcium gluconate:

- Neonates: 100-150mg/kg/dose IV Q 8 hr
  - Infants, toddlers: 50-100mg/kg/dose IV Q 8 hr
  - Preschoolers to adolescents: 20-50mg/kg IV Q 8 hr, (maximum single dose is 2,000 mg) or Administer Calcium chloride:
    - Consider for the child who is very ill (e.g. the child whose liver may not be able to metabolize the gluconate)
    - Neonates: 30-50 mg/kg/dose IV Q 8 hr
    - Infants, toddlers: 15-33mg/kg/dose IV Q 8
    - Preschoolers to adolescents: 10-15 mg/kg IV Q 8 hr
-



## UNC Carolina Air Care Hypoglycemia

To prevent hypoglycemia and to maintain blood glucose in the normal range

Serum glucose levels in healthy individuals vary over a surprisingly wide range and may depend upon factors such as age, recent caloric intake and utilization and type of carbohydrate intake. The operational definition of hypoglycemia during transport will be: neonates < 40 mg/dl; older children < 60 mg/dl.

### History

#### Patients at Risk:

Neonates: premature infants, SGA infants, infants who have been stressed, hypoxemic, or hypothermic, infants with hyperinsulinism (i.e. infants of diabetic mothers), infants with congenital heart disease.

Older children: administration of insulin in diabetic without appropriate carbohydrate intake, sepsis

#### PHYSICAL EXAM Signs and Symptoms:

- jitteriness, tremors
- irritability
- weak or high pitched cry
- irregular respirations, tachypnea, and/or apnea
- lethargy, decreased tone and/or poor feeding
- sweating, pallor and tachycardia
- seizures
- coma may result from severe or prolonged hypoglycemia

#### Additional symptoms in older patients:

- confusion
- bizarre behavior
- visual disturbances
- headache

LABORATORY DATA Glucose meter results (utilizing I-Stat, Sure Step Pro or other instrument approved by UNC Air Care), serum glucose or estimation of glucose using enzyme color indicators (Chemstrip, Dextrostix) below the lower limits of the designated normal range for age.

### TREATMENT

1. Obtain glucose measurement with glucose meter or Chemstrip in all patients at risk, unless measurement has been performed by referring hospital within previous 30 minutes.
  2. Establish IV access and administer glucose if value is abnormal: neonate: 2-4 ml/kg D10W over 2-5 minutes  
pediatric patient: 0.5 g/kg D50W (0.5g/ml) over 2-5 minutes.
  3. Provide continuous infusion of a glucose containing maintenance IV fluid following bolus infusion.
  4. Assess blood glucose 10-15 minutes after bolus infusion.
    - Reassess blood glucose every 30 minutes until stable
-



## UNC Carolina Air Care Sepsis

To identify and treat patients with sepsis

### History

- Risk Factors:
  - Early-onset Neonatal Sepsis
  - Prematurity
  - Male gender
  - Multiple gestation birth
  - Maternal genitourinary tract colonization and infection
  - Chorioamnionitis
  - Prolonged rupture of membranes
- Constitutional illnesses and diseases (e.g., Sickle cell disease, immune deficiency, bronchopulmonary dysplasia, etc.)
- Immunosuppressive therapies

### Historical Clues:

- Poor Feeding
- Irritability
- Lethargy
- Temperature instability

### Late-onset and Older Pediatric Patients

- Indwelling catheters and other appliances

### PHYSICAL EXAM

#### General

- Fever
- Hypothermia (more common than fever in neonate)
- Respiratory
- Grunting
- Nasal flaring
- Retractions
- Tachypnea
- Apnea

- Decreased spontaneous movement
  - Seizures
- #### Cardiovascular
- Bradycardia/tachycardia
  - Hypotension/shock

#### Skin

- Petechiae
- Pustules
- Sclerema
- Hyperemia
- 

#### Neurologic

- Hypotonia

### LABORATORY DATA

- Leukocytosis
- Neutropenia (much more common than leukocytosis in neonates)
- Thrombocytopenia
- Laboratory evidence of coagulopathy
- Hypoglycemia/hyperglycemia

### XRAY DATA

No specific radiographic findings; abnormalities on chest Xray present with associated pneumonia.

### TREATMENT

1. Maintain airway and oxygenate appropriately.
2. Obtain vascular access.
3. Place Foley catheter (in older patients).
4. Fluid resuscitate with NS or LR 10-20cc/kg if poor perfusion, hypotension or shock present.
5. If shock persists after two fluid boluses, contact MCO to discuss inotrope therapy.
6. Begin maintenance dextrose solution and follow blood glucose.
7. Obtain blood culture, and CBC (if time allows).
8. Administer antibiotics. For early-onset neonatal infection Ampicillin and Gentamicin Clindamycin if progressive NEC suspected. For late onset neonatal infection Consult MCO For pediatric patients Contact MCO
9. Maintain universal precautions



## UNC Carolina Air Care Meningitis

To outline the management of meningitis

### History

#### Neonates and Young Children

- Hypothermia in neonates
- Hypotension/shock
- Poor feeding
- Alternating drowsiness and irritability

#### Older Children

- Fever
- Irritability
- Vomiting
- Headache
- Photophobia
- Seizures

### PHYSICAL EXAM

#### General

- Lethargy, somnolence, or coma
- Petechial skin lesion (particularly with *N. meningitidis*)

#### Neonates and Young Children

- Jaundice
- Bulging fontanel

#### Older Children

- Nuchal rigidity
- Sensori-motor and/or autonomic disturbances

### TREATMENT

1. Begin respiratory isolation (mask for crew)
  2. Maintain airway and oxygenate appropriately.
    - May Keep PaO<sub>2</sub> >100, and PCO<sub>2</sub> 30-40.
    - May need to electively intubate and ventilate.
  3. Aggressively treat shock using colloid 10-20cc/kg, if shock persists, repeat administration of volume expander
  4. If shock persists after two fluid boluses, contact MCO to discuss inotrope therapy.
  5. Once shock is treated, begin maintenance intravenous fluids. Fluid restriction may be advisable; contact MCO.
  6. Treat seizures (see Altered Neurologic Status protocol).
  7. Administer antipyretics for hyperthermia.
  8. Administer antibiotics. (contact MCO for drug of choice.)
-



## UNC Carolina Air Care Metabolic Acidosis

To identify and treat metabolic acidosis and its underlying cause

### DEFINITION

Metabolic acidosis is the accumulation of excess hydrogen ions in the serum. Metabolic acidosis results from excessive production of hydrogen donors, inadequate excretion of hydrogen ions or excessive loss of buffer. Metabolic acidosis may result from a variety of causes including:

- hypovolemia
- other causes of shock
- renal tubular acidosis
- diabetic ketoacidosis
- poisonings/ ingestions
- inborn errors of metabolism
- miscellaneous causes

### HISTORY

The patient's history may reveal clues regarding etiology. These historical clues are very specific to each cause and are listed in the protocols for individual diseases and problems (e.g., see Hypovolemia/Shock and Poisoning).

### PHYSICAL EXAM

There are no specific findings associated with metabolic acidosis. Abnormal findings result from the underlying cause. Blood pressure should be recorded initially and monitored frequently in all patients with metabolic acidosis. Respiratory rate and depth may be increased when patients attempt to correct metabolic acidosis with respiratory alkalosis.

### LABORATORY DATA

1. Obtain an ABG in patients at risk. Significant metabolic acidosis in pediatric patients is usually defined as a pH less than 7.30 with a base deficit greater than 5
2. If the etiology of the metabolic acidosis is not known, the differential diagnosis may be narrowed by calculating the anion gap:

CALCULATING THE ANION GAP:  $\text{serum Na} - (\text{serum HCO}_3 + \text{serum CL})$  normal anion gap = 8 - 15  
If the anion gap is greater than 15, the patient has an increase in unmeasurable anions.

3. Causes of metabolic acidosis with an increased anion gap include:
  - diabetic ketoacidosis
  - uremia (phosphates and sulfates); acute renal failure
  - lactic acidosis (lactate)
  - aspirin poisoning (salicylate)
  - methyl poisoning (formic acid)
  - ethylene glycol poisoning (oxalic acid and formic acid)
  - inborn errors of metabolism
4. Causes of metabolic acidosis without an increased anion gap include:
  - loss of buffers, such as with diarrhea (loss of bicarbonate ions)
  - dehydration
  - uremia (the kidneys cannot excrete acids formed daily)
  - renal tubular acidosis
  - sepsis
  - shock from any cause



## UNC Carolina Air Care Supraventricular Tachycardia

To identify and manage patients with supraventricular tachycardia

**DEFINITION** Supraventricular tachycardia (SVT) is a tachyarrhythmia characterized by a fixed elevated heart rate between 160 and 300, but usually around 230, with each beat originating from an abnormal focus in either an aberrant location in the atrium or in the node. When SVT persists beyond a brief period of time it is often called paroxysmal atrial tachycardia (PAT).

**HISTORY** is often nonspecific. First onset is usually in infancy, unless there is underlying cardiac disease complicated by SVT. Symptoms generally first appear after congestive heart failure develops. This may be hours to days after the onset of SVT in an otherwise healthy child. It may also result from Digoxin toxicity.

**PHYSICAL EXAM** SVT of short duration may not cause symptoms (stable SVT), but with time is accompanied by signs and symptoms of or significant CHF (unstable SVT). The period before onset of symptoms is variable and will depend upon the presence of underlying heart disease and age. (Curiously, infants appear to tolerate SVT for longer periods than older patients.)

### LABORATORY

- SVT is a narrow complex tachycardia with a QRS duration less than 0.1 second and an often unidentifiable P-wave.
- Heart rate is usually greater than 220
- Lack of variability in rate/rhythm is characteristic.

### TREATMENT

Stable SVT:

- Administer oxygen.
- Establish IV access.
- Consult with MCO regarding drug therapy.

Unstable SVT:

- Provide 100% oxygen and bag-mask ventilation if respiratory failure is present. Intubate and ventilate if signs of respiratory failure persist or are severe.
- Establish IV access. Consult with MCO regarding drug therapy. Drugs used in the management of SVT may include the following:
  - Adenosine
  - Digoxin
  - Propranolol
  - Verapamil

The following scheme will usually be recommended.

- Administer Adenosine 0.05mg/kg RAPID IV push. Repeat every 2 minutes to a maximum of 0.25mg/kg or until termination of SVT. Adenosine MUST be pushed very rapidly & flushed rapidly & immediately with NS very near the IV site. The half life is very short & loses efficacy if pushed slowly.
- If pharmacotherapy fails or cardiorespiratory failure upon presentation is life-threatening, perform synchronized cardioversion with 0.5-1.0 joules/kg. If unresponsive, repeat with 2 joules/kg.
- Once rhythm is restored, a drug, typically Digoxin, is usually initiated to maintain sinus rhythm.

Refer to Adult OB / Peds: Pediatric Tachycardia adequate or poor perfusion (Protocols [512](#) & [513](#)) for wide complex tachycardia (QRS>.08 sec).



## UNC Carolina Air Care Congestive Heart Failure

To identify and treat congestive heart failure

**DEFINITION** Congestive heart failure is the condition in which the heart cannot provide adequate cardiac output for the body's demand. This condition can result from:

- Excessive demand (e.g. with hyperthyroidism, arteriovenous malformation, or a variety of structural abnormalities of the heart characterized by left-to-right shunting), sepsis
- Disease or dysfunction of the myocardium
- Structural abnormalities resulting in obstruction to outflow from the heart (aortic stenosis)
- Fluid overload
- Miscellaneous causes

### HISTORY

- decreased feeding
- poor weight gain
- easily fatigued
- decreased urine output
- may have history of congenital heart disease

**PHYSICAL EXAM** Clinical signs are variable and will depend upon the severity, age of patient and whether failure is predominantly left-sided or rightsided. Signs on physical exam may include:

- diaphoresis
- irritability
- tachypnea and dyspnea
- wheezing and/or rales
- tachycardia
- decreased peripheral pulses
- delayed capillary refill
- pulsus alternans
- jugular venous distention
- decreased blood pressure in the presence of cardiogenic shock
- peripheral edema
- hepatomegaly

**XRAY DATA** Chest xray:

- cardiomegaly
- abnormal cardiac silhouette with some lesions
- engorgement of pulmonary vasculature
- radiographic findings of pulmonary edema

**LABORATORY DATA** Arterial blood gas analysis should be performed to identify infants with acidosis and/or hypoxemia. Metabolic acidosis is often present, always with cardiogenic shock.

### TREATMENT

1. Administer oxygen to ensure normoxia.
  2. Intubate and ventilate if respiratory effort is excessive or cardiogenic shock is present.
  3. Sedate with Fentanyl.
  4. Administer Vecuronium when agitated after adequate sedation is administered.
  5. Reduce fluid intake to 60% of maintenance.
  6. Administer Lasix (1mg/kg IV) if pulmonary edema is present.
  7. Consider inotropic support if cardiac output does not improve with the measures outlined above (Dopamine, Dobutamine).
-



## UNC Carolina Air Care Respiratory Failure

To identify the presence of respiratory failure in a neonatal patient, to identify the underlying pathophysiology, and to treat respiratory failure with the necessary respiratory support.

**IDENTIFICATION** Respiratory failure is present when any of the following conditions exist:

- Failure to adequately oxygenate
- Failure to adequately ventilate
- Airway obstruction
- Apnea

Pathology of the respiratory system results in functional abnormalities; the alteration in physiology causing these functional abnormalities in an individual patient represents the pathophysiology of respiratory failure in that patient and is the basis for therapy. The two major functional abnormalities in neonates requiring transport are failure to oxygenate and failure to ventilate.

Failure to oxygenate results from:

- Diffusion defects
- Hypoventilation
- Intrapulmonary shunting
- Extrapulmonary shunting

Failure to ventilate results from:

- Decreased central respiratory drive
- Upper airway obstruction
- Small airway obstruction
- Parenchymal (air space) disease

**HISTORY** Elements of the history may provide clues about the pathophysiology but are more helpful in determining the antecedent disease.

**PHYSICAL EXAM** Differential features of the physical exam include the following:

Failure to oxygenate:

Diffusion defects

- Rarely seen in the absence of an additional alteration in physiology
- No distinctive features on physical exam

Hypoventilation

- Decreased respiratory effort
- Retractions with airway obstruction
- Decreased air entry sounds

Intrapulmonary shunting

- “Abnormal” breath sounds, usually rales
- Physical evidence of non-compliance

Extrapulmonary shunting

- Relatively clear breath sounds
- Usually little or no decrease in compliance
- Heart murmur may be present if antecedent is cyanotic heart disease; usually not present if antecedent is PPHN

Failure to ventilate:

Decreased central respiratory drive

- Decreased respiratory effort; does not increase with stimulation
- Decreased depth or rate of respiration

Upper airway obstruction

- Stridor
- Other upper airway sounds

- Other findings of anatomical obstruction (e.g., choanal atresia, glossoptosis, laryngeal web)

Small airway obstruction

- Wheezing

Parenchymal disease

- Abnormal or absent breath sounds

**LABORATORY DATA** A blood gas analysis is the single most helpful laboratory test in the assessment of an infant with respiratory failure, and should be performed in the evaluation of all infants with respiratory distress.



## UNC Carolina Air Care Respiratory Distress Syndrome

To identify and treat the sequelae of surfactant deficiency in infants

### HISTORY

Infants at Risk:

- Premature infants (risk inversely proportional to gestational age; uncommon after 34 weeks)
- Infants of diabetic mothers
- Asphyxiated infants

Onset of symptoms at less than one hour of age Progressive increase in severity during the first 48 to 72 hours of life (unless treated with surfactant)

### PHYSICAL EXAM

- Tachypnea (rate >60/min)
- Grunting
- Retractions (intercostal, subcostal, substernal)
- Nasal flaring
- Decreased thoracic volume
- Scattered rales heard throughout lung fields
- Cyanosis in room air

### XRAY DATA

Chest xray: (Prior to surfactant)

- Generalized reticulogranular pattern (ground glass appearance)
- Homogeneous density throughout lungs
- Air bronchograms
- Low lung volumes

### TREATMENT

Non-specific Therapies:

1. Discontinue enteral fluids and establish intravenous access.
2. Maintain adequate hydration & serum glucose.
3. Administer oxygen to keep PaO<sub>2</sub> 60-80 mmHg
4. Follow guidelines for treatment of respiratory failure.
5. Obtain CBC/blood culture & begin broad spectrum antibiotics (ampicillin and gentamicin).
6. Provide neutral thermal environment.

Specific Therapy:

Administer Survanta if infants meets the following criteria:

- Diagnosis of RDS established with reasonable certainty
  - Mechanical ventilation required for treatment of RDS & oxygen requirement >40%.
  - Stable cardiorespiratory status with adequate oxygenation and ventilation
  - No contraindication to prolongation of time in referring hospital
-



## UNC Carolina Air Care Transient Tachypnea of the Newborn

To outline the management of patients with Transient Tachypnea of the Newborn (TTNB)

### HISTORY Risk Factors:

- Prematurity (although generally not extreme prematurity)
- C-section delivery
- Rapid vaginal delivery
- Mild birth asphyxia (particularly without labor)
- Maternal analgesia/anesthesia

Onset of symptoms within first hour of life. Distress usually not severe

### PHYSICAL EXAM

- Tachypnea (usually  $>80$ /min)
- Retractions, nasal flaring and grunting unusual
- Increased AP chest dimension
- Breath sounds clear but “distant”
- Mild cyanosis on room air

### LABORATORY DATA

Hypercarbia in first 8 hours of life common

### XRAY DATA Chest x-ray:

- Prominent vascular markings
- Fluid present in the fissures or pleural spaces
- Hyperinflation with flattened diaphragm on lateral view
- Chest x-ray usually clears within 24 -48 hours

### TREATMENT

1. Administer oxygen to keep PaO<sub>2</sub> 60-80mmHg.
  2. Follow Respiratory Failure Protocol for signs and symptoms of respiratory failure.
  3. Establish IV access.
  4. Discontinue enteral fluid
  5. Maintain adequate hydration & serum glucose.
  6. Administer antibiotics until pneumonia is ruled out (usually ampicillin and gentamicin).
  7. Provide neutral thermal environment
-



## UNC Carolina Air Care Meconium Aspiration Syndrome

To outline the management of patients with Meconium Aspiration Syndrome (MAS)

### HISTORY Infants at Risk:

- Any infant with meconium stained amniotic fluid during labor and delivery is at risk for aspiration. Aspiration of thick or particulate meconium places the infant at risk of developing MAS.
- Infants at risk for passing meconium in the intrapartum period include:
  - asphyxiated infants
  - post-term infants
  - infants of mothers with placental disease

### PHYSICAL EXAM

- Tachypnea
- Cyanosis often refractory to oxygen therapy alone
- Grunting, flaring, retractions
- Barrel chest; increased AP chest diameter
- Coarse breath sounds

### LABORATORY DATA

Severe hypoxemia refractory to oxygen therapy common; indicates presence of pulmonary hypertension Hypercarbia and respiratory acidosis when airway obstruction by meconium present

### XRAY DATA

Chest x-ray:

- Non-uniform, coarse, patchy infiltrates radiating from the hilum into the peripheral field
- Focal areas of irregular aeration, some appearing atelectatic or consolidated, others emphysematous
- Hyperexpansion of the thorax with flattening of the diaphragm

### TREATMENT

1. Treat signs and laboratory evidence of respiratory failure: follow Respiratory Failure Protocol
  2. The goal of cardiorespiratory therapies should be to maintain pO<sub>2</sub> above 80 mmHg or oxygen saturation above 98%.
  3. If unresponsive to ventilatory management, consider the possibility of the pulmonary hypertension; if present follow Persistent Pulmonary Hypertension of the Newborn Protocol.
  4. Obtain vascular access.
  5. Correct hypoglycemia, hypocalcemia and hypovolemia.
  6. Correct acidosis, either with buffer or ventilation depending upon the relative contribution of metabolic and respiratory acidosis, to maintain pH above 7.35.
  7. Sedate infant if agitated, particularly if agitation is associated with worsening cyanosis or desaturation.
  8. Paralysis may also be required if sedation alone is not effective.
  9. Obtain CBC and blood culture and administer antibiotics
-



## UNC Carolina Air Care Persistent Pulmonary Hypertension of the Newborn

To outline the management of patients with Persistent Pulmonary Hypertension of the Newborn (PPHN)

HISTORY Risk Factors:

- Term or near-term gestation
- Severe birth asphyxia
- Meconium aspiration
- Severe pulmonary parenchymal disease
- Lung Hypoplasia syndromes such as diaphragmatic hernia
- Sepsis
- Pneumonia
- Maternal use of non-steroidal anti-inflammatory agents at any time during gestation
- Respiratory distress within the first few hours of life

PHYSICAL EXAM Early signs include tachypnea and cyanosis, but work of breathing may not be markedly increased, unless there is coincidental pulmonary parenchymal disease (e.g. MAS). There is generally a rapidly increasing oxygen requirement to keep arterial oxygen tension in a satisfactory range. Cyanosis and hypoxemia usually respond poorly to increased ambient oxygen.

LABORATORY DATA Carbon dioxide excretion is generally not a serious problem. Acidosis is usually present but mild until profound hypoxia occurs. Marked liability of blood oxygenation with wide, rapid swings in PaO<sub>2</sub> are common and nearly pathognomonic of PPHN. The diagnosis of PPHN is strongly supported by observing a significant drop (15 torr) between the PaO<sub>2</sub> in the right radial artery and abdominal aorta. Also, saturation differences between pre-and post-ductal sites may be seen by pulse oximetry. Absence of this difference does not rule out PPHN, since the primary site of shunting may be at the foramen ovale.

XRAY DATA Pulmonary parenchymal densities are generally mild in comparison with the degree of clinical hypoxia. There may be scattered abnormal pulmonary densities but usually not the characteristic granularity and air bronchograms of RDS. Occasionally the scattered heavy densities of meconium aspiration syndrome with air trapping will be evident. Decreased vascular markings may be present, particularly if PPHN occurs in the absence of pulmonary parenchymal disease.

### TREATMENT

Respiratory therapy:

1. All infants with PPHN should be placed in 100% oxygen throughout transport unless high PaO<sub>2</sub>'s can be maintained constantly in less oxygen.
2. If PaO<sub>2</sub> can be maintained in the 70 or above range by increasing ambient oxygen only, then ventilation should not be initiated.
3. If PaO<sub>2</sub> falls below this range in 100% oxygen, begin mechanical ventilation.
4. The goal of mechanical ventilation should be to reduce PCO<sub>2</sub> to the 30-35 range. Parameters of ventilation should be chosen to provide maximal ventilation with the least impact on mean airway pressure. Suggested initial settings are: FiO<sub>2</sub> 1.0, IMV 40, PIP 24, PEEP 4, Ti 0.3.
5. If improvement in oxygenation does not occur, increase PIP and IMV. IMV should not exceed 60/minute.

Pharmacologic therapy:

1. Agitation of an infant with PPHN should be avoided. Sedation is often helpful and necessary. Morphine sulfate or Fentanyl should be administered to infants who become agitated and who are placed on mechanical ventilation.



## UNC Carolina Air Care Diaphragmatic Hernia

To identify and treat cardiorespiratory dysfunction caused by congenital diaphragmatic hernia (CDH)

**HISTORY** There are no known risk factors for CDH. The majority of cases of CDH that present with acute respiratory distress result from hernias on the left side. Infants with CDH typically develop severe, early onset respiratory distress. Failure to respond to resuscitation immediately following delivery is common.

**PHYSICAL EXAM** Acute and severe respiratory distress; cyanosis may be unresponsive to increased ambient oxygen  
Decreased or absent breath sounds on the ipsilateral side, usually the left  
Bowel sounds may be audible on the ipsilateral side  
Shift of heart sounds to the contralateral side  
Scaphoid abdomen (may not be present after intubation and ventilation)

**XRAY DATA** Chest xray:

- Loops of intestine in the thoracic cavity
- Shift of the mediastinum to the contralateral side

**TREATMENT**

1. Immediate endotracheal intubation. DO NOT VENTILATE BY FACE MASK.
2. NG tube/repleg to low continuous suction
3. Place pre-ductal pulse oximeter and transcutaneous CO<sub>2</sub> monitor.
4. Ventilation strategy:
  - a. Begin at 100 % oxygen, PIP of 20-25; PEEP at 3-5, IMV 40-50.
  - b. Accept pre-ductal sats >80 %.
  - c. Accept PCO<sub>2</sub> 45-65.
5. For a base deficit >10, give 2 meq/kg of NaHCO<sub>3</sub>.
6. Sedate and paralyze.
7. Obtain vascular access (low UVC is acceptable).
8. IVF (D10W) at 80 cc/kg/day.
9. Judicious use of fluid boluses.
10. Use dopamine as needed for BP support.
- II. Minimize stimulation.

**COMMENTS** Diaphragmatic hernias usually result in lung hypoplasia on at least the ipsilateral side. Rupture of either lung is common and should be treated with a thoracostomy tube. Prevention of pneumothorax is essential. Low pressures, higher rates and short inspiratory time will help prevent pneumothoraces. Pulmonary hypertension also frequently accompanies diaphragmatic hernia as a result of lung hypoplasia. Infants should be provided with 100% oxygen throughout transport.

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## UNC Carolina Air Care Gastroschisis / Omphalocele

To identify and treat problems associated with congenital defects of the abdominal wall

### HISTORY

**Gastroschisis:** There are no known risk factors for gastroschisis. Because of the widespread use of prenatal fetal ultrasound, gastroschisis is now more often identified prenatally. Most cases are anticipated prior to delivery. Because of the high association with high GI obstruction, polyhydramnios is common, therefore, preterm delivery is common.

**Omphalocele:** There are no known risk factors associated with omphalocele except when associated with a syndrome (e.g. Beckwith- Wiedemann syndrome). Most large omphaloceles are identified during prenatal ultrasound. However, small lesions may go unrecognized.

### PHYSICAL EXAM

#### Gastroschisis

- Full thickness defect of the anterior abdominal wall, most commonly to the right and slightly below the umbilicus.
- The organs often located outside the abdomen include stomach, small bowel, colon and, rarely, the liver.
- Exposed viscera may have fibrinous coating or may be under torsion.

#### Omphalocele

- Full thickness defect of the abdominal wall at the umbilicus which includes the base of the umbilical cord
- Contents depend primarily upon the size of the defect
- No exposure of viscera if membrane intact
- Hypothermia often present, particularly with gastroschisis
- Hypovolemia/hypotension if fluid loss not replaced adequately (rarely occurs with intact omphalocele)
- Potential for respiratory distress which is usually linked to the degree of prematurity

**LABORATORY DATA** Metabolic acidosis if hypovolemia present Hypoglycemia if in association with Beckwith-Wiedemann syndrome

### TREATMENT

1. Assure adequate oxygenation and ventilation
2. Bowel should be positioned and supported, if necessary, so that no tension or torsion is applied to the viscera. If bowel has been wrapped prior to arrival of the team, it should be unwrapped and observed for torsion and rewrapped.
3. Cover exposed viscera with warm sterile saline dressing, turban-style. Put infant in a sterile bowel bag secured at the level of the axilla.
4. Place infant on side and support abdomen with diapers if necessary.
5. Place a double-lumen orogastric tube/repleg to low suction.
6. Administer parenteral fluids at 1.5-2 times maintenance (usually D<sub>10</sub>W).
7. Correct acid-base balance.
8. Provide neutral thermal environment.
9. Begin broad spectrum antibiotics.
10. Monitor serum glucose.

**COMMENTS** Omphaloceles are usually easily distinguished from gastroschisis by the covering membrane and the involvement of the umbilical cord seen in the former. A ruptured omphalocele should be treated like a gastroschisis. An intact membrane will decrease fluid loss. Gastroschisis is rarely associated with other congenital defects, although commonly associated with preterm birth. Omphaloceles, however, have a high incidence of accompanying anomalies: Cardiac, renal, neurological and chromosomal.

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## UNC Carolina Air Care Neural Tube Defect

To support a patient with a neural tube defect, including patients with meningomyelocele, meningocele, and encephalocele

**HISTORY** Because of the availability of maternal AFP screening and prenatal ultrasound, neural tube defects are usually identified prior to delivery and some are repaired in-utero. Maternal history may include poor fetal growth, decreased fetal movement or polyhydramnios.

### PHYSICAL EXAM

- Note size, shape, and contents of lesion.
- Note presence of covering membrane and any leakage of CSF.
- Measure the head circumference.
- Assess intracranial pressure by palpating the anterior fontanel.
- Palpate the abdomen for bladder size and emptying ability using the crede maneuver.
- Note position and movement of lower extremities.

**XRAY DATA** Radiographic evaluation of infants with neural tube defects is critical in planning appropriate therapies, but is not necessary during transport.

### TREATMENT

1. Position prone and prevent sac from rupture.
  2. Apply sterile non-adherent dressing (e.g. Telfa), moistened with saline over the defect.  
DO NOT USE BETADINE!! IT KILLS NERVE CELLS!!
  3. Apply 4x4 over dressing and secure with Kerlex.
  4. For open lesions, obtain a swab for culture.
  5. Do not use sterile isolation bag. May wrap with Kerlex.
  6. Prevent contamination of defect with urine or stool.
  7. Place IV and begin maintenance fluids.
  8. Begin broad spectrum antibiotics (usually ampicillin and gentamicin).
-



## UNC Carolina Air Care Necrotizing Enterocolitis

To identify and treat problems associated with necrotizing enterocolitis (NEC)

### HISTORY Infants at Risk:

- Preterm infants
- Associated with other complications of prematurity (e.g., PDA, RDS, asphyxia, hypothermia, exchange transfusions)
- Term infants with a history of sepsis, acidosis and/or hypoxemia
- Enteral feeding (feeding with breast milk protective)
- Unusual in first three days of life; rarely seen after three weeks

### Historical Clues:

- Poor feeding
- Temperature instability
- Lethargy
- Irritability
- Apnea
- Diarrhea
- Gastric residuals

### PHYSICAL EXAM

- Abdominal distention and tenderness
- Rubor or bluish discoloration of the abdominal wall
- Absent bowel sounds
- Poor skin perfusion
- Hypotension/shock
- Bile stained gastric aspirate
- Respiratory compromise

### LABORATORY DATA

- Occult and/or gross blood in stools
- Stools with increased reducing substance (over I+ on a Clinitest tape)
- Metabolic acidosis
- Thrombocytopenia
- Neutropenia
- Hyponatremia
- Laboratory evidence of coagulopathy

### XRAY DATA

- Dilation of the bowel
- Persistent nonmotile loops of bowel
- Thickened bowel wall
- Pneumatosis intestinalis (diagnostic)
- Free air within the peritoneal cavity
- Air in the portal venous system

### TREATMENT

1. Assure adequate oxygenation and ventilation.
2. Obtain IV access.
3. Treat hypovolemia or shock.
4. NPO.
5. Place replegic to low intermittent suction.
6. CBC, blood culture, stool culture (if possible), ABG.
7. Broad spectrum antibiotics (ampicillin, and gentamicin).
8. Clindamycin should be added to antibiotic coverage if perforation has occurred or if perforation is likely as evidenced by a rapidly deteriorating condition.
9. Maintenance IV fluids should be adjusted to individual needs:
  - Because of capillary damage, third spacing and excessive fluid loss into the gut or peritoneum, an increase in maintenance fluids above normal may be required, usually 1.5 times maintenance. D5W with electrolytes is satisfactory (omit KCl if the infant is acidotic or oliguric).
  - The goal for urine output should be 1-1.5cc/kg/hr.

COMMENTS Necrotic bowel causes marked increase capillary permeability throughout the entire body with the resulting sequestration of large volumes of fluid in the extravascular spaces.



## UNC Carolina Air Care EA / TEF

To identify and treat the complications of esophageal atresia and tracheoesophageal fistula (EA/TEF)

**DEFINITION** A congenital interruption of the esophagus (esophageal atresia) may be associated with fistulous connections between the tracheal/bronchial tree or distal GI tract. The various combinations of connections, and their frequency, are depicted in the accompanying figure.

**HISTORY** There are no known risk factors for EA/TEF. These lesions are not easily identified during prenatal ultrasound unless EA is present in the absence of TEF. With this anomaly, polyhydramnios is invariably present and a stomach “bubble” is not seen on fetal ultrasound. Birth is more likely to be premature.

### PHYSICAL EXAM

- Excessive saliva production, drooling
- Inability to pass NG tube into stomach
- Choking, cyanotic episodes, tachypnea, wheezing
- Scaphoid abdomen if EA present without TEF

### XRAY DATA

- Radiographic documentation of coiling of the NG tube in the esophagus
- Esophageal pouch (often filled with air) is visible
- Air in GI tract confirms presence of TEF; absence implies EA without TEF

### TREATMENT

1. Provide airway and/or ventilatory support as needed.
  2. Place infant on right side and elevate head and chest to a 45 degree angle.
  3. Place a double lumen catheter in esophageal pouch and place to low-intermittent suction.
  4. NPO; provide maintenance IV fluids.
  5. Avoid agitation. During valsalva associated with agitation, air is forced into the stomach through the fistula. The stomach distends and reflux of gastric content into the lungs may occur and cause severe respiratory distress
-



## UNC Carolina Air Care Cyanotic Congenital Heart Disease

To outline the care of an infant with suspected or confirmed cyanotic congenital heart disease

DEFINITION Cyanotic congenital heart disease occurs whenever there is an anatomic abnormality which:

- decreases pulmonary blood flow
- causes circulation of venous return directly into systemic outflow
- causes separation of the systemic and pulmonary circulation.

HISTORY Infants are usually term. There is usually no history of prenatal/intrapartum complications.

PHYSICAL EXAM:

- Profound cyanosis in an infant who may otherwise appear well
- No improvement in cyanosis with 100% oxygen
- Usually not initially acidotic, but metabolic acidosis may develop with prolonged hypoxemia
- Typically ventilation is normal with clear breath sounds
- Heart murmur or other auscultative findings may or may not be present

XRAY DATA Abnormal size or shape of heart or decreased pulmonary vascular markings may be present. Pulmonary vascular markings can be increased as with truncus arteriosus. Lung fields are usually clear.

TREATMENT

1. Place infant in 100% oxygen.
2. Intubate and ventilate as needed for apnea or labored respiratory effort. Infants on prostaglandin infusions should be considered for intubation prior to transport due to the possible side effect of apnea. The risk of apnea is greatest in the first hours of prostaglandin infusion.
3. Consult MCO to discuss use of prostaglandins. Consider prostaglandin therapy if:
  - $PO_2 < 30-40$  mmHg and/or oxygen saturation  $< 80\%$
  - Femoral pulses diminished or absent with poor perfusion
  - Metabolic acidosis persists with good ventilation and volume/ inotrope support.
  - There is a high likelihood of cyanotic congenital heart disease based on history/exam/data
4. Sedate if agitated.
5. Consider bicarbonate administration to correct metabolic acidosis.
6. Monitor metabolic parameters (glucose, calcium) and correct if necessary.



To outline management of patients with upper airway obstruction

***CROUP (INCLUDES BACTERIAL TRACHEITIS AND SUBGLOTTIC STENOSIS)***

1. Signs, symptoms: mild elevation of temperature, malaise, rhinitis, loss of appetite.
2. After 2-3 days, development of hoarseness, inspiratory stridor, barking cough, tachypnea, retractions.

TREATMENT

1. Minimize agitation.
2. Provide supplemental oxygen in a manner patient will tolerate.
3. Avoid respiratory depressants or sedatives.
4. Administer racemic epinephrine(0.25cc in 2cc NS by nebulization).
  5. Consider dexamethasone 0.5-0.6 mg/kg - contact MCO.
6. Discontinue any known drying agents antihistamines, atropine
7. Decision to intubate is generally made on clinical grounds, not with ABG's.
8. If intubation is needed, use ETT one size smaller than usual for age.
9. Administer IV fluids at 1.5 times maintenance.
10. Discontinue oral intake.

***EPIGLOTTITIS***

1. Short prodrome of 6-10 hours with high fever (38-40 degrees Celsius).
2. Signs, symptoms: sore throat, malaise, rapid development of dysphagia, inability to swallow, drooling, inability to lie down, dyspnea.

TREATMENT

1. Maintain close observation.
  2. Do not aggravate the patient(no labs, no ABG's, no IV, do not place in horizontal position).
  3. Administer humidified oxygen.
  4. Controlled intubation in OR with anesthesiologist and ENT.
  5. Secure endotracheal tube.
  6. Sedate after airway secured.
  7. Muscle relaxants may be needed.
  8. Respiratory isolation.
  9. Maintenance IV fluids.
  10. Antipyretics for temperature>38.5C.
  11. Culture epiglottis after intubation.
  12. Obtain blood culture.
  13. Begin antibiotics.
-



## UNC Carolina Air Care Lower Airway Obstruction

To outline care of patients with lower airway obstruction

### ***PNEUMONIA/BRONCHIOLITIS***

1. Mild upper respiratory infection for several days, abrupt fever  $>39.0$ , productive or dry cough.
2. Signs/symptoms: respiratory distress, tachypnea, retractions with use of accessory muscles, cyanosis.
3. Auscultation: rales, wheezes.
4. Chest x-ray: indicative air trapping, thickening of bronchial wall, interstitial pneumonia, atelectasis.

### **TREATMENT**

1. Establish airway, ventilate as required.
2. Administer oxygen with humidity.
3. Bronchodilators may be needed for bronchospasm & wheezing.
4. Respiratory isolation techniques.
5. Sedation, muscle relaxants.
6. Administer IV maintenance fluid.
7. Obtain blood culture.
8. Initiate antibiotic therapy.

### ***ASTHMA***

1. Signs, symptoms:
  - d. Respiratory distress
  - e. Cough
  - f. Expiratory wheeze
  - g. Prolonged expiratory phase
  - h. Prolonged inspiratory phase (if severe)
  - i. Dehydration
2. Labs: ABG, CBC
3. Chest x-ray: infiltrates, patchy atelectasis, hyperinflation
4. Note quality of cry or ability to talk (indicators of patient's forced expiratory volume)

### **TREATMENT**

1. Keep a calm atmosphere, allow to assume a position of comfort.
  2. Administer oxygen 2-4 liters per minute by mask or nasal cannula.
  3. Aerosolized bronchodilators:
    - Albuterol-(0.5% solution) 0.03ml/kg; max=5mg(1cc). May use hourly. Alternatively, give continuous nebulization of 0.4-0.8 mg/kg/hr; max of 15 mg/hr.
    - Atropine-(0.5 mg/ml) 0.075 mg/kg (max 2 mg every six hours)
    - Glycopyrrolate-(0.2 mg/ml) 0.025-0.05 mg/kg every 6 hours. (preferred with atropine)
  4. Adrenergic agents:
    - Epinephrine -I:1000 SQ: 0.01cc/kg/dose (max=0.03cc); may repeat two times at 20 minute intervals
    - Terbutaline -1mg/cc SQ: 0.01cc/kg/dose(max= 0.3cc); may repeat once in 30 minutes
    - Aminophylline (for those not on chronic theophylline therapy) Load: 6 mg/kg over 20 minutes  
Maintenance: 1 mg/kg/hr If a dose is missed, give 2.5mg/kg and then start an aminophylline drip of 1mg/kg/hr Therapeutic level is 10-20mcg/ml
    - Steroids: Methylprednisone - Load: 2 mg/kg, maintenance: 1 mg/kg every six hours
  5. Administer antibiotics as indicated
  6. Mechanical ventilation
-



To outline the care of patients with diabetic ketoacidosis

### SUPPORTIVE DATA

1. Serum glucose >300
2. Metabolic acidosis with pH <7.2
3. Serum bicarbonate <15
4. Dehydration
5. Ketonuria
6. Lab values: decreased Na, K, CO<sub>2</sub>, PO<sub>4</sub>, and pH; increased BUN, glucose

### TREATMENT

1. Manage airway appropriately.
2. Establish IV access.
3. Assume 10% dehydration.
4. If shock present, bolus with 10-20cc/kg NS/LR and repeat as needed.
5. Maintenance fluid:
  - Glucose >300 = 0.45 NS with KCl if +urine output.
  - Glucose <300 = D10% 0.45NS with KCl if +urine output.
6. Rate = 2 times maintenance rate.
7. Insulin drip: 0.1 U/kg/hr. Mix I:I in NS using Regular insulin and remember to flush the tubing.
8. Sodium bicarbonate only by MCO order.
9. Monitor serum glucose every hour.
9. Be observant for cerebral edema and increased ICP.

### COMMENTS

1. Initial rehydration will decrease glucose and increase pH even without insulin therapy.
  2. Glucose should not drop more than 50% in the first six hours.
    - Titrate insulin drip for glucose drop of 50-100 mg/dl/ hour.
    - If admission glucose over 800, drop only by 50mg/dl/ hour to prevent cerebral edema.
-



## UNC Carolina Air Care AMS Increased ICP Seizure

To outline the care of patients with altered level of consciousness, increased intracranial pressure, and status epilepticus.

### *ALTERED LEVEL OF CONSCIOUSNESS*

#### **SUPPORTIVE DATA**

History: diabetic imbalance, drug/alcohol ingestion, trauma, infection, heat stroke, cardiac dysrhythmias.

#### **TREATMENT**

1. Manage airway and oxygen appropriately.
2. Stabilize spine: in line cervical stabilization must be applied if trauma has not been ruled out. [Refer to adult team Pediatric Head Trauma if suspected].
3. Establish IV access.
4. Volume resuscitation as needed.
5. If there is an obvious overdose of narcotics, give Narcan 0.1mg/kg IV or IM.
6. Begin maintenance IV fluids.
7. Follow neurological exam. If condition deteriorates, begin measures to lower the ICP.
8. After facial trauma ruled out, place a nasogastric tube and decompress the stomach.
9. Consider activated charcoal.
10. Contact MCO for pharmacologic agents.

### *STATUS EPILEPTICUS*

#### **SUPPORTIVE DATA**

1. History-recurrent seizures without awakening.
2. Neonatal causes - congenital or acquired metabolic disorders, hypoxia, congenital malformation, CNS infections.
3. Infant/child causes - head trauma, child abuse, toxins, meningitis, idiopathic.
4. Adolescent causes - metabolic disorders, drug withdrawal, uremia, toxins, CNS tumors, head injury, idiopathic, drug overdose.

#### **TREATMENT**

1. Maintain airway and oxygenate appropriately.
2. Establish vascular access.
3. Anticonvulsants to stop seizures:  
\* Lorazepam 0.1 mg/kg or Valium 0.2-0.4mg/kg. Then load with Phenobarbital 20mg/kg or Phenytoin 18mg/kg.
4. Fluid resuscitate as needed.
5. Begin maintenance IV fluids, use D5NS or D51/2NS.
6. Follow neurological exam.
7. NGT to suction.
8. Antipyretics for hyperthermia.
9. Antibiotics as indicated.
10. Correct electrolyte abnormalities.



To identify and manage pathology associated with ingestion or other exposures to poisonous substances

### ASSESSMENT

1. Refer to Assessment Protocol.
2. Note burns in mouth, nose, etc.
3. Note any odors.
4. Note any material around mouth.
5. Treat the patient not the poison.

### SUPPORTIVE DATA

Obtain history:

- Define product name, ingredients, amount consumed, and current symptoms.
- If there is any question regarding a medication, request the prescription number, dispensing pharmacy, or prescribing physician.
- Always request that the product be brought in with the child.

### TREATMENT

1. Manage airway and oxygenate appropriately.
2. Establish IV access.
3. Treat shock.
4. Gather available laboratory data: urine, blood, gastric aspirate, ABG, electrolytes, glucose, ammonia, liver enzymes, CXR.
5. *Decontamination*: for dermal or ophthalmic exposure, flush with copious amounts of water for at least 15 minutes.
6. Ingested poisons-the goal is to delay absorption and enhance elimination.
7. *Emesis*:
  - A. Syrup of Ipecac (15ml) PO or NG, may repeat one time if no emesis.
  - B. Save product of emesis.
  - C. Contraindications:
    - the unconscious patient.
    - LOC has or may deteriorate.
    - absent gag reflex.
    - ingestion of caustic agents.
    - ingestion of most antiemetic drugs.
    - ingestion of most hydrocarbons(gasoline, kerosene, etc.).
8. *Gastric lavage*
  - A. Indicated when patient is unconscious, rapidly losing consciousness, seizing, or has no gag reflex.
  - B. Intubate prior to lavage.
  - C. Use a large Ewald tube.
  - D. Continue lavage until absence of solid material.



## Statement of Use

These treatment protocols are intended to be used as guidelines during the care and transport of patients by UNC Air Care.

The protocols are based upon interpretation of current standards of care as identified in recent journal articles, medical text references, and the faculty of the School of Medicine at University of North Carolina- Chapel Hill. They are intended to be used in conjunction with the provider's good clinical judgment and thorough assessments.

Ultimately, providers are responsible for their own actions. Therefore it is imperative that all providers develop a strong understanding of the etiology of an illness in order to appropriately apply the use of these protocols to each specific situation that they may encounter. By doing so, the provider will be able to "think" their way through any patient situation, rather than being just protocol driven. If situations arise where the provider is unsure of the most prudent course of treatment, consult with medical control.

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UNC Carolina Air Care Appendix Form  
**Chest Pain / Fibrinolytic Candidate Check List**

	Yes	No
Ongoing chest discomfort (> 20 minutes and < 24 hours)	[ ]	[ ]
Oriented and able to cooperate	[ ]	[ ]
Age > 35 years (> 40 years if female)	[ ]	[ ]

History of Stroke or TIA	[ ]	[ ]
Known bleeding disorder	[ ]	[ ]
Active internal bleeding with in the last 2 weeks	[ ]	[ ]
Surgery of Trauma with in the last 2 weeks	[ ]	[ ]
Terminal Illness	[ ]	[ ]
Jaundice, hepatitis, kidney failure	[ ]	[ ]
Use of anticoagulants	[ ]	[ ]

Systolic / Diastolic blood pressure  
 Right arm \_\_\_\_\_ / \_\_\_\_\_  
 Left arm \_\_\_\_\_ / \_\_\_\_\_

EKG Done	[ ]	[ ]
----------	-----	-----

**HIGH RISK PROFILE**

Heart rate > 100 bpm	[ ]	[ ]
BP < 100 mm Hg	[ ]	[ ]
Pulmonary edema (rails > ½ way up)	[ ]	[ ]
Shock	[ ]	[ ]

*All highlighted box's must be checked and the patients Blood Pressure < 180 / 100 for the patient to be a candidate for thrombolytic therapy with suspected AMI.*

*If all highlighted box's are checked and the patients EKG indicates ST elevation or new BBB the MCO should be contacted to confer on possible administration of Thrombolytics*

UNC Carolina Air Care Appendix Form  
**Ischemic Stroke / Fibrinolytic Candidate Check List**

<b>Inclusion Criteria</b>	<b>YES</b>	<b>NO</b>
Age 18 years or greater	[ ]	[ ]
Clinical diagnosis of ischemic stroke causing measurable neurologic deficit	[ ]	[ ]
Time of symptom onset well established to be less than 180 minutes before treatment would begin	[ ]	[ ]
<hr/>		
<b>Exclusion Criteria</b>		
Evidence of intercranial hemorrhage on noncontrast head CT	[ ]	[ ]
Only minor or rapidly improving stroke symptoms	[ ]	[ ]
High clinical suspicion of subarachnoid hemorrhage even with normal CT	[ ]	[ ]
Active internal bleeding (e.g. GI bleed or urinary bleeding within the last 21 days)	[ ]	[ ]
Known bleeding diathesis, including but not limited to		
➤ Platelet count < 100,000 / mm <sup>3</sup>	[ ]	[ ]
➤ Patient has received heparin within 48 hours and had elevated activated PTT greater than the upper limit of normal for the laboratory	[ ]	[ ]
➤ Recent use of anticoagulant (e.g. Warfarin) and elevated PT >15 seconds	[ ]	[ ]
Intracranial surgery, serious head trauma, or previous stroke within the past 3 years	[ ]	[ ]
Major surgery or serious trauma within 14 days	[ ]	[ ]
Recent arterial puncture at a non compressible site	[ ]	[ ]
Lumbar puncture within 7 days	[ ]	[ ]
History of intracranial hemorrhage, arteriovenous malformation or aneurysm	[ ]	[ ]
Witnessed seizure at stroke onset	[ ]	[ ]
Recent Acute Myocardial Infarction	[ ]	[ ]
Pregnancy or parturition within previous 30 days	[ ]	[ ]
Baseline labs: Glucose <50 or >400, HCT < 25	[ ]	[ ]
On repeated measurements, SBP >185 mm HG or DBP > 110 mm HG at the time of treatment, requiring IV drip medication to reduce blood pressure to within these limits	[ ]	[ ]
Inability to obtain informed consent from the patient or family member	[ ]	[ ]
<hr/>		
<b>CT Scan Exclusion</b>		
➤ Blood of any degree	[ ]	[ ]
➤ Mass effect with any obvious early edema	[ ]	[ ]

***All highlighted boxes must be checked before thrombolytic therapy can begin***

# LEMON Airway Evaluation

## Evaluation for a difficult airway

**LEMON** airway evaluation should be done by team members prior to the intubation process to assist with identifying potential difficult airways for endotracheal intubation.

Team members should be prepared to implement additional airway control measures for patients with an identified difficult airway. Such measures to include the potential for use of the surgical airway procedure.

### LOOK EXTERNALLY

External indicators of either difficult intubation or difficult ventilation include: presence of a beard or moustache, abnormal facial shape, extreme cachexia, edentulous mouth, facial trauma, obesity, large front or “buck” teeth, high arching palate, receding mandible, short bull neck.

### EVALUATE 3-3-2 RULE

**3** Fingers between the patient’s teeth (patients mouth should open adequately to permit three fingers to be placed between the upper and lower teeth)

**3** Fingers between the tip of the jaw and the beginning of the neck (under the chin)

**2** Fingers between the thyroid notch and the floor of the mandible (top of the neck)

### MALLAMPATI

This scoring system is based on the work of Mallampati et al published in the Canadian Anesthesia Society Journal in 1985. The system takes into account the anatomy of the mouth and the view of various anatomical structures when the patient opens his mouth as wide as possible. This test is performed with the patient in the sitting position, the head held in a neutral position, the mouth wide open and the tongue protruding to the maximum. Inappropriate scoring may occur if the patient is in the supine position (instead of sitting), if the patient phonates or if the patient arches his or her tongue.

**Class I** (easy) = visualization of the soft palate, fauces, uvula, anterior and posterior pillars

**Class II** = visualization of the soft palate, fauces, uvula

**Class III** = visualization of the soft palate and the base of the uvula

**Class IV** (difficult) = soft palate is not visible at all

### OBSTRUCTION

Besides the obvious difficulty if the airway is obstructed with a foreign body, one should also consider other obstructions such as tumor, abscess, epiglottitis or expanding hematomoma.

### Neck Mobility

Ask the patient to place their chin on their chest and to tilt their head backward as far as possible. Obviously, this will not be possible in the immobilized trauma patient

UNC Carolina Air Care Appendix Form  
**Los Angeles Prehospital Stroke Screen (LAPSS)**

1. Patient Name: \_\_\_\_\_  
Last First

2. Information /History from:  
 Patient  
 Family Member Name Phone  
 Other

3. Last known time patient was at baseline or deficit free and awake: Military Time: \_\_\_\_\_  
Date: \_\_\_\_\_

**SCREENING CRITERIA:**

	Yes	Unknown	No
4. Age > 45 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. History of seizures or epilepsy <b>absent</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Symptom duration <b>less than</b> 24 hours	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. At baseline, patient is <b>not</b> wheelchair bound or bedridden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Yes		No
8. Blood glucose between 60 and 400	<input type="checkbox"/>		<input type="checkbox"/>

9. Exam: **LOOK FOR OBVIOUS ASYMMETRY**

	Normal	Right	Left
Facial Smile / Grimace:	<input type="checkbox"/>	<input type="checkbox"/> Droop	<input type="checkbox"/> Droop
Grip:	<input type="checkbox"/>	<input type="checkbox"/> Weak <input type="checkbox"/> None	<input type="checkbox"/> Weak <input type="checkbox"/> None
Arm Strength	<input type="checkbox"/>	<input type="checkbox"/> Drifts Down <input type="checkbox"/> Falls Rapidly	<input type="checkbox"/> Drifts Down <input type="checkbox"/> Falls Rapidly

Based on exam, patient has <b>only unilateral</b> (and not bilateral) weakness:	Yes		No
	<input type="checkbox"/>		<input type="checkbox"/>
<b><u>Items 4,5,6,7,8,9 all YES (or unknown) then LAPSS screening criteria met</u></b>	<input type="checkbox"/>		<input type="checkbox"/>

If LAPSS criteria for stroke met, call receiving hospital with information, If not then return to the appropriate treatment protocol.  
 (Note: the patient may still be experiencing a stroke even if LAPSS criteria are not met.)

Time LAPSS form completed: \_\_\_\_\_

Form completed by: \_\_\_\_\_



## **Induced Hypothermia (33°C for 24hrs)**

### **Criteria for Inducing Hypothermia:**

- Resuscitated from cardiac arrest requiring CPR or defibrillation
- Time from arrest to return of spontaneous rhythm (ROSC) < 60 minutes
- Patient remains comatose (no purposeful response to pain, GCS<9)
- Intubated
- No terminal disease (e.g. metastatic cancer) or advanced dementia
- Systolic blood pressure  $\geq 90$ mmHg
- Initial temperature > 34°C
- Age greater than 16

### **Exclusion Criteria**

- Cardiac arrest from trauma, head injury, drug overdose, hemorrhage or sepsis
- DNR/DNI
- Pregnancy, unless performed in consultation with OB/GYN

### **ICED therapy-start on arrival to ED**

- Fully Expose patient and connect to cardiac monitor
- Wrap hands and feet in dry towels (reduces shivering and frostbite)
- Fentanyl 1-2 mcg/kg IVP and repeat Q 30minutes
- Midazolam (Versed) 1-2 mg/hr IV
- Vecuronium 0.1mg/kg IV bolus, max 10mg (lacrilube in eyes, tape shut for comfort)
- Continue analgesia, sedation and paralysis during entire 24hr cooling phase
- Insert temp foley or esophageal temp probe (target temperature 33°C ASAP)
- Cover patient with iced wet sheets and turn on fans
- Pack head, axilla and groin with ice packs
- Sandwich patient with cooling blanket set at 5°C and target temperature of 33°C
- Complete infusion of 2L iced saline bolus, then switch to LR at 200ml/hr
- Remove ice packs when target temperature met, but continue cooling blanket
- Make sure ventilator not supplying heated air
- Keep room temperature as cool as possible

### **Initiate ED diagnostic workup and terminate cooling if contraindications develop**

- connect to pulse oximetry
- connect to capnography (keep End tidal CO<sub>2</sub> around 40mmHg to avoid hyperventilation)
- Acucheck glucose (treat with insulin if >180mg/dl)
- Blood pressure Q15 minutes (fluids, dopamine or epinephrine for target MAP>80)
- Systolic blood pressure above 180 start nitroglycerin drip if pulse inadequate.
- EKG
- Portable CXR
- Head CT rule out bleed
- ABG (inform lab of body temperature at time of ABG, it must be temperature corrected)
- Draw labs CBC, chem. 10, cardiac enzymes, coags, lipase, urine HCG, BMP, tox screen
- STEMI pager if patient meets EKG criteria and can continue hypothermia
- Notify MICU or CCU team of admission
- Consult neurology
- Aspirin 325mg via NGT or rectal in all patients if no contraindications



## UNC Adult ICED (Induced Cooling to Eliminate Deficits) Protocol

### ICU Protocol

- Analgesia, sedation and paralytics per ICU protocol
- Record vital signs including temperature Q30 minutes
- Adjust ventilator to maintain ETCO<sub>2</sub> or PaCO<sub>2</sub> around 40mmHg to avoid hyperventilation
- Adjust ventilator to maintain PaO<sub>2</sub> greater than 80mmHg and less than 150mmHg.
- Maintain core temperature at 33°C for 24hrs (esophageal, temp foley or pulmonary artery)
- Call House officer if temperature below 32°C or above 34°C
- Maintain MAP goal 80-100 mmHg
- Call House office if MAP less than 80Hg or greater than 120mmHg
- DVT prophylaxis protocol Heparin 5000 units SC Q12hr
- SUP prophylaxis protocol Famotidine 20mg IV or NGT Q12hr
- Treat hyperglycemia and electrolyte imbalances (glucose <60>180mg/dl, K+<3.4>5.4mEq, Mg<1.6mg/dl, etc)
- Call House officer if any active bleeding

### Physiology of hypothermia

Hypothermia alters ABG values (lab needs to be informed of body temperature during ABG, they will correct for body temperature)

Hypothermia causes vasoconstriction that leads to diuresis and dehydration: important to maintain adequate I/Os

Hypothermia suppresses insulin release and leads to hyperglycemia that needs to be treated  
Hypothermia will cause bradycardia (cardioprotectant) that does not need to be treated unless blood pressure drops

### **Rewarming Protocol (passive process, target temperature 36°C)**

- Do not add external heat during rewarming, it can worsen neurological outcome
- Stop KCl during rewarming unless patient severely hypokalemic
- Assure adequate hydration before initiating rewarming protocol
- Turn off cooling blanket and make sure patient is dry
- Cover with insulated blankets applied at room temperature
- Rewarm no faster than 1°C every 4 hrs
- OK to initiate ventilator warm humidified air set at a temp of 36°C
- Closely monitor for hypotension and hyperkalemia
- Discontinue paralytic agents if pulmonary status stable
- Discontinue analgesia and sedation when core temperature 36°C
- Avoid rebound hypothermia with antipyretics as needed
- Continue surveillance for occult infections

### **Assessing Neurological Outcome for Prognosis (with Neurology at 72 hours)**

- Prognosis of neurological outcome not accurate before 72 hours after ROSC<sup>1</sup>
- UNC brain death protocol predictive of poor outcome 72 hours after ROSC
- Absence of papillary light reflex predictive of poor outcome 72 hours after ROSC
- Absence of motor response to pain predictive of poor outcome 72 hours after ROSC
- Bilateral absence of early cortical SSEPs predictive of poor outcome 72 hours after ROSC

1. Zandbergen EG, de Haan RJ, Stoutenbeek CP, et al. Systematic review of early prediction of poor outcome in anoxic-ischaemic coma. [see comments]. Lancet. Dec 5 1998;352(9143):1808-1812.



Normal Blood Pressure Ranges

Age	Systolic	Diastolic
Newborn- 12 hours (1000 gm)	39-59	16-36
Newborn- 12 hours (3000 gm)	50-70	25-45
Newborn- 96 hours	60-90	20-60
Infants	74-100	50-70
Toddlers	80-112	50-80
Preschoolers	82-110	50-78
School-Age	84-120	50-78
Adolescents	94-140	2-88

Estimated Blood Volume

Age	Volume
Infants/Children	80 ml/kg
Adolescents/Adults	65-70 ml/kg

Normal Heart Rate

Age	Beats/min
Infants	120-160
Toddlers	90-140
Preschoolers	80-110
School-Age	75-100
Adolescents	60-90

Normal Respiratory Rates

Age	Breaths/min
Infants	30-60
Toddlers	24-40
Preschoolers	22-34
School-Age	18-30
Adolescents	12-16

Normal Urine Output

Age	Output
Newborn	0.5 ml/kg/hr-3.0 ml/kg/hr
Infants/Toddlers	2 ml/kg/hr
Preschoolers/School-Age	1 ml/kg/hr