

2024 Children's Transport Patient Care Protocols



Children'sSM
Healthcare of Atlanta



**Children's Transport
Patient Care Protocols
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Children's Transport Patient Care Protocols **INTRODUCTION**

The following protocol/standing order sets are designed to provide pediatric patients brought to Children's Healthcare of Atlanta by the Critical Care Transport Team with unified consistent care options for the provider to initiate in conjunction with treatment received by patient at the referring facility prior to contacting medical control. These protocols represent standing physician orders and are intended to represent available options for the provider prior to contacting medical control. They are designed to be utilized in an algorithmic format. The advanced transport ventilator, high flow nasal cannula and blood administration protocols are only to be utilized by paramedics who have been trained, approved and credentialed by agency and medical director. The provider can contact medical control at any time and must contact medical control for any flight or ICU patient after assessment and pertinent lab work has been obtained to discuss patient plan of care.

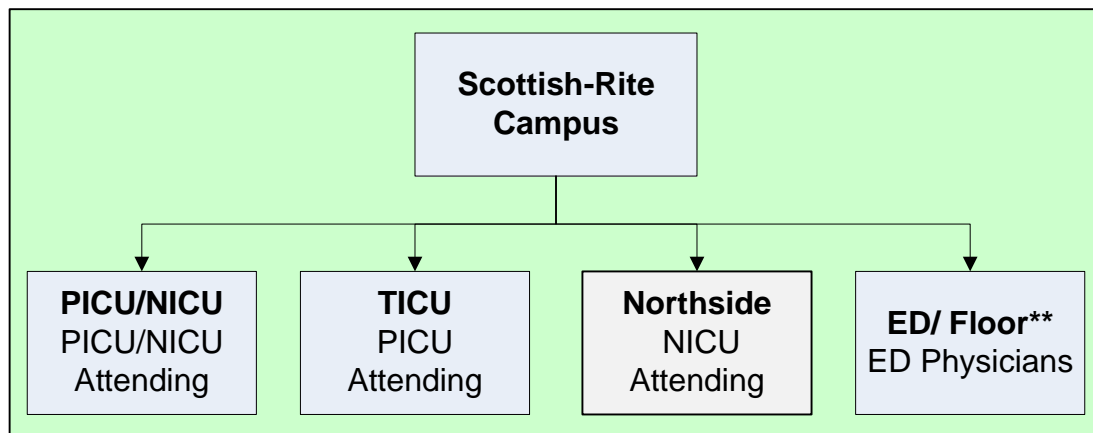
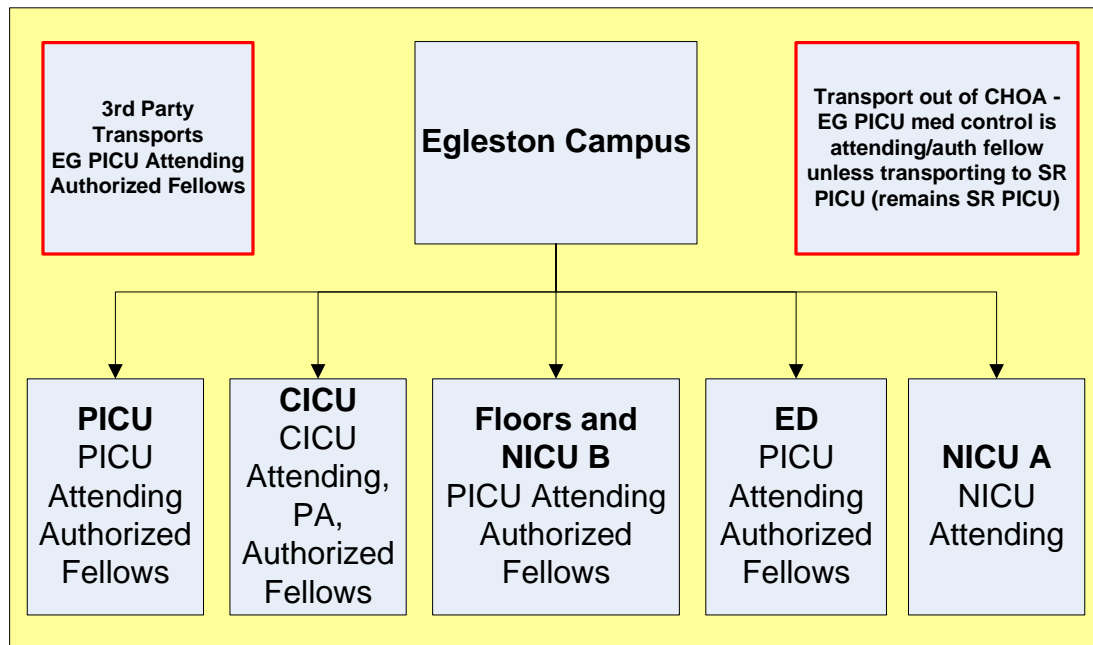
The protocols contain certain conventions that are clearly outlined in the administrative section of the protocol set. Please pay special attention to the format of the medical control orders. They are clearly outlined in bold, double-lined and grayed. These specific orders require direct online medical control. Medications and procedures that do not require on-line medical control can be administered / performed in accordance with the appropriate patient care protocols. Procedures are addressed in the procedure section of the protocols.

This protocol set is a fluid document that will constantly be reevaluated and changed as needed. Additional protocols will be added as needed. The objective of this protocol set is to provide our care providers with a working document that can also serve as a quick reference guide. However; the judgment of the medical team on-site remains sovereign. If the protocol being utilized does not appear to promote appropriate care, contact medical control immediately for clarification or revision.

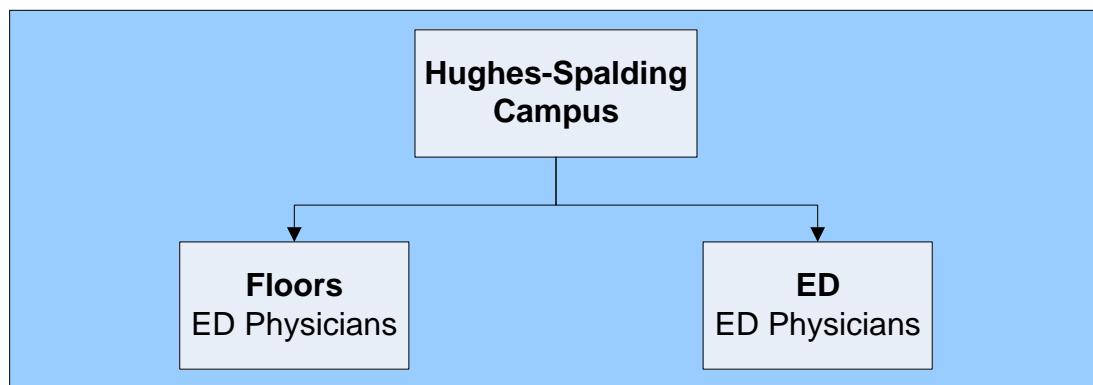
These Patient Care Protocols are approved as written.

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Director	Date
DocuSigned by: <i>Lucy [Signature]</i> F2E074A654AB43B...	4/4/2024
Medical Director	Date
DocuSigned by: <i>[Signature]</i> 69E50E155AEB487...	2/22/2024
Medical Director	Date

Children's Transport
Patient Care Protocols
MEDICAL CONTROL



**For SR floor patients needing PICU admission, contact PICU attending



**Children's Transport
Patient Care Guideline
Transport Pediatric Early Warning Signs
Transport Decision Guidelines**

PEWS	3	2	1	0
Airway/ Breathing *NIV, RAM and Intubated patients require Advanced Medic or RT All Paramedics can run HFNC and NRB ECMO/INO requires therapist unless approved by med control	<ul style="list-style-type: none"> Unstable OR Artificial airway RR >25 above normal or 5 Below normal with retractions and/or >50% FiO2 requirement not including nebs PCO2 >55 acutely with PH <7.35 (not intubated) BiPap acutely High Flow Nasal Cannula ≥ 8 lpm Heliox RAM ECMO* iNO** 	<ul style="list-style-type: none"> RR >20 above normal OR Using accessory muscles OR 40-49% FiO2 not including neb ≥ 3 LPM or >1L infant Continuous Neb or 3 intermittent nebs in 1 hr PCO2 >50 acutely with PH <7.35 (not intubated) High Flow Nasal Cannula <8 lpm 	<ul style="list-style-type: none"> RR >10 above normal OR 24-40% FiO2 not including neb ≤2 LPM; < 1L for infant PCO2 acutely > 45 (not intubated) Intermittent nebs 	<ul style="list-style-type: none"> No adjuncts No O2 requirement WNL for Age No Retractions
Circulation All patients less than 28 days of life and all patients with a 3 in this category require RN unless approved by medical control	<ul style="list-style-type: none"> Grey/ASHEN OR CRT ≥ 5 OR Tachycardia 30 above normal with a temp of <38C OR Bradycardia OR Requiring greater than 40 cc's/kg volume replacement Requiring Pressors Emergent blood products PGE 	<ul style="list-style-type: none"> CRT 4 seconds or Tachycardia 20 above normal with a temp of <38C Systolic BP < normal lower parameters 70 +2 x (age in years) ≥/ 2 years old MAP > 90 	<ul style="list-style-type: none"> Pale or CRT 3 seconds HR ≥ 10 above normal with a temp of <38C Systolic BP less than normal upper parameters (90 + 2 X (age in years) for patients ≥ 2 years old 	<ul style="list-style-type: none"> Pink, CRT 1-2 Seconds HR WNL BP WNL
Disability GCS < 10 acutely needs Respiratory Therapist or advanced medic unless approved by medical control	<ul style="list-style-type: none"> Lethargic, Confused OR Reduced Pain Response OR GCS ≤ 10 acutely Medically paralyzed and sedated Unequal Pupils 	<ul style="list-style-type: none"> Irritable or Agitated but Not consolable GCS ≤ 12 acutely 	<ul style="list-style-type: none"> Sleeping, Irritable but consolable 	<ul style="list-style-type: none"> Playing Appropriate

0 - 1 consider preferred provider; 2 - 5 not meeting categorical criteria or distance consider appropriate ground team

PEWS of 3 in any one category or a total of 6 meets Children's Transport flight criteria, FLIGHT SHOULD BE OFFERED

* Medical Control determines team configuration for all ECMO referrals

PEWS Score determines team configuration – consult medical control if specific team member not available

Children's Transport Patient Care Guideline

Additional Considerations for Transport Mode Triage

**The following conditions have been determined to be appropriate for utilization of
Helicopter Transport**

AIRWAY

- Epiglottitis
- Croup with hypoxia, AMS
- Upper airway obstruction secondary to FB
- Unstable Intubated patients
- Asthma with AMS
- Angioedema
- Anaphylaxis
- Unstable Airway

CARDIAC

- TGA with intact septum
- HLHS with intact septum
- TAPVR
- Shunt dependent patients with poor perfusion
- Unknown diagnosis of CHD needing PGE's
- Unstable arrhythmias: unstable SVT, Vtach

SURGICAL EMERGENCIES (depending on distance)

- Volvulus/malrotation
- Intussusception
- Ovarian Torsion
- Testicular Torsion
- NEC
- Bowel perforation
- Incarcerated Hernia
- Button battery ingestion

TRAUMA

- High Spinal cord injuries
- Tension Pneumothorax
- Cardiac tamponade
- Liver Lacerations
- Splenic injury with hypotension
- CHI with GCS ≤ 10
- CHI with active seizure activity
- Epidural bleed
- Subdural bleed with GCS ≤ 10
- Significant ICH
- Cerebral edema documented on CT scan

Automatic helicopter dispatch if:

- Requested by referring physician
- Cardiac arrest/post arrest
- Consider helicopter for patients ≥ 90 miles

TRAUMA Continued

- Head injuries w/ Cushing's Triad (HTN, bradycardia +/- altered respiratory effort)

ORTHO

- Fractures with loss of distal pulse
- Concern for loss of limb
- 2 or more pelvic fractures
- Open book pelvic fracture

MEDICAL

- Cardiac Arrest
- Post arrest
- AMS with GCS ≤ 10
- AMS with Cushing's Triad (HTN, bradycardia +/- altered respiratory effort)
- DKA with AMS
- Shock, hemodynamic instability, pressor dependent
- Impending respiratory failure
- Toxic ingestion with hemodynamic instability

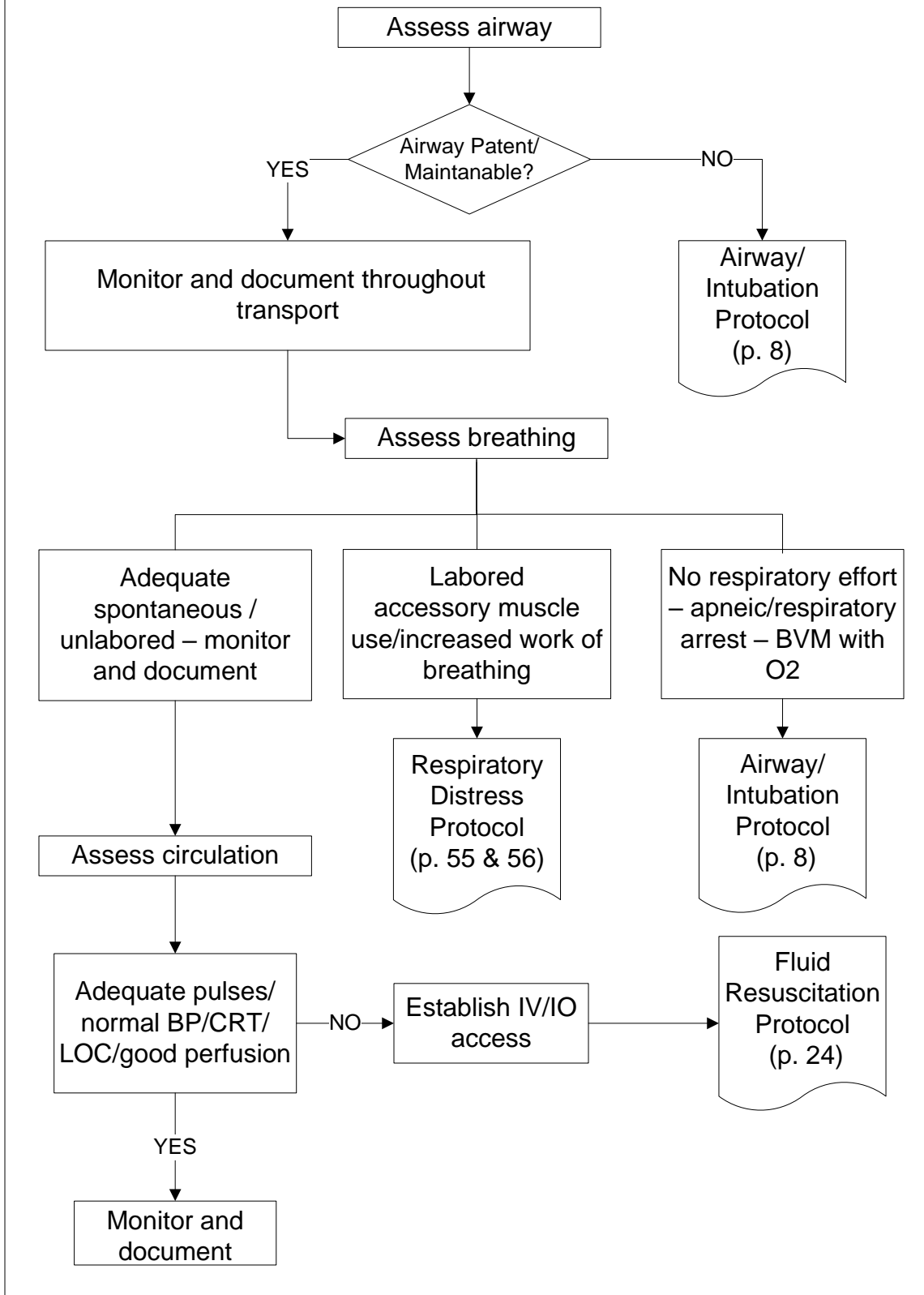
Age	Heart Rate	Systolic BP Lower Limit	RR
Birth – 6 months	140	60	45
7 months – 1 year	135	70	40
2 – 3 years	120	75	30
4 – 5 years	110	80	28
6 – 12 years	85	85	20
13 years - adult	80	90	15

Revised 8/18/2023

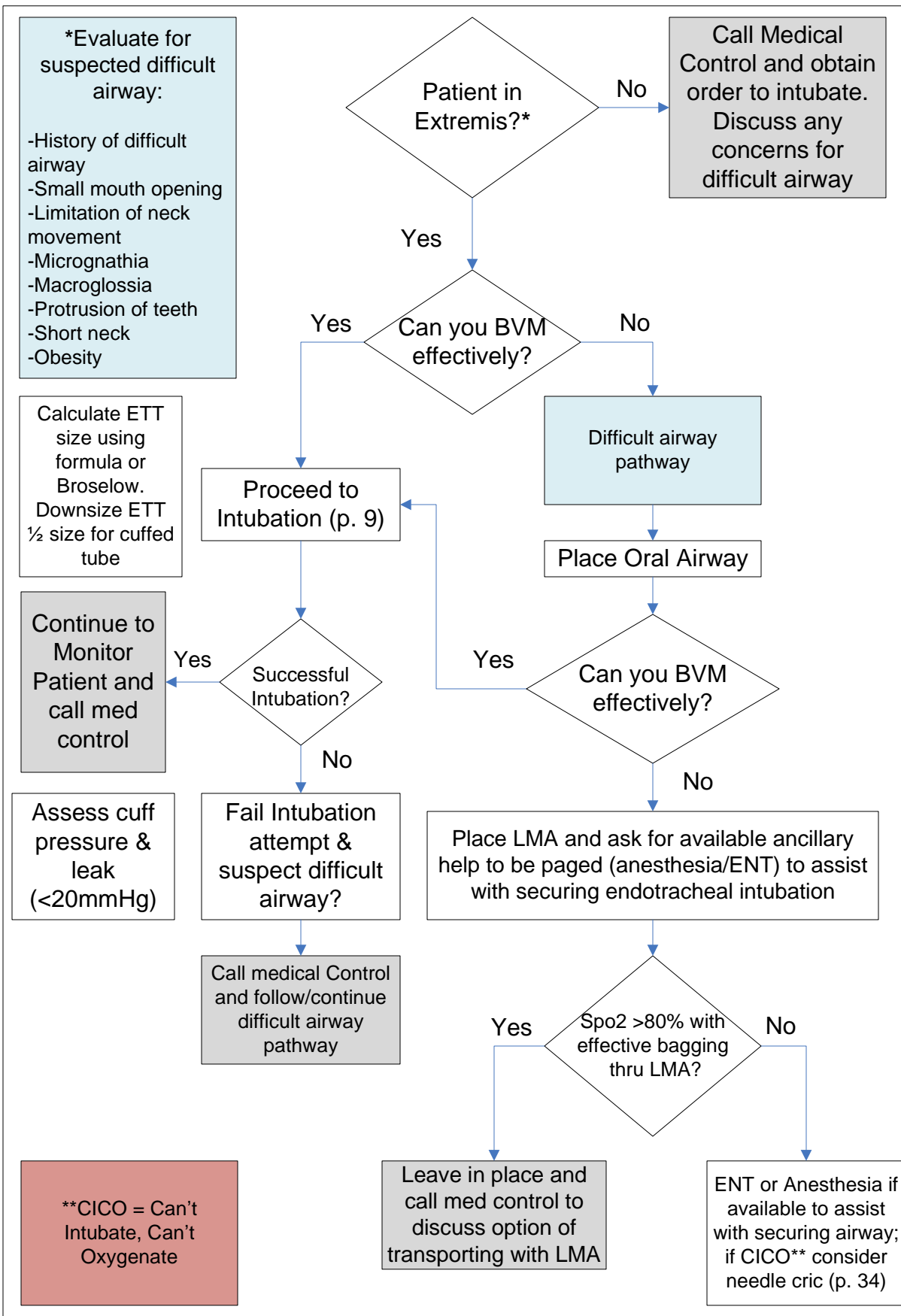
Children's Transport Patient Care Protocols **MEDICAL ASSESSMENT**

Place on cardiac monitor, pulse oximeter, blood pressure monitor

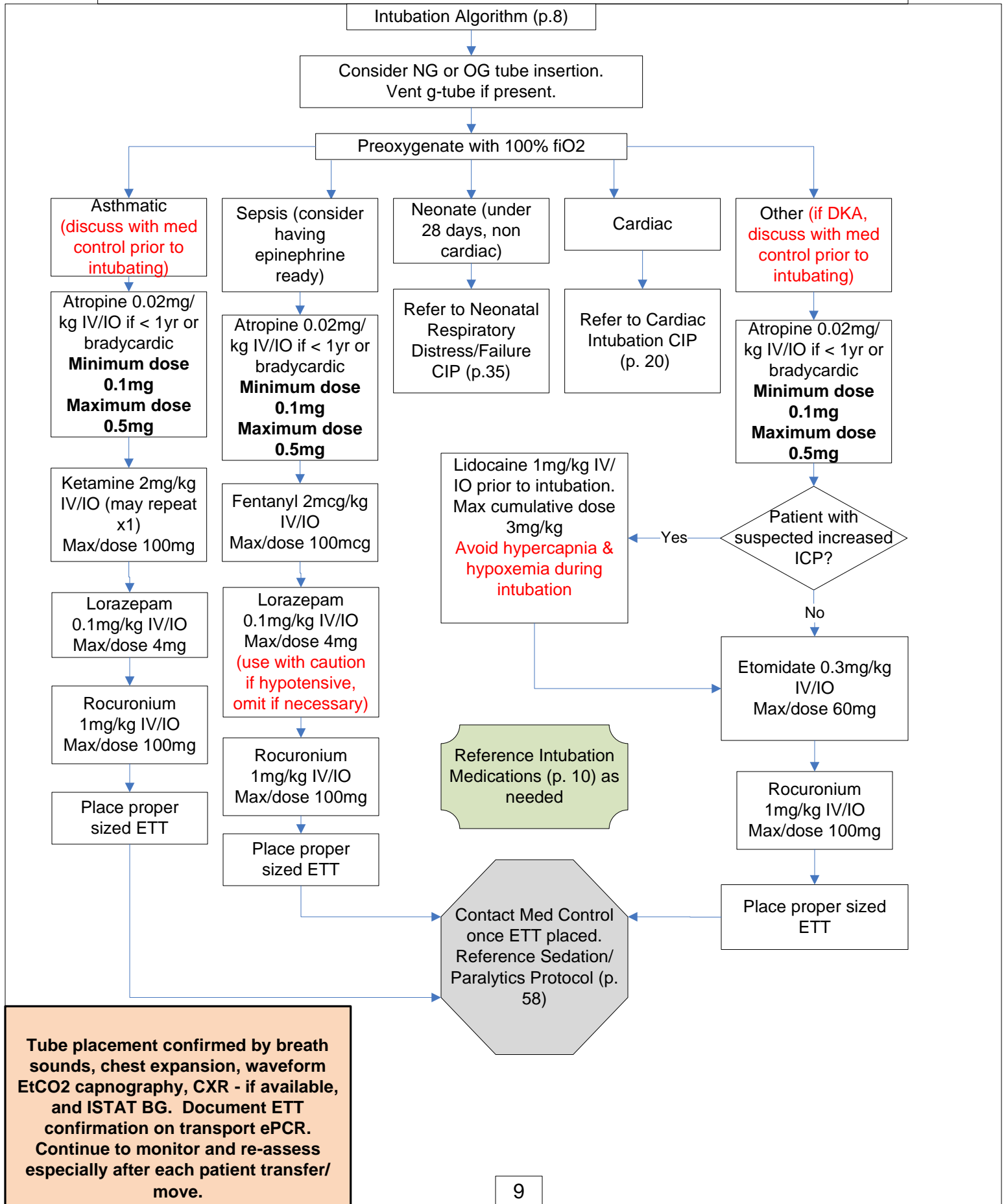
Maintain C-Spine immobilization if spinal injury is suspected



Children's Transport Patient Care Protocols Intubation/Difficult Airway Algorithm



Children's Transport Patient Care Protocols **AIRWAY/INTUBATION PROTOCOL**

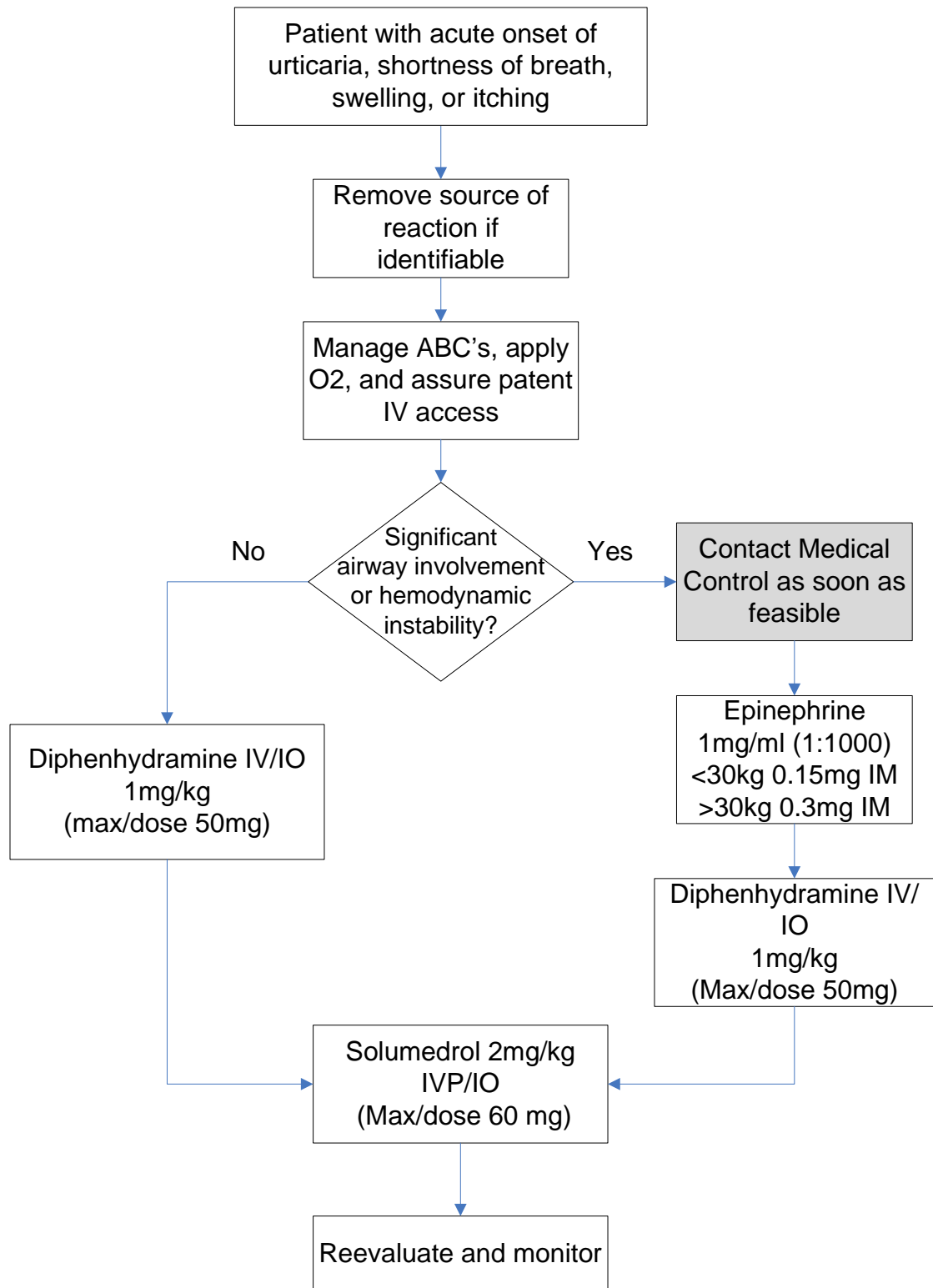


Children's Transport
Guideline
INTUBATION INDUCTION MEDICATIONS

CLASS/DRUG				
DOSAGE				
ONSET				
DURATION				
MIN/MAX				
Anticholinergic				
Atropine	0.02 mg/kg IV/IO	40-60 seconds	1-4 hours	minimum 0.1mg min/0.5mg max
Sedatives				
Midazolam	0.05-0.1 mg/kg IV/IO	60-90 seconds	<60 minutes	4 mg max
Lorazepam	0.05-0.1 mg/kg IV/IO	1-5 minutes	4-6 hours	4 mg max
Etomidate	0.3-0.6 mg/kg IV/IO	1 minute	4-10 minutes	60 mg max
Ketamine	1-2 mg/kg IV/IO	60-90 seconds	15-120 minutes	100 mg max
Propofol	2-2.5 mg/kg IV/IO	40 seconds	5-10 minutes	200 mg max
Paralytics				
Norcuron (Vecuronium)	0.1 mg/kg IV/IO	3-5 minutes	60-75 minutes	10 mg max
Zemuron (Rocuronium)	0.6-1.2 mg/kg IV/IO	45-60 seconds	15-150 minutes	100 mg max
Analgesics				
Fentanyl	1-2 mcg/kg IV/IO	Almost immediate	30 - 60 minutes	100 mcg max
Morphine	0.05-0.1 mg/kg IV/IO	5 – 10 minutes	1-2 hours	4 mg max

Paramedic is not approved or credentialed by agency or medical director to administer induction paralytic agent

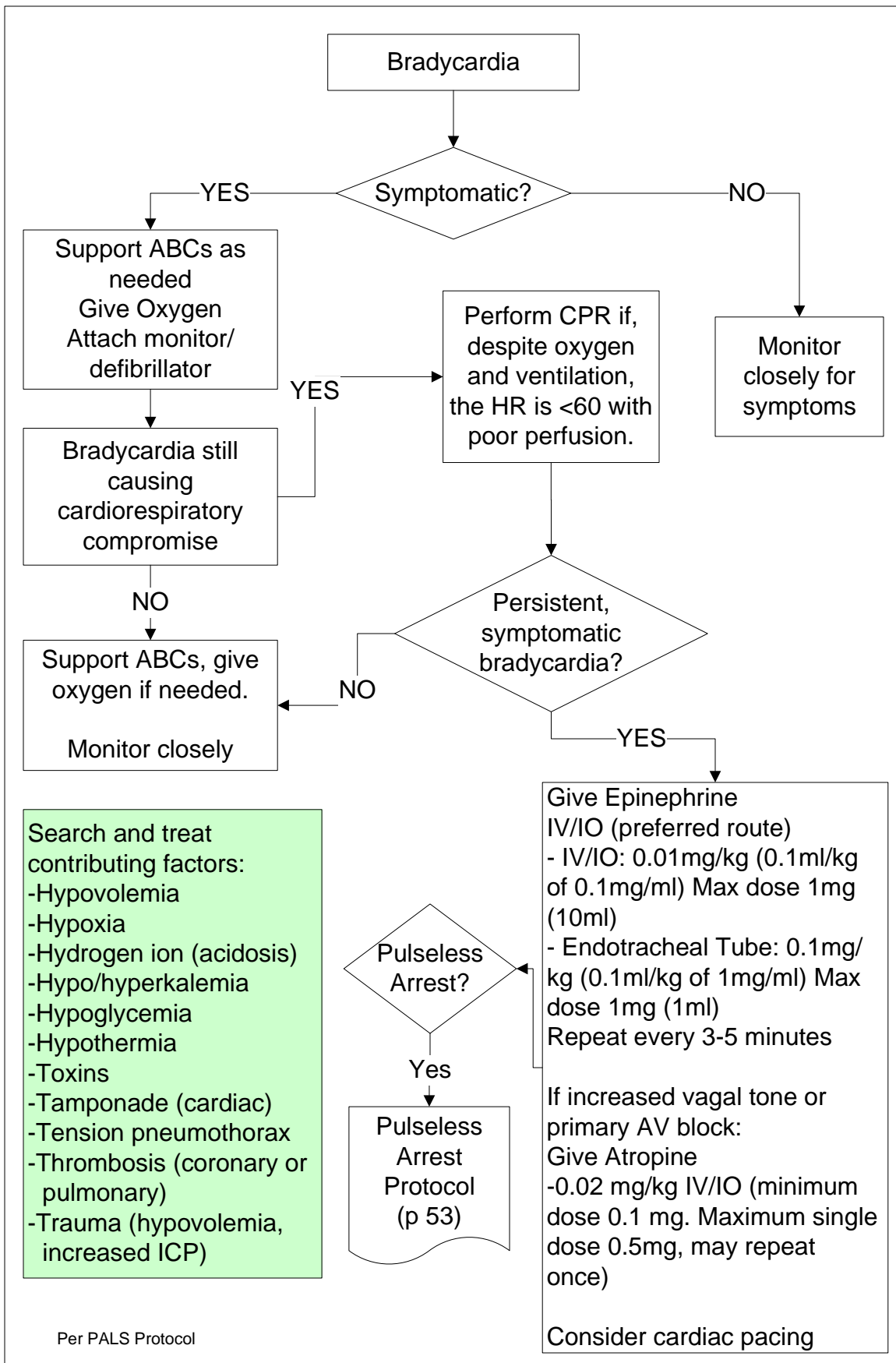
Children's Transport
Patient Care Protocols
Anaphylaxis / Allergic Reaction



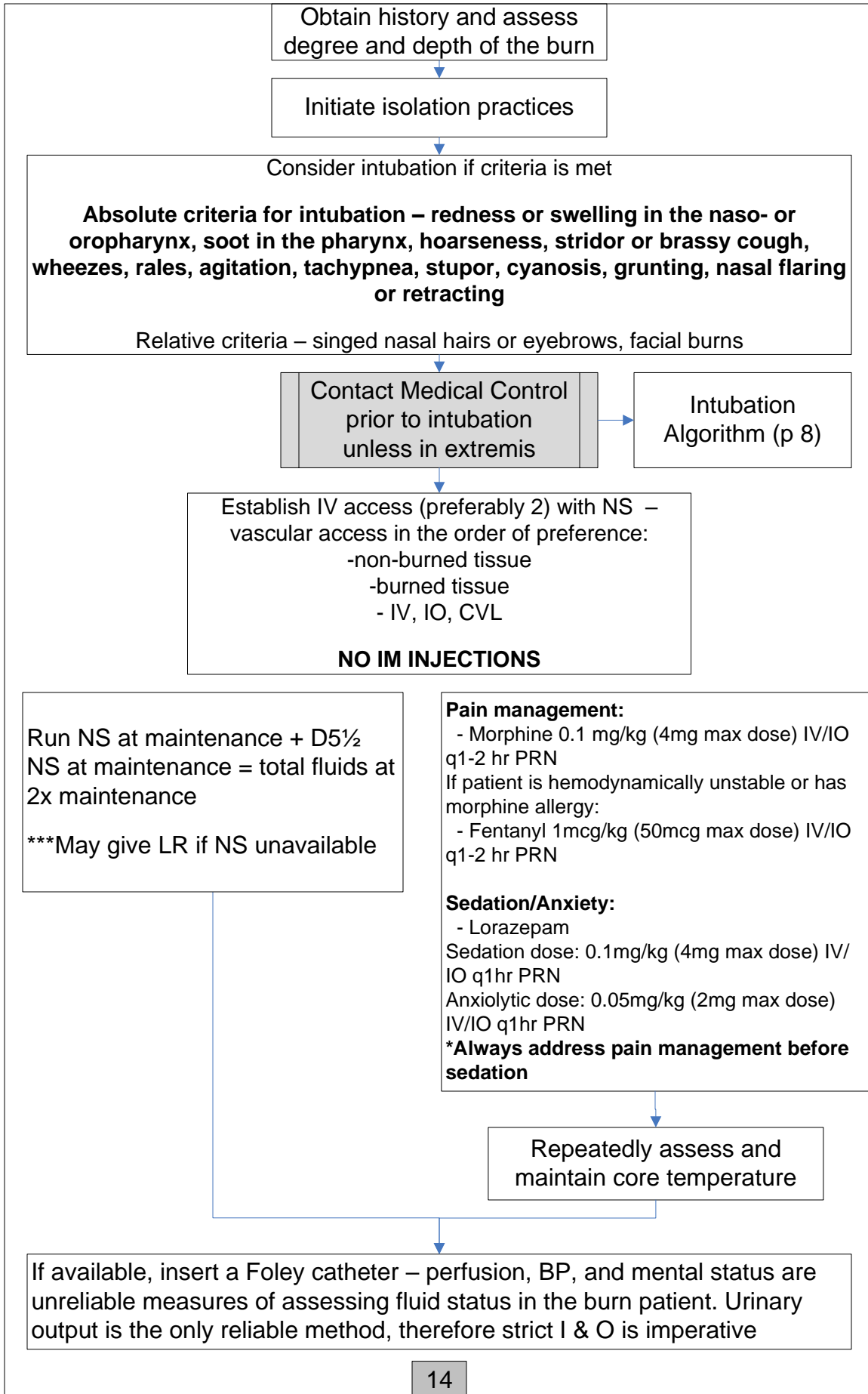
Children's Transport
Patient Care Protocols
ABNORMAL LAB VALUES

<p>Hypocalcemia Ionized calcium < 4.5</p> <p>↓</p> <p>Contact Medical Control/Orders May include the following</p> <p>↓</p> <p>Consider correcting if ionized calcium < 4 (< 4.5 cardiac/septic patient)</p> <p>Calcium Gluconate 100/mg/kg IV/IO over 1 hour** (Max/dose 1 gram)</p> <p>**Dilute Calcium Gluconate to 20mg/ml concentration. Use central line or largest PIV possible & do not exceed infusion rate of 100mg/min</p>	<p>Hypoglycemia (Serum Glucose < 70)</p> <p>↓</p> <p>Infant* (< 1 year old) – D10W – 1.0 gm/kg (10ml/kg) IV/IO</p> <p>Dilute below doses 1:1 with sterile water</p> <p>Child (>1 year old) – D50 – 0.5gm/kg (1ml/kg) IV/IO (Max. dose 25 gm)</p> <p>Child (>=8years old) – D50 – 0.5gm/kg (1ml/kg) IV/IO (Max. dose 50 grams)</p> <p>Check glucose in 15 min & repeat dextrose dose if no change or glucose <50. If glucose stable above 70, may check level q30 mins</p> <p>*If concern for fluid overload in infant, discuss D10 dosing with medical control.</p>	<p>Hypokalemia (K ≤ 3.5)</p> <p>↓</p> <p>Contact Medical Control/Orders May include the following</p> <p>↓</p> <p>Consider correcting if potassium <3</p> <p>Potassium Chloride 0.25 mEq/kg IV/IO over 1 hour (Max. dose 10 meq for <8yrs old. Max dose 20meq for >8yrs old)</p> <p>***Dilute 8 mEq/ 100cc NS for PIV</p> <p>***Dilute 1 mEq/ 1 cc NS for CVL</p> <p>NEVER BOLUS KCL</p>	<p>Hyperkalemia (K ≥ 6.5) Ensure sample not hemolyzed</p> <p>↓</p> <p>Contact Medical Control/Orders May include the following</p> <p>↓</p> <p>Consider correcting if potassium ≥6 and symptomatic Discontinue potassium in IV fluids if any</p> <p>Calcium Gluconate 100 mg/kg IV/IO over 10 minutes** (Max/ dose 1 gram)</p> <p>Sodium Bicarb 1 mEq/kg IV/IO diluted 1:1 with sterile water over 5 minutes (Max/dose 50meq) – flush well between meds</p> <p>Glucose and Insulin drip 0.5 gm/kg (5ml/kg) dextrose (max 250ml) + 0.125 unit/kg insulin (max 10 units). Combine & infuse IV/IO over 30 minutes.</p> <p>Nebulized Albuterol < 25kg = 2.5mg 25 – 50kg = 5mg > 50kg = 10mg</p>
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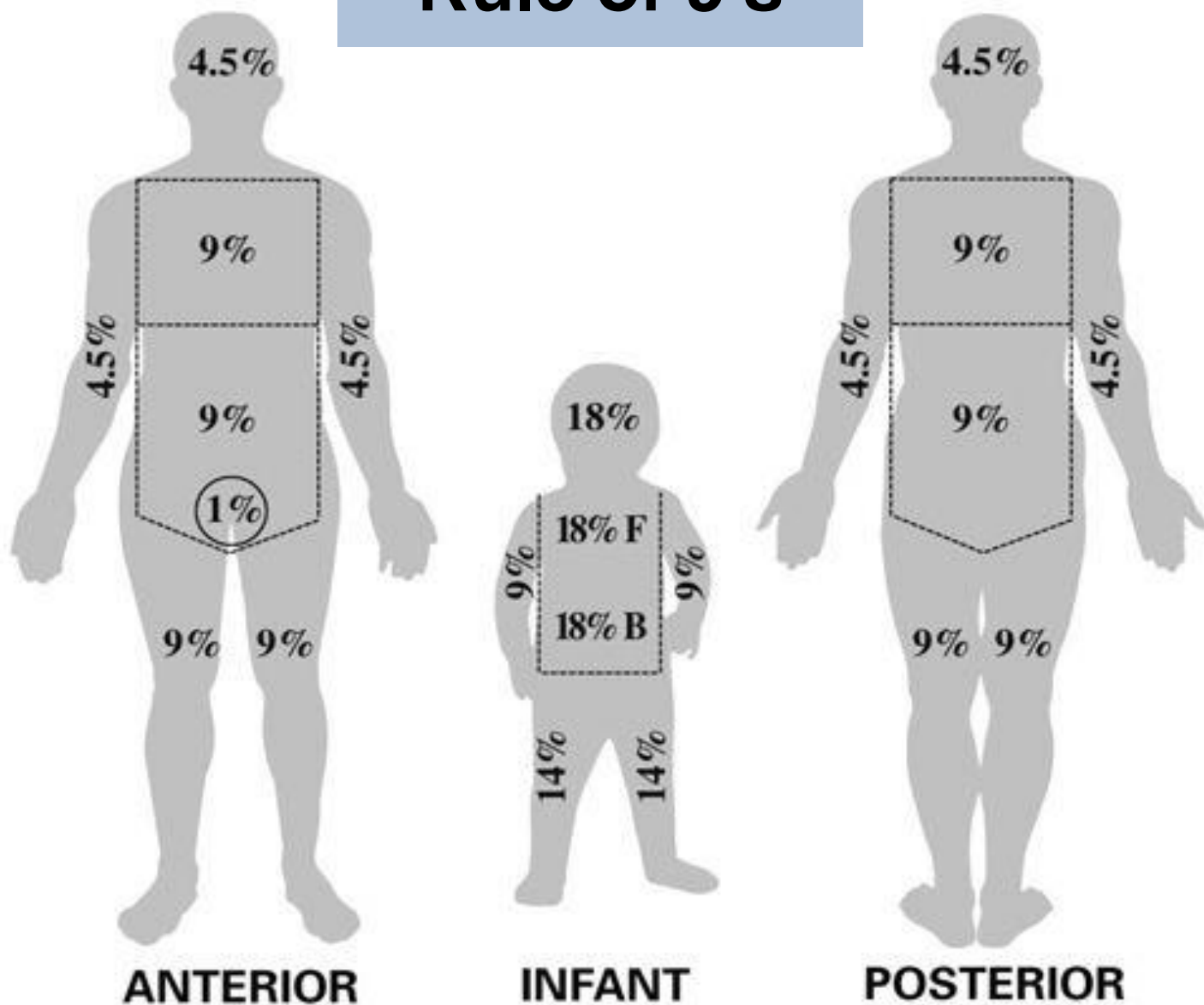
Children's Transport Patient Care Protocols **BRADYCARDIA**



Children's Transport
Patient Care Protocols
BURNS

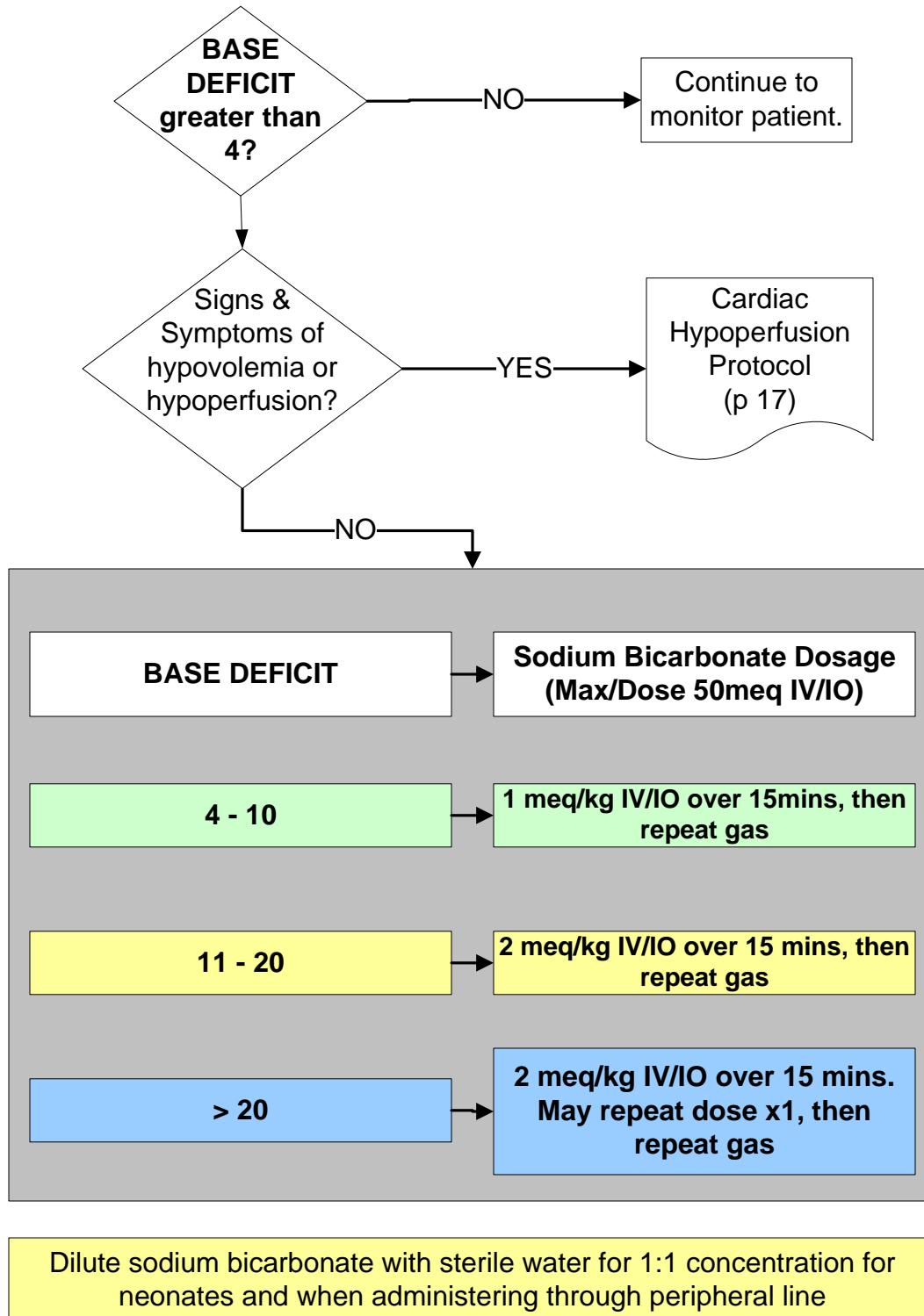


Rule of 9's



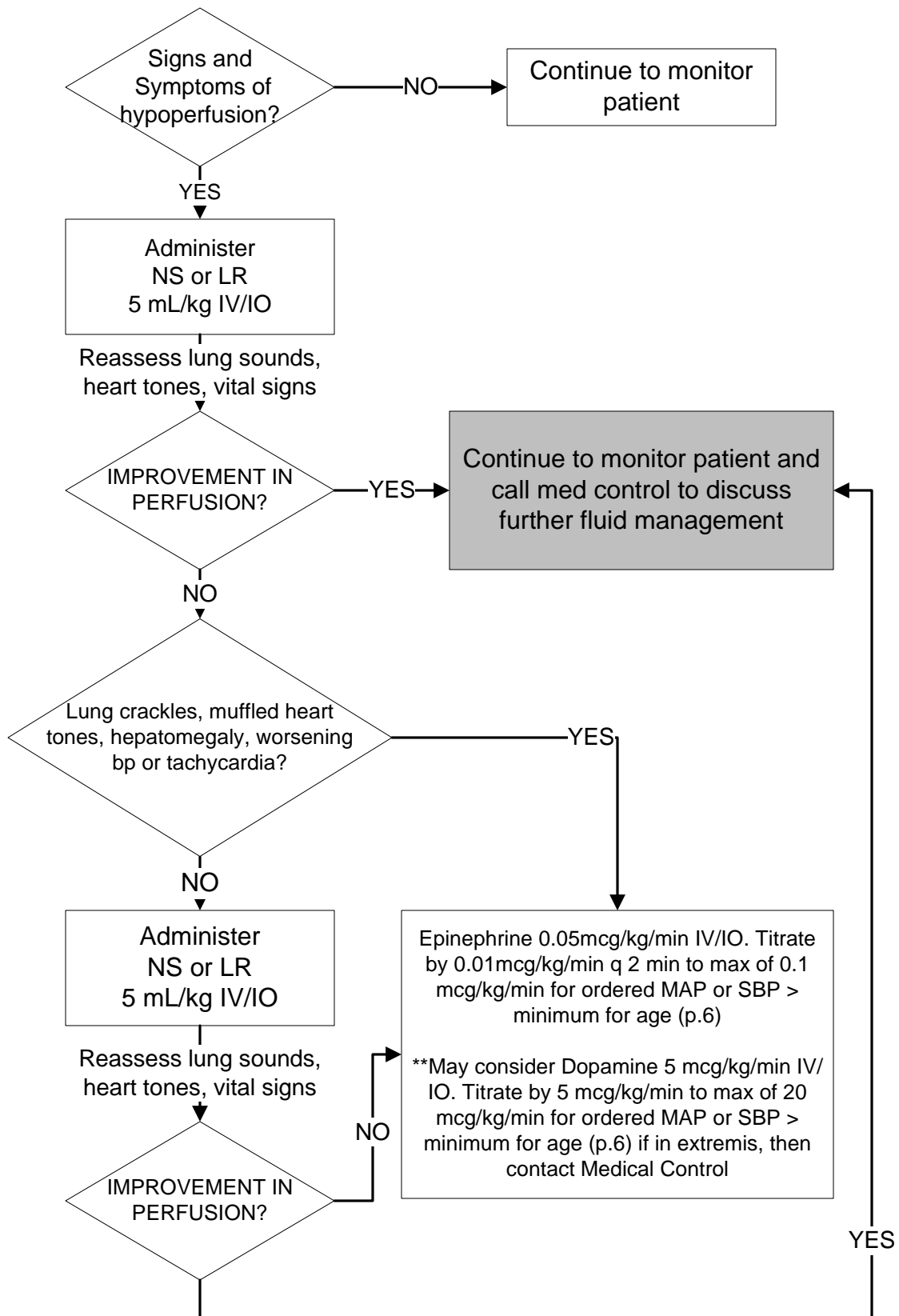
Children's Transport
Patient Care Protocols
CARDIAC ACIDOSIS

This protocol should be utilized as a guideline for rapid institution of therapies required by infants and children with cardiac anomalies



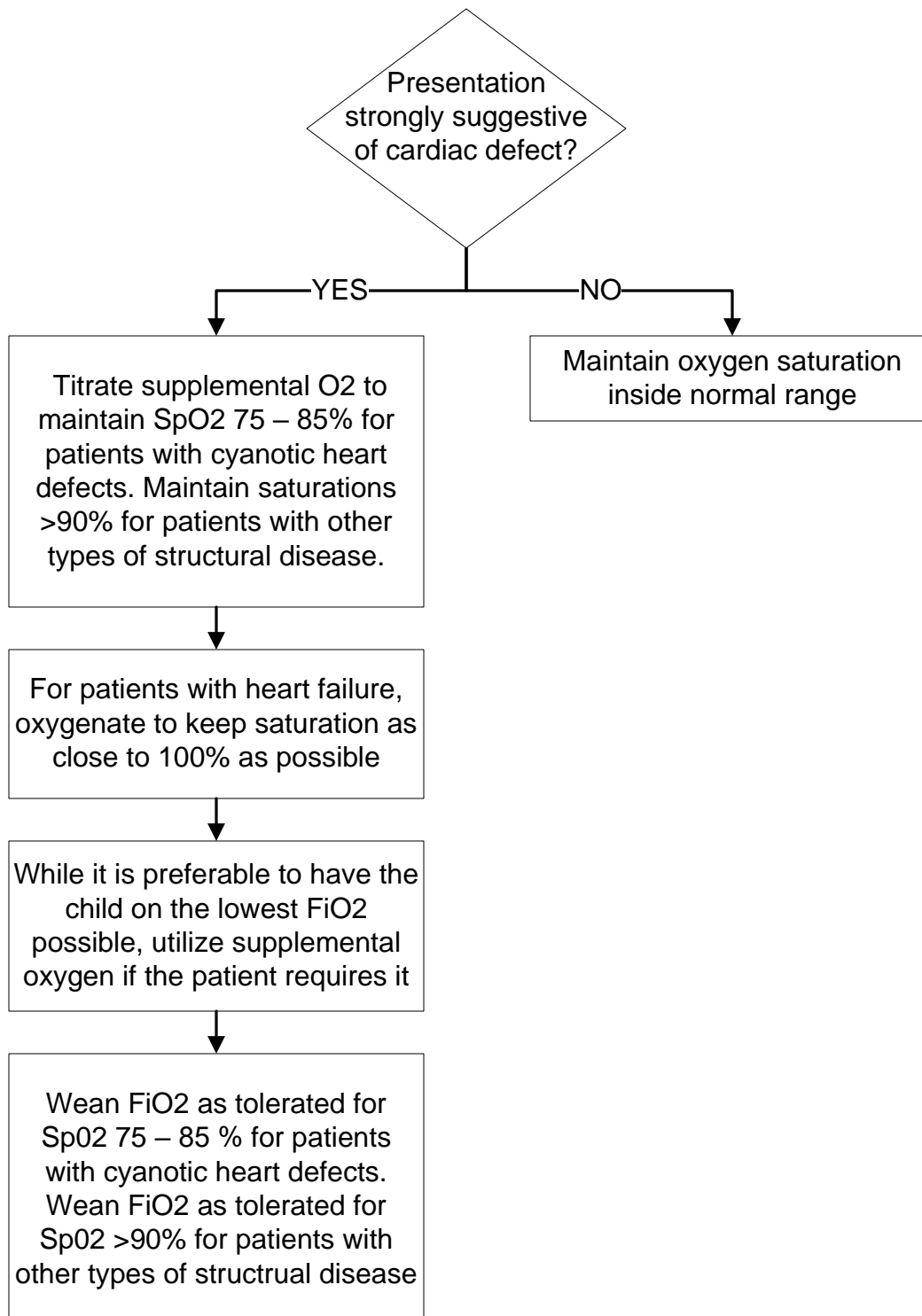
Children's Transport
Patient Care Protocols
CARDIAC HYPOPERFUSION

This protocol should be utilized as a guideline for rapid institution of therapies required by infants and children with cardiac anomalies



Children's Transport
Patient Care Protocols
CARDIAC SUPPLEMENTAL OXYGEN

This protocol should be utilized as a guideline for rapid institution of therapies required by infants and children with cardiac anomalies



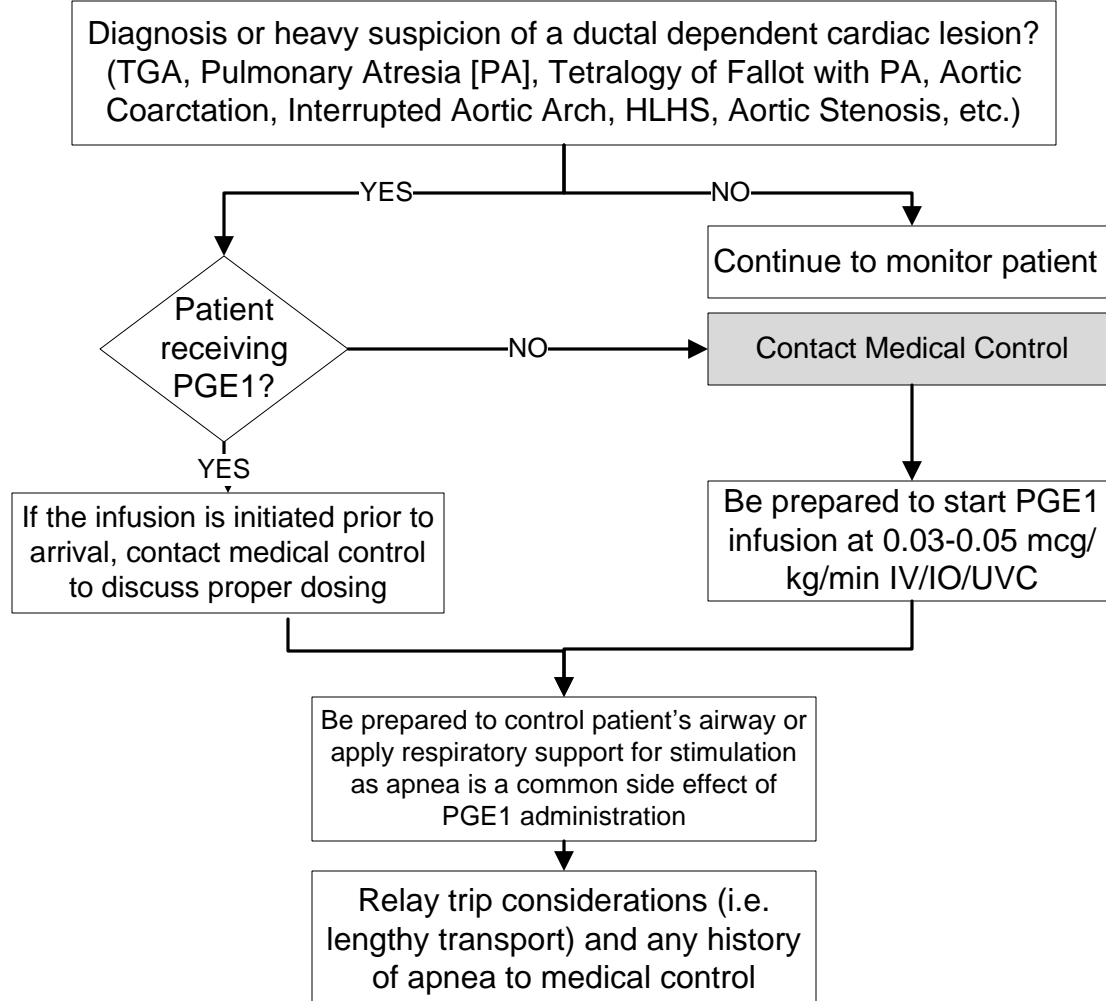
Children's Transport
Patient Care Protocols
CARDIAC PGE ADMINISTRATION

This protocol should be utilized as a guideline for rapid institution of therapies required by infants and children with cardiac anomalies.

PGEs will be taken on all patients < 30 days of age unless a definitive diagnosis obviously precludes need.

Check blood pressures in all 4 extremities and SaO₂ pre and post ductal in all patients up to 3 months of age with any suspicion of a cardiac lesion

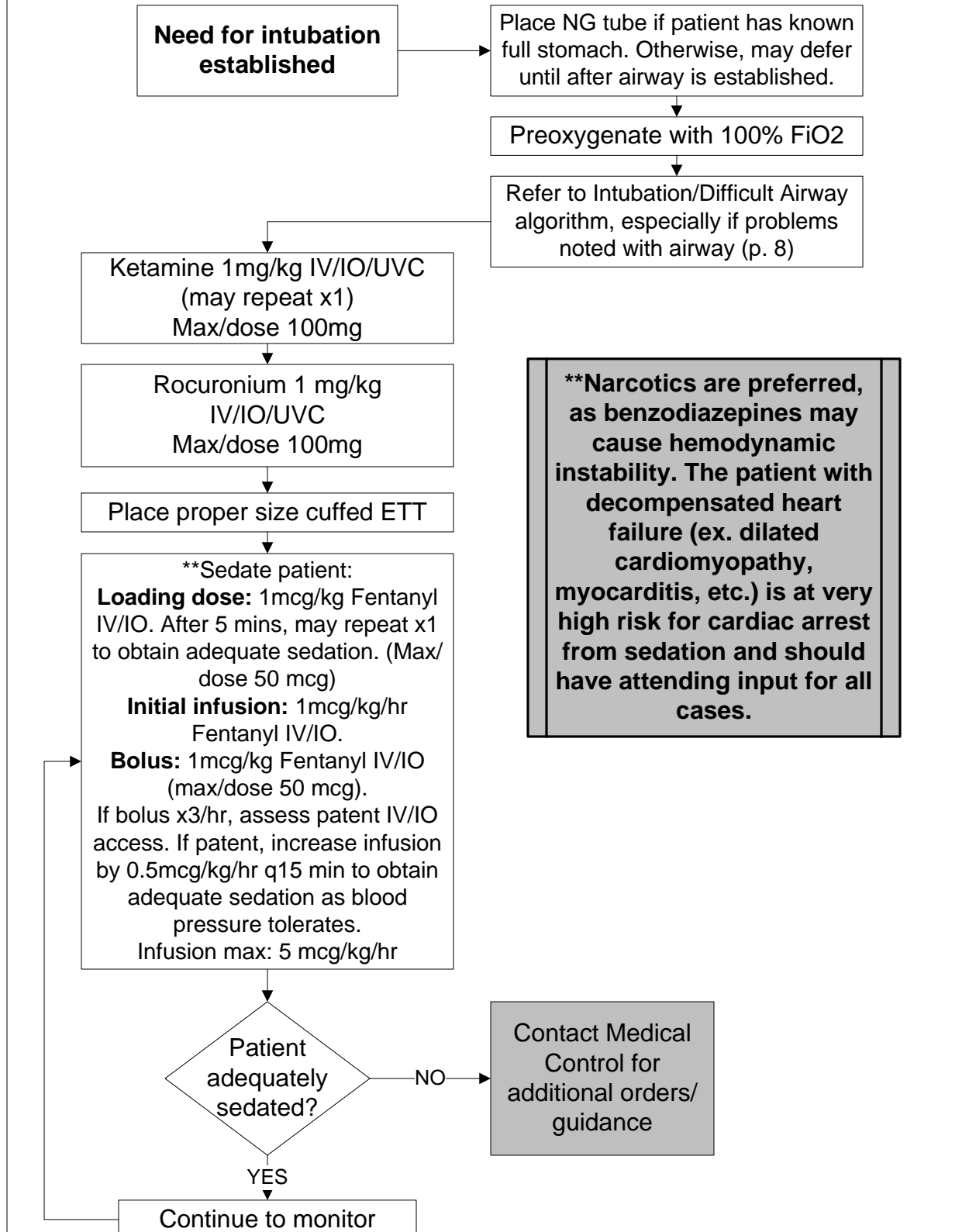
PGE 1 is not a benign drug; therefore the lowest therapeutic dose should be used. Doses outside the standard dose range (0.03 – 0.05 mcg / kg / min) requires the approval of the receiving cardiologist



Patients being transported with PDA dependent lesions who are compromised by a PDA that has closed (example is newly diagnosed HLHS who is acidotic) will benefit from higher doses of PGE 1. Discuss with med control, but frequently 0.05 - 0.1 mcg/kg/min IV/IO/UVC may be used until the PDA is open. Discuss possible need for intubation with medical control.

Children's Transport
Patient Care Protocols
CARDIAC INTUBATION

This protocol should be utilized as a guideline for rapid institution of therapies required by infants and children with cardiac anomalies



Children's Transport Patient Care Protocols Combative Patients

Every effort should be made to avoid transporting patients in a combative state

Patient responds to verbal reassurance, quiet environment, comfort measures, diversionary activities, provider interaction, or parental comforting

Yes

Transport and monitor for change

No

Patient continues to be combative or escalates aggressive behavior

Use Ativan first line for all patients:

Ativan 0.1mg/kg IV/IM
(Max/dose 2 mg)

If Ativan insufficient:

Patients > 3yrs give
Haldol Lactate
0.15mg/kg IM
(Max/dose 5mg)

If Haldol given, administer
Diphenhydramine 1mg/kg
IV/IM
(Max dose 50mg)

Contact Med Control
Physician if additional
doses needed

Contact medical control to
discuss physical restraint
orders and other options if
combative behavior is
continued

Refer to Department Policy
4.9 *Combative Patient* for
transport decisions

Refer to System Policy
1.20 *Medical Restraints*

Children's Transport
Patient Care Protocols
DIABETIC KETOACIDOSIS

DIAGNOSIS

Serum glucose GREATER than 250
pH < 7.3
Bicarb < 15 mEq
Ketones in urine or blood

Definition of Classic HHS*:

-glucose > 600 mg/dL
-serum CO₂ > 15 mmol/L
-small or no ketones
-Altered mental status
Contact Med Control and
do not start DKA protocol

****Poor Perfusion =**

Cool extremities
Capillary refill > 3
seconds Hypotension
(as defined in Vital Sign
Policy 23.00)

If not given at referring facility:
Give NS/LR 10cc/kg bolus IV/IO over
30 min
Repeat x1 if pt has poor perfusion**

K ≤ 5.5

K > 5.5

Maintenance Fluids

NS with 20 mEq KCL 1.5 times
maintenance rate IV/IO

(The addition of 20 mEq K phosphate is
acceptable if already in place by
referring)

If new onset DKA, prior to
insulin initiation, draw **red**
top tube for insulin level
if able.

Maintenance Fluids

K+ >5.5 or no UOP use
NS only 1.5 times
maintenance rate IV/IO

Add KCL and K Phos
after urine output
established (as available)

Insulin Drip (HIGH ALERT MEDICATION)

Dose 0.1 units/kg/hr or 0.1 mL/kg/hr IV/IO of 1 unit/mL
concentration

If premixed 1unit/mL insulin bag is not available, add 100 units
regular insulin to 100cc NS = 1 units/mL

Correct metabolic abnormalities - **Acidosis causes
hyperkalemia, which self-corrects when acidosis is
corrected. Sodium Bicarbonate is contraindicated in
pediatric DKA due to increased incidence of cerebral edema.**

Abnormal
Lab Values
(p 12)

Repeat glucose checks every 30 minutes. If glucose dropping ≥
100 mg/dL per hour, call med control for further instruction. When
serum glucose 250 mg/dl run D10W and NS 1:1 at 1.5x MIVF
rate IV/IO.

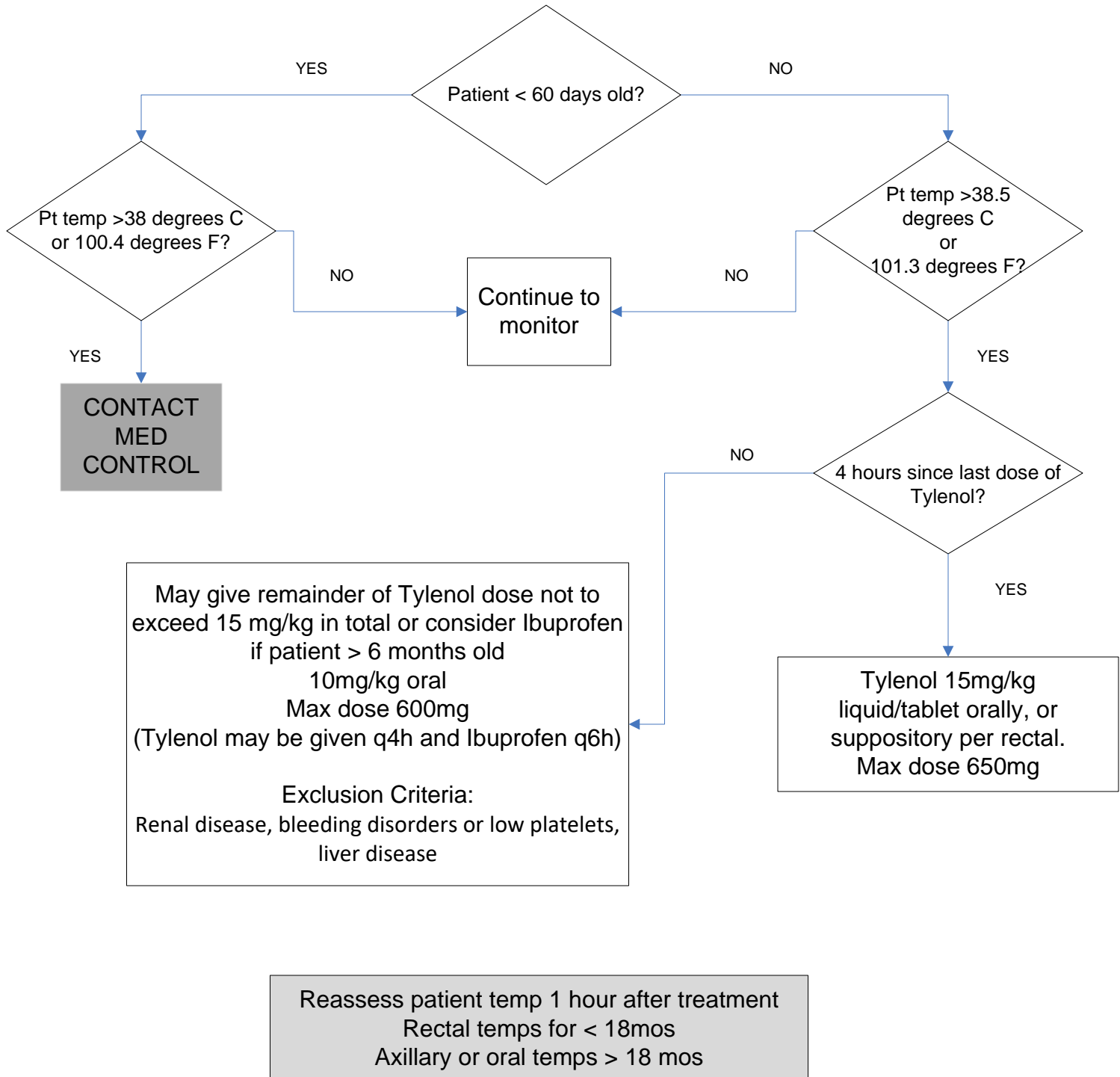
Monitor neuro status frequently. If intubation is anticipated, call
med control immediately.

DKA patients are at risk for cerebral edema – Discuss hypertonic
saline 5mL/kg IV/IO with Med Control

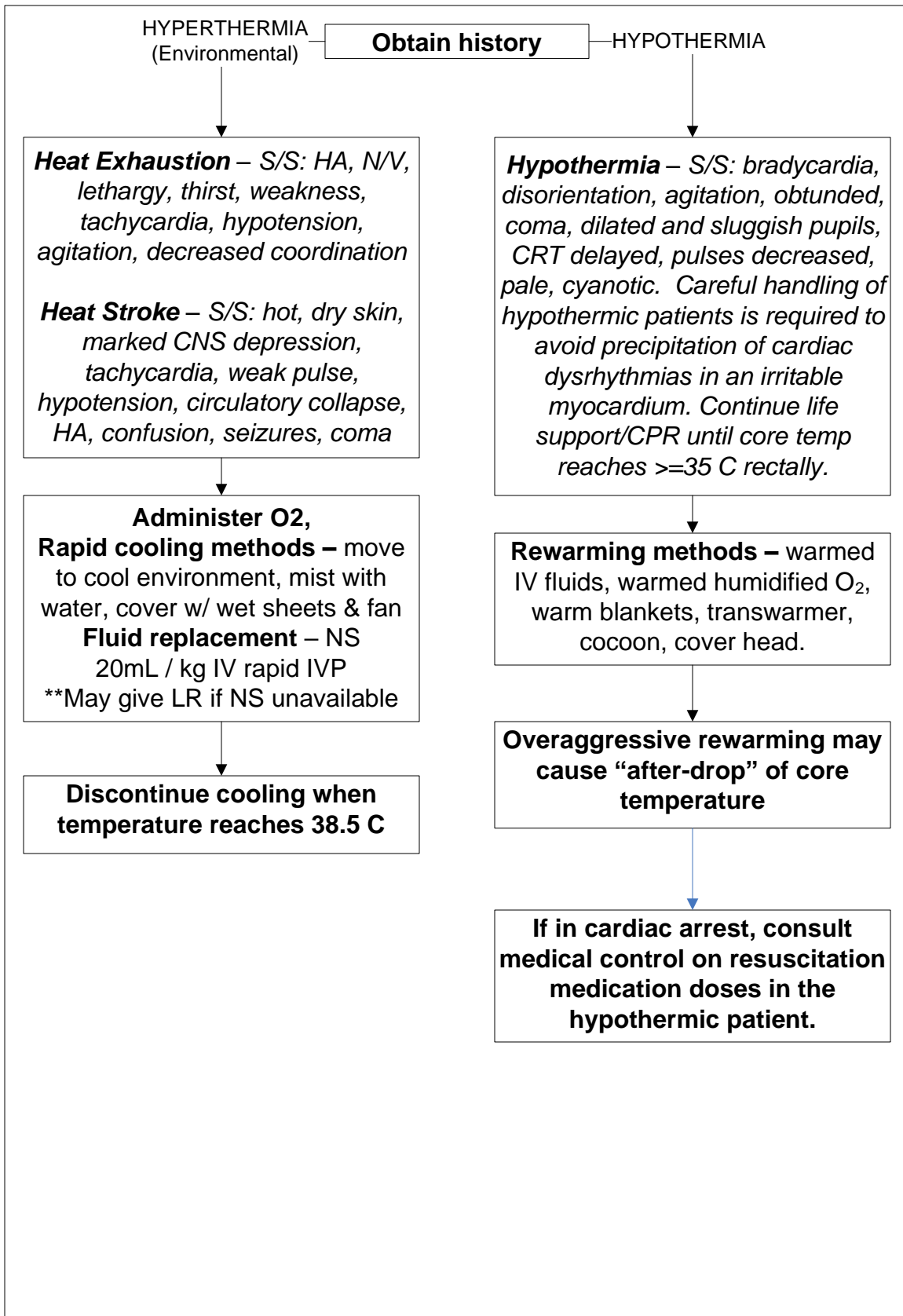
Neuro
Protocol
(p 50)

Children's Transport Team
Patient Care Protocols
Fever

Exclusion criteria:
Trauma
Stridor, moderate or severe retractions
Drooling (suspicion of epiglottitis)
History of liver disease
Immunosuppressed patient



Children's Transport Patient Care Protocols Hyperthermia/Hypothermia



Children's Transport
Patient Care Protocols
Heliox 80/20

Must be ordered by Med Control and available on ground transport

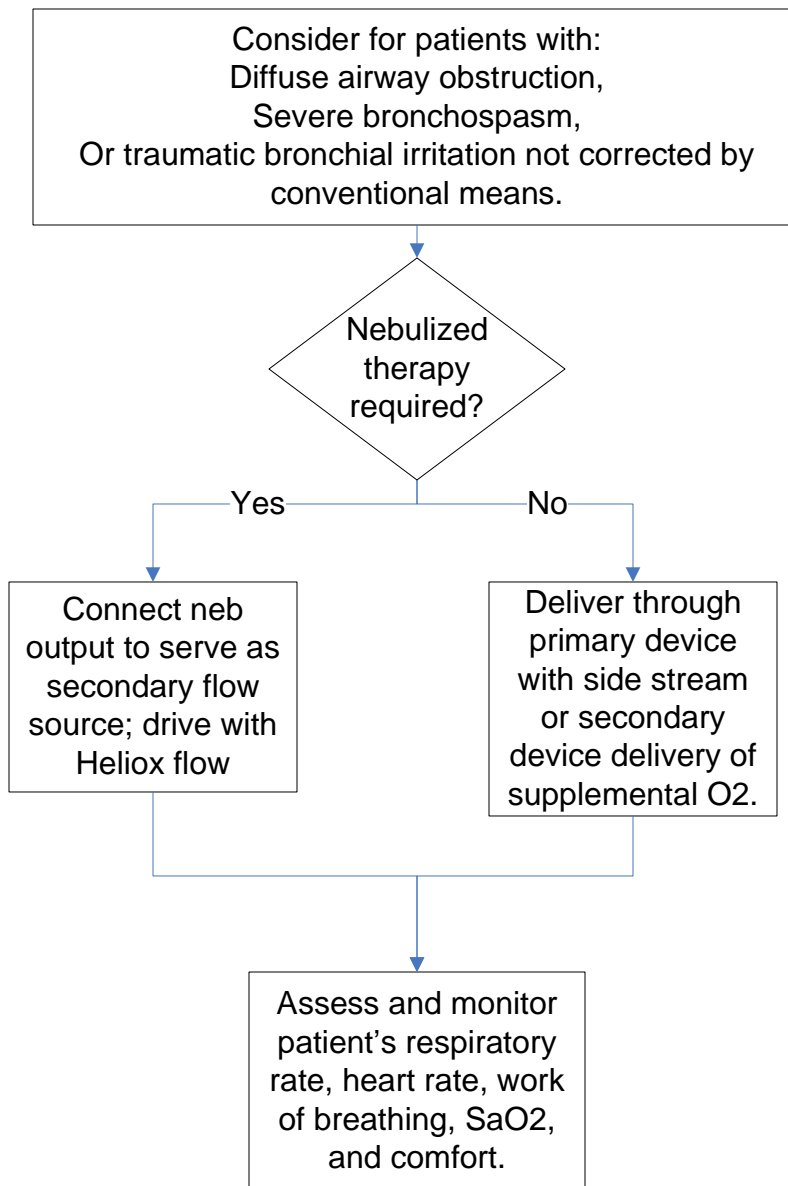
Qualifying patients
will have < 0.4
FiO₂ requirement

Concurrent
administration of > 0.4 FiO₂ with
Heliox may render
therapy
ineffective.

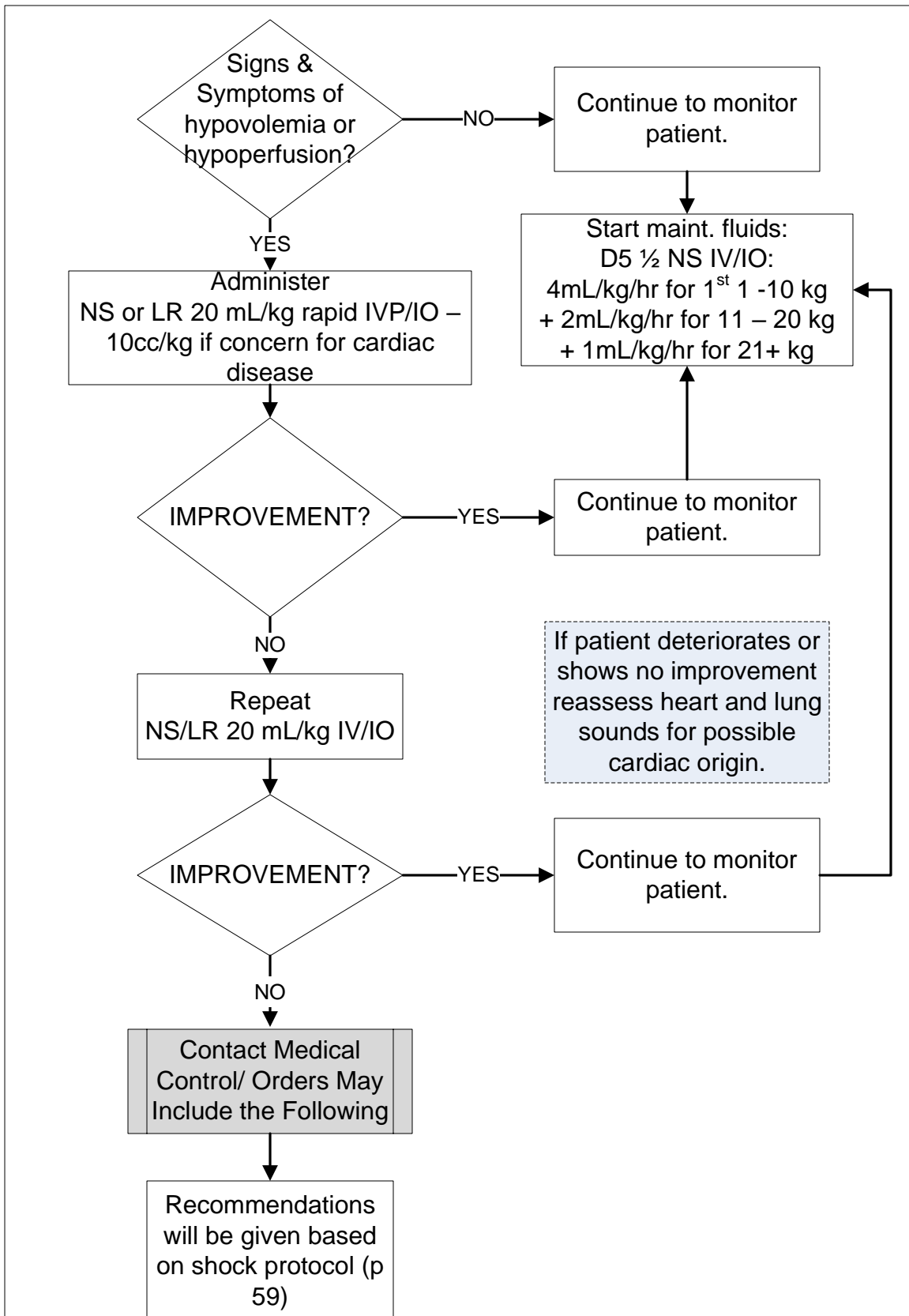
Heliox delivered
via ETT or BiPaP
requires RRT
unless approved
by Medical Control

Heliox
administration
requires a
minimum of 1
LPM supplemental
O₂

Heliox should be
delivered through
a device that
provides for
minimal room air
entrainment.



Children's Transport
Patient Care Protocols
FLUID RESUSCITATION



Children's Transport Patient Care Protocols High Flow Nasal Cannula

For use in the spontaneously breathing hypoxic or hypercarbic patient with: increased WOB, apnea of prematurity, other signs of respiratory distress.

When possible,
obtain initial gas
and repeat once
patient is on
stable settings

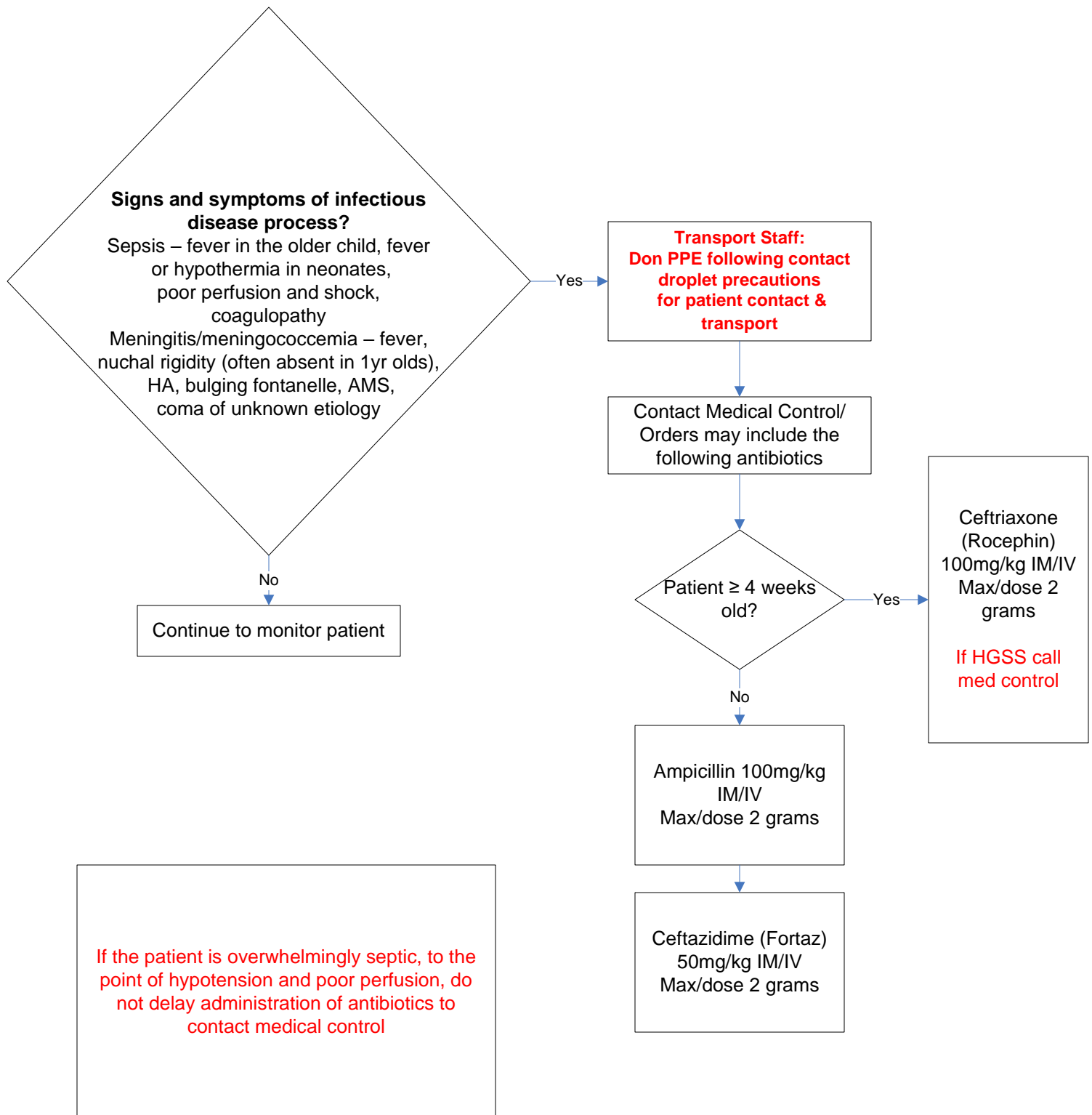
**Initiation of High Flow Nasal Cannula
requires a medical control order**

≤ 1yr: start at 1 lpm/kg. Adjust flow rate to assist with breathing. Med control must order flow rates exceeding 2lpm/kg or 20 lpm and/or $fiO_2 > 0.5$. Max rate is at the discretion of med control.

> 1yr: start at 10 lpm total flow. Adjust flow rate to assist with breathing. Med control must order flow rates exceeding 2lpm/kg or 20 lpm and/or $fiO_2 > 0.5$. Max rate is at the discretion of med control.

Consider adding heat and humidity to any nasal cannula flow greater than 2lpm. Heat alone does not make the cannula “high flow”. All cannulas classified as high flow require use of a high flow nasal cannula interface device and heated-humidity circuit and are documented as HFNC. The HFNC definitions and heat recommendation listed above do not apply to pediatric or adult patients with chronic oxygen requirement.

Children's Transport
Patient Care Protocols
INFECTIOUS DISEASE



Children's Transport Patient Care Protocols **INTRAOSSEUS ACCESS Algorithm**

Need for Intraosseous Access established:

- Unable to initiate peripheral IV access per PALS guidelines and/or CHOA policy, and
 - Specific need for medications / fluids



Call Medical Control Physician prior
to initiation unless patient is in
extremis

Contraindications

- Fracture of tibia or femur
- Previous orthopedic procedures or IO insertion in previous 24 hrs
- An extremity compromised by a pre-existing medical condition (ex. Tumor, peripheral vascular disease)
- Infection over insertion site
- Inability to locate landmarks (relative contraindication)
- Excessive tissue over insertion site (relative contraindication)

Sites

- Proximal tibia - 1-3 cm (approximately 1 finger width) below the tibial tuberosity on the anteromedial surface of the tibia
- Distal femur
- Distal tibia

With medical control consultation only:

- Anterior superior iliac spine
- Proximal humerus

Procedure

- Locate site
- Assess for contraindications
- Support leg on firm surface
- Clean site using sterile technique

EZ IO:

- Prepare needle and driver set
- Insert EZ IO needle through subcutaneous tissue at 90° angle until touching bone. If black line seen, initiate drill.
- Remove driver from needle set
- Remove stylet from catheter
- Connect extension set
- Confirm placement: assess for extravasation, bone stability, ease of flushing – instill 2% lidocaine 0.5mg/kg (max 40mg) in conscious pt OR NS (5ml for peds)
- Secure tubing and catheter
- Start infusion with pressure (bag or pump)
- Maintain fluids KVO at all times if not in use
- If site is clear but not flowing well re-flush with NS

Children's Transport
Patient Care Protocols
METHEMOGLOBINEMIA

CAUSES- sulfa drugs, foods with nitrates, aniline dyes, mothballs, numbing sprays, Oragel, diarrhea, and acidosis in neonates and young infants

Signs and symptoms - fatigue, dyspnea, altered mental status and functioning

Skin – slate gray in color, cyanosis when met hgb reaches 10-15%, often confused with cyanotic heart disease since 100 % FiO₂ does not correct cyanosis

ABG – blood is dark despite pO₂ values – **Hallmark sign**

Metabolic Acidosis

Decreased neuro functioning with levels >50%, fatal at > 70%

Contact
Medical
Control



Transport on 100 % FiO₂

Treatments

Discuss possible diagnosis and treatment with medical control.

Met Hgb > 30% - Methylene blue 1-2 mg/kg IV over 5-10 minutes – **color improves within 1 hour of administration**

Children's Transport
Patient Care Protocol

MIXING MEDICATIONS-ANTIBIOTICS

IV Antibiotics

Antibiotic	IV Dosage	Max IV Concentration	IV Infusion Rate	IV Reconstitution Vial:diluent=conc	Max Dose
Ampicillin	25-100 mg/kg/dose	<500mg 100mg/mL >500mg 30mg/ml	3-5 min IVP 15-30 min infusion	1G:9.8mL=100mg/mL	2 Grams
Cefazolin (Ancef)	25 mg/kg/dose	100 mg/mL IVP ≤ 20 mg/mL infusion	3-5 min IVP 10-60 min infusion	500mg:2ml SWFI = 225mg/ml Further dilute with NS or D5W for appropriate conc. for IVP or infusion	2 Grams
Ceftazidime (Fortaz)	30-50mg mg/kg/dose	100 mg/mL IVP 50 mg/mL infusion	3-5 min IVP 10-30 min infusion	USE STERILE WATER 1G:9.6mL=100mg/mL	2 Grams
Ceftriaxone (Rocephin)	50-100 mg/kg/dose	40 mg/mL	30-45 min infusion	USE STERILE WATER 1G:9.6mL=100mg/mL	2 Grams
Gentamicin	1.5-4 mg/kg/dose	2 mg/mL	30 min infusion (DO NOT IV PUSH)	Vial concentration 10 mg/ml -OR- 40 mg/mL Check Carefully	120 milligrams
Vancomycin	15-20 mg/kg/dose	5 mg/mL	60 min infusion	500mg:10mL=50mg/mL	1 Gram

IM Antibiotics

Antibiotic	IM Dosage	Max IM Concentration	IM Reconstitution Vial:diluent=conc
Ampicillin	25-100 mg/kg/dose	250 mg/ml	MIX with Sterile Water 1G:3.4mL=250mg/mL
Ceftriaxone (Rocephin)	50-100 mg/kg/dose	350 mg/mL	MIX with 1% Lidocaine 1G:2.1mL=350mg/mL

Children's Transport
Patient Care Protocols
MIXING MEDICATIONS-PRESSORS

Epinephrine/Norepinephrine 1 mg/mL vial

Desired Final Concentration	mL Needed	mL NS to make 50 mL volume
16 mcg/mL	0.8	49.2
32 mcg/mL	1.6	48.4

Vasopressin 20 unit/ml vial

Label: Vasopressin for Shock

Desired Final Concentration	mL Needed	mL D5W to make 100ml volume
0.1 unit/ml	0.5	99.5 (withdraw 0.5ml from 100ml bag)

PGE 1 500 mcg/mL vial

Desired Final Concentration	mL Needed	mL NS to make 50 mL volume
10 mcg/mL	1	49

Terbutaline 1mg/ml vial

Desired Final Concentration	mL Needed	mL NS to make 10 mL volume
0.5 mg/ml	5	5

Naloxone 0.4mg/ml vial

Desired Final Concentration	mL Needed	mL NS to make 100 mL volume
4mcg/ml	1	99 (withdraw 1ml from a 100ml bag)

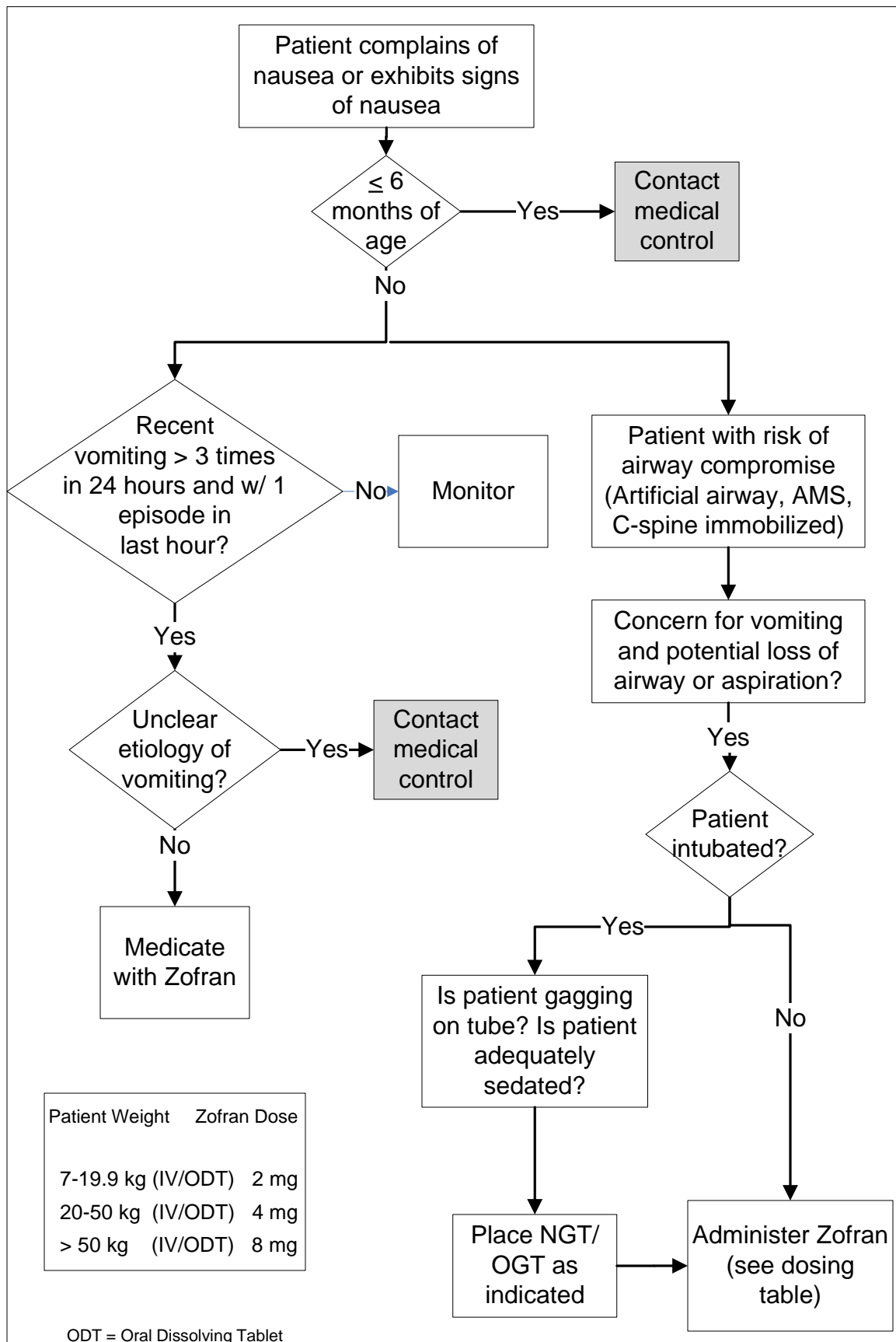
Lidocaine 20mg/ml vial

Desired Final Concentration	mL Needed	mL NS to make 50 mL volume
4mg/ml	10	40

Electrolytes

Medication	Dilution	Max Dose
KCL	8meq/100cc NS or 0.2 meq/ml	< 8yrs old 10 meq > 8yrs old 20 meq
Mag Sulfate (500mg/ml)	Dilute 2 ml (1000 mg) of mag sulfate with 8ml of NS = 100mg/ml	2000mg
Calcium Gluconate (100mg/ml)	Dilute 10 ml (1000 mg) of calcium gluconate with 40 ml of NS = 20 mg/ml	1000mg
Calcium Chloride (100mg/ml)	Dilute 10 ml (1000 mg) of calcium chloride with 40 ml of NS = 20 mg/ml	1000mg

Children's Transport Patient Care Protocols NAUSEA/VOMITING



Children's Transport
Patient Care Protocols
NEEDLE CRICOTHYROTOMY Algorithm

Can't Intubate, Can't Oxygenate (CICO)
scenario such as:

- Acute upper airway obstruction that cannot be relieved using basic airway positioning maneuvers, finger sweep, or tracheal visualization and Magill forceps removal
- Respiratory arrest with facial or neck anatomy or injury that make endotracheal intubation impossible

Contact Medical Control

Prepare the neck with
antiseptic solution

Locate the cricothyroid membrane: The small midline indentation just below the protuberance to the thyroid cartilage (Adam's apple)

Stabilize the trachea; insert a 14-gauge (or 16-gauge) angiocath, with a syringe attached, into the middle of the cricothyroid membrane, with the needle at a 45-degree angle (pointed downward). Aspirate with the syringe as the needle is inserted (2 –3 mL NS may be placed in the syringe to assist with air bubble visualization)

When air returns into the syringe the trachea has been entered. Stop needle insertion and advance the catheter downward and remove the needle from the trachea.

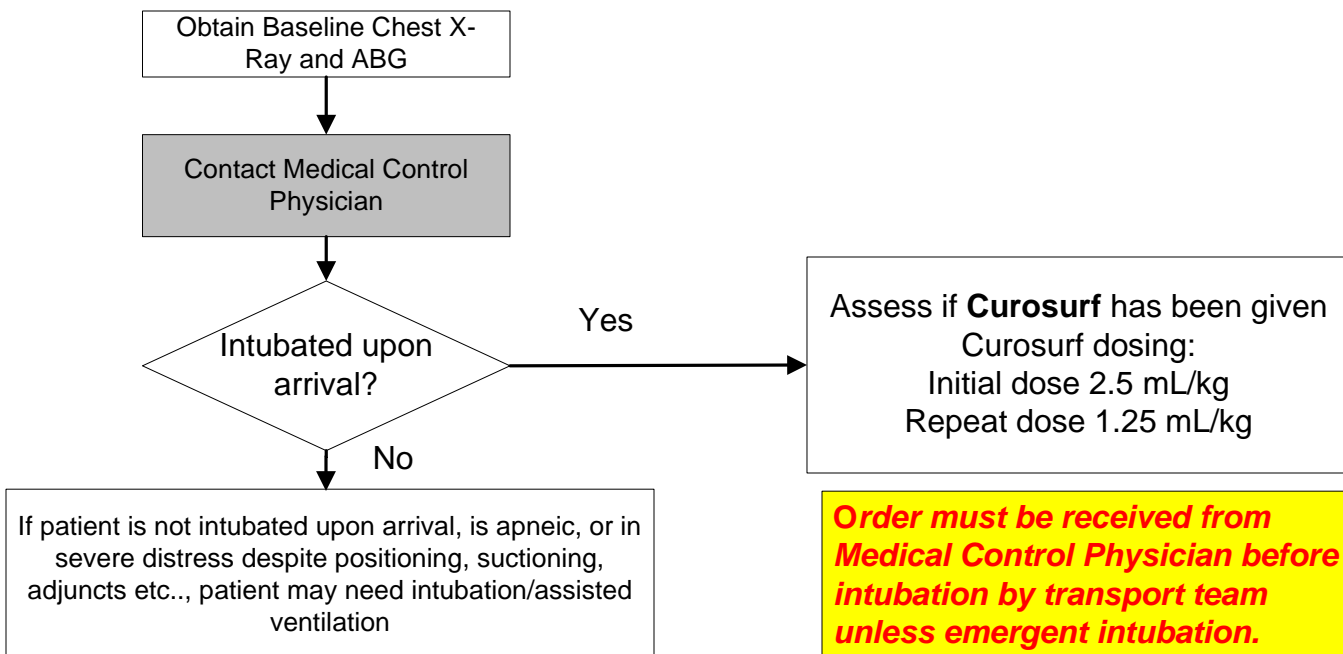
Connect the catheter using adapter from 3.0 ETT, connect to BVM and ventilate every 2-3 seconds.

Rapid disposition of patient to secure a definitive airway is required!

Children's Transport Patient Care Protocols

NEONATAL RESPIRATORY DISTRESS/FAILURE (1)

NOTE: if patient has known or suspected congenital heart disease, see **Cardiac Supplemental Oxygen Protocol (p 18)** before initiating supplemental oxygen



Guidelines for Surfactant Replacement Therapy:

Pre-Curosurf Replacement Therapy

1. **Order must be received from Medical Control Physician before administration of surfactant by transport team**
2. Consider surfactant for infants:
 - <32 weeks gestation at significant risk for RDS
 - With RDS confirmed by clinical and radiologic findings
 - Requiring endotracheal intubation
3. Obtain ABG, confirm patient weight and ETT placement.

Curosurf Replacement Therapy

4. Position infant flat and midline, pre-oxygenate and suction. If the dose you are giving is the initial dose, you will give in two equal aliquots. Rapidly administer $\frac{1}{2}$ the total dose (one aliquot) via ETT Tube. After the first aliquot is given, immediately manually bag the patient for 1 minute. Repeat with second aliquot. After the second aliquot is given, immediately bag the patient for 1 minute. Do not rotate the patient side to side, keep the patient flat and midline. Do not suction patient for at least 1 hour after dose given.

Monitoring

5. Monitor HR, RR, BP, oxygen saturation, chest expansion, work of breathing, perfusion during and after administration. Re-evaluate breath sounds and aeration after administration.
6. Curosurf therapy produces rapid improvement in lung oxygenation and compliance that may require immediate reduction in ventilator pressures. Notify Medical Control Physician of response to Curosurf replacement therapy.
7. Be prepared for and aware of complications:
 - Decreased oxygen saturations
 - Decreased chest expansion, pneumothorax
 - Pulmonary hemorrhage
 - Hypotension, hypoperfusion
 - Bradycardia
 - ETT obstruction

Children's Transport
Patient Care Protocols
NEONATAL RESPIRATORY DISTRESS/FAILURE (2)

Neonatal Endotracheal Intubation Equipment

1. Gather supplies:

- Appropriate sized endotracheal tube
- General Guidelines for ETT Tubes

<1000 grams	2.5 mm
1000 - 2000 grams	3.0 mm
2000 - 3000 grams	3.5 mm
>3000 grams	3.5 - 4.0 mm

- Wire guide stylet (if not already located in ETT)
- Pencil-handled laryngoscope with appropriate size Miller or Macintosh blade (00 or 0)
- 6, 8, and 10 FR suction catheters
- 100% oxygen source
- Anesthesia bag with appropriate size face mask
- Neobar

2. Place NG Tube and aspirate to empty stomach contents

3. Pre-oxygenate with 100% oxygen

4. Be prepared to give medications (ordered per Medical Control Physician)

- Ativan 0.1 mg/kg IV
- Fentanyl 1 mcg/kg IV
- Rocuronium 1 mg/kg IV

5. Verify tube placement:

- CXR is the best verification of appropriate ETT position (this is not always possible on transport)
- Breath sounds present and equal bilaterally
- Pedi-Cap color change from purple to yellow (yellow = yes)
- ETCO₂ with appropriate reading/waveform
- An improvement in vital signs should be seen, however this is not a reliable verification of tube placement

6. Hand ventilate patient until ventilator settings are obtained from Medical Control Physician.

7. Document:

- ETT Size, location/depth where tube is secured
- Vital signs
- ETCO₂ reading **Note:** document ETCO₂ reading each time patient is moved
- Ordered ventilator settings
- Patient status

8. Follow up care, blood gas, and further transportation orders, etc. per Medical Control Physician

Children's Transport Patient Care Protocols **NEONATAL HYPOTENSION**

Mean Arterial Pressure (MAP) < gestational age in weeks

AND/OR

Patient has signs of poor perfusion such as:

- Grey/pale/mottled coloring
- Cool extremities
- Delayed capillary refill
- Oliguria/Anuria

Notify Medical Control Physician of blood pressure and perfusion.

- Hypotension which occurs at referring hospital should be referred to referring physician.
- Hypotension which occurs en route to receiving facility should be referred to Medical Control Physician.

Patient
experiencing
respiratory
distress?

YES

Neonatal
Respiratory
Distress/Failure
Protocol (p 35,36)

NO

Be prepared to give **0.9% Normal Saline (NS) 10 ml/kg IV** over 10-20 minutes. Assess BP and perfusion after bolus, repeat as ordered by Medical Control Physician

If volume expansion ineffective, notify Medical Control Physician. Be prepared to start **Dopamine drip at 5 mcg/kg/min** or **Epinephrine drip at .05mcg/kg/min** (or as ordered by Medical Control Physician). Titrate dopamine as ordered by Medical Control

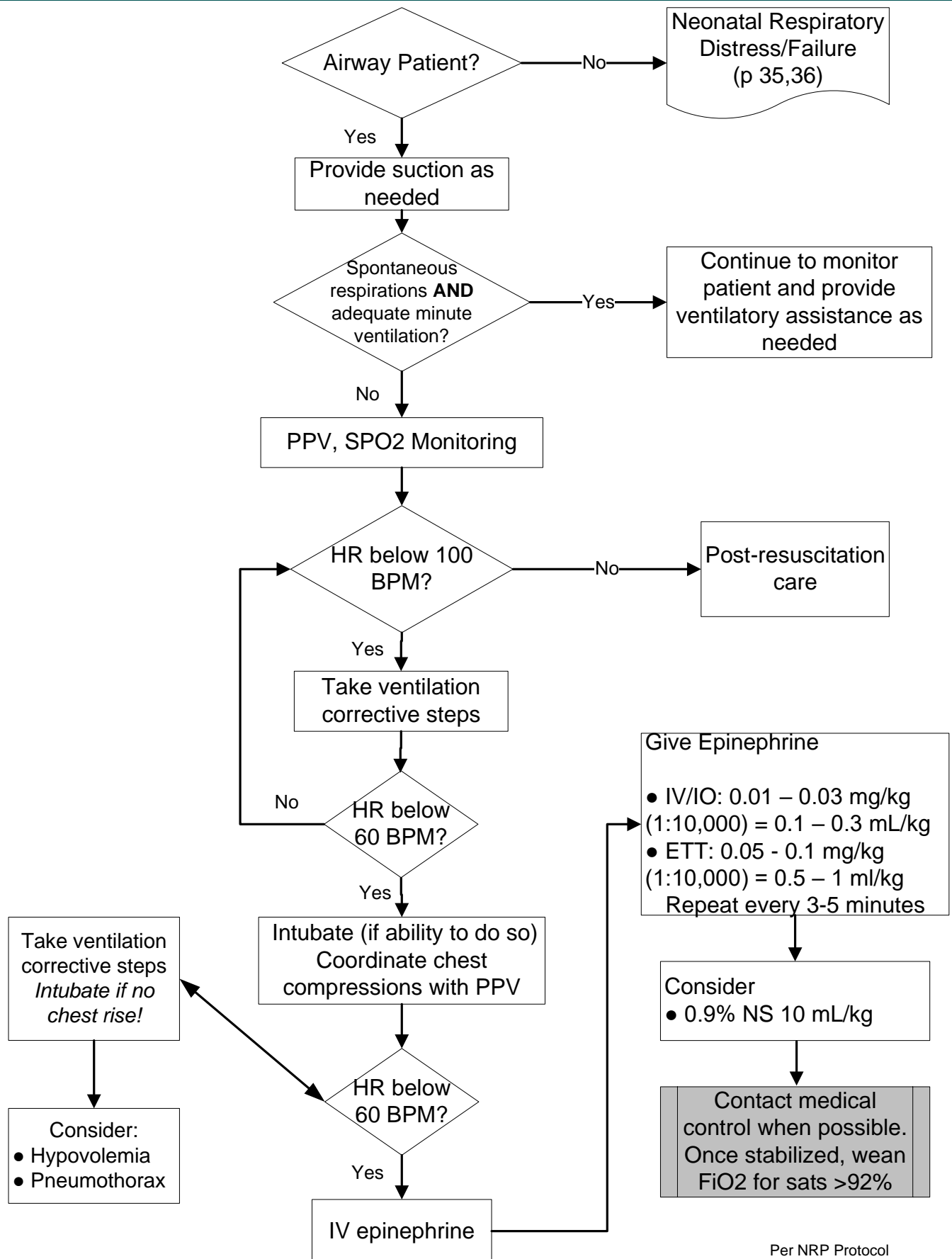
If hypotension is abrupt in onset, consider mechanical cause.

Assess for:

- Appropriate ETT placement
- Appropriate ventilation/oxygenation
- Possible Pneumothorax
- Other causes, such as: pneumopericardium, uncontrolled bleeding

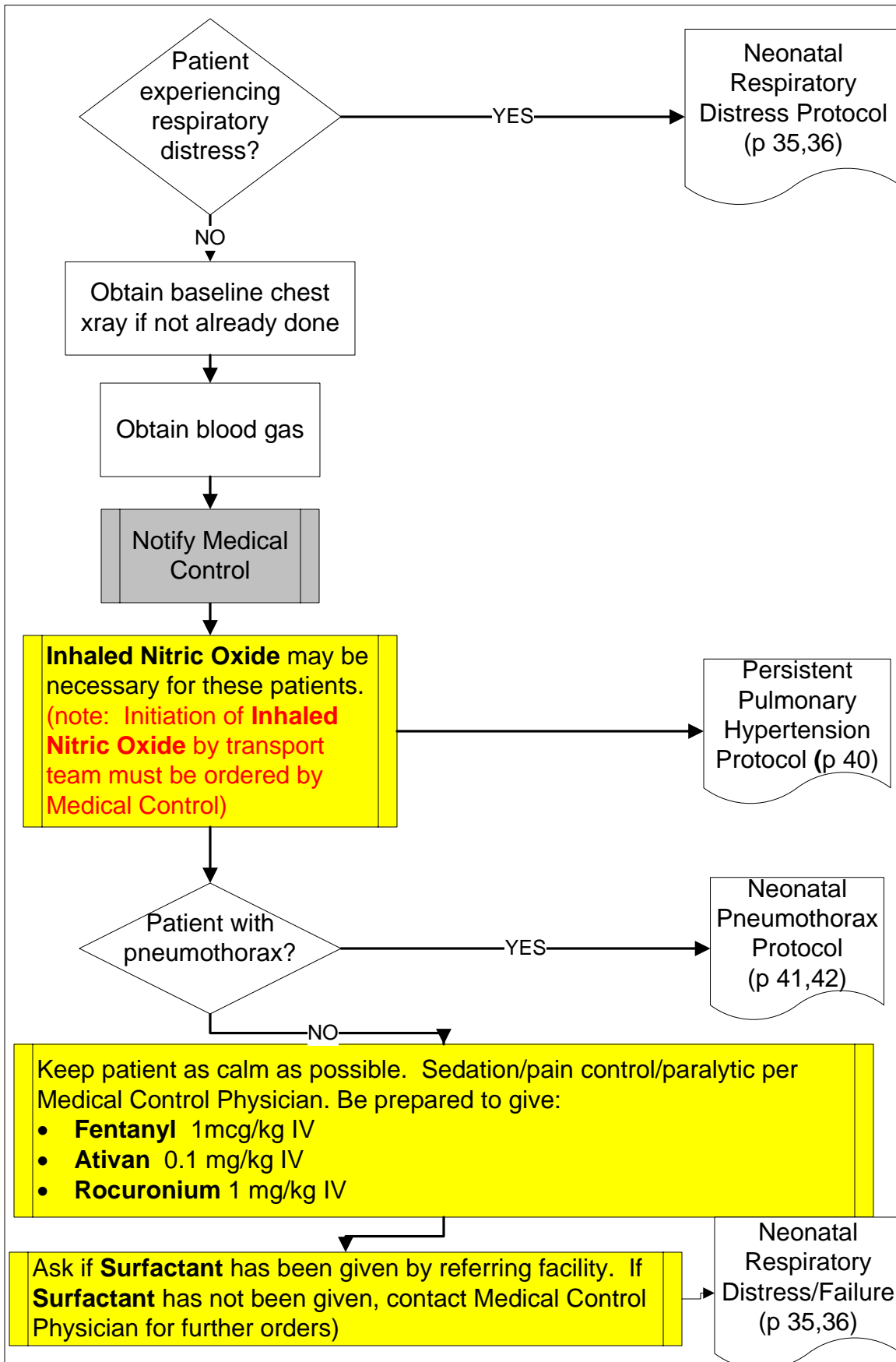
Pneumothorax
protocol
(p 41,42)

Children's Transport Patient Care Protocols **NEONATAL CARDIOPULMONARY ARREST**



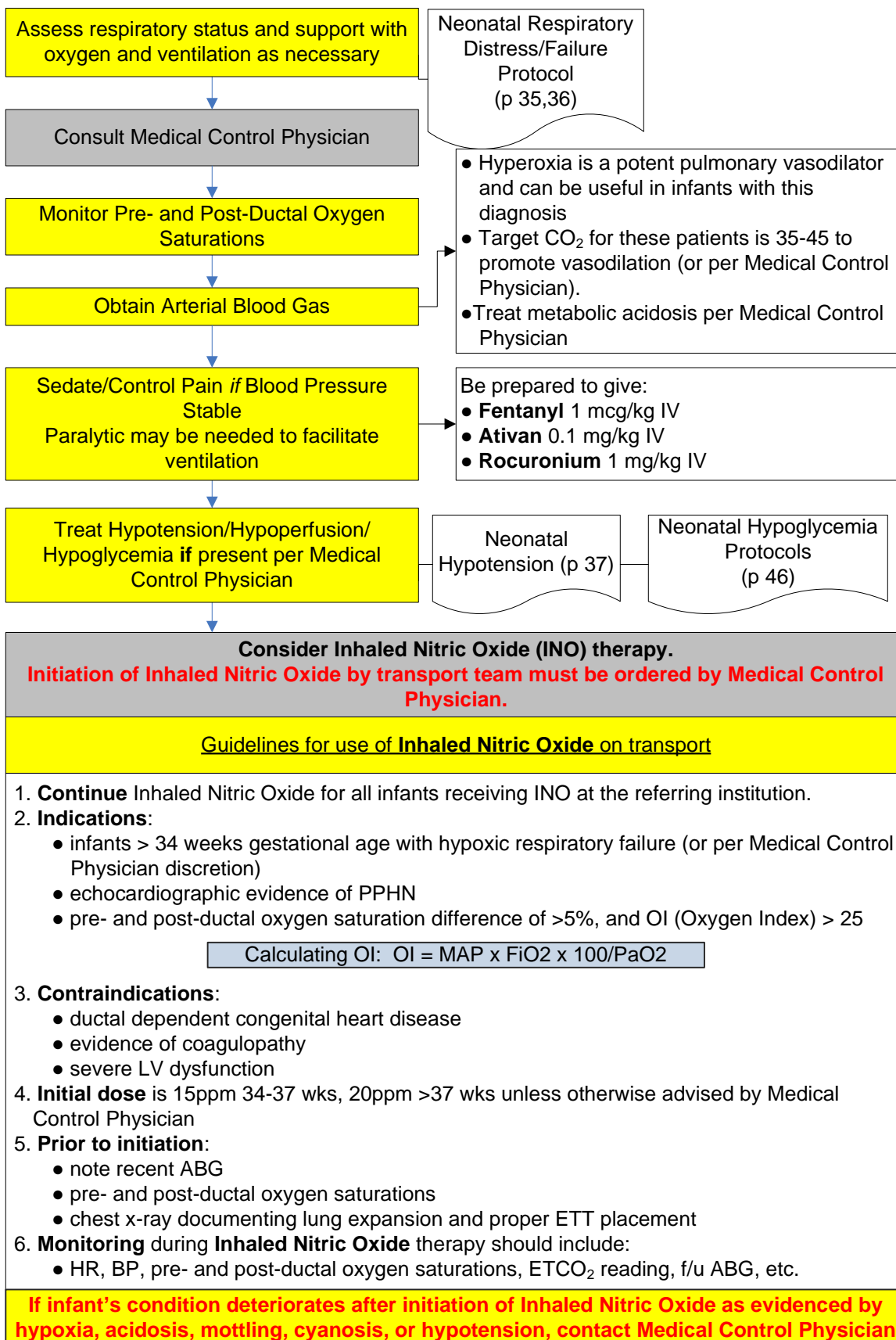
Per NRP Protocol

Children's Transport
Patient Care Protocols
NEONATAL MECONIUM ASPIRATION



Children's Transport Patient Care Protocols

NEONATAL PULMONARY HYPERTENSION



Children's Transport Patient Care Protocols

NEONATAL PNEUMOTHORAX/NEEDLE DECOMPRESSION

Asymptomatic Pneumothorax (Documented by CXR)

- No mediastinal shift
- No significant resp. distress
- No hypotension

- Notify Medical Control Physician of patient status/clinical picture
- Place infant in 100% FiO2 delivered via mode ordered by Medical Control Physician
- Attempt to keep infant quiet/comfortable.
- If respiratory distress worsens and/or blood pressure falls, see below.

Symptomatic Pneumothorax (tension) (Diagnosed by CXR)/ Transillumination, or emergently by clinical picture)

- Mediastinal shift
- Significant resp. distress
- Hypotension

- If not already done, and if possible, obtain chest x-ray.
(if patient is unstable, do not delay treatment in order to obtain chest x-ray)

Call Medical Control:

- Discuss clinical condition
- If ordered, be prepared to perform needle thoracentesis

Needle Decompression Procedure

There are two options for needle insertion. The first is a lateral approach and the second is an anterior approach. The lateral approach is recommended because of the reduced risk for hitting major blood vessels in the anterior medial chest region. Baby should be turned with the aspiration site superior to allow the air to rise.

Lateral Approach and Landmarks

1. Turn the baby 45 degrees with the affected (pneumo) side up and support the back with a small blanket.
2. Move the arm up and away from the catheter insertion site.
3. Using sterile technique, insert the needle or catheter/stylet between the 4th and 5th intercostal space in the mid-axillary or anterior axillary line. This location is usually adjacent to the nipple line and down.

Anterior Approach and Landmarks

1. Position the infant supine with the head of the bed slightly elevated (so that air will rise).
2. Using sterile technique, insert the needle between the 2nd and 3rd intercostal space in the midclavicular line.

Equipment for Needle Decompression:

- 18 or 20-gauge percutaneous catheter or butterfly
- 3 way stopcock
- 20ml syringe
- Extension tubing / T-connector
- Skin prep
- Sterile gloves
- Tape

**Children's Transport
Patient Care Algorithm
NEONATAL PNEUMOTHORAX/NEEDLE DECOMPRESSION**

Needle Decompression Procedure

Cleanse the skin with antiseptic solution. Use sterile gloves and maintain sterility throughout the procedure.

Insert the catheter or needle perpendicular to the body into the pleural space, above the rib to avoid the intercostal artery which is underneath the rib. Avoid excessive insertion depth of the stylet or butterfly needle.

If using the IV catheter, remove the stylet once it has entered the pleural space. Advance the soft flexible catheter further into the pleural space. With the stylet removed, attach the catheter hub to the pre-assembled T-connector, stopcock, and syringe set-up.

If using the butterfly, attach the IV tubing, stopcock and syringe assembly before beginning the procedure. Check to see that the stopcock is open from the IV needle to the syringe. Enter the pleural space with the needle and then stop. Do not insert the IV needle further at this point (to avoid piercing the lung tissue). Open the stopcock to the patient.

Gently aspirate on the plunger until resistance is met, or until the syringe is full of air. If using the butterfly needle, and no air is obtained, advance the needle slightly further and repeat the procedure until air is obtained.

Turn the stopcock off to the patient.

Rapidly push the air out of the syringe into the air. Be careful not to spray this air, which may contain body fluids. Repeat this process until all of the air is evacuated.

Continue aspiration process until a neonatologist is available to place a chest tube, or otherwise ordered by Medical Control Physician.

An improvement in vital signs should be observed. If patient continues to be in respiratory distress, be hypotensive etc., continue to rule out other causes and notify Medical Control Physician for further orders.

Neonatal
Respiratory
Distress/Failure
(p 35,36)

Neonatal
Hypotension
(p 37)

Children's Transport Patient Care Protocols NEONATAL SURGICAL (1)

The Medical Control Physician and accepting surgeon will facilitate stabilization of the surgical neonate for transport.

Assess respiratory status and support with oxygen and ventilation as necessary.
(Applies to all patients)

Respiratory
Distress/Failure
Protocol
(p 35,36)

Bowel
Obstruction

- Place OG repleg to suction
- Document Fluid losses
- IVF/other orders per Medical Control Physician

Gastroschisis

- Place OG repleg to suction.
- Evaluate appearance of bowel for evidence of impaired perfusion.
- Place lower 2/3 of body in sterile body bag.
- Position patient on right side, handle with care to avoid strangulation of bowel.
- Document fluid losses. Start D5LR IV/IO at 150 ml/kg/day and replace further IVF OG/NG output
- Fluid loss management per Medical Control Physician
- Thermoregulation
- Watch for hypotension/hypoperfusion. Treat per Medical Control Physician.

Neonatal
Hypotension
Protocol
(p 37)

Omphalocele

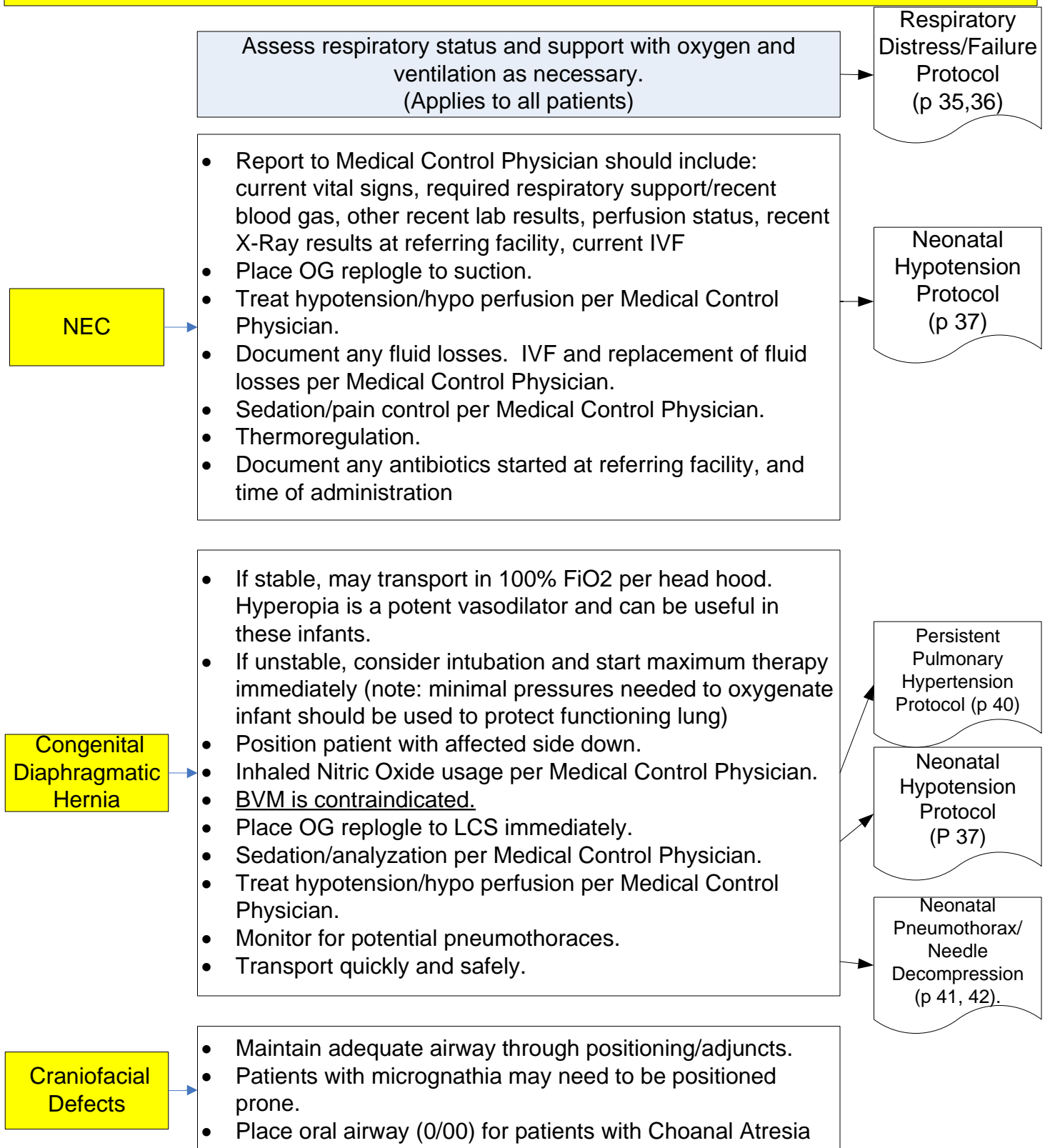
- Place OG repleg to suction. Check often to ensure suction is working.
- If omphalocele sac is intact, may wrap with saline moistened gauze. Handle with care
- If omphalocele sac is ruptured, treat as gastroschisis. (see above)
- Document any fluid losses. IVF and fluid loss replacements per Medical Control Physician.
- Thermoregulation.

Esophageal
Atresia (with
or without
Tracheoesoph
ageal Fistula)

- Place OG repleg or Anderson tube to LCS.
- Place infant prone or right- sided with HOB elevated 30– 40 degrees.
- Consider intubation only if severe respiratory compromise (unable to decompress gastric distention caused by positive pressure ventilation).
- BVM is contraindicated.

Children's Transport Patient Care Protocols NEONATAL SURGICAL (2)

The Medical Control Physician and accepting surgeon will facilitate stabilization of the surgical neonate for transport.



Children's Transport
Patient Care Protocols
NEONATAL SURGICAL (3)

The Medical Control Physician and accepting surgeon will facilitate stabilization of the surgical neonate for transport.

Assess respiratory status and support with oxygen and ventilation as necessary.
(Applies to all patients)

Respiratory
Distress/Failure
Protocol
(p 35,36)

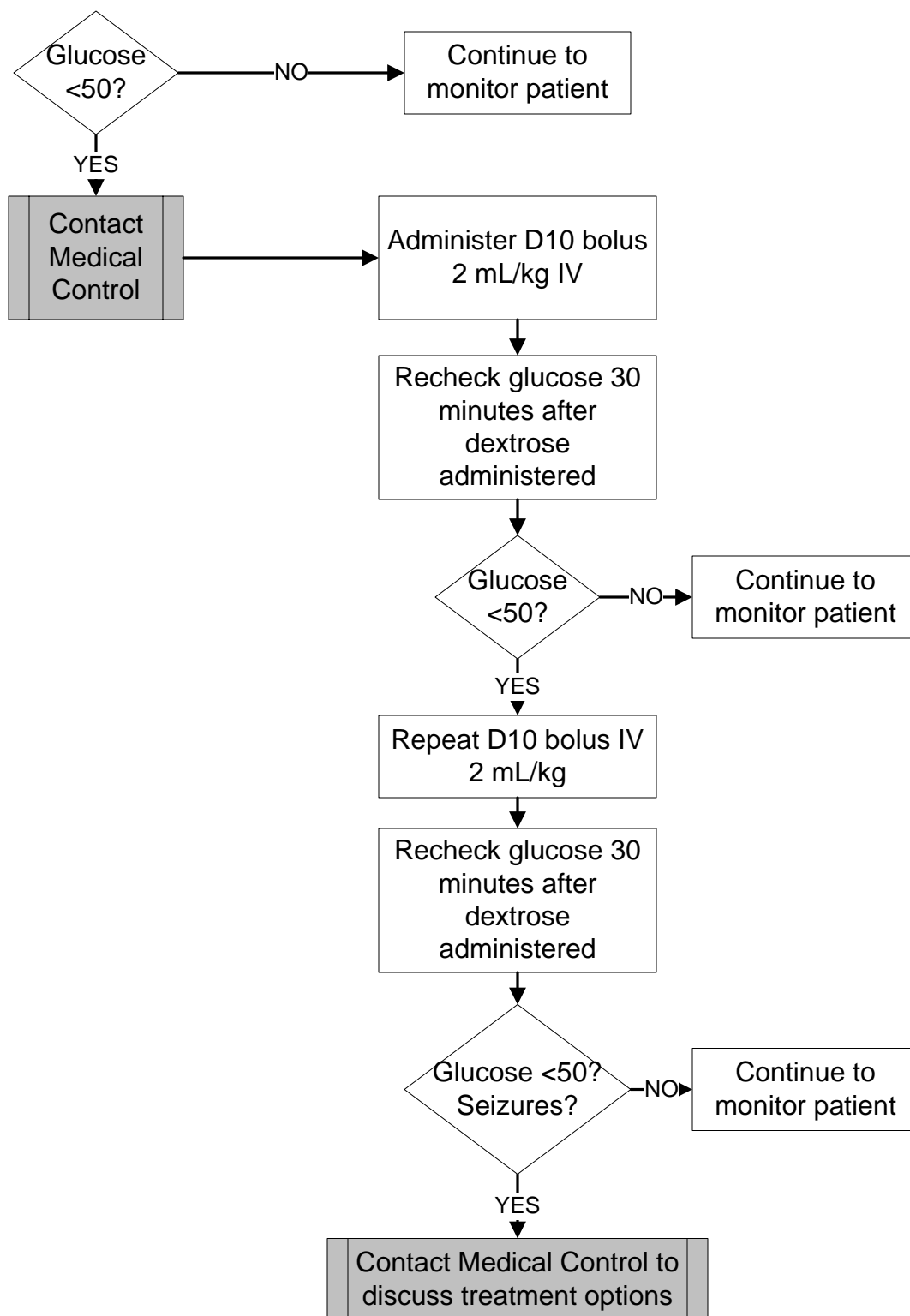
Encephalocele

- If defect integrity is compromised, cover with sterile saline- moistened telfa.
- If intact, leave uncovered.
- Handle with care when moving/positioning. Support encephalocele when moving head.
- Position patient for optimal airway/comfort.
- Thermoregulation

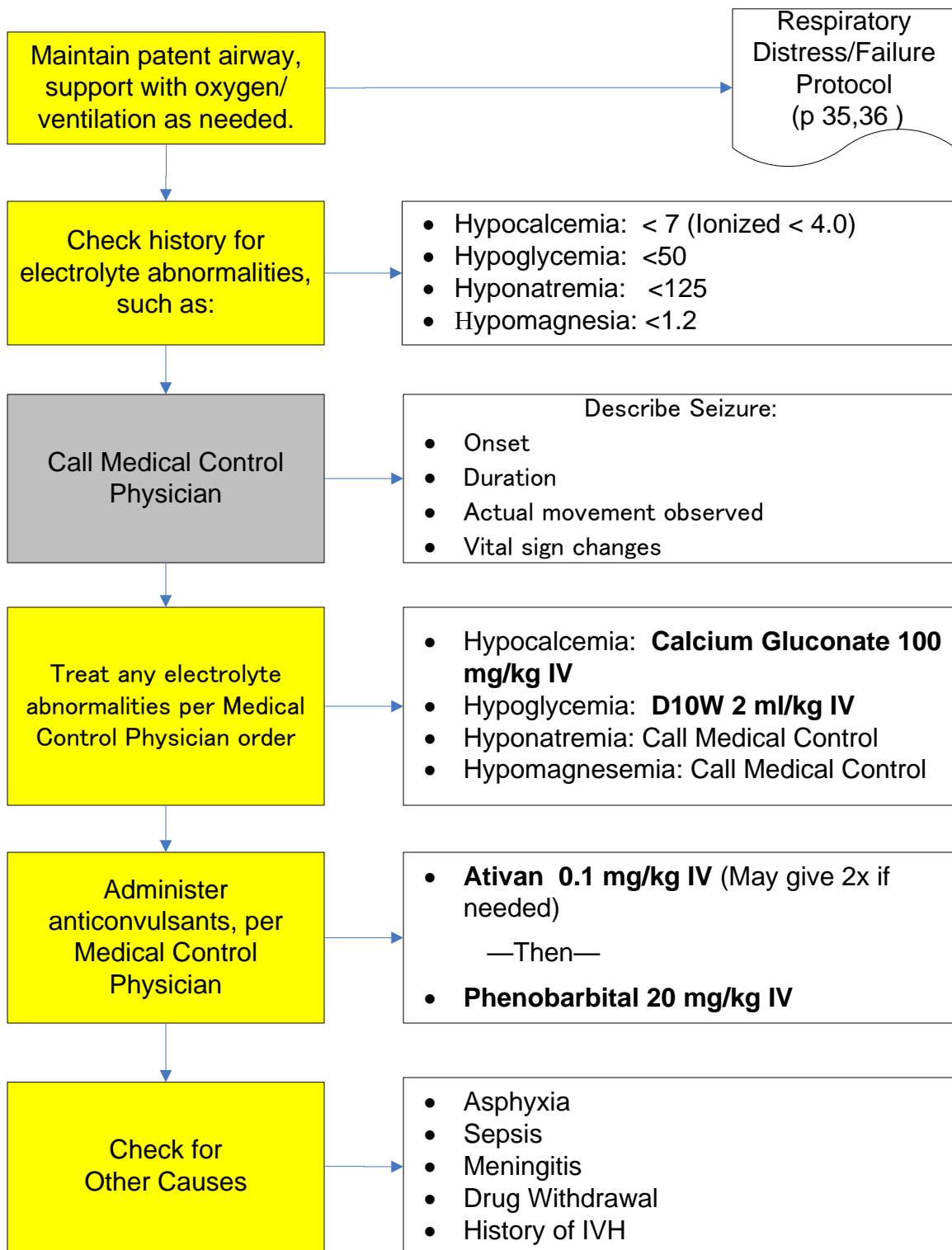
Meningocele/
Meningomyelocele

- Place infant in prone position. Keep HOB elevated if patient has known hydrocephalus.
- Note size, location, and sac integrity of defect.
- Cover defect with sterile saline- moistened telfa. Keep diaper/other coverings away from defect.
- Thermoregulation.

Children's Transport
Patient Care Protocols
NEONATAL HYPOGLYCEMIA



Children's Transport Patient Care Protocols **NEONATAL SEIZURES**



Children's Transport Patient Care Protocols Neonatal Therapeutic Hypothermia(TH)

- Neonatal Transport Team is dispatched for potential TH under the direction of NSH Neonatologist.
- Decision to initiate TH will be finalized by NSH Neonatologist on call.
- Goal is to Transport infant to NSH within 6 hours of Life
- For children being transferred between Northside campuses, the Northside physician will serve as medical control if that physician has active staff privileges with Children's. If the Northside physician does not have active staff privileges with Children's, the Scottish Rite NICU physician will serve as medical control.



NSH Neonatologist will instruct referring hospital to initiate passive cooling

1. Turn off Radiant Warmer and all other external heat sources.
2. Secure vascular access ASAP, at least 2 PIV but no scalp IV's. Central access preferred.
3. Monitor core (rectal) temperature every 15 minutes if continuous monitoring is not available.
4. Core temperature target should be 33.5°C to 34.5°C.
5. Prevent over cooling by turning the heat source back on if needed to keep target temp.
6. Active cooling by the referring center is strongly discouraged.



Neonatal Transport Team



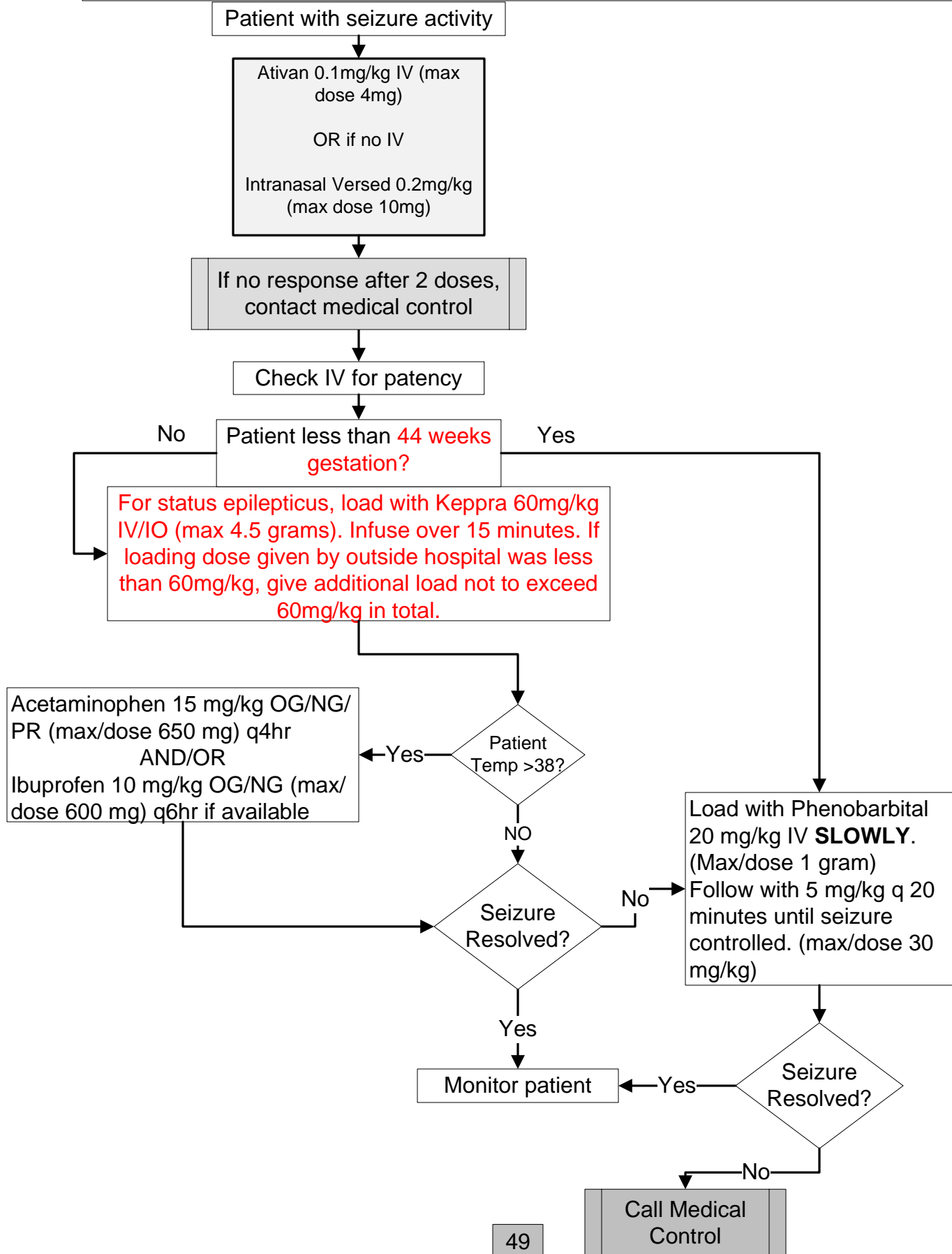
Active cooling with TECOthern® NEO

1. Insert rectal temp probe to depth of 6cm and secure to thigh
2. Place the baby directly on the mattress
3. Determine starting core temp (document time)
4. Goal core temp 33.5° +/- 0.5°C (92.3°F +/- 1.0°F (Needs to reach within 6 hours of life)
5. Turn on the TECOthern Neo® and confirm alarms as previously described
6. Connect the rectal temp probe to the rectal cord and plug into device (port R)
7. Select "Servo control mode (Constant rectal temperature)
8. Select 33.5°C as the set point and 0 hours (this is the default and will cool the baby to 33.5°C as fast as possible)
9. Press "apply" button and then push "start" button
10. Confirm rectal temp probe is in place
11. Cooling is now initiated, make note of time when patient's core temperature reaches 33.5°C, this is the beginning of the 72 hours of cooling therapy

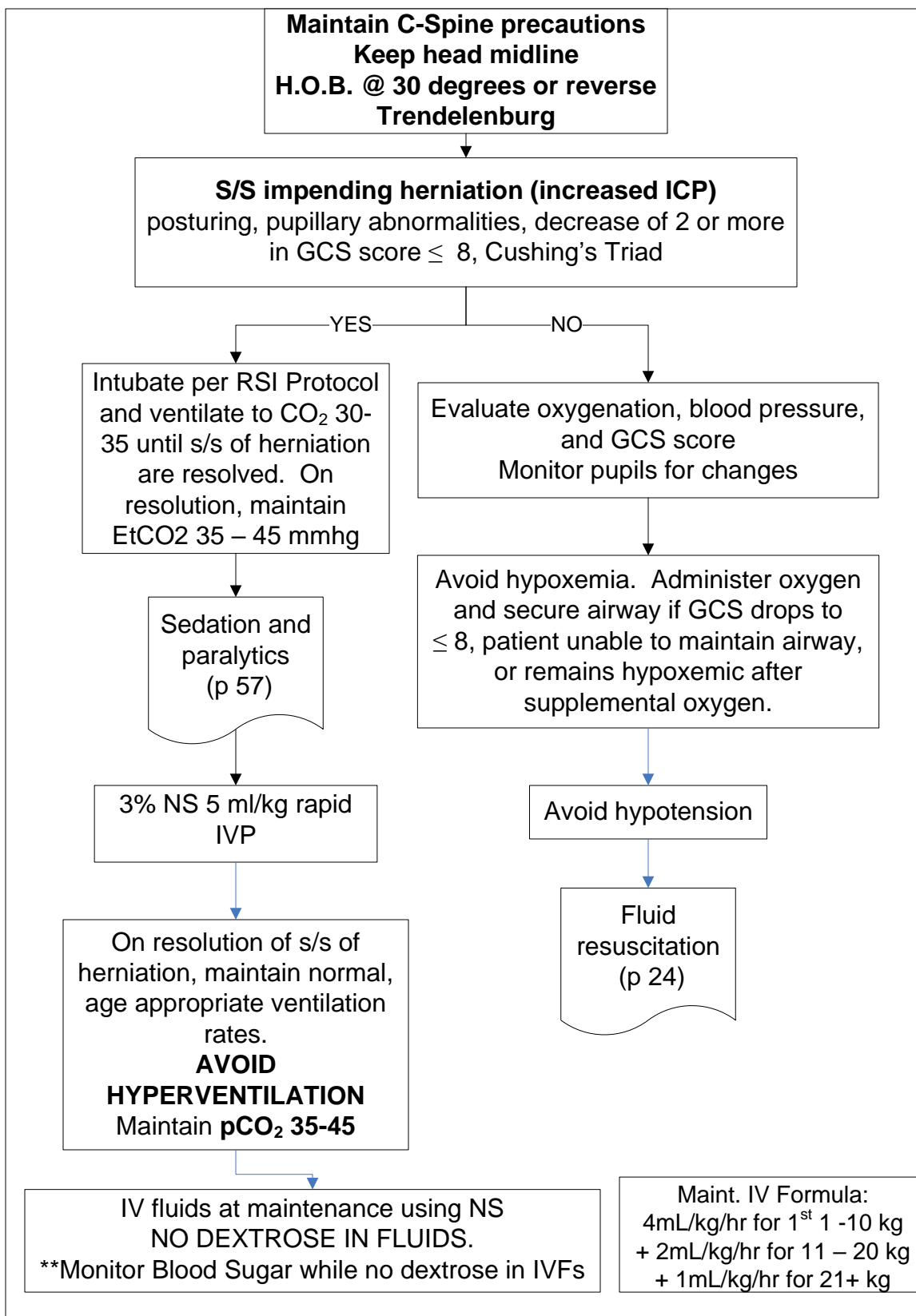
TIPS

- When transferring the baby in and out of transport isolette, pick up the baby and mattress together
- Plug the TECOthern® into the ambulance/aircraft power source ASAP. Cooling and temperature recording resumes once plugged back in to power source & will continue at same settings as long as disconnect time is less than 60 mins.
- Discuss need for sedation or pain medication with medical control if patient is shivering or uncomfortable.
- Monitor patient for seizures and discuss with medical control if seizures noted.
- Discuss need to switch machine to "Servo Control Complete Treatment Mode" if long transport time
- Expect baseline heart rate to fall as patient approaches target temp. Often <100 BPM. Maintain all other vitals in normal range

Children's Transport
Patient Care Protocols
NEUROLOGICAL/SEIZURES

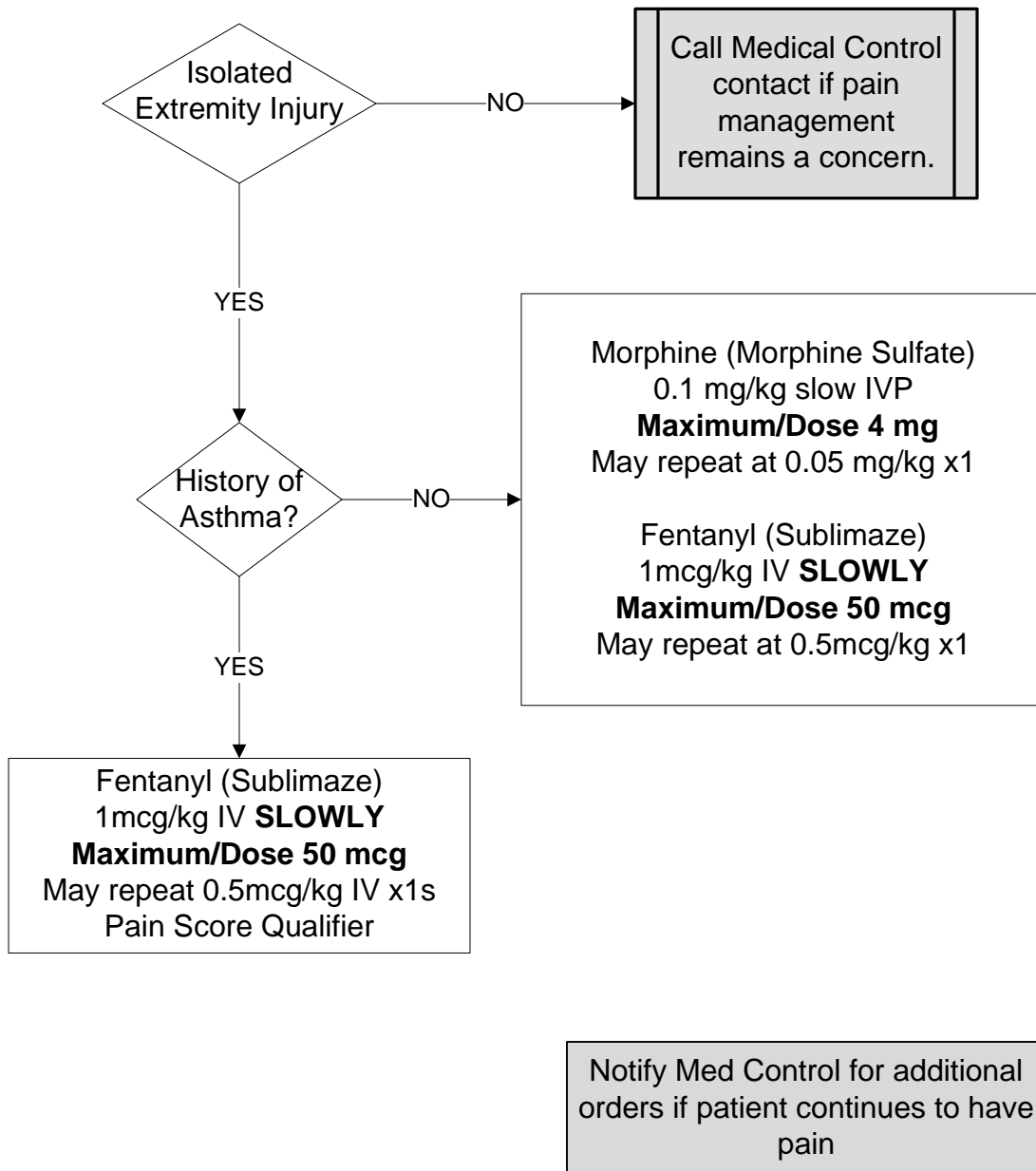


Children's Transport Team
Patient Care Protocols
NEUROLOGICAL/INCREASED ICP & TBI



Children's Transport
Patient Care Protocols
PAIN MANAGEMENT

If the patient has received pain medication at the referring facility within 2 hours, only a single dose can be given without contact with medical control.



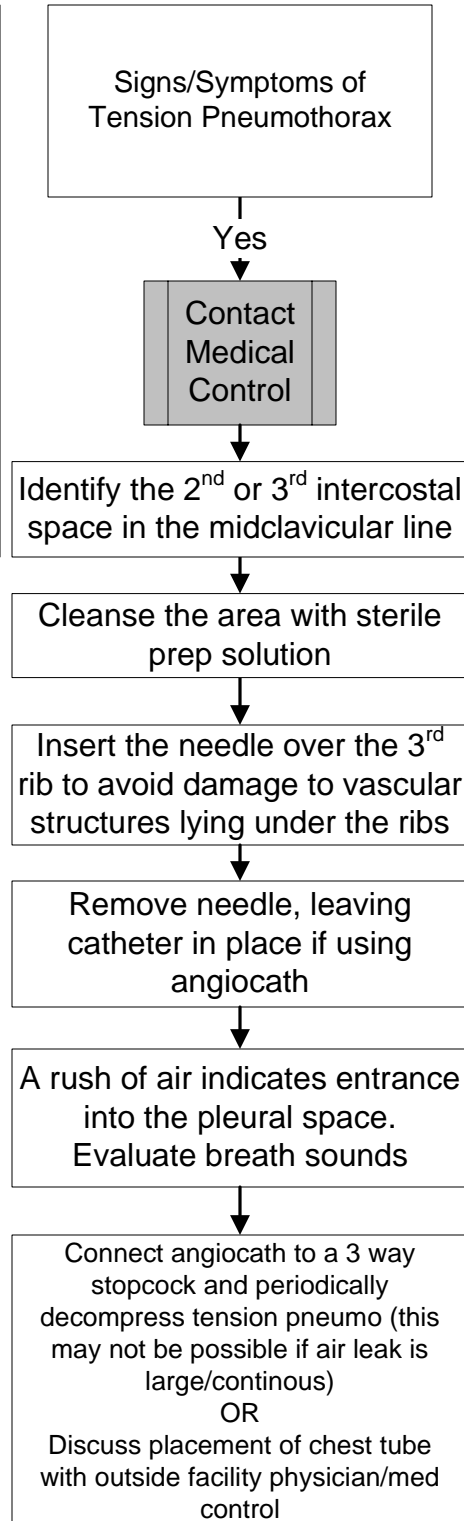
Children's Transport Patient Care Algorithm

PNEUMOTHORAX & NEEDLE DECOMPRESSION

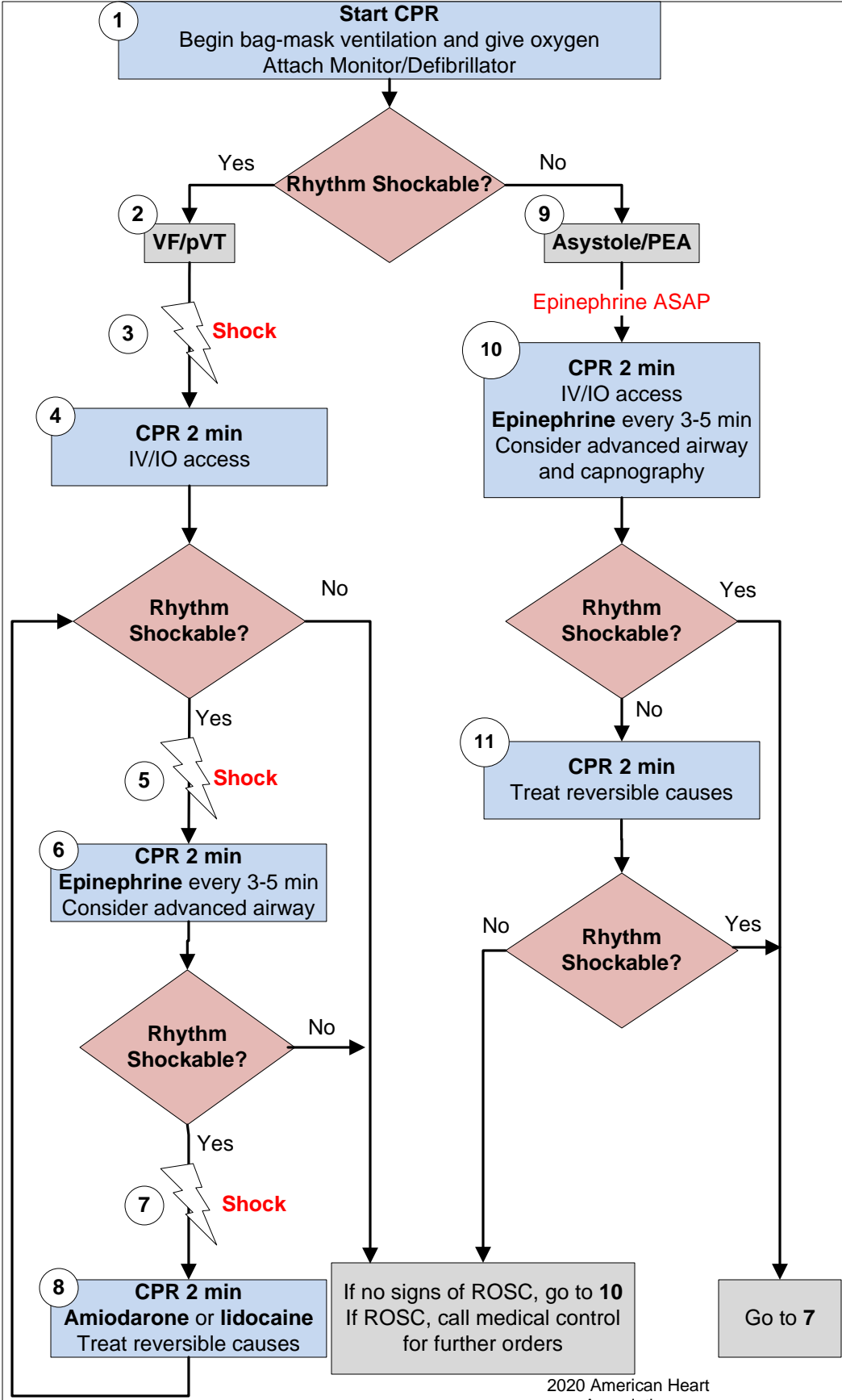
Needle thoracostomy is an emergency technique used to relieve increased intrapleural pressure in the event of a tension pneumothorax.

Signs and symptoms of a tension pneumothorax

- Low cardiac output - hypotension
- Hyperresonance to chest percussion
- Severe respiratory distress
- Diminished breath sounds on the affected side
- Tracheal deviation
- Jugular venous distention



Children's Transport Patient Care Protocols PULSELESS ARREST



- Push hard ($\geq 1/3$ of anteroposterior diameter of chest) and fast (100-120/min) and allow complete chest recoil
- Minimize interruptions in compressions
- Change compressor every 2 minutes, or sooner if fatigued
- If no advanced airway, 15:2 compression-ventilation ratio
- If advanced airway, provide continuous compressions and give a breath every 2-3 seconds

- First shock 2 J/kg
- Second shock 4 J/kg
- Subsequent shocks $\geq 4\text{J/kg}$, maximum 10 J/kg or adult dose

Epinephrine IV/IO dose: 0.01 mg/kg (0.1ml/kg of the 0.1mg/ml concentration). Max dose 1mg. Repeat every 3-5 minutes. If no IV/IO access, may give endotracheal dose: 0.1mg/kg (0.1ml/kg of the 1mg/ml concentration). Max dose endotracheal tube epinephrine is 2.5mg

Amiodarone IV/IO dose: 5mg/kg bolus during cardiac arrest. May repeat up to 3 total doses for refractory VF/pulseless VT. Max/dose 300mg, max/dose 15mg/kg.

or

Lidocaine IV/IO dose: Initial:1mg/kg loading dose. Max/dose 3mg/kg.

<p>Advanced Airway</p> <ul style="list-style-type: none"> - Endotracheal intubation or supraglottic advanced airway - Waveform capnography or capnometry to confirm and monitor ET tube placement
--

- Hypovolemia
- Hypoxia
- Hydrogen ion (acidosis)
- Hypoglycemia
- Hypo-hyperkalemia
- Hypothermia
- Tension pneumothorax
- Tamponade, cardiac
- Toxins
- Thrombosis, pulmonary
- Thrombosis, coronary

Children's Transport
Patient Care Protocols
RENAL

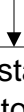
Correct any non-renal cause of anuria/oliguria, such as
volume depletion and obstruction



Eliminate potassium from IV fluids



Hold administration of all nephrotoxins (aminoglycosides
and NSAIDs)



Restrict D5 ½ NS **OR** Fluids started IV/IO at referring facility
to
½ - ¾ maintenance rate

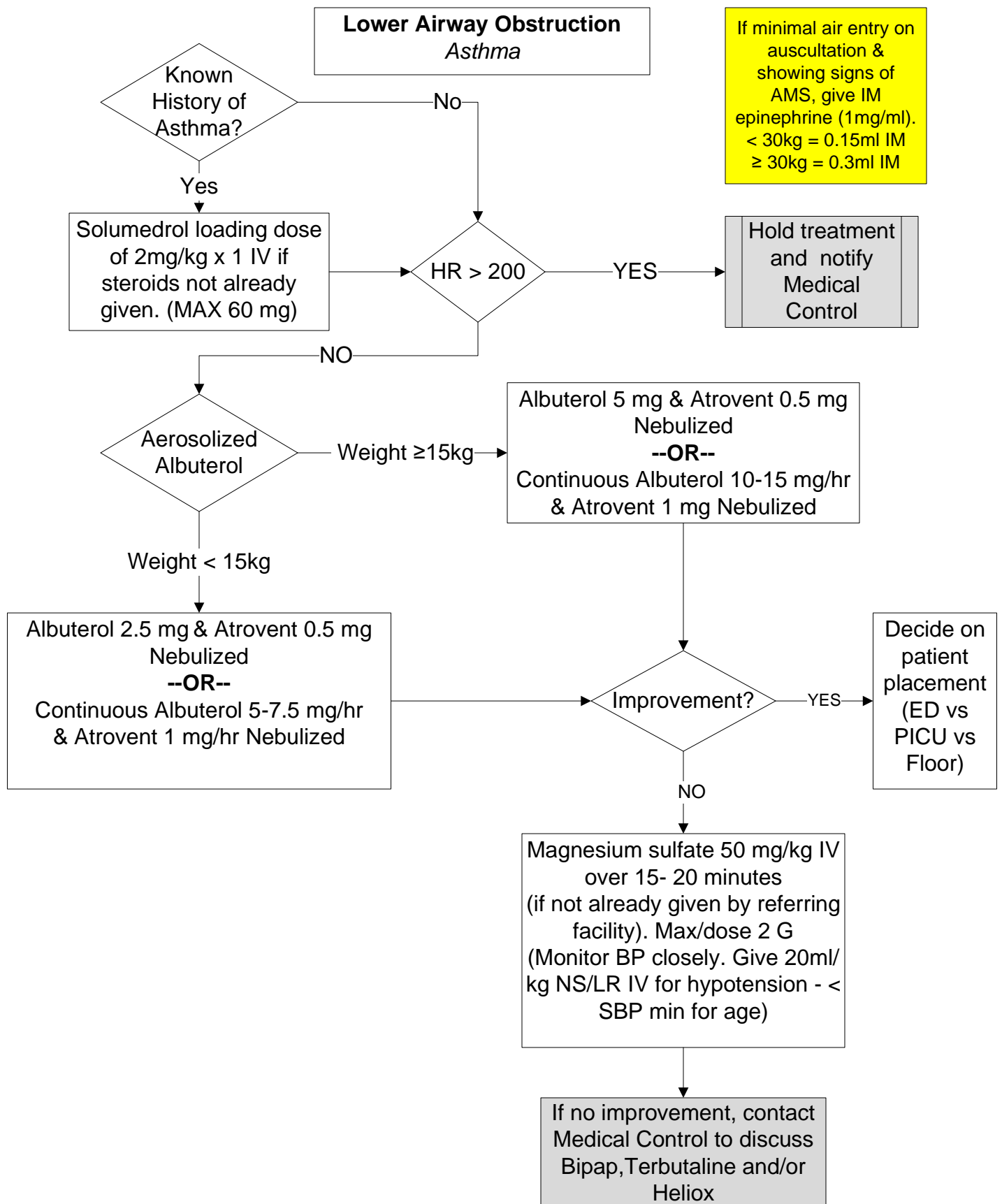


If patient appears dehydrated, discuss fluid resuscitation
with medical control



Proceed to Abnormal Labs Protocol
if needed.
(p. 12)

Children's Transport
Patient Care Protocols
RESPIRATORY DISTRESS/LOWER AIRWAY

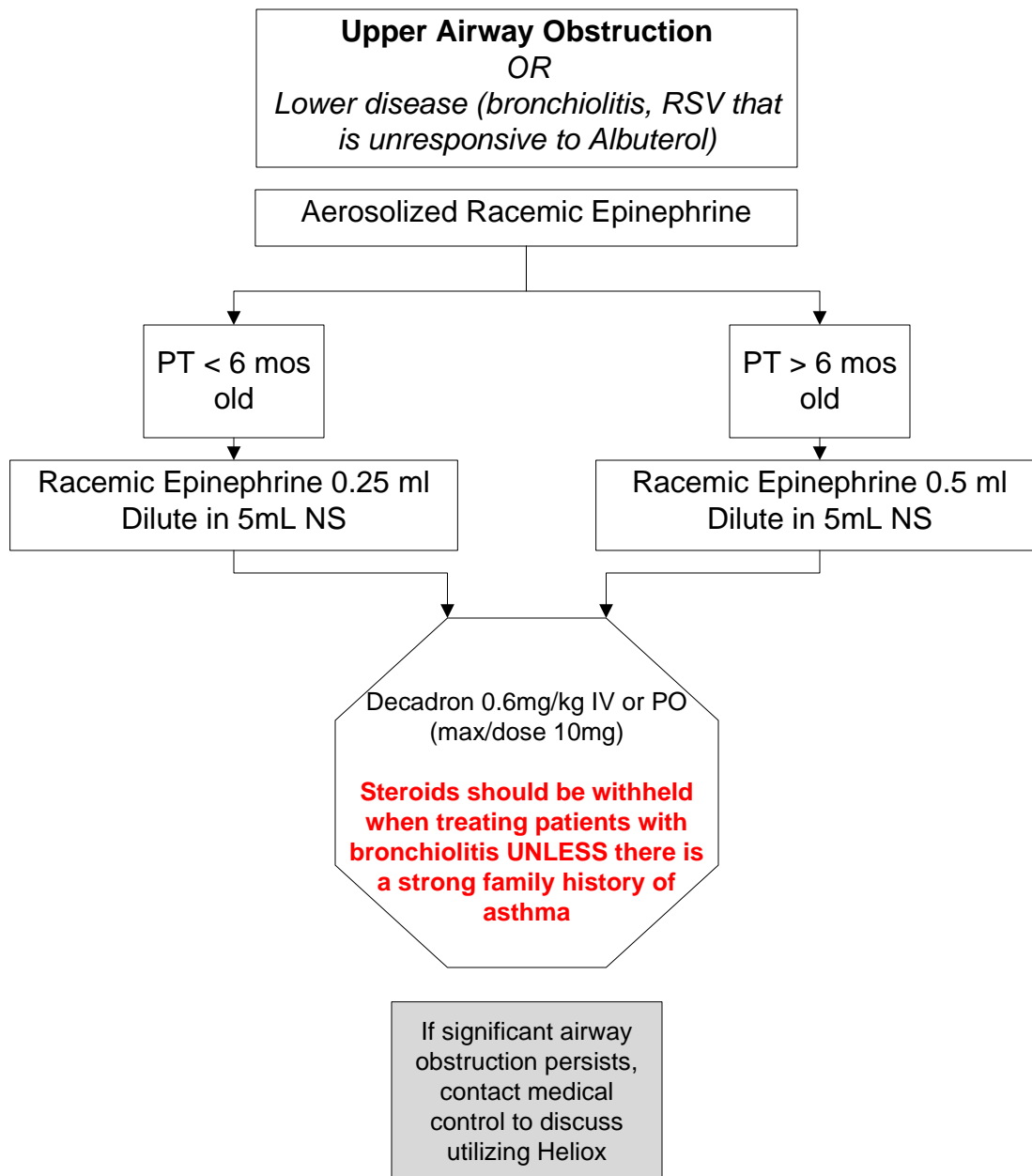


Children's Transport
Patient Care Protocols
RESPIRATORY DISTRESS/UPPER AIRWAY

Upper Airway Disease Processes: croup, epiglottitis, foreign body aspiration, bacterial tracheitis.

Clinical S/S: stridor, retractions, harsh barking sounds, prolonged inspiratory phase.

If epiglottitis suspected – do not examine pharynx with tongue blade, do not attempt to intubate without anesthesia/ENT personnel present!



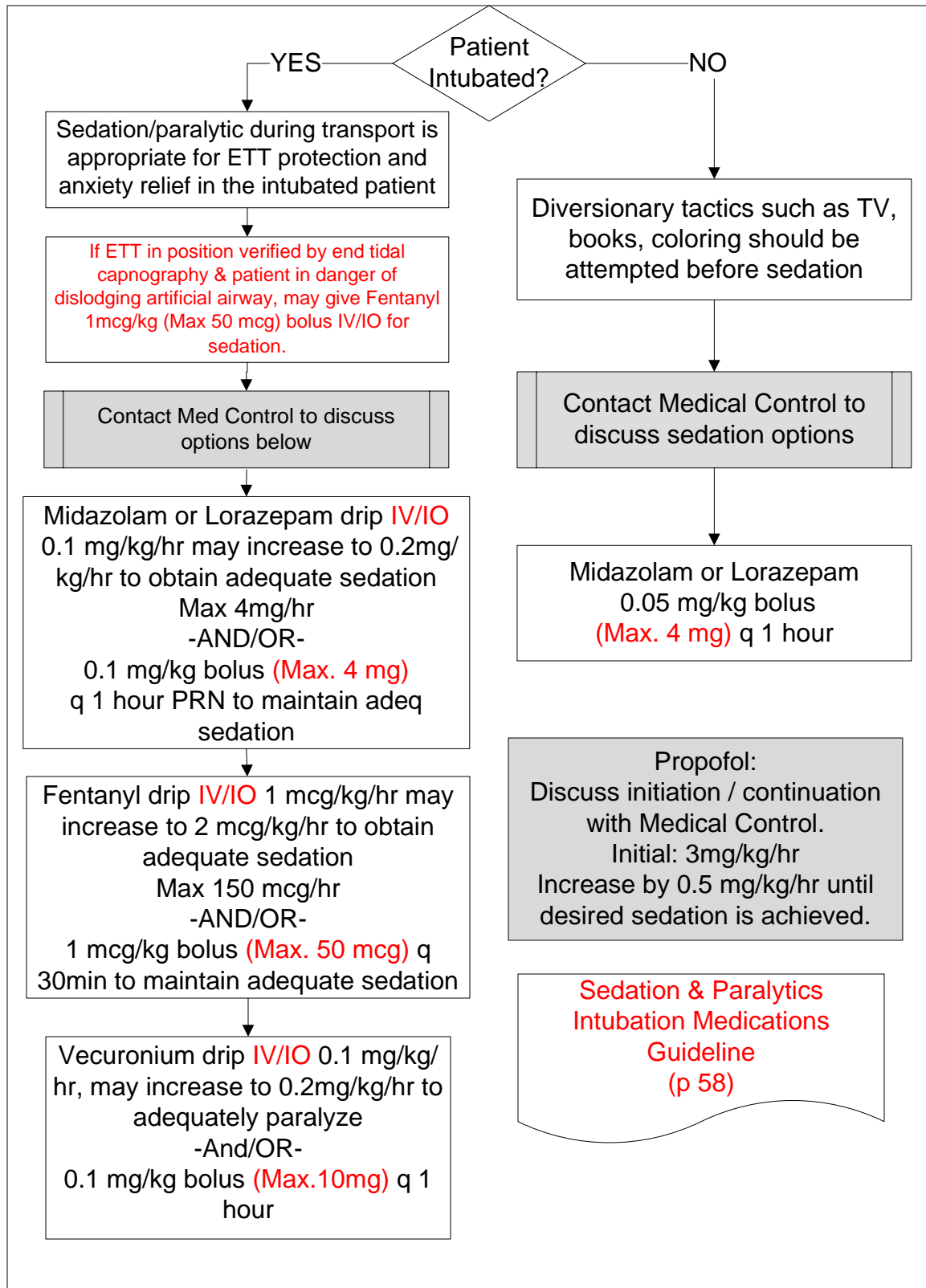
Radiological findings:

Croup – A/P neck – steeple sign

Epiglottitis – lateral neck – thumb print sign

Foreign Body – CXR- unilateral hyperinflation and atelectasis of opposite lung. Radiopaque foreign body in upper airway

Children's Transport Patient Care Protocols **SEDATION & PARALYTICS**



Children's Transport
Guideline
INTUBATION INDUCTION MEDICATIONS

CLASS/DRUG				
CLASS/DRUG	DOSAGE	ONSET	DURATION	MIN/MAX
Anticholinergic				
Atropine	0.02 mg/kg IV/IO	40-60 seconds	1-4 hours	minimum 0.1mg min/0.5mg max
Sedatives				
Midazolam	0.05-0.1 mg/kg IV/IO	60-90 seconds	<60 minutes	4 mg max
Lorazepam	0.05-0.1 mg/kg IV/IO	1-5 minutes	4-6 hours	4 mg max
Etomidate	0.3-0.6 mg/kg IV/IO	1 minute	4-10 minutes	60 mg max
Ketamine	1-2 mg/kg IV/IO	60-90 seconds	15-120 minutes	100 mg max
Propofol	2-2.5 mg/kg IV/IO	40 seconds	5-10 minutes	200 mg max
Paralytics				
Norcuron (Vecuronium)	0.1 mg/kg IV/IO	3-5 minutes	60-75 minutes	10 mg max
Zemuron (Rocuronium)	0.6-1.2 mg/kg IV/IO	45-60 seconds	15-150 minutes	100 mg max
Analgesics				
Fentanyl	1-2 mcg/kg IV/IO	Almost immediate	30 - 60 minutes	100 mcg max
Morphine	0.05-0.1 mg/kg IV/IO	5 – 10 minutes	1-2 hours	4 mg max

Paramedic is not approved or credentialed by agency or medical director to administer induction paralytic agent

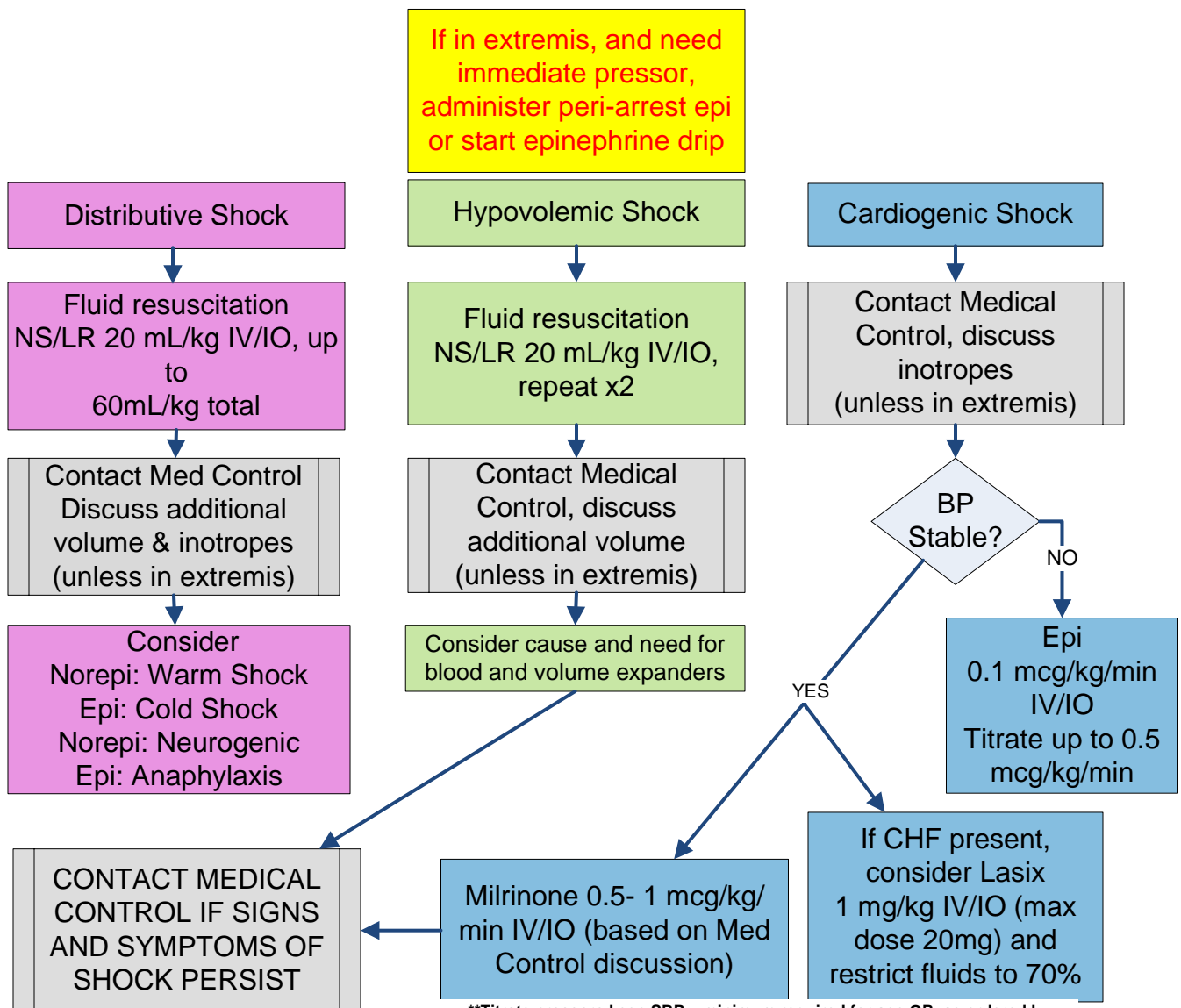
Children's Transport Patient Care Protocols **SHOCK**

Hypovolemia is the most common cause of shock in children. Give each bolus as rapidly as possible. Expect to give > 60 mL/kg in first 45 – 60 minutes. More if needed.

Distributive shock: S/S fever, poor perfusion, may have bounding pulses and warm, red skin, may have history of recent illness.

Hypovolemic shock: S/S poor perfusion, decreased UOP, poor skin turgor, dry mouth, low CVP, small heart on CXR, history of vomiting/diarrhea, poor PO intake, fever, large blood loss, decreased CRT, increased HR for age. Blood pressure is not a good indicator of shock, it is the last parameter to fall!

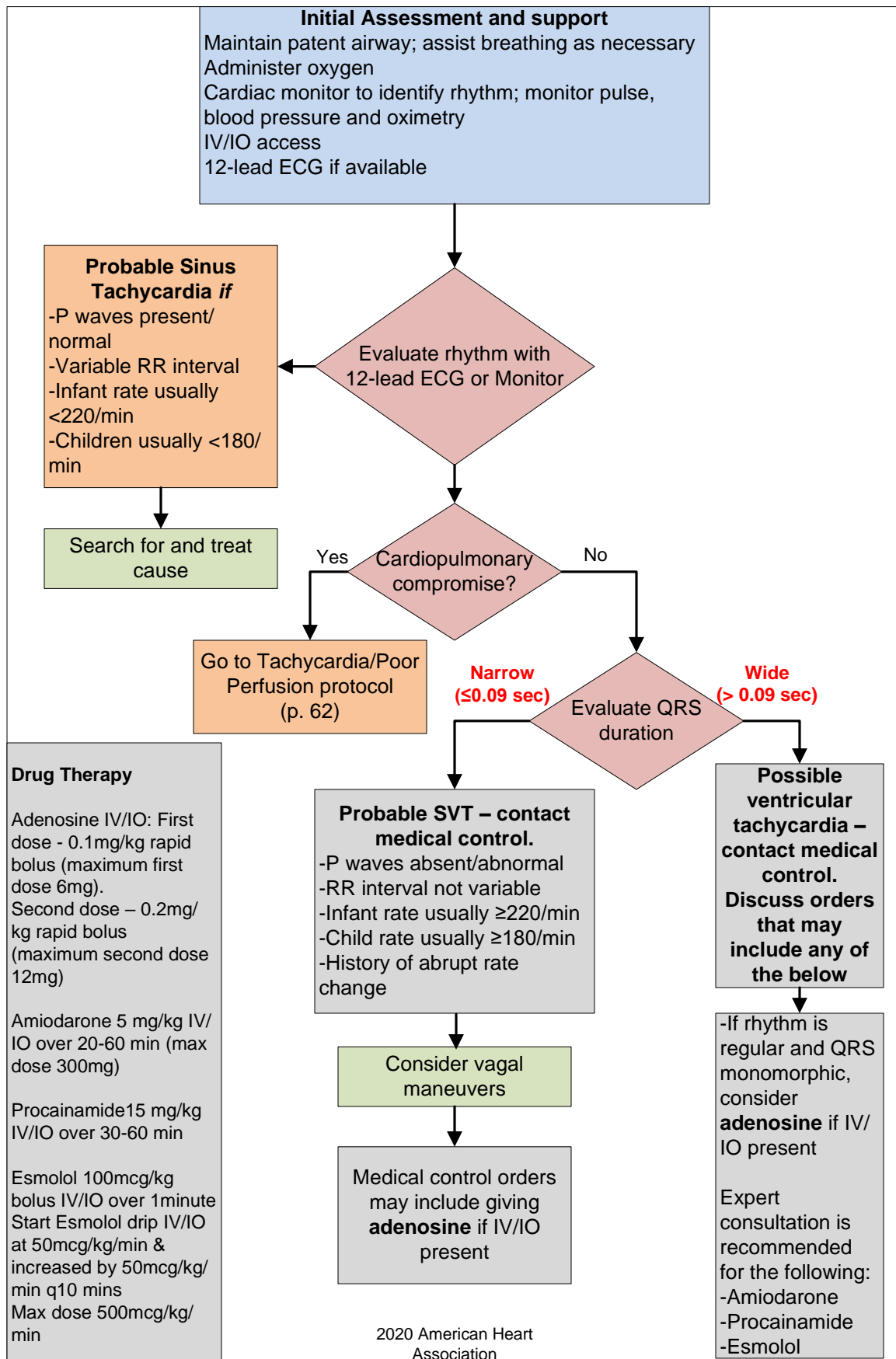
Cardiogenic Shock – S/S – CHF, cardiomegaly, pulmonary edema, hepatomegaly, gallop, rales, rhonchi, wheezing, venous distention, muffled heart sounds, high CVP.



****Titrate pressors keep SBP > minimum required for age OR as ordered by Med Control**

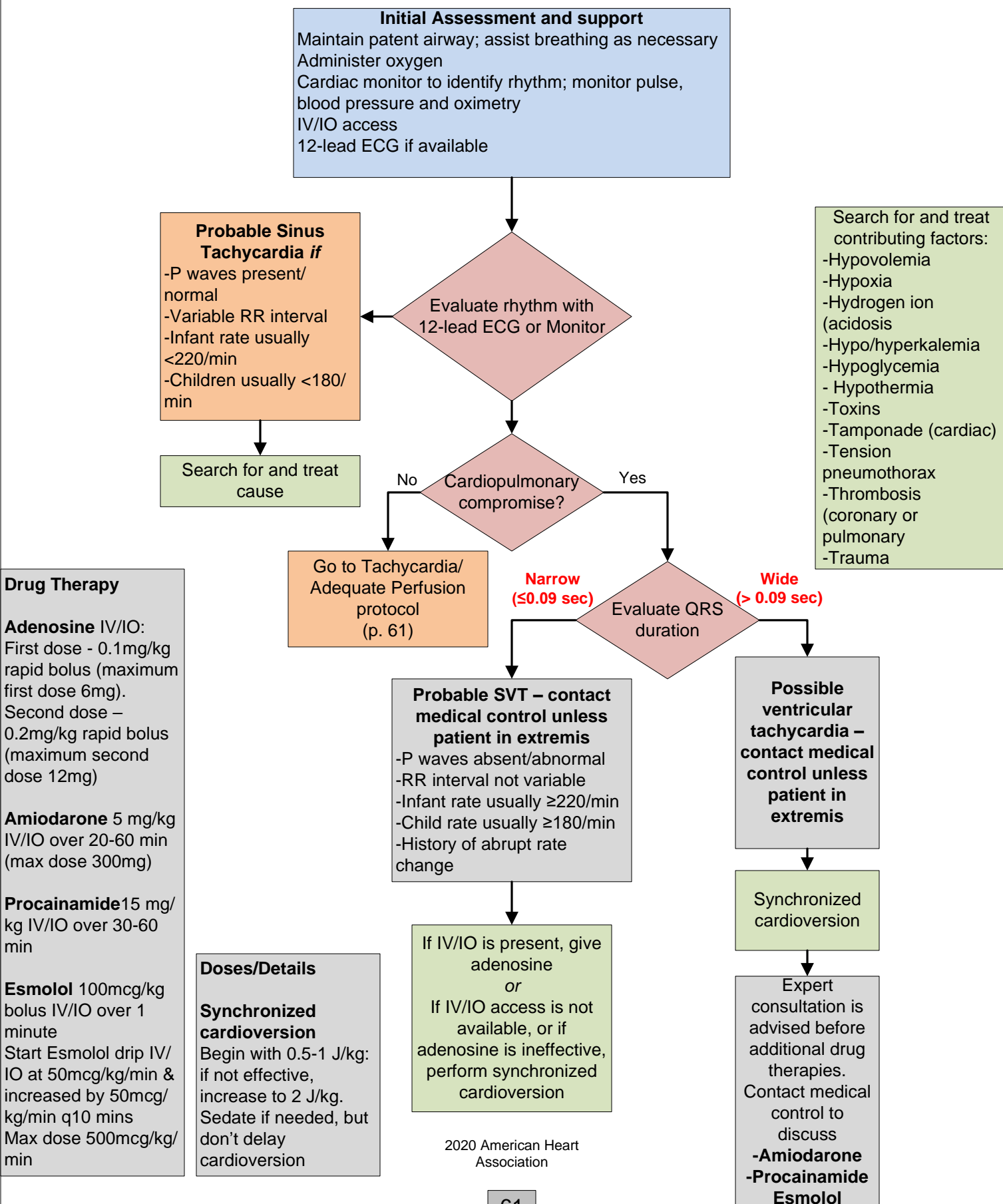
****May give LR if NS not available**

Children's Transport Patient Care Protocols **TACHYCARDIA/ADEQUATE PERFUSION**



Children's Transport Patient Care Protocols

TACHYCARDIA/POOR PERFUSION WITH PULSES



Children's Transport
Patient Care Protocols
TOXICOLOGY

Obtain as accurate a history as possible – substance, time, amount, prehospital treatment. Transport sample of substance to the receiving facility. Discuss treatment plan with Medical Control.

Naloxone – 0.1 mg/kg (max dose of 2mg) IVP, IM, ET, or Intranasal – repeat x 1 in 5 minutes – administer for unknown or opioid ingestions

Dextrose - Infant < 1 year old: D10W 1.0 gm/kg IV/IO

Dilute below doses 1ml:1ml with sterile water

Child > 1 year old D50 - 0.5 gm/kg IV/IO
(max dose 25 grams)

Child >=8 years old D50 - 0.5 gm/kg IV/IO (max dose 50 grams)

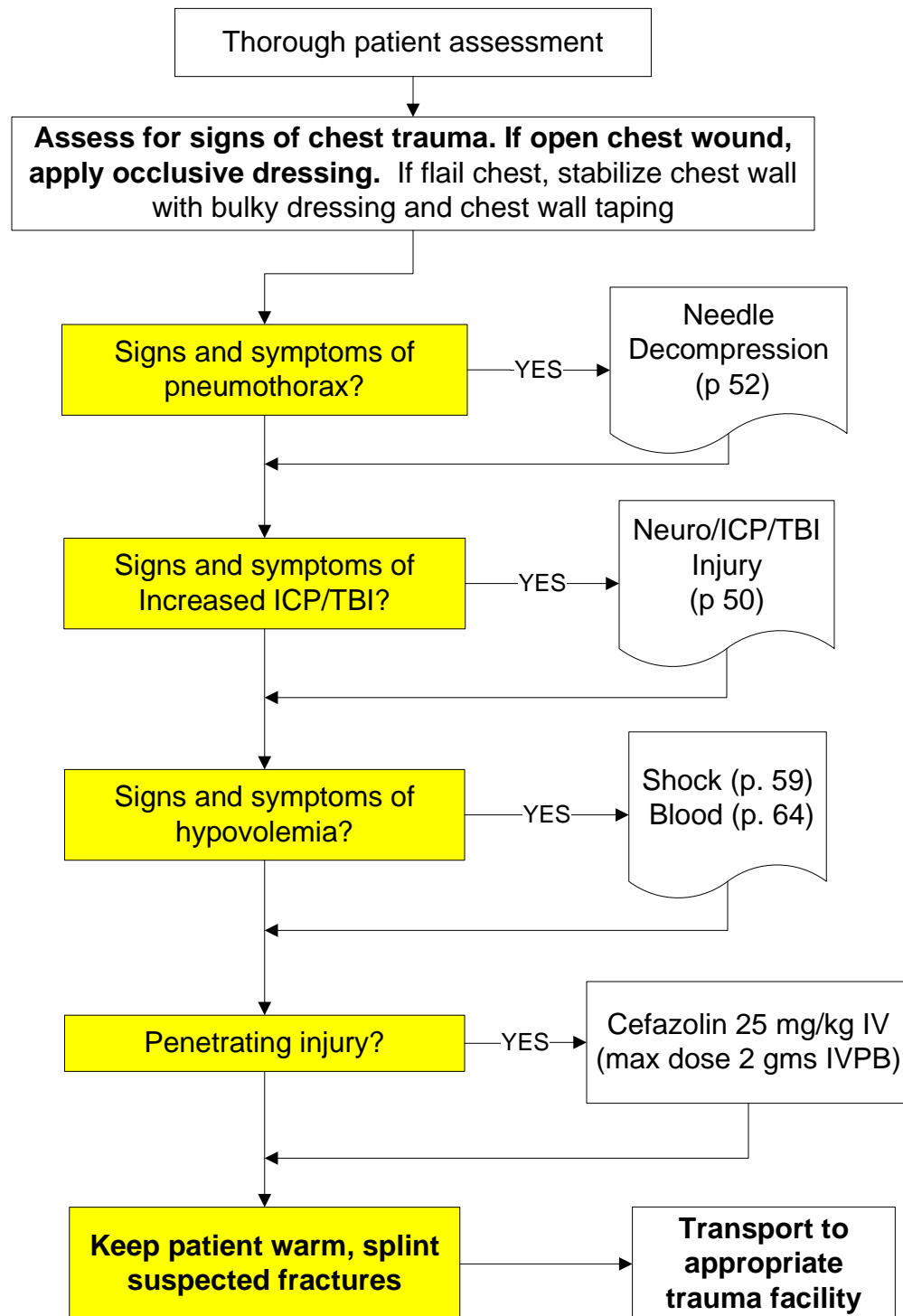
Alkalinization – Sodium Bicarbonate 2 mEq/kg (max dose 50 meq) in D5W IV over 1 hour.

Activated Charcoal – 1 gm/kg NG/PO (max dose of 50 grams) 1st dose should include Sorbitol.

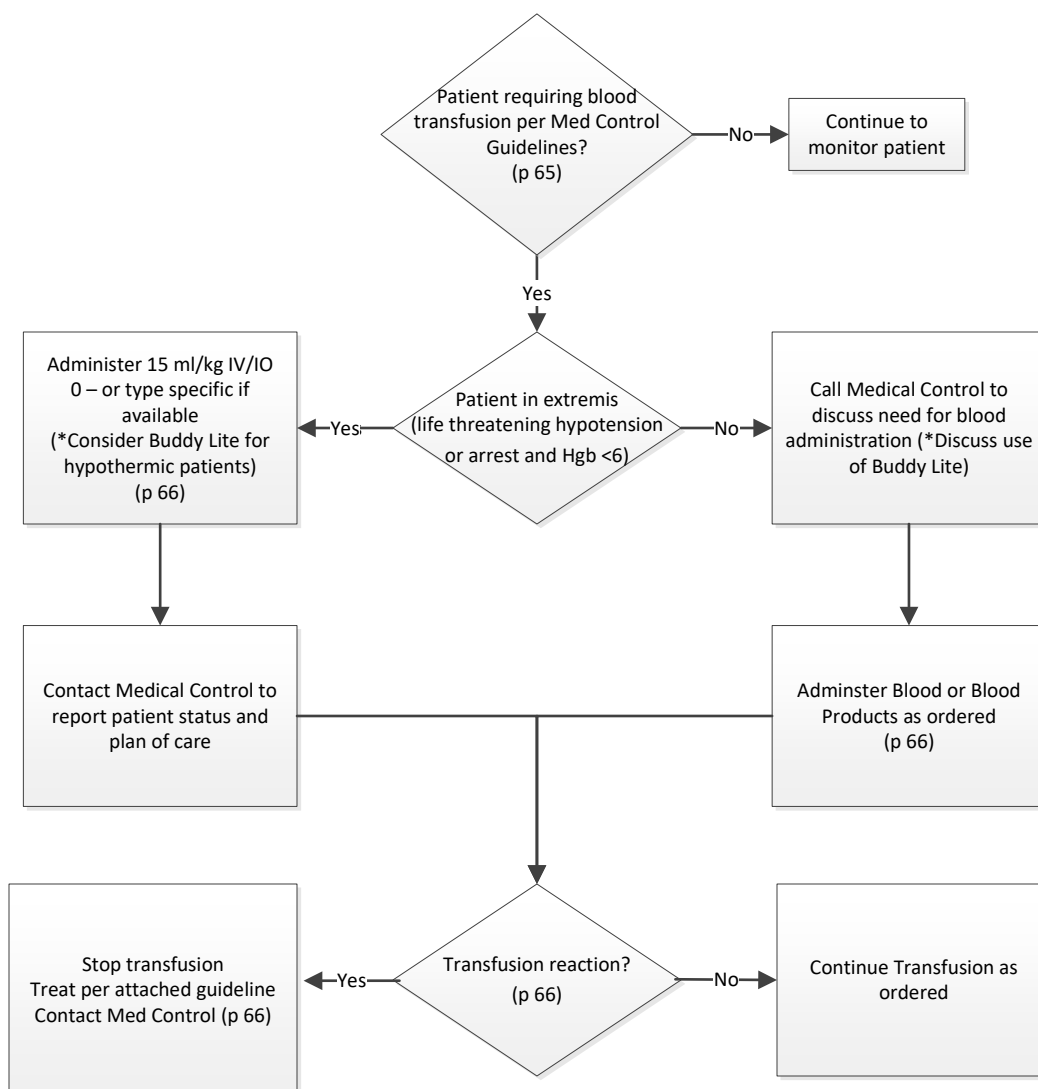
Monitor closely for rapid changes in patient condition, despite initial determination of patient stability – many substances can cause sudden life threatening complications such as cardiac arrest, dysrhythmias, and seizures.

Children's Transport
Patient Care Protocols
TRAUMA

Cervical spine/full backboard immobilization – all pediatric patients are immobilized with appropriate devices unless directed by Medical Control



Children's Transport Patient Care Protocols Blood Administration on Transport 1 of 3



*Criteria to use Buddy Lite Warmer: Patient in extremis needing blood product transfusion and meets at least 1 of the following criteria:

- Hypothermia <36 degrees Celsius
- Transfusing $\geq 15\text{cc/kg}$ blood product and patient not febrile

*Criteria to call Med Control prior to using Buddy Lite Warmer:

- Patient is post-arrest
- Patient has a TBI
- Patient is not in extremis

Children's Transport
Patient Care Protocols
Blood Administration on Transport 2 of 3

Trauma patients:

Contact med control prior to administering blood

May administer without med control if patient in extremis (life threatening hypotension or arrest) with a documented Hgb < 6

Criteria if not in extremis:

–Hgb < 7

–Known or suspected trauma (GSW/ blunt abdominal trauma/ long bone fx/ pelvic fx/ TBI)

AND signs of hemodynamic compromise

–On vasopressors

–Hypotension as defined by age...

–Tachycardia as defined by age...

Or at the discretion of medical control

Medical patients:

Must contact med control prior to transfusing blood

May administer without med control if patient in extremis (life threatening hypotension or arrest) with a documented Hgb < 6 and is on inotropes. May limit volume given (5 ml/kg aliquots) for patients with heart failure or fluid overload.

Criteria if not in extremis:

–Hgb < 7

AND at least one of the following

–Signs of hemodynamic compromise

–Hypoxic resp failure not responding to peep/fio2

Or at the discretion of medical control

Children's Transport
Patient Care Protocols
Blood Administration on Transport 3 of 3

- Administer blood per med control order and per CHOA Blood Administration Policy 7.2
- Use filtered blood tubing, tubing gets flushed with NS only (no LR or D5W)
- Record a full set of the patient's vital signs prior to beginning infusion and then per policy
- Patient's temperature should not rise more than 2 degrees **farenheit** from baseline
- Repeat this procedure for every new unit of product
- Consider repeating iSTAT to reassess H/H and iCal if administering multiple units/products

Transfusion Reactions: Call Med Control. **DO NOT DISPOSE OF PRODUCT OR TUBING IN ANY REACTION**

ACUTE HEMOLYTIC:

- **TIME OF ONSET:** 5-15 minutes
- **SYMPTOMS:** Chills, back pain, temperature elevation, nausea/vomiting, oliguria, flushing, headache, dyspnea
- **TREATMENT:**
 - Discontinuation of infusion.
 - Treat shock
 - Benadryl **1 mg/kg IV (50mg max dose)**

ANAPHYLACTIC (rare):

- **TIME OF ONSET:** Immediate
- **SYMPTOMS:** Severe respiratory/CV distress, cyanosis, hypotension, cramping, nausea/vomiting
- **TREATMENT:**
 - Discontinuation of infusion
 - Treat shock
 - Anaphylaxis protocol (page 11)
 - Contact med control and blood bank immediately

FEBRILE (NON-HEMOLYTIC):

- **TIME OF ONSET:** Varies
- **TREATMENT:**
 - PO or PR Tylenol (see fever protocol page 23)
 - If reaction worsens, stop transfusion and treat based on reaction S/S

Children's Transport
Patient Care Protocols
ADVANCED TRANSPORT VENTILATOR

Indication Criteria : Normal Lungs (example: Elective Post-Op patients, Airway protection, and Status Epilepticus), Hypoxemic Respiratory Failure patients.

Contraindication Criteria: High Frequency Oscillations Ventilation, BiVent Patients, ECMO ventilated patients, Chronic Airway Ventilated Patients.

Initial Patient Assessment

- Interview and Conduct Physical Examination.
- Assess Vital Signs: Normal and Abnormal ranges.
- Heart Rhythm
- Secure/Endotracheal Tube size, placement, and cuff pressure.
- Breath Sounds and Chest Radiograph (if available).
- Pulse Oximetry and End-Tidal Carbon Dioxide.
- Assess Blood Gases.
- Fluid and Electrolyte Assessment.
- Neurological Assessment and Mental Status.

Children's Transport
Patient Care Protocols
ADVANCED TRANSPORT VENTILATOR

Ventilator Management

Contact Med Control to discuss initial vent management

Choose a mode of ventilation

-**P-SIMV**, Pressure Control + PS or
-**APV-SIMV** (PRVC) + PS

Rate: Infant (0-6 mos) 30
Infant (6 mos-12mos) 25
child (1-12 years) 20
Adolescent (13 years-Adult) 15

Vt set: 6-8 ml/Kg of ideal bodyweight (to keep PIP < 35 cmH2O)
for PC, set PIP to achieve Vt <8 ml/Kg

FIO2: Keep SPO2 > 94% unless permissive hypoxemia is implemented

Ti : Infant 0.5 sec.
child 0.75 sec.
Adult 1.0 sec.

Select Pressure Support of 10 cmH2O and 5 cm of PEEP
(titrate PS to achieve spontaneous Vt exhaled of 6-8 ml/Kg).

- Place patient on the Ventilator, re-assess patient's respiratory response & vital signs. Package for transport, re-assess after packaging.
- Re-asses Endotracheal Tube Placement, Breath Sounds including visualizing chest xray.
- Heart Rhythm, Pulse Oximetry and EtCO2 Monitoring Re-assess Blood Gas (CBG or VBG)10 minutes after being placed on the ventilator.

Ventilator Adjustments

Children's Transport
Patient Care Protocols
ADVANCED TRANSPORT VENTILATOR

Ventilator Adjustments

Keep SaO₂ or SPO₂ > 94 % unless
doing permissive hypoxemia

Keep PCO₂ 35 - 45 unless doing
permissive hypercapnia

If SaO₂ is < 94%
on FIO₂ > 60%
Increase PEEP
by 2 every 5
minutes to max
of 10 cm as
long as
perfusion
intact

If SaO₂ >
93% on FIO₂
< 60% wean
FIO₂ by 5%
every 10
minutes to a
minimum of
30%

If PaCO₂ is
> 50 and or
pH is < 7.3

If PaCO₂ is
< 35 or pH is
> 7.40

Increase IMV
2- 5 bpm

Decrease IMV
2- 5 bpm

Contact Medical Control

Reassess Blood Gas or ETCO₂ in 10
minutes after increasing or
decreasing rate as needed, contact
Medical Control if increasing rate by
> 10

Patient stable with acceptable
parameters

Children's Transport
Patient Care Protocols
ADVANCED TRANSPORT VENTILATOR

Patient Monitoring during Transport

- A Self-inflating Manual BVM must be present, attached to 100% oxygen flowmeter. Assess Bulk Oxygen usage.
- Maintain an established patent secured airway (ensure the breathing circuit is free of obstructions).
- Continuously monitor vital signs, pulse oximetry and ETCO₂ capnography. Document every 5 minutes in ePCR.
- Maintain MIVF (refer to protocols for VBGs/fluids/sedation) and monitor IV pumps.
- Ensure all electrical devices are plugged into outlets.
- Secure loose equipment.

Trouble-shooting and Alarms

- Always disconnect the patient and manually ventilate with self inflating bag attached to oxygen source when identifying an unknown ventilator alert.
- Backup ventilation - an apnea has caused the ventilator to switch from support to backup ventilation mode. Check the patient. Check ventilator settings.
- Expiratory Minute volume (high) & (low) - (High) Preset default alarm limit exceeded increased patient activity. Ventilator self-triggering (autocycling) improper alarm limit setting. Check the patient and breathing system. Check trigger sensitivity setting. Check alarm limits. (Low)-check patient, check cuff pressure, check breathing circuit for leak/disconnect. Consider ventilatory support for the patient.
- Gas Supply Pressure Low- Air/O₂ supply is below 2.0 kPa x , check gas line, check connections.
- High Continuous Pressure - Constant high pressure for more than 15 seconds (PEEP+15 cmH₂O). Check patient and breathing system. Check ventilator settings. Contact a Service Technician.

Algorithm for Use of Home Vent During Ground Transport

Does the vent dependent patient requiring transport have a respiratory concern?

Rotor transport is excluded from use of home vent during transport

Yes

No

Transition patient to Transport Ventilator

Is the RT or Advanced Medic comfortable utilizing the patient's home vent for transport?

Yes

No

Is Med Control ok with the RT or Advanced Medic utilizing the patient's home vent for transport?

Transition patient to Transport Ventilator

Yes

No

Ok to use patient's home vent

Transition patient to Transport Ventilator

Children's Transport
Patient Care Protocols
Button Battery Ingestion

Patient presents with known or suspected Button Battery (BB) ingestion 1,2



For ingestion

<12 hours²:

• ≥12 mo. give 10ml honey PO q10 min

x 6 doses max

*additional doses per Med Control

Keep patient NPO (except honey/Carafate)
Provide oral suction as needed.

Inclusion Criteria:

Known or suspected Button Battery Ingestion

Age ≥12 months

Patient able to swallow

Exclusion Criteria:

Patient < 12 months

Vomiting

Respiratory Distress

Intubated

Allergy to Honey

Battery determined in stomach (patient will still need evaluation by physician)

AMS

For all known or suspected BB ingestions (<12 hours) transferred to the ED, recommend **immediate** administration of oral Honey

1 SUSPECT BUTTON BATTERY (BB) INGESTION

• Patient with abrupt onset of any one of the following: refusal of oral intake, difficulty swallowing, chest pain, drooling, airway obstruction, or wheezing or stridor without typical prodromal symptoms of viral illness.

• Presumed "coin" shape ingestion.

• **For patients presenting to an Urgent Care center with BB ingestion, immediately begin Honey and contact Transfer Center for Emergent transfer to ECH or SR.**

• Batteries located in the esophagus may be asymptomatic initially. **Do not wait for symptoms to appear.** Serious burns can occur within 2 hours.

• Do not induce vomiting or give cathartics

Symptoms of BB

ingestion include: Occult or visible bleeding, persistent or severe abdominal pain, vomiting, signs of acute abdomen and/or fever, and/or profoundly decreased appetite (unless symptoms unrelated to battery ingestion)

2 DETERMINE BB SIZE AND LOCATION

Honey is recommended for all known or suspected BB ingestions **within the past 12 hours** (increased risk of esophageal perforation if >12 hours)

• Begin honey once BB ingestion suspected. If X-ray shows **esophageal location**, continue until patient reaches the OR. Discontinue if battery located in the stomach. If ≥12 mo. give honey 10 ml PO Q10 min, max 6 Doses*

**May exceed max doses per MD order*

• 1 honey packet (9.2 ml) is acceptable substitute for 10 ml dose

• Chemical content & diameter of the BB can be determined from imprinted code found on the battery case

• Assume hearing aid batteries are <12mm

Children's Transport
Guideline
BUDDY LITE GUIDELINE 1 of 2

I. Policy

For active blood warming during administration, under discretion of medical control unless patient is in extremis.

II. Procedure

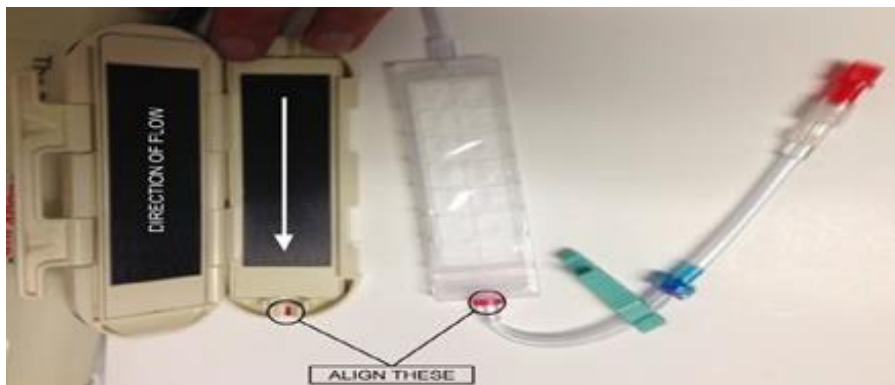
A. Ensure battery is charged. See display end of battery pack (5 bars is a full charge).



B. Prime blood tubing using normal saline.

C. Attach blood tubing to Buddy Lite tubing (BLUE cap), prime buddy lite tubing using normal saline. Remove all air by gently tapping buddy lite tubing set.

D. Insert buddy lite tubing into warming unit and close latch. Align red to red.



Children's Transport
Guideline
BUDDY LITE GUIDELINE 2 of 2

- E. Connect to patient – RED cap end of buddy lite tubing, unclamp lines.
- F. Turn ON the unit at the battery pack to begin the infusion. Solid blue light on battery indicates unit is working correctly.



- G. Alarm/Malfunction – RED/Blue light flash. To reset turn the unit OFF then ON again.
- H. When heating, there is a green light that flashes intermittently on the heater unit indicating active heating.



- I. Can connect a 3-way stopcock between blood tubing and buddy lite tubing if necessary for a push-pull setup.

Children's Transport
Patient Care Protocols
REPORT Guideline

Below is a generalized format for providing report to receiving nurses and/or medical control when providing patient information. It is not meant to be all inclusive, and not every report will require each piece of information. It is merely intended to act as a reference guide.

A – airway (ETT size, cuffed, position)
B – breathing (vent settings, FiO₂/Blood Gas)
C – circulation (BP/pressors/hemodynamics)
D - de brain (paralytics, bolt, seizures, CSF counts)
E – electrolytes (NA, K, HCO₃, Base, CA, GLU)
F – fluids (IVF, rate)
G – gastrointestinal, nausea, vomiting, stools
H – hematology (avail blood products/H&H/Platelets/Coags)
I – infection (antibiotics, cultures, CBC, CRP)
J – joints and skin (IV sites, swelling, rash)
K – kidneys (output, renal disease)
L – lines (NG, Foley, Swan, CVL, PICC, A-line, I/O, PIV)
M – medications
N – mode (ground, air, ETA)
O - other
P – plan
Q - questions

Children's Transport
Patient Care Protocols
Appendix 1

Definitions:

Extremis – in grave or extreme circumstances, a state that without intervention would result in death

Hypotension – SBP < minimum for age (see pg 6)

Hemodynamic instability - A state requiring pharmacologic or mechanical support to maintain a normal blood pressure or adequate cardiac output

Septic shock: S/S fever, poor perfusion, may have bounding pulses and warm, red skin, may have history of recent illness. (p 59)

Hypovolemic shock: S/S poor perfusion, decreased UOP, poor skin turgor, dry mouth, low CVP, small heart on CXR, history of vomiting/diarrhea, poor PO intake, fever, large blood loss, decreased CRT, increased HR for age. Blood pressure is not a good indicator of shock, it is the last parameter to fall. (p 59)

Cardiogenic Shock – S/S – CHF, cardiomegaly, pulmonary edema, hepatomegaly, gallop, rales, rhonchi, wheezing, venous distention, muffled heart sounds, high CVP (p 59)