SUPPLEMENTAL MATERIAL

Data S1. Johns Hopkins Resuscitation Debriefing Privacy and Confidentiality.

Johns Hopkins Resuscitation Debriefing Privacy and Confidentiality

Thank you for coming today to discuss and learn from last week's pediatric cardiac arrest events. The purpose of this QI initiative is to identify every pediatric cardiac arrest event in the hospital, discuss what went well and what didn't in order to develop strategies to improve performance in the future. In order to inform each case's discussion we will review as much objective data as possible in order to identify instances of high and low performance and to gain insight as to what have mediated them such as communication, leadership, shared mental models, equipment and room ergonomics. There is increasing literature which suggests that debriefing real events with data from those events leads to subsequent future performance benefits and we are operating in part using this concepts and methods from this evidence. Although objective data is our gold standard we also recognize the complexity of these events and the importance of your observations and actions. Understanding what decisions were made during these events provide tremendous valuable insight as to why things happened the way they did and what we might learn from them to take with us into the future. To that end we ask questions from a place of genuine curiosity with an aim to learn and never to interrogate or to make anyone feel bad; we will try our hardest to ask questions respectfully and always with a productive purpose in mind. We know that everyone here is intelligent, has worked and trained hard, and wants to provide the best care possible to children in the hospital every day. We ask that everyone honors that commitment and one another by sharing the lessons learned from this discussion while maintaining the privacy and confidentiality of each other.

Table S1. Johns Hopkins Pharmacy Acute Event Peer-to-Peer Debriefing Form.

Pediatric RRT/ PICU Code Blue/Alpha Trauma/DART Response Debriefing for Pharmacy
Privileged and Confidential/Peer Review Protected

******Please use blue or black pen******

Event Date: _____ Event Time: _____ AM/PM Location: _____ MRN: _____

Patient Name: _____ Patient Weight: _____ kg Patient in Isolation: Yes No

Pharmacist Completing Form: _____ Other Responding Pharmacist(s): _____

1. Indication for the Pediatric RRT/PICU Code Blue/DART:
   ☐ Respiratory Distress ☐ Cardiac Arrest ☐ Anaphylaxis ☐ Altered Mental Status
   ☐ Hypotension ☐ Seizure ☐ DART ☐ Other: _____

2. Which of the 5 questions of the Pharmacist's script were asked?

Who is the team leader?	☐ Yes	☐ No
Who is the medication RN	☐ Yes	☐ No
What is the patient's weight?	☐ Yes	☐ No
Does the patient have a working IV?	☐ Yes	☐ No
What algorithm is being followed?	☐ Yes	☐ No

   If no, which questions were not asked and why? _____

3. Medications administered (please list):

   _____

4. Timing of first epinephrine dose after initiation of chest compressions: _____

5. Was ECMO discussed/activated after the first dose of epinephrine? ☐ Yes ☐ No

6. Number of doses of epinephrine administered: _____

7. Were all doses of epinephrine given within the recommended 3 - 5 minute interval? ☐ Yes ☐ No

8. Was sodium bicarbonate administered? ☐ Yes ☐ No

   If yes, what was the indication: ☐ Acidosis ☐ Hyperkalemia ☐ Unknown

9. Was calcium chloride/gluconate administered? ☐ Yes ☐ No

   If yes, what was the indication: ☐ Hypocalcemia ☐ Hyperkalemia ☐ Unknown

10. Were there any missing medication(s) or supplies? ☐ Yes ☐ No

    If yes, please list: _____

11. Any concerns about teamwork/communication? ☐ Yes ☐ No

    If yes, please describe: _____

12. Any positive feedback about teamwork/communication? ☐ Yes ☐ No

    If yes, please describe: _____

13. List any interventions you made that you would like to share?

    _____

Please email or return the completed form to LeAnn's or Lisa's mailbox Last Updated 5/17
Additional forms can be found on the I-drive under Pediatric Pharmacy/Emergency Drug Bags/Debriefing

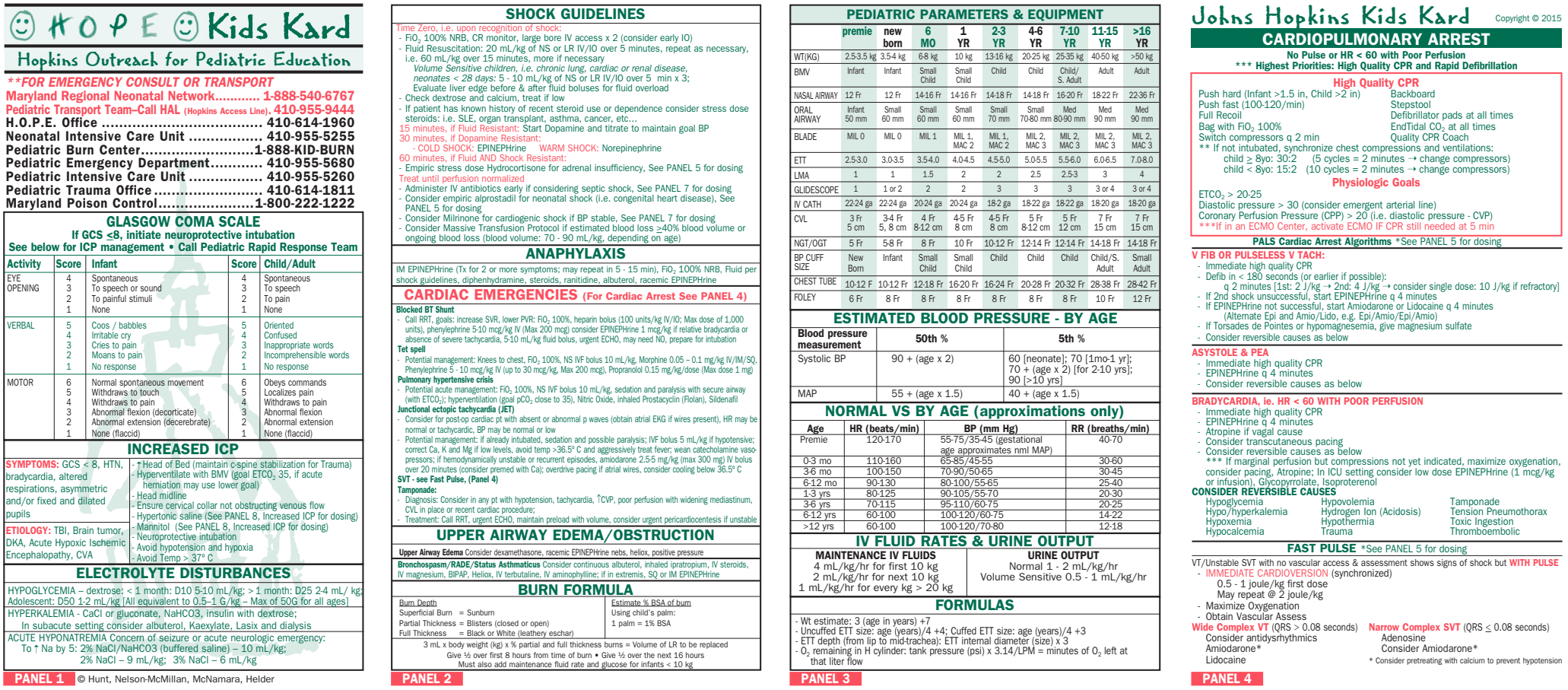
Table S2. Johns Hopkins Resuscitation Debriefing and Discussion Guide.

Johns Hopkins Resuscitation Debriefing and Discussion Guide

1. Review **patient history**: 2-3 Sentences with relevant medical history, present illness, any prior cardiac arrest this admission/ever.
2. Describe **preceding events**: conditions, exposures, and perceived stability leading up to the event. Discuss likelihood and nature of arrest onset, gradual vs. precipitous, expected vs. sudden, potential causal interventions. Given pre-arrest timing and duration Inquire what was done (if anything) to prepare.
3. Discuss physiology-basis or team-decision making that prompted **the initiation of CPR**.
4. Describe the **first few minutes** of the resuscitation including: initiation of CC, quality of CPR, role assignments, kinetics, sound, CRM/TeamSTEPPS challenges/wins.
5. Review **objective data** including bedside monitor second to second data and JH CPR Performance Report Card (if available). For OR/Cath/MRI review Anesthesia record.
6. Discuss **coaching** feedback direction style used and methods employed: was it quantitative “make your rate 100 / try to get co2 >20”, qualitative “good depth”, relative “deeper/ slower”, reinforcing “good job, just like that”. Which were effective and why?
7. **Pharmacy**: medication administration, access, dosing, communication, algorithm adherence, 5 questions asked?
8. **Redo / Repeat:** if you could go back and change something what would be? If we should repeat something for similar patients / situations, what should it be?
9. Event impact **on non-event related patient care**. Open discussion as we evolve discussion points: think how were resources allocated safely / unsafely/ unintended consequences due to response, etc.
10. General **ECPR** topics to include: candidacy discussion/confusion. If activated within in appropriate timing. Were ECPR benchmarks met?
11. Time permitting: **precision/personalized CPR** approach for this patient. Was discussed prior to arrest? Was adhered to?

Figure S1. Johns Hopkins Kids Kard Pediatric Acute Emergencies Cognitive Aid*

*Cognitive Aid for pediatric emergencies with area designed to support cardiac arrest management, includes AHA CPR depth and rate targets, and expert consensus-based targets



☺ H O P E ☺ Kids Kard

Hopkins Outreach for Pediatric Education

****FOR EMERGENCY CONSULT OR TRANSPORT**

Maryland Regional Neonatal Network..... 1-888-540-6767
Pediatric Transport Team–Call HAL (Hopkins Access Line). 410-955-9444
H.O.P.E. Office 410-614-1960
Neonatal Intensive Care Unit 410-955-5255
Pediatric Burn Center.....1-888-KID-BURN
Pediatric Emergency Department..... 410-955-5680
Pediatric Intensive Care Unit 410-955-5260
Pediatric Trauma Office 410-614-1811
Maryland Poison Control.....1-800-222-1222

GLASGOW COMA SCALE

If GCS ≤8, initiate neuroprotective intubation
See below for ICP management • Call Pediatric Rapid Response Team

Activity	Score	Infant	Score	Child/Adult
EYE OPENING	4	Spontaneous	4	Spontaneous
	3	To speech or sound	3	To speech
	2	To painful stimuli	2	To pain
	1	None	1	None
VERBAL	5	Coos / babbles	5	Oriented
	4	Irritable cry	4	Confused
	3	Cries to pain	3	Inappropriate words
	2	Moans to pain	2	Incomprehensible words
	1	No response	1	No response
MOTOR	6	Normal spontaneous movement	6	Obeys commands
	5	Withdraws to touch	5	Localizes pain
	4	Withdraws to pain	4	Withdraws to pain
	3	Abnormal flexion (decorticate)	3	Abnormal flexion
	2	Abnormal extension (decerebrate)	2	Abnormal extension
	1	None (flaccid)	1	None (flaccid)

INCREASED ICP

SYMPTOMS: GCS < 8, HTN, bradycardia, altered respirations, asymmetric and/or fixed and dilated pupils

ETIOLOGY: TBI, Brain tumor, DKA, Acute Hypoxic Ischemic Encephalopathy, CVA

- ↑Head of Bed (maintain c-spine stabilization for Trauma)
- Hyperventilate with BMV (goal $ETCO_2$ 35, if acute herniation may use lower goal)
- Head midline
- Ensure cervical collar not obstructing venous flow
- Hypertonic saline (See PANEL 8, Increased ICP for dosing)
- Mannitol (See PANEL 8, Increased ICP for dosing)
- Neuroprotective intubation
- Avoid hypotension and hypoxia
- Avoid Temp > 37° C

ELECTROLYTE DISTURBANCES

HYPOGLYCEMIA – dextrose: < 1 month: D10 5-10 mL/kg; > 1 month: D25 2-4 mL/ kg; Adolescent: D50 1-2 mL/kg [All equivalent to 0.5–1 G/kg – Max of 50G for all ages]

HYPERKALEMIA - CaCl or gluconate, NaHCO3, insulin with dextrose; In subacute setting consider albuterol, Kaexylate, Lasix and dialysis

ACUTE HYPONATREMIA Concern of seizure or acute neurologic emergency:
To ↑ Na by 5: 2% NaCl/NaHCO3 (buffered saline) – 10 mL/kg;
2% NaCl – 9 mL/kg; 3% NaCl – 6 mL/kg

PANEL 1 © Hunt, Nelson-McMillan, McNamara, Helder

SHOCK GUIDELINES

Time Zero, i.e. upon recognition of shock:
- FiO_2 100% NRB, CR monitor, large bore IV access x 2 (consider early IO)
- Fluid Resuscitation: 20 mL/kg of NS or LR IV/IO over 5 minutes, repeat as necessary, i.e. 60 mL/kg over 15 minutes, more if necessary
  Volume Sensitive children, i.e. chronic lung, cardiac or renal disease, neonates < 28 days: 5 - 10 mL/kg of NS or LR IV/IO over 5 min x 3; Evaluate liver edge before & after fluid boluses for fluid overload
- Check dextrose and calcium, treat if low
- If patient has known history of recent steroid use or dependence consider stress dose steroids: i.e. SLE, organ transplant, asthma, cancer, etc…

15 minutes, if Fluid Resistant: Start Dopamine and titrate to maintain goal BP

30 minutes, if Dopamine Resistant:
- COLD SHOCK: EPINEPHrine WARM SHOCK: Norepinephrine

60 minutes, if Fluid AND Shock Resistant:
- Empiric stress dose Hydrocortisone for adrenal insufficiency, See PANEL 5 for dosing

Treat until perfusion normalized
- Administer IV antibiotics early if considering septic shock, See PANEL 7 for dosing
- Consider empiric alprostadil for neonatal shock (i.e. congenital heart disease), See PANEL 5 for dosing
- Consider Milrinone for cardiogenic shock if BP stable, See PANEL 7 for dosing
- Consider Massive Transfusion Protocol if estimated blood loss ≥40% blood volume or ongoing blood loss (blood volume: 70 - 90 mL/kg, depending on age)

ANAPHYLAXIS

IM EPINEPHrine (Tx for 2 or more symptoms; may repeat in 5 - 15 min), FiO_2 100% NRB, Fluid per shock guidelines, diphenhydramine, steroids, ranitidine, albuterol, racemic EPINEPHrine

CARDIAC EMERGENCIES (For Cardiac Arrest See PANEL 4)

Blocked BT Shunt
- Call RRT, goals: increase SVR, lower PVR: FiO_2 100%, heparin bolus (100 units/kg IV/IO; Max dose of 1,000 units), phenylephrine 5-10 mcg/kg IV (Max 200 mcg) consider EPINEPHrine 1 mcg/kg if relative bradycardia or absence of severe tachycardia, 5-10 mL/kg fluid bolus, urgent ECHO, may need NO, prepare for intubation

Tet spell
- Potential management: Knees to chest, FiO_2 100%, NS IVF bolus 10 mL/kg, Morphine 0.05 – 0.1 mg/kg IV/IM/SQ, Phenylephrine 5 - 10 mcg/kg IV (up to 30 mcg/kg, Max 200 mcg), Propranolol 0.15 mg/kg/dose (Max dose 1 mg)

Pulmonary hypertensive crisis
- Potential acute management: FiO_2 100%, NS IVF bolus 10 mL/kg, sedation and paralysis with secure airway (with $ETCO_2$); hyperventilation (goal pCO_2 close to 35), Nitric Oxide, inhaled Prostacyclin (Flolan), Sildenafil

Junctional ectopic tachycardia (JET)
- Consider for post-op cardiac pt with absent or abnormal p waves (obtain atrial EKG if wires present), HR may be normal or tachycardic, BP may be normal or low
- Potential management: if already intubated, sedation and possible paralysis; IVF bolus 5 mL/kg if hypotensive; correct Ca, K and Mg if low levels, avoid temp >36.5° C and aggressively treat fever; wean catecholamine vasopressors; if hemodynamically unstable or recurrent episodes, amiodarone 2.5-5 mg/kg (max 300 mg) IV bolus over 20 minutes (consider premed with Ca); overdrive pacing if atrial wires, consider cooling below 36.5° C

SVT - see Fast Pulse, (Panel 4)

Tamponade:
- Diagnosis: Consider in any pt with hypotension, tachycardia, ↑CVP, poor perfusion with widening mediastinum, CVL in place or recent cardiac procedure;
- Treatment: Call RRT, urgent ECHO, maintain preload with volume, consider urgent pericardiocentesis if unstable

UPPER AIRWAY EDEMA/OBSTRUCTION

Upper Airway Edema Consider dexamethasone, racemic EPINEPHrine nebs, heliox, positive pressure

Bronchospasm/RADE/Status Asthmaticus Consider continuous albuterol, inhaled ipratropium, IV steroids, IV magnesium, BIPAP, Heliox, IV terbutaline, IV aminophylline; if in extremis, SQ or IM EPINEPHrine

BURN FORMULA

Burn Depth	Estimate % BSA of burn
Superficial Burn = Sunburn	Using child's palm:
Partial Thickness = Blisters (closed or open)	1 palm = 1% BSA
Full Thickness = Black or White (leathery eschar)	

3 mL x body weight (kg) x % partial and full thickness burns = Volume of LR to be replaced
Give ½ over first 8 hours from time of burn • Give ½ over the next 16 hours
Must also add maintenance fluid rate and glucose for infants < 10 kg

PANEL 2

PEDIATRIC PARAMETERS & EQUIPMENT

	premie	new born	6 MO	1 YR	2-3 YR	4-6 YR	7-10 YR	11-15 YR	>16 YR
WT(KG)	2.5-3.5 kg	3.5-4 kg	6-8 kg	10 kg	13-16 kg	20-25 kg	25-35 kg	40-50 kg	>50 kg
BMV	Infant	Infant	Small Child	Small Child	Child	Child	Child/ S. Adult	Adult	Adult
NASAL AIRWAY	12 Fr	12 Fr	14-16 Fr	14-16 Fr	14-18 Fr	14-18 Fr	16-20 Fr	18-22 Fr	22-36 Fr
ORAL AIRWAY	Infant 50 mm	Small 60 mm	Small 60 mm	Small 60 mm	Small 70 mm	Small 70-80 mm	Med 80-90 mm	Med 90 mm	Med 90 mm
BLADE	MIL 0	MIL 0	MIL 1	MIL 1, MAC 2	MIL 1, MAC 2	MIL 2, MAC 3	MIL 2, MAC 3	MIL 2, MAC 3	MIL 2, MAC 3
ETT	2.5-3.0	3.0-3.5	3.5-4.0	4.0-4.5	4.5-5.0	5.0-5.5	5.5-6.0	6.0-6.5	7.0-8.0
LMA	1	1	1.5	2	2	2.5	2.5-3	3	4
GLIDESCOPE	1	1 or 2	2	2	3	3	3	3 or 4	3 or 4
IV CATH	22-24 ga	22-24 ga	20-24 ga	20-24 ga	18-2 ga	18-22 ga	18-22 ga	18-20 ga	18-20 ga
CVL	3 Fr 5 cm	3-4 Fr 5, 8 cm	4 Fr 8-12 cm	4-5 Fr 8 cm	4-5 Fr 8 cm	5 Fr 8-12 cm	5 Fr 12 cm	7 Fr 15 cm	7 Fr 15 cm
NGT/OGT	5 Fr	5-8 Fr	8 Fr	10 Fr	10-12 Fr	12-14 Fr	12-14 Fr	14-18 Fr	14-18 Fr
BP CUFF SIZE	New Born	Infant	Small Child	Small Child	Child	Child	Child	Child/S. Adult	Small Adult
CHEST TUBE	10-12 F	10-12 Fr	12-18 Fr	16-20 Fr	16-24 Fr	20-28 Fr	20-32 Fr	28-38 Fr	28-42 Fr
FOLEY	6 Fr	8 Fr	8 Fr	8 Fr	8 Fr	8 Fr	8 Fr	10 Fr	12 Fr

ESTIMATED BLOOD PRESSURE - BY AGE

Blood pressure measurement	50th %	5th %
Systolic BP	90 + (age x 2)	60 [neonate]; 70 [1mo-1 yr]; 70 + (age x 2) [for 2-10 yrs]; 90 [>10 yrs]
MAP	55 + (age x 1.5)	40 + (age x 1.5)

NORMAL VS BY AGE (approximations only)

Age	HR (beats/min)	BP (mm Hg)	RR (breaths/min)
Premie	120-170	55-75/35-45 (gestational age approximates nml MAP)	40-70
0-3 mo	110-160	65-85/45-55	30-60
3-6 mo	100-150	70-90/50-65	30-45
6-12 mo	90-130	80-100/55-65	25-40
1-3 yrs	80-125	90-105/55-70	20-30
3-6 yrs	70-115	95-110/60-75	20-25
6-12 yrs	60-100	100-120/60-75	14-22
>12 yrs	60-100	100-120/70-80	12-18

IV FLUID RATES & URINE OUTPUT

MAINTENANCE IV FLUIDS
4 mL/kg/hr for first 10 kg
2 mL/kg/hr for next 10 kg
1 mL/kg/hr for every kg > 20 kg

URINE OUTPUT
Normal 1 - 2 mL/kg/hr
Volume Sensitive 0.5 - 1 mL/kg/hr

FORMULAS

- Wt estimate: 3 (age in years) +7
- Uncuffed ETT size: age (years)/4 +4; Cuffed ETT size: age (years)/4 +3
- ETT depth (from lip to mid-trachea): ETT internal diameter (size) x 3
- O_2 remaining in H cylinder: tank pressure (psi) x 3.14/LPM = minutes of O_2 left at that liter flow

PANEL 3

Johns Hopkins Kids Kard

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CARDIOPULMONARY ARREST

No Pulse or HR < 60 with Poor Perfusion
***** Highest Priorities: High Quality CPR and Rapid Defibrillation**

High Quality CPR

Push hard (Infant >1.5 in, Child >2 in)
Push fast (100-120/min)
Full Recoil
Bag with FiO_2 100%
Switch compressors q 2 min
Backboard
Stepstool
Defibrillator pads at all times
EndTidal CO_2 at all times
Quality CPR Coach

** If not intubated, synchronize chest compressions and ventilations:
child ≥ 8yo: 30:2 (5 cycles = 2 minutes → change compressors)
child < 8yo: 15:2 (10 cycles = 2 minutes → change compressors)

Physiologic Goals

$ETCO_2$ > 20-25
Diastolic pressure > 30 (consider emergent arterial line)
Coronary Perfusion Pressure (CPP) > 20 (i.e. diastolic pressure - CPV)
***If in an ECMO Center, activate ECMO IF CPR still needed at 5 min

PALS Cardiac Arrest Algorithms *See PANEL 5 for dosing

V FIB OR PULSELESS V TACH:
- Immediate high quality CPR
- Defib in < 180 seconds (or earlier if possible):
  q 2 minutes [1st: 2 J/kg → 2nd: 4 J/kg → consider single dose: 10 J/kg if refractory]
- If 2nd shock unsuccessful, start EPINEPHrine q 4 minutes
- If EPINEPHrine not successful, start Amiodarone or Lidocaine q 4 minutes (Alternate Epi and Amio/Lido, e.g. Epi/Amio/Epi/Amio)
- If Torsades de Pointes or hypomagnesemia, give magnesium sulfate
- Consider reversible causes as below

ASYSTOLE & PEA
- Immediate high quality CPR
- EPINEPHrine q 4 minutes
- Consider reversible causes as below

BRADYCARDIA, ie. HR < 60 WITH POOR PERFUSION
- Immediate high quality CPR
- EPINEPHrine q 4 minutes
- Atropine if vagal cause
- Consider transcutaneous pacing
- Consider reversible causes as below

*** If marginal perfusion but compressions not yet indicated, maximize oxygenation, consider pacing, Atropine; In ICU setting consider low dose EPINEPHrine (1 mcg/kg or infusion), Glycopyrrolate, Isoproterenol

CONSIDER REVERSIBLE CAUSES

Hypoglycemia
Hypo/hyperkalemia
Hypoxemia
Hypocalcemia
Hypovolemia
Hydrogen Ion (Acidosis)
Hypothermia
Trauma
Tamponade
Tension Pneumothorax
Toxic Ingestion
Thromboembolic

FAST PULSE *See PANEL 5 for dosing

VT/Unstable SVT with no vascular access & assessment shows signs of shock but **WITH PULSE**
- IMMEDIATE CARDIOVERSION (synchronized)
  0.5 - 1 joule/kg first dose
  May repeat @ 2 joule/kg
- Maximize Oxygenation
- Obtain Vascular Assess

Wide Complex VT (QRS > 0.08 seconds)
Consider antidysrhythmics
Amiodarone*
Lidocaine

Narrow Complex SVT (QRS ≤ 0.08 seconds)
Adenosine
Consider Amiodarone*

* Consider pretreating with calcium to prevent hypotension

PANEL 4

MEDICATIONS

CARDIAC ARREST AND SHOCK

ADENOSINE — **0.1 mg/kg IV/IO Rapid Bolus**
May repeat at 0.2 mg/kg, then 0.3 mg/kg IV/IO after 2 minutes
Max first dose 6 mg, Max subsequent dose 12 mg
administer using a stopcock attached to a 10 mL NS flush

ALPROSTADIL — FOR DUCTAL DEPENDENT LESIONS: 0.05 – 0.1 MCG/KG/MIN

AMIODARONE — **5 mg/kg IV/IO; Max single first dose: 300 mg; Max subsequent dose: 150 mg**
Max total dose: 15 mg/kg/24 hours OR 2.2 G daily
Consider pretreatment with calcium to prevent hypotension
If no pulse, push undiluted
If pulse, dilute and give over 20-60 minutes
Monitor for hypotension
Post Resuscitation Infusion: 5 - 10 mcg/kg/min

ATROPINE — **0.02 mg/kg IV/IO, 0.04 - 0.06 mg/kg ETT**
Min single dose 0.1 mg, Max single dose 0.5 mg Repeat q 5 minutes,
to Max total dose 1 mg

CALCIUM CHLORIDE — **(10%) - 20 mg/kg IV/IO (0.2 mL/kg) over 5 minutes, Max dose of 1 G**

CALCIUM GLUCONATE — **60 mg/kg (Max 3 G)**

DEXTROSE — **0.5 – 1 G/kg (Max 50 G)**
< 1 month: 5-10 mL/kg of 10% Dextrose
> 1 month: 2-4 mL/kg of 25% Dextrose
Adolescent: 1-2 mL/kg of 50% Dextrose

EPINEPHrine — **0.01 mg/kg of 1:10,000 IV/IO** (0.1 mL/kg); Max single dose of 1 mg
0.1 mg/kg of 1:1000 ETT for >28 days (0.1 mL/kg); Max single dose of 2.5 mg
Administer q 4 min in cardiac arrest

GLUCAGON — **< 20 kg: 0.5 mg and patients ≥ 20 kg: 1 mg · IV/IM/SubQ, Max single dose 1 mg**

HYDROCORTISONE — **Shock - 2 mg/kg IV/IO/IM; Max single dose 100 mg**

INSULIN — **0.1 units/kg IV/IO with 0.5 G/kg of dextrose for hyperkalemia**
Max dose of Insulin 10 units; aspart or regular

LIDOCAINE — **1 mg/kg IV/IO, 2 - 3 mg/kg ETT Max dose of 100 mg**
May repeat q 5 minutes to Max total dose 3 mg/kg
Post Resuscitation Infusion: 20 - 50 mcg/kg/min

MAGNESIUM SULFATE — **50 mg/kg, Max dose of 2 G**
If no pulse, push undiluted
If pulse, dilute and give over 20 - 60 minutes, Monitor for hypotension and bradycardia

SODIUM BICARBONATE — (8.4%) - 1 mEq/kg IV/IO
For infants < 10 kg, dilute with equal volume of sterile water
administer only with clear indication

VASOPRESSIN — **0.4 units/kg dose IV/IO; Max dose of 40 units**

ADDITIONAL DRUGS

ALBUMIN — **5% albumin - 0.5 - 1 G/kg (10 - 20 mL/kg);**
25% albumin - 0.5 - 1 G/kg (2 - 4 mL/kg);

CHARCOAL, ACTIVATED — **Initial dose: 1 G/kg PO or gastric tube**
Max dose of 100 G. Contact Poison Control @ 1-800-222-1222

DiphenhydrAMINE — **1 mg/kg IV/IM/PO q 4 hours**
Max total dose 50 mg (contains propylene glycol)

FUROSEMIDE — **1 mg/kg IV/IM q6 - 8 hours; 2 mg/kg PO q6 - 8 hours.**
Max 200 mg IV/day, 600 mg PO/day.

NALOXONE — **Respiratory depression: 0.001-0.005 mg/kg IV/IM/IO/SUBQ,**
May redose, Max dose: 0.1 mg
Full Reversal: 0.1 mg/kg IV/IO/IM/SUBQ; Max dose 2 mg

RANITIDINE — **0.5 - 1 mg/kg IV/IM q 6 - 8 hours, Max dose of 50 mg**

PANEL 5

MEDICATIONS

RESPIRATORY

INHALED BRONCHODILATORS

ALBUTEROL — **<20 kg: 2.5 mg; ≥20 kg: 5 mg, in 3 mL NS nebulized**
May be repeated q 20 mins x 3 or continuous

EPINEPHrine — **Racemic: 0.25 - 0.5 mL of 2.25% solution in 2 mL NS nebulized**
1:1000: 2.5 - 5 mL in 3 mL NS nebulized

IPRATROPIUM — **0.25 - 0.5 mg/dose in 3 mL NS q20min x 3 acute use, then q4-8 hours;**
May be given with albuterol

IM/SubQ AND IV BRONCHODILATORS

IM/SubQ EPINEPHrine — **0.01 mg/kg of 1:1000 (0.01 mL/kg) q 20 minutes x 3**
Max single dose 0.5 mg

IM EPINEPHrine AUTOINJECTOR — **10 - 29 kg: EpiPen Jr. 0.15 mg IM**
≥ 30 kg: EpiPen 0.3 mg IM;
Used for pts with allergic reaction involving ≥ 2 systems
May redose q 5 - 15 min

MAGNESIUM SULFATE — **75 mg/kg IV/IO (Max dose 2 G)**
Give over 20 - 60 minutes. Monitor for hypotension/bradycardia

TERBUTALINE — **Loading dose: 2 - 10 mcg/kg IV over 30 minutes, Max dose of 1 mg**
Initial infusion rate: 0.1 - 0.2 mcg/kg/minute, titrate up in increments of
0.1 - 0.2 mcg/kg/minute every 30 minutes
Max infusion rate: 4 mcg/kg/minute (note doses as high as 10 mcg/kg/min have been used) monitor cardiac enzymes

STEROIDS

DEXAMETHASONE — **0.25 - 0.5 mg/kg/dose IV/IO q6 hours for airway edema (Max dose 10 mg)**
0.6 mg/kg/dose IM/PO for croup (Max dose 16 mg)

MethylPREDNISolone — **Loading dose: 2 mg/kg/dose IV/IM for status asthmaticus**
Max loading dose of 60 mg.
Maintenance: 0.5mg/kg/dose IV/IM q 6 hours up to 5 days
Max maintenance dose 80 mg/day

PrednisoLONE/ PrediniSONE — **2 mg/kg/day PO daily for acute asthma**
Max total dose 80 mg/day

SEDATION AND PAIN MANAGEMENT (Unintubated Patient)**

**Apply O_2, Monitor with $ETCO_2$, Prepare equipment for airway rescue

ACETAMINOPHEN — **10 - 15 mg/kg/dose q 4 - 6 hours PO/PR (Max single dose 650 mg); IV dose**
12.5 mg/kg/dose IV (see reference for further dosing as interval dependent on age)
Contraindicated in patients with known hepatic disease

BARBITUATE — **listed under neuro/seizure and increased ICP sections**

BENZODIAZEPINES — **listed under induction and neuro/seizure sections**

FentaNYL — **0.5 - 1 mcg/kg IV/IO q 30-60 minutes, Max dose 50 mcg.**
Intranasal dosing: 1 - 2 mcg/kg using an atomizer (Max dose 100 mcg);
risk of rigid chest
Give no faster than 1 mcg/kg/minute

HYDROmorphone — **0.015 mg/kg IV q 4 - 6 hrs PRN,** (Max dose 1 mg for opiate naïve patients for IV dosing.) 0.03 - 0.08 mg/kg PO q4 - 6 hrs PRN, (Max dose of 4 mg for opiate naïve patients.)

IBUPROFEN — **10 mg/kg/dose PO q 6 - 8 hrs (Max single dose 800 mg)**
Max dose 40 mg/kg/day
Contraindicated in patients with trauma or bleeding disorder.

KETAMINE — **0.5 - 1 mg/kg IV, Max dose of 150 mg**

KETOROLAC — **0.5 - 1 mg/kg IV/IM q 6-8 hours**
Max single dose 30 mg. Caution with renal insufficiency.
Contraindicated in patients with trauma or bleeding disorder

MORPHINE — **0.05 - 0.1 mg/kg IV/IM/IO/SubQ** Max adult dose 5 mg.

PANEL 6

MEDICATIONS

VASOACTIVE INFUSIONS

DOPamine — **5 - 20 mcg/kg/min**

DOBUTamine — **2 - 20 mcg/kg/min**

EPINEPHrine — **0.01 - 0.2 mcg/kg/min, up to 1 in severe circumstances**

ESMOLOL — **50 - 300 mcg/kg/min**

ISOPROTERENOL — **0.05 - 2 mcg/kg/min**

MILRINONE — **Loading dose: 50 mcg/kg IV over 10-60 minutes**
Infusion: 0.25 - 1 mcg/kg/min
consider dose adjustment with renal dysfunction

NICARDIPINE — **0.5 - 5 mcg/kg/min**

NITROGLYCERIN — **0.5 - 20 mcg/kg/min**

NITROPRUSSIDE — **0.5 - 10 mcg/kg/min; caution cyanide toxicity**

NOREPINEPHRINE — **0.01 - 0.2 mcg/kg/min, up to 1 in severe circumstances**

PHENYLEPHRINE — **Bolus: Usual starting bolus dose 1 mcg/kg and range per effect 1 - 10 mcg/kg; consider up to 30 mcg/kg for Blocked BT shunt or Tet spell); Max single dose of 200 mcg**
Infusion: 0.5 - 5 mcg/kg/minute

VASOPRESSIN — **0.5 - 2 MILLIUnits/kg/min for hypotension;**
0.5 - 10 MILLIUnits/kg/hr for DI

ANTIBIOTICS - FIRST DOSE FREQUENCY DETERMINED BY AGE, INDICATION AND RENAL FUNCTION

ACYCLOVIR — **Dose using IBW; ≤ 12 yrs: 20 mg/kg/dose IV;**
> 12 yrs: 10 mg/kg/dose IV

AMPICILLIN — **25 - 50 mg/kg/dose IV/IM**
50 - 100 mg/kg/dose IV/IM for severe infections.
(Max dose 2 G)

CEFAZOLIN — **25 mg/kg/dose IV (Max dose 2 G)**

CEFEPIME — **50 mg/kg/dose IV (Max dose 2 G)**

CEFOTAXIME — **50 mg/kg/dose (Max dose 2 G)**

CefTRIAXone — **50 - 75 mg/kg/dose IV**
50 mg/kg/dose q12 hours IV/IM for meningitis.
Use with caution in patients with penicillin allergy
Contraindicated in infants < 1 month of age. Do not administer with calcium-containing solutions or products. (Max dose 2 G)

GENTAMICIN — **2.5 mg/kg/dose IV/IM** Infuse over 30 minutes. Obtain peak and trough levels with third dose.
Dose based on Ideal Body Weight (IBW) unless the patient is a neonate or underweight

MEROPENEM — **33 mg/kg/dose IV (Max dose 2 G)**

PIPERACILLIN/ TAZOBACTAM — **Dosing based on piperacillin content. 100 mg/kg/dose IV (Max dose 4 G)**

VANCOMYCIN EMPIRIC DOSING — 15 mg/kg/dose IV/IO
20 mg/kg/dose IV/IO for meningitis, pneumonia, osteomyelitis, and MRSA bacteremia
(Max dose 2 G) Infuse over 60 minutes
Evaluate trough levels in patients with varying renal function

NOTE: Every effort has been made to ensure these drug dosages and procedures are in accordance with accepted standards at time of publication. The user is urged to check the product information sheet included in each medication package, which includes recommended doses, warnings and contraindications. JANUARY 2015

PANEL 7

MEDICATIONS

NEURO/SEIZURES**

**Apply O_2, Monitor with $ETCO_2$, Prepare equipment for airway rescue

DIAZEPAM — **0.05 - 0.1 mg/kg IV/IO q 15 - 30 minutes, 0.2 mg/kg PR**
Max total dose 10 mg

LORazepam — **0.05 - 0.1 mg/kg IV/IO/IM**
Max total dose 4 mg (contains propylene glycol).

MIDAZOLAM — **0.1 mg/kg IV/IO/IM** Max total sedative dose 4 mg.
Intranasal: 0.2 - 0.3 mg/kg/dose Max 10 mg using an atomizer

FOSPHENYTOIN — **Loading dose: 15 - 20 mg phenytoin equivalent (PE)/kg IV/IO/IM**
Max dose of 2 G. Must be diluted for IV/IO administration
Max infusion rate: 3 mg PE/kg/min or 150 mg/min

PHENobarbital — **Loading dose: 15 - 20 mg/kg IV/IO SLOWLY, then 5 mg/kg/dose q 20 minutes until seizures controlled. Max dose 1 G**
Max total dose 30 mg/kg

levETIRAcetam — **Loading dose: 20 mg/kg IV/IO over 15 minutes (Max 1.5 G)**

INCREASED ICP (See PANEL 1 for ICP Management)

HYPERTONIC SALINE — **To↑Na by 5: 2% NaCl/NaHCO3 (buffered saline) – 10 mL/kg;**
2% NaCl – 9 mL/kg; 3% NaCl – 6 mL/kg

MANNITOL — **Initial dose: 0.25 - 1 G/kg IV over 2 minutes, may repeat once**
Must use in-line filter. Larger doses may require a fluid bolus to avoid hypotension

PENTobarbital — **1 - 3 mg/kg IV,** 2 - 6 MG/KG PO/IM/PR
Max dose 100 mg ***total or single dose***

INTUBATION MEDICATIONS

PREMEDICATIONS

ATROPINE — **0.02 mg/kg IV/IO/IM.**
Min dose 0.1 mg Max dose 0.5 mg

GLYCOPYRROLATE — **0.004 mg/kg IV/IM; Max dose 0.1 mg**

LIDOCAINE — **1 mg/kg IV/IO for patient's at risk for increased ICP or bronchospasm**
Max dose 100 mg

INDUCTION AGENTS

ETOMIDATE — **0.3 mg/kg IV/IO for normotensive patient**
0.15 mg/kg IV/IO for hypotensive patient
Max dose 20 mg

FentaNYL — **1 - 2 mcg/kg IV/IO q 30 - 60 minutes Max single dose of 100 mcg**
Give no faster than 1 mcg/kg/min (risk of rigid chest) if occurs, consider naloxone or paralytic with BMV.

KETAMINE — **1 - 2 mg/kg IV/IO; 2 - 5 mg/kg IM.** Max single dose of 150 mg
consider for bronchodilation properties

MIDAZOLAM — **0.05 - 0.1 mg/kg IV/IO** Max single dose of 4 mg

PROPOFOL (Induction Only) — **2 mg/kg IV/IO**

PARALYTICS administration with a sedative is recommended

PANCURONIUM — **0.1 mg/kg dose IV/IO q 30 - 60 minutes, paralyzing dose**
0.01 mg/kg, defasciculating dose

ROCURONIUM — **1.2 mg/kg IV/IO (Max dose 100 mg)**

SUCCINYLCHOLINE — **1 - 2 mg/kg IV/IO (Max 200 mg IV),**
2 - 4 mg/kg IM (Max 150 mg IM - due to limited volume for IM meds)
Can use 4 mg/kg IM to break laryngospasm
Contraindicated in patients with neuromuscular disease and renal failure

VECURONIUM — **0.1 - 0.2 mg/kg IV/IO q 30 - 60 minutes (Max dose 10 mg)**

PANEL 8