Objectives

The learner will be able to:

1. List commonly used pediatric code drugs based on PALS 2015 guidelines
2. Discuss mechanism of action, clinical indications, adverse effects, and special considerations of pediatric code drugs
3. Provide various cases and choice of code drug
Case #1

HPI: 15 mo old previously healthy male, fussy at home, inconsolable, decreased po intake seen at PCPs office, transferred to CHoR ED for fast HR.
WT: 12 kg

In ED: awake, alert, crying, HR on monitor 210, 12 lead EKG, PIV left AC

Intervention: Adenosine 1.2mg IV push

Adenosine

Therapeutic Category: Class V Antiarrhythmic
Mechanism of Action: Interrupts re-entry pathway through AV node by slowing conduction time restoring NSR, Half-life: <10sec
Clinical Indication: Paroxysmal supraventricular tachycardia
Dosing:
IV: 0.1mg/kg (MAX 6mg/dose) rapid IV push follow with NS flush
2nd dose: 0.2mg/kg (MAX 12mg)
3rd dose: 0.3mg/kg (MAX 12mg)
Kids> 50kg get 6mg, 12mg, 12mg
Adenosine

Adverse Effects:
- Hypotension
- Bronchospasm
- Cardiac arrest
Adenosine

Be Safe:
Continuous EKG, HR, BP, RR
Be ready to shock/pace
Attending MD at bedside
Respiratory compromise: ?
use in asthmatics or in kids
presenting with bronchospasm, dyspnea

Case #2

HPI: 12mo old previously healthy male, 3 day
history of fever, URI symptoms, found lethargic
and minimally responsive by mom. EMS called
brought to CHoR ED in full arrest.

PMH: Heart block in utero, seen by Pediatric
Cardiology at 10mo due to murmur, thought to be
benign

WT: 10kg
**Case #2**

**Shock**
- CPR

**Shock**
- CPR

**Shock**
- CPR
  - Epinephrine

**Intervention:** Epinephrine 0.1mg IV push

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**Epinephrine**

**Therapeutic Category:** Adrenergic Agonist

**Mechanism of Action:**
- Stimulates adrenergic receptors
- Alpha 1-vasoconstrictor
- Beta1-cardiac (increases contractility/HR)
- Beta 2-bronchodilatation, vasodilatation

**Short half life <5min**

**Clinical Indications:**
- Pulseless arrest, symptomatic bradycardia
- Hypotensive shock
- Anaphylaxis
- Asthma/Croup
Epinephrine Label

Old
- Epinephrine Injection, USP 1:1000
- Epinephrine Injection, USP 1:10,000

New
- Epinephrine Injection, USP 1 mg/mL
- Epinephrine Injection, USP 0.1 mg/mL

Epinephrine Dosing

Pulseless arrest/symptomatic bradycardia:
- IV/IO: 0.01mg/kg (0.1ml/kg of 0.1mg/ml solution) q3-5min, MAX single dose 1mg
- ETT: 0.1mg/kg (0.1ml/kg of 1mg/ml solution) q3-5 min MAX 2.5mg

Hypotensive shock:
- IV/IO: 0.1 to 1mcg/kg/min

Anaphylaxis:
- IM/SQ: 0.01mg/kg (0.01ml/kg of 1mg/ml solution) q5-15min, MAX single dose 0.3mg-0.5mg
  - IM: anterolateral aspect of middle third of thigh
- IV/IO: 0.01mg/kg (0.1ml/kg 0.1mg/ml solution) q3-5min MAX single dose 1mg
Epinephrine
Continuous IV infusion: MOA dose dependent:
Inotropic:
- 0.02-0.1 mcg/kg/min (↑ CO, ↑ HR, ↑ SVR, ↑ PVR)
Vasopressor:
- 0.1-1 mcg/kg/min (↑ CO, ↑ SVR)
- >1-2 mcg/kg/min (↑ SVR, ↑ CO)
Adverse Effects:
- Tachycardia, arrhythmia
- Hypertension
- Increased myocardial oxygen consumption
- Hyperglycemia
- Pulmonary edema

Case #2

Shock • CPR
Shock • CPR • Epinephrine
Shock • CPR • Amiodarone / Lidocaine

Intervention: Amiodarone 50mg IV

Click to download: Guidelines for Cardiopulmonary Resuscitation and CPR Shock ©20102015 American Heart Association

Pediatric Cardiac Arrest Algorithm—2015 Update

Can't help but wonder: Amiodarone 50mg IV

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Amiodarone

Therapeutic Category: Class III: Antiarrhythmic

Mechanism of Action:
Slows AV conduction and prolongs QT interval through actions mediating effects on NA, K, CA channels
Blocks alpha and beta properties
Vasodilatory and negative inotropic effects

Clinical Indications:
refractory SVT, shock-refractory VF or pVT

Dosing:

Shock refractory VF/pVT:
- IV/IO: 5mg/kg rapid bolus, may repeat up to 2x, use undiluted

Perfusing tachycardias:
- IV/IO: 5mg/kg (6mg/ml) over 20-60 minutes
- Continuous IV infusion: 5-15mcg/kg/min

Adverse Effects:
Hypotension
Bradycardia, asystole
Torsade de pointes
AV block
Lidocaine

Therapeutic Category: Class IB Antiarrhythmic: Na⁺ Channel blocker

Mechanism of Action:
Slows ventricular conduction

Clinical Indication: shock refractory VF or pVT

Dose:
IV/IO: 1mg/kg loading dose
Continuous IV infusion: 20-50mcg/kg/min
ETT: 2-3mg/kg loading dose, flush 5ml NS, 5 assisted manual ventilations

Adverse Effects:
CNS toxicity, dose dependent

Intervention: Lidocaine 10mg IV, 20mcg/kg/min

Case #2

Torsades de Pointes
Magnesium sulfate

Therapeutic Category: Anticonvulsant, Electrolyte supplement
Mechanism of Action: slows rate of S-A node conduction prolonging conduction time, relaxation of bronchial smooth muscle
Clinical Indications: Torsades de pointes, VF/pVT associated with Torsades de pointes
Dose: IV/IO: 25-50mg/kg/dose, bolus, Max 2,000mg/dose
Adverse effects:
Hypotension, asystole (IV, rate related)

Intervention/Case Update: 500mg IV MgSulfate

Case #3
HPI: 4 week old admitted to PICU for respiratory failure due to RSV, intubated, Fentanyl and dexmedetomidine gtts, ND feeds
WT: 3kg
VS: HR: 136, SATS 98% on 40% FIO2, End tidal 43
Resident unwraps baby to examine him heart rate starts to drop
130→109→88→67
SATS remain 98%
Atropine

Therapeutic Category: Anticholinergic
Mechanism of Action: Parasympatholytic, increases heart rate and improves conduction through the AV node.
Clinical Indications:
Treat/prevent bradycardia from vagal response
Primary AV block
Premed for emergency tracheal intubation
Dose:
IV/IO: 0.02mg/kg, may repeat once
➢ MIN dose: 0.1mg in kids >5kg
➢ MAX single dose child: 0.5mg, adolescent: 1mg
ETT: 0.04-0.06mg/kg/dose mix with 3-5ml NS, flush, Bag
**Atropine**

**Side effects:**
- Hot as a Hare
- Blind as a Bat
- Dry as a Bone
- Red as a Beet
- Mad as a Hatter

**Intervention/Case Update:**
Atropine 0.06mg IV, HR 135

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**Case #4**

HPI: 15yo female h/o depression presents following ingestion of grandmothers bottle of Diltiazem

IN ED: AOx3, BP 90/40, HR 48, WT 75kg, given IVF, atropine, transferred to PICU

IN PICU: becomes somnolent, BP 60/-, HR 40
Interventions: ABCs
IVF, atropine no response
Calcium Chloride

**Therapeutic Category:** calcium salt, electrolyte supplement

**Mechanism of Action:** increases myocardial contractility

**Clinical Indications:**
- Cardiac Arrest in presence of:
  - Hypocalcemia
  - Hyperkalemia
  - Hypermagnesemia
  - Calcium Channel Blocker overdose

**Dose:**
- IV/IO: 20mg/kg/dose (0.2ml/kg), slow IVP, MAX 2G repeat in 10 min PRN
- Calcium gluconate: 60-100mg/kg/dose, MAX 3G
Calcium Chloride

Adverse Effects:
Bradycardia
Hypotension
Peripheral vasodilatation
Hyperchloremic acidosis
Extravasation-tissue necrosis

Intervention/Case Update: 1500mg CaCl IV, started on a gtt; improved with interventions, transferred to VTCC

Case #5

HPI: 6yo h/o chronic renal failure, missed dialysis due to illness, presents to nephrology clinic today. WT 30kg

LABS: K 6.6, wide QRS, peaked T waves on EKG

Interventions in clinic:
Calcium gluconate: 100mg/kg/dose, max 2G
Transfer to PICU
Sodium bicarbonate

Therapeutic Category: Alkalinizing agent
Mechanism of Action: dissociates to provide bicarb ion and raises blood and urinary pH
Drives potassium back into the cell
Clinical Indications/Dosing:
Metabolic acidosis (severe), hyperkalemia
- IV/IO: 1meq/kg/dose slow push
Sodium channel blocker overdose (tricyclic antidepressant)
- IV/IO: 1-2meq/kg/dose bolus until serum pH>7.45
- Infusion: 150meq NaHCO₃/L solution titrate to maintain alkalosis

Adverse Effects:
Vesicant >=8.4%
Cerebral hemorrhage
Pulmonary Edema
↓NA,↑K, ↓Ca
References


Baily, Pamela. Primary drugs in pediatric resuscitation. In: UpToDate, Post TW (Ed), UpToDate, Waltham, MA. (Accessed on September 7, 2016.)


Questions?