

Pediatric Drug Doseages

PEDIATRIC DOSE WILL NEVER EXCEED ADULT DOSE

Dextrose Dose scale.

Dextrose Concentration	Dose	Instruction
D ₁₀ (< 1 mth)	5 ml/Kg	D ₁₀
D ₂₅ (1mth-2yrs)	2 ml/Kg	Waste 40 ml D ₅₀ and Draw 40 mL NaCL
D ₅₀ (2yr +)	1 ml/Kg	Waste 25 ml D ₅₀ and Draw 25 mL NaCL

No Need to Reconstitute Drug

Pediatric Electrical Therapy

Defibrillation	2J/Kg (200 J Max)	4J/Kg (360 J Max)	10J/Kg (360 J Max)
Cardioversion	1J/kg (360 J Max)	2 J/kg (360 J Max)	
Transcutaneous Pacing	Lowest J (Capture)	Rate-100 BPM	

The Rule Of Nines

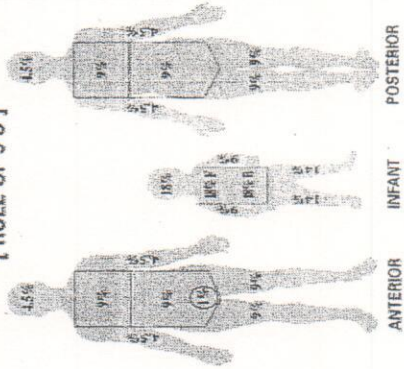
Only 2nd and 3rd degree burn injury are used to calculate the extent of burn that is applied to burn formula calculations.

Alternate Method: The size of the patient's hand, including the fingers, represents approx. 1% of their body surface.

Pediatric Considerations

- Increased fluid requirements relative to adults
- Increased surface area : mass ratio
- Hypoglycemia may occur in infants (<30 kg) due to limited glycogen reserves

[RULE OF 9'S]



PALMAR METHOD
(Patient's palm)

GLASGOW COMA SCALE

Category For Patients	For <2 Years Old	For Patients >2 Years Old
Eye Opening (E)	(4) Spontaneous (3) To speech (2) To pain (1) None	(4) Spontaneous (3) To speech (2) To pain (1) None
Verbal Response (V)	(5) Coos, babbles (4) Irritable, cries (3) Cries to pain (2) Moans to pain (1) None	(5) Oriented (4) Confused (3) Inappropriate words (2) Incomprehensible (1) None
Motor Response (M)	(6) Normal spontaneous movements (5) Withdraws from touch (4) Withdraws from pain (3) Abnormal flexion (2) Abnormal extension (1) None	(6) Obeys commands (5) Localizes to pain (4) Withdrawal to pain (3) Flexion to pain (2) Extension to pain (1) None

Pediatric Drug Calculations

The intent of the lecture is to instill confidence in first round drug administration of pediatrics patients in the emergency setting. Studies have shown the lack of Epi administration in codes with a fifteen or twenty minute transport have had negative outcome on the chance of patient survival. HandTevy is a great resource, but nothing substitutes knowing your doses.

Epi 1:10,000

- Packed: 1mg/10mL
- Explain how you can break down the concentration to smaller increments: 1mg/10mL is the same as 0.1mg/1mL which is the same at 0.01mg/0.1mL
- Dose per protocol is 0.01mg/kg which is the same as 0.1mL/kg
- Always first drug in every code. Take the weight and multiply it by 0.1mL. That number remains the same for the entire code.
- Examples:
 - $10\text{kg} \times 0.1\text{mL} = 1\text{mL}$
 - $20\text{kg} \times 0.1\text{mL} = 2\text{mL}$
 - $33\text{kg} \times 0.1\text{mL} = 3.3\text{mL}$

Amiodarone

- Packaged: 150mg/3ml
- Explain how you can break down the concentration to smaller increments: 150mg/3mL is the same as 50mg/1mL which is the same as 5mg/0.1mL
- Dose per protocol is 5mg/kg which is the same as 0.1mL/kg
- Code dose for Amiodarone will then be the same as your Epi dose.
- Examples:
 - $15\text{kg} \times 0.1\text{mL} = 1.5\text{mL}$
 - $27\text{kg} \times 0.1\text{mL} = 2.7\text{mL}$
 - $30\text{kg} \times 0.1\text{mL} = 3\text{mL}$

Atropine

Packed: 1mg/10mL (Same as Epinephrine 1:10,000)

- In Pediatric Bradycardia, Atropine is the 2nd drug, after Epinephrine 1:10,000
- Dose per protocol is 0.02mg/kg which is the same as 0.2mL/kg
- Just remember that Epinephrine is first and its dose is 0.1mL/kg, and Atropine is second and its dose is 0.2mL/kg.
- Examples:
 - $15\text{kg} \times 0.2\text{mL} = 3\text{mL}$
 - $25\text{kg} \times 0.2\text{mL} = 5\text{mL}$
 - $21\text{kg} \times 0.2\text{mL} = 4.2\text{mL}$

Narcan

- Packaged 2mg/2mL
- Dose per protocol is 0.1mg/kg which is the same as 0.1mL/kg
- Routes: IV/IO/MAD-preferred

Adenosine

$EPI = 0.01 \text{ mg/kg} = 0.1 \text{ mL/kg}$

$Ami = 5 \text{ mg/kg} = 0.1 \text{ mL/kg}$

$ADemo = 0.1 \text{ mg/kg} = 0.1 \text{ mL/kg}$

PALS < 8 yrs > 17

PEDS = < 12 yrs < 40 kg

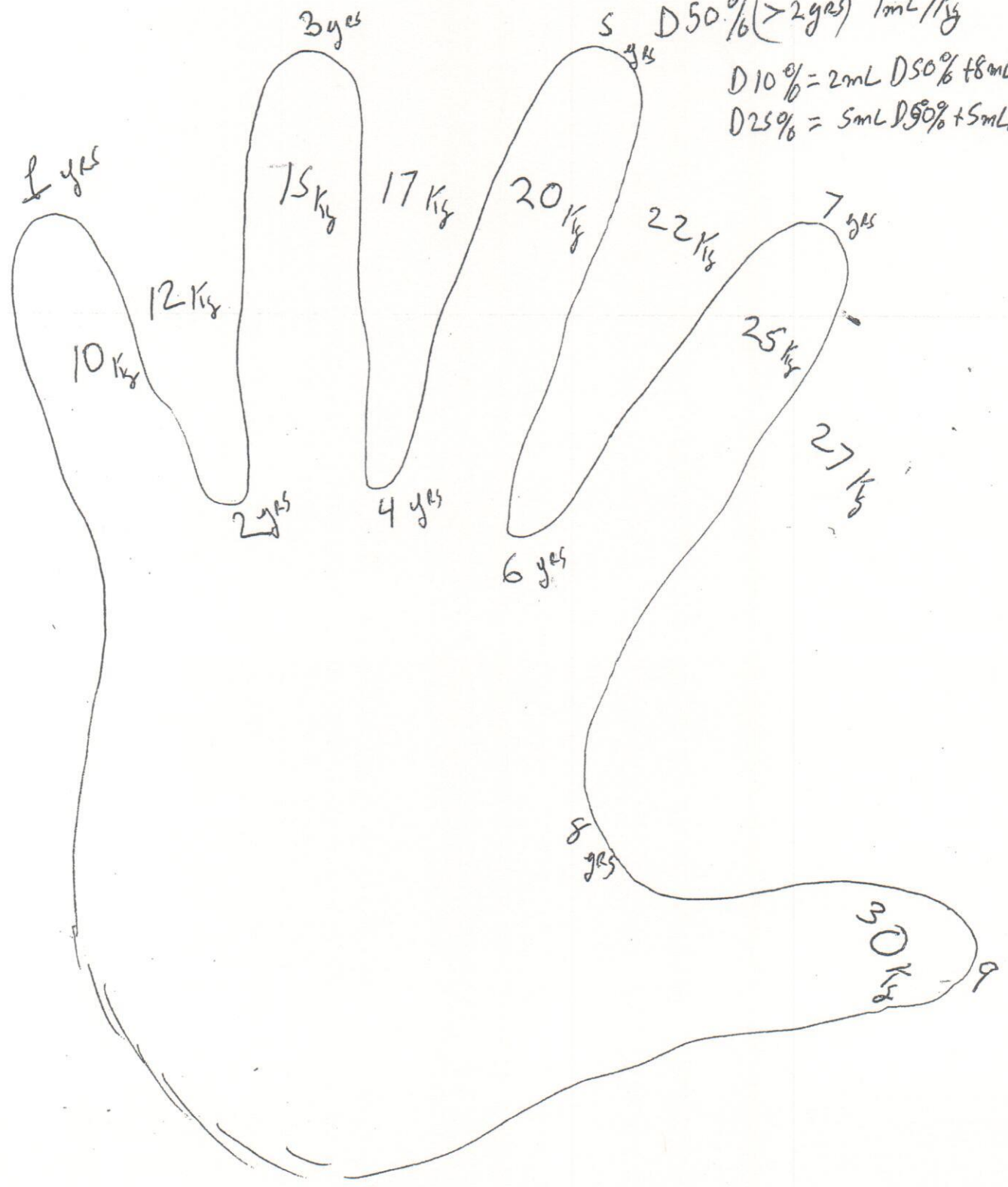
D10% (< 30 days) 5 mL/kg

D25% (> 30 days - 2 yrs) 2 mL

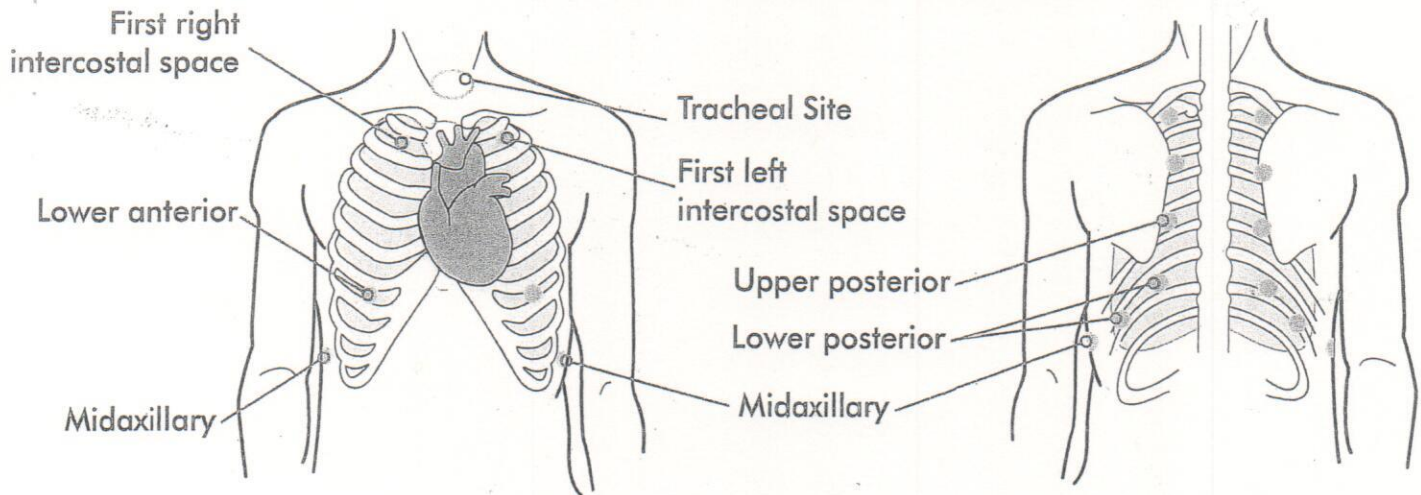
D50% (> 2 yrs) 1 mL/kg

D10% = 2 mL D50% + 8 mL NS

D25% = 5 mL D50% + 5 mL NS



Anterior/ Posterior Lung Sites



	Tracheal Site	First Left & Right Intercostal Sites	Upper Posterior Lung Sites	Lower Posterior Lung Sites Two Midaxillary Sites 2 Lower Anterior Sites
1. Normal Lung	Tracheal	Bronchovesicular	Normal Vesicular	Normal Vesicular
2. Normal Vesicular	Tracheal	Bronchovesicular	Normal Vesicular	Normal Vesicular
3. Wheezes	Wheeze	Wheeze	Wheeze	Wheeze Lower Volume
4. Mono Wheeze	Mono Wheeze	Mono Wheeze	Mono Wheeze	Mono Wheeze Lower Volume
5. Fine Crackle	Fine Crackle	Fine Crackle	Fine Crackle	Fine Crackle
6. Coarse Crackle	Coarse Crackle	Coarse Crackle	Coarse Crackle	Coarse Crackle
7. Ronchi	Ronchi	Ronchi	Ronchi	Ronchi
8. Stridor	Stridor	Stridor	Stridor Lower Volume	Stridor Lower Volume
9. Cavernous	Cavernous	Cavernous	Cavernous	Cavernous
10. Bronchovesicular	Tracheal	Bronchovesicular	Normal Vesicular	Normal Vesicular
11. Bronchial	Bronchial	Bronchial	Normal Vesicular	Normal Vesicular
12. Pulmonary Edema	Pulmonary Edema	Pulmonary Edema	Pulmonary Edema	Pulmonary Edema
13. Infant	Infant	Infant	Infant	Infant
14. Friction Rub	Tracheal	Bronchovesicular	Friction Rub	Friction Rub
15. Egophony	Egophony	Egophony	Egophony	Egophony
16. Pectoriloquy	Pectoriloquy	Pectoriloquy	Pectoriloquy	Pectoriloquy

$$\text{EPI} = 0.01 \text{ mg/kg} = 0.1 \text{ mL/kg}$$

$$\text{Ami} = 5 \text{ mg/kg} = 0.1 \text{ mL/kg}$$

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PALS < 8 yrs > ACLS

PEDS = < 12 yr < 40 kg

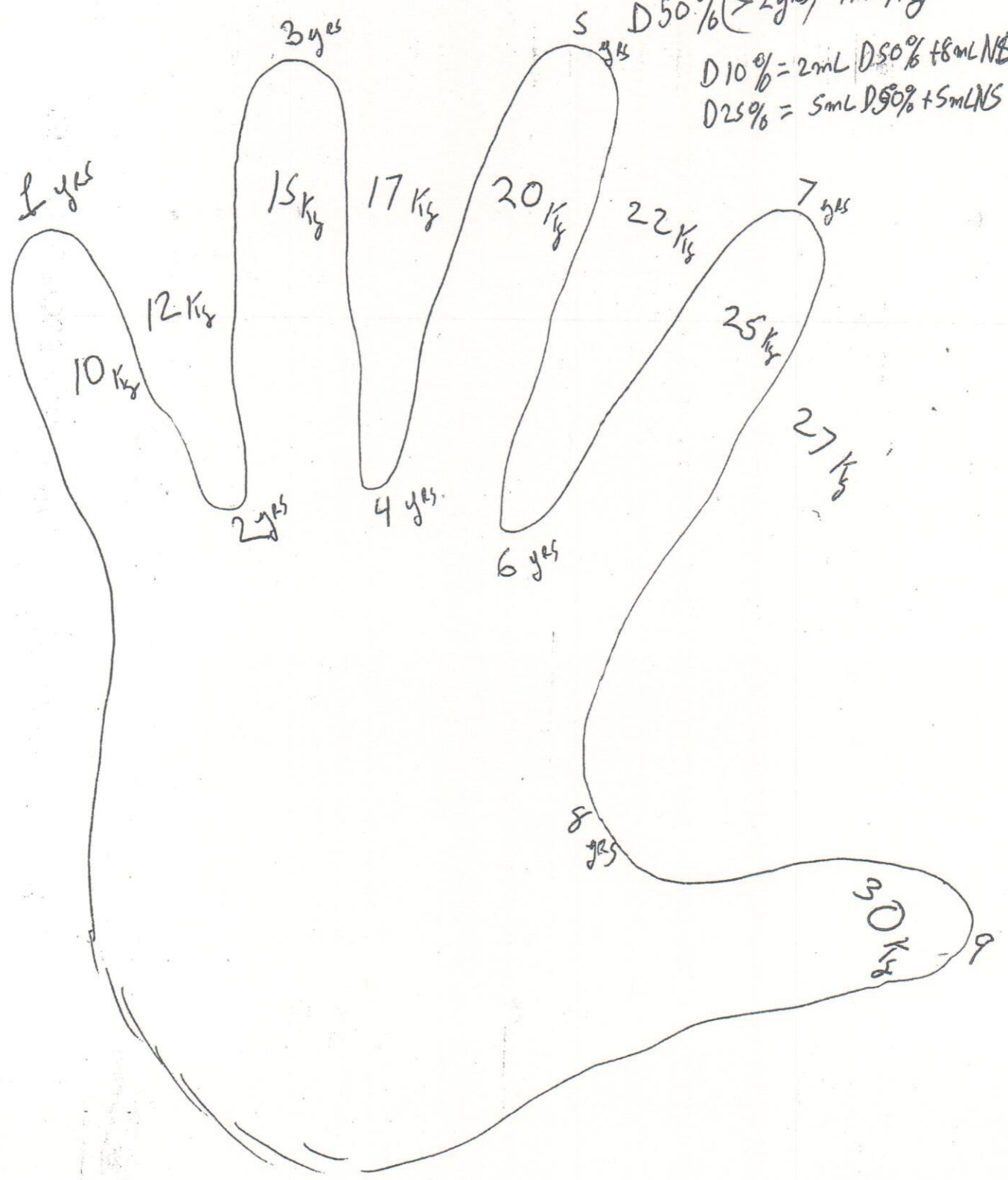
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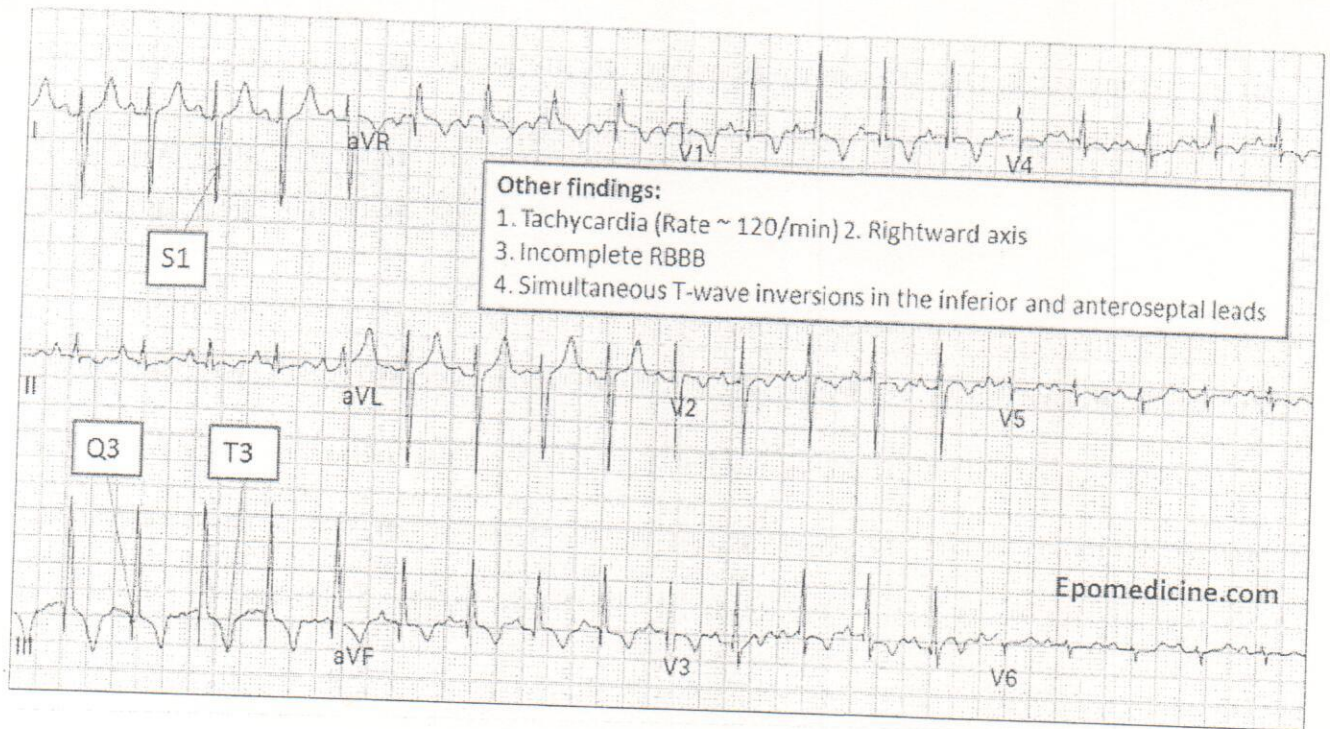
D25% (> 30 days - 2 yrs) 2 mL/kg

D50% (> 2 yrs) 1 mL/kg

D10% = 2 mL D50% + 8 mL NS

D25% = 5 mL D50% + 5 mL NS





- Packaged: 6mg/2ml
- Dose: 0.1mg/kg & 0.2mg/kg
- HandTevy book notes the volume to administer as being drawn straight out of the vial but if you don't have the HandTevy book the easiest way to calculate the dose is to make the concentration 1 to 1
- To do make Adenosine 1 to 1: Waste 6mL out of a 10mL prefilled syringe (leaving 4mL), then draw up the 2mL of Adenosine into the syringe. The result is a concentration of 6mg of Adenosine in 6mL (1 to 1)

Magnesium Sulfate

- Packaged: 5gm/10mL
- Explain how you can break down the concentration to smaller increments: 5gm/10mL is the same as 5000mg/10mL which is the same as 500mg/1mL which is the same as 50mg/0.1mL
- Dose is the same for cardiac arrest and bronchospasm: 50mg/kg which is the same as 0.1mL/kg
 - Torsades = IV/IO push
 - Bronchospasm = Drip over 10-15 minutes

Epinephrine 1:1000

- Packaged: 1mg/1mL
- Dose: 0.01mg/kg which is the same as 0.01mL/kg
- Do not exceed the adult dose of 0.3mg (9 year old weighing 30kg gets the max dose)

Versed

- Packaged: 5mg/1mL
- IM or IN route in a 1 year old (10kg) is 0.4mL, each age after gets an additional 0.1mL until the max of 1mL is reached at age 7
- IV dose is half the IM/IN dose

Fentanyl

- Packaged: 100mcg/2mL
- IV Dose: 0.5mcg/kg
- MAD Dose: 1.5mcg/kg split between both nostrils
- IV Dose: HandTevy weight, move the decimal two spaces to the left.
 - 5 year old weighs 20kg = .2mL
 - 7 year old weight 25kg = .25mL
- MAD Dose: HandTevy weight, multiply by 3 then move the decimal two spaces to the left.
 - 5 year old weighs 20kg x 3 = 60 = .6mL
 - 7 year old weighs 25kg x 3 = 75 = .75mL

Solumedrol

- 2mg/kg not to exceed 60mg. This drug can be given IV/IO or IM.

Benadryl

- Packaged: 50mg/1mL which is the same as 5mg/.1mL
- Dose: 1mg/kg via IV/IO/IM

Glucagon

- There is no specific weight base dose for this medication. <5 years = 0.5mg, >5 years = 1mg

Common Overdoses

Calcium CB

Beta Blocker

Cyanide

Narcotic

Organophosphate

Tricyclic

Phenothiazine

Amyl nitrate

Benzodiazepines

Cocaine

Possible Problem

Head Injury ICP

CHF

Asthma

Crush Injury

HTN

Alt Loc

Renal Failure

Burns Fluid

Antidote

Calcium 500mg / Epi drip

Glucagen 3mg / Epi drip

Cyno Kit 5GR/15min

Narcan 2mg

DuoDote Atropine 2.1mg/2-Pam 600mg

Sodium Bicarb 1mEq/kg

Benadryl 50mg Twitching

Ativan 1-2mg painful movement

Methylene Blue 1mg/kg

Romazicon .2mg/15sec

Ativan 1-2mg

Solution

Lido – Manitol – RSI – Intubate

Nitro – CPAP – Lasix – MS – Tridil

Albut–Atrov–SM–Breth–Mag–Epi sq

Sodium Bicarb over 4hrs / NS if not

Lopressor 5mg or Nitro .4mg

Ck – Pupils-BS-FAST

Soudium-Calcium-Albuterol

Parkland Formula NS 4xWTx% - 24hrs

Medication Pre-Mix Drips

Dopamine 400mg/250cc – 1600Mcq/min – weight LBS drop last number to get starting dose of 5Mcq/kg/min. 60gtt/set

Lidocane 1GR/250cc – 4mg/min – start at 2mg/min 30gtts with a 60gtts/set

Tridil 5mg/250cc – 20Mcq/min – start at 10Mcq/min 30gtts with a 60gtts/set

Have to mix Drips

Amiodarone 150mg/100cc- give over 10min with 10gtts/set and drip 1 drop a sec.

Epi 1mg/250cc – 4mcq/min- start at 2Mcq/min 30gtts with 60gtts/set

Mag Sulfate 2-5GR/100cc over 10 – 20min. use a 10gtts/set and run a 1gtts/sec or 1gtts/ every 2 sec for 20 min.

Manitol mix .5-1GR/kg in a 100cc bag drug is stored at 100GR dose. Give over 10min 1gtts/sec or 1gtts every 2 sec.

Pedi Medication Doses

Atropine .02mg/kg

D25 .5GR/kg

Amiodarone 5mg/kg

Solu-Medrol 2mg/kg

Epi .01mg/kg

Narcan .1mg/kg

Benadrly .5mg/kg

Mag >25kg 1GR/20min

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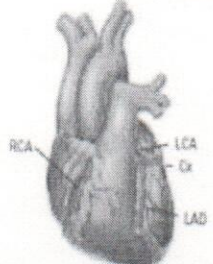
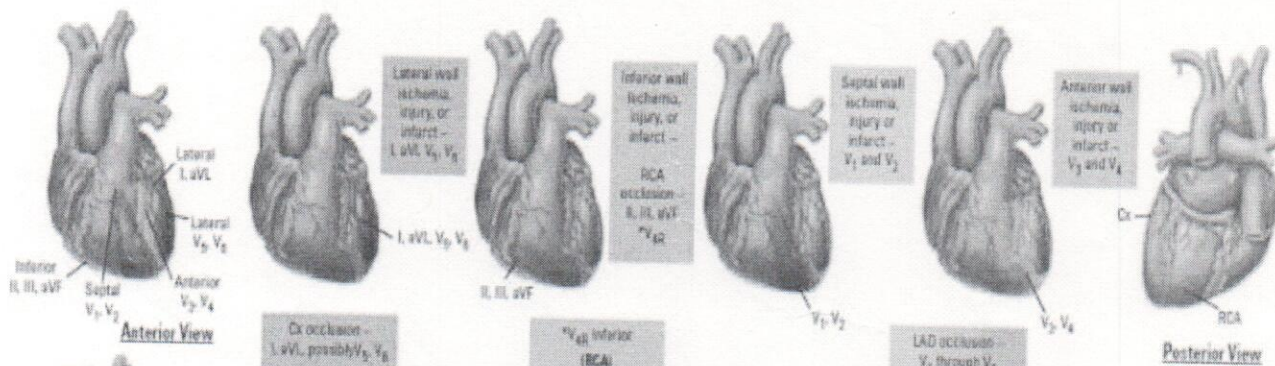
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A picture of the heart



I Lateral (Cx) / (LAD)	aVR	V ₁ Septal (LAD) / Bundle Branches	V ₄ Anterior (LAD)
II Inferior (RCA)	aVL lateral (Cx) / (LAD)	V ₂ Septal (LAD) / Bundle Branches	V ₆ Lateral (Cx) / (LAD)
III Inferior (RCA)	aVF Inferior (RCA)	V ₃ Anterior (LAD)	V ₅ Lateral (Cx) / (LAD)

Normal limits	ms
PR:	0.12 - 0.20
QRS:	0.06 - 0.11
QTc:	Male 0.397
	Female 0.415

(LAD) Left anterior descending artery; (RCA) Right coronary artery; (Cx) Circumflex artery
 *There may be an overlap in blood supply by the RCA and Cx artery depending on which artery is dominant.

LIMB LEADS

I Lateral left ventricle	aVR square root of squat
II Inferior portion of the left ventricle	aVL Lateral left ventricle
III Inferior portion of the left ventricle	aVF Inferior portion of the left ventricle

PRECORDIAL LEADS

V1 Septal	V4 Anterior
V2 Antero-Septal	V5 Lateral left ventricle
V3 Antero-Septal	V6 Lateral left ventricle

SETTING	FUNCTION	CLINICAL USE & CONCERNS
(FIO₂) Fractional Inspired Oxygen	The fraction of inspired gas that is oxygen The percent of oxygen	Should always be used prior to and after suctioning Oxygen concentrations of greater than 0.50 (50%) increase the risk of oxygen toxicity if delivered for more than 24 hours
(PIP) (P_{peak}) Peak Inspiratory Pressure	The maximum inspiratory pressure	Increases Peak Inspiratory Pressure may indicate secretions, obstruction, ventilatory resistance or kinked tubing
(PEEP) Positive End Expiratory Pressure	Constant airway pressure that stabilizes the alveoli during the expiration A PEEP setting of 5cm H ₂ O is equivalent to the effect of a closed glottis and is called physiologic PEEP	Used with CV, A/C, and SIMV to improve oxygenation by opening collapsed alveoli at the end of expiration Complications from the increased pressure can include decreased cardiac output, pneumothorax, and increased intracranial pressure
(V_T) (VT, TV) Tidal Volume	The volume of gas delivered with each breath Volume of gas delivered during each ventilator breath	Ventilator tidal volume usually 6-8 cc/kg A patient's spontaneous tidal volume should be at least 5 ml/kg
(P_{mean}) Mean Airway Pressure	Mean Airway Pressure	Increased P _{mean} may recruit additional alveoli
(P_{plat}) Plateau Pressure	Inspiratory hold pressure measured at end inspiration Pressure required to overcome tissue resistance and inflate alveoli	General measurement of lung stiffness
(V_E) Minute volume	The total volume of air inhaled and exhaled in one minute	Normal minute volume is 5-10 liters per minute RR X VT
(IRV) Inverse Ratio Ventilation	Inspiratory;Expiratory (I:E) ratio normally 1:2 but is reversed to 2:1 or greater; requires sedation/ paralysis A pressure control ventilation	Improves oxygenation in patients who are still hypoxic even with PEEP
(NIF) Negative Inspiratory Force	The negative inspiratory pressure generated with a deep inspiration	A patient's NIF should be at least -20 cm H ₂ O.
(VC) Vital Capacity	The maximal amount of air that can be exhaled after a normal inhalation	A patient's vital capacity should be at least 10cc/kg
(FVC) Forced Vital Capacity	The amount of forced exhaled volume following a deep inspiration	Pulmonary function test
(FRC) Functional Residual Capacity	The volume left in the lungs at end expiration	Increased with COPD patients
Auto-PEEP	When expiratory time is not sufficient for the lungs to empty before delivery of the next breath (air trapping), alveolar pressure will be greater than the baseline at end-expiration even if PEEP has not been set on the ventilator	If pressure continues to build in this manner, delivered tidal volumes will drop, work of breathing will increase, and the patient will experience acute discomfort until the extra volume producing the pressure is released. Patients with obstructive lung disease are prone to the development of auto-PEEP
(WOB) Work of Breathing	Measures the work required to breathe	Looks at respiratory rate and effort

Ventilator Alarms

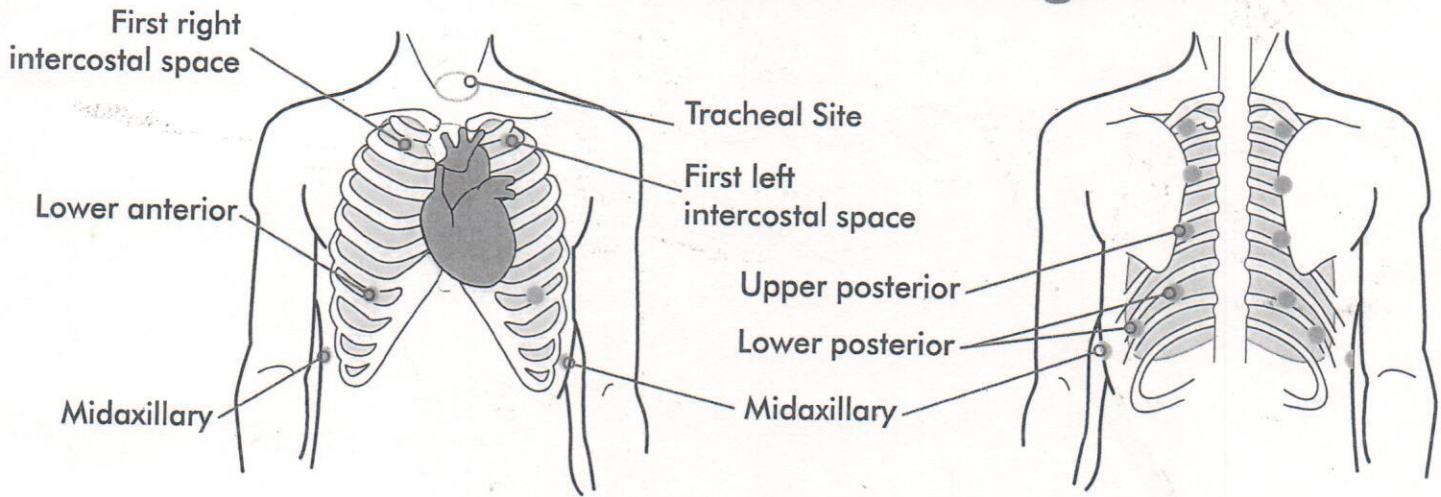
Orlando Health: ADULT CONTINUOUS INFUSION STANDARD DILUTIONS AND DOSING GUIDELINES Cont. – Page 2 of 5

DISCLAIMER: The following table is intended to serve as a general guideline for the continuous infusion of medications in adult patients. Variations in the diluent, maximum concentration, and/or dosing may be appropriate in select circumstances. These guidelines are not intended to replace clinical judgment. A physician order is required when a concentration or diluent that differs from the standard concentration is needed.

DISCLAIMER: The designation of "PREMIX" in this table does not guarantee that the medication will be dispensed as the premixed formulation. The use of the premixed product may be site specific or may change based on availability.

DRUG	STANDARD CONCENTRATION/DILUENT	ALTERNATIVE DILUENT	LOADING DOSE	ANTIHYPERTENSIVE/ANTIARRHYTHMIC MEDICATIONS		USUAL STARTING DOSE	USUAL DOSE RANGE	ALTERNATE CONCENTRATION(S)
				USUAL STARTING DOSE	USUAL DOSE RANGE			
Amlodarone (Cordarone)	450 mg/250 mL in D5W (1.8 mg/mL)	N/A	V-Fib: 300mg IV-push x1, may give additional 150mg IV-push x1 A-Fib: 150mg IV-bolus over 10min	1mg/min x 6 hours, then 0.5mg/min x 18 hours (An alternative dosing regimen that may be used in A-Fib is 20mg/kg infused over 24 hours)			N/A	
Diltiazem (Cardizem)	125 mg/125 mL in NS (1 mg/mL)	D5W	0.25 mg/kg; may repeat after 15 min with 0.35 mg/kg	5 mg/hr	5-15 mg/hr		N/A	
Esmolol (Brevibloc)	PREMIX in NS 2.5 gm/250 mL NS (10 mg/mL)	D5W	500 mcg/kg over 1 minute	50 mcg/kg/min	50-300 mcg/kg/min		5 g/250mL D5W 20 mg/mL *This concentration should be mixed only in D5W and given only via a central line	
Fenoldopam (Corlopam)	20 mg/250 mL in NS (80 mcg/mL)	D5W	N/A	0.1 mcg/kg/min	0.01-1.6 mcg/kg/min		N/A	
Labetalol (Normodyne, Trandate)	200 mg/200 mL in NS (1 mg/mL)	D5W	N/A	2 mg/min	1-4 mg/min		1000 mg/500 mL (2 mg/mL)	
Lidocaine	PREMIX in D5W 1 gm/250 mL (4 mg/mL)	NS	1-1.5 mg/kg; may repeat after 5-10 min with 0.5-0.75 mg/kg to a total of 3 mg/kg	2 mg/min	1-4 mg/min		N/A	
Nicardipine (Cardene)	PREMIX 20 mg/200 mL in NS (0.1 mg/mL)	D5W	N/A	5 mg/hr	5-15 mg/hr		40 mg/200 mL PREMIX (0.2 mg/mL)	
Nitroglycerin (Nitro-Bid IV)	PREMIX in D5W 50 mg/500 mL (100 mcg/mL)	D5W	N/A	5 mcg/min	5-200 mcg/min		25 mg/250 mL (100 mcg/mL)	
Nitroprusside (Nipride)	50 mg/250 mL in D5W (200 mcg/mL)	D5W	N/A	0.5 mcg/kg/min	0.5-10 mcg/kg/min		200 mg/500 mL (400 mcg/mL)	
Procainamide (Pronesyl)	1 gm/250 mL in D5W (4 mg/mL)	D5W	17mg/kg (max 1 gm) over 30 min	30-50 mg/min	1-4 mg/min		N/A	

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11. Bronchial	Bronchial	Bronchial	Normal Vesicular	Normal Vesicular
12. Pulmonary Edema	Pulmonary Edema	Pulmonary Edema	Pulmonary Edema	Pulmonary Edema
13. Infant	Infant	Infant	Infant	Infant
14. Friction Rub	Tracheal	Bronchovesicular	Friction Rub	Friction Rub
15. Egophony	Egophony	Egophony	Egophony	Egophony
16. Pectoriloquy	Pectoriloquy	Pectoriloquy	Pectoriloquy	Pectoriloquy

Vittal

Anion Gap

- the difference between major plasma cations and major plasma anions.

$$\text{Anion gap} = ([\text{Na}^+] + [\text{K}^+]) - ([\text{Cl}^-] + [\text{HCO}_3^-])$$

$$\begin{aligned} \text{Gap} &= \text{Na}^+ + \text{K}^+ - \text{Cl}^- - \text{HCO}_3^- \\ [15] &= 140 + 5 - 105 - 25 \text{ mMol/L} \end{aligned}$$

Normal Anion Gap

Children : 9mo. 19 yrs = 8 ± 2 mMol /L

Adults : 12 ± 2 mMol /L

Dyspnea

- Dyspnea with wheezes: Combination updraft (check peanut allergies), Solumedrol, Mag, Think EPI if no change.
- Dyspnea with Rales and low B/P: NRB, Dopamine, EKG check for STEMI. (this is cardiogenic shock).
- Dyspnea with Rales and High B/P: CPAP, NTG spray, NTG paste, (ASA if chest pain), Lasix, Morphine, EKG check for STEMI.

Allergic Reaction

- Anaphylaxis: (Decreased LOC, stridor, hypotension) : EPI IM, Benadryl, 20ml NS bolus, Solumedrol, Pepcid. (If no change in B/P after bolus repeat bolus then EPI drip). EPI 2-10mcg/min.
- Stable reaction: Benadryl, Pepcid, Solumedrol (if dyspnea add NEB)

LOC

- General approach (if trauma think C-spine elevate head 30 degree) Airway exam if not effective MAD narcans, check glucose, EKG Head to toe, Intubate if Narcan does not work(always give 2 mg of Narcan). If Narcan and glucose does not work Intubate.
- Intubation: If Pt takes OPA placed tube no drugs needed.
- Intubation with RSI: (Adult) 20mg of Etomidate and 100mg of Succ.(PEDS) will used browslow tape.
- Confused/combatative: Check glucose, rule out CVA, think sedation will used Geodon 20mg IM for any adult, may used Ativan or MAD versed.

Cardiac

- Chest pain: ASA, NTG, NTG paste, Morphine, O2 IV reassessment. If hypertension and heart rate greater than 100 give Lopressor 5mg.
- Perfect ACLS you know this shit.
- ROSC: B/P if low fix it 20 ml/kg bolus then Dopamine. EKG call STEMI if there then lets make them cold Use cold NS (state this to judge I'm using Ice cold no glucose NS at 30 ml/kg till the temp reaches 93 degrees.)

SHOCK COMPARISON

Type of Shock	Causes:	Pathophysiology	Signs and Symptoms
Hypovolemic	Body Fluid Depletion— <ul style="list-style-type: none"> • Hemorrhage Internal External • Dehydration 	Too little blood volume causes a MAP ↓ so that body's need for tissue oxygenation is not met. (↓CO ↓CVP ↓PAP ↓PCWP)	↑ Respirations Prolonged Capillary Refill Weak, rapid pulse ↓ or absent urine output ↓ blood pressure Thirst, agitation, anxiety ↓ O2 saturation Confusion, lethargy Skeletal muscle weakness Pain Cyanotic, cold, clammy skin Respiratory Acidosis Changes in H&H ↓ deep tendon reflexes
Cardiogenic	Direct Pump Failure <ul style="list-style-type: none"> • MI, Cardiac Arrest • Ventricular Dysrhythmia 	Heart cannot contract effectively Fluid volume not affected ↓ CO ↓ Afterload → ↓ MAP (↓ CO ↑ CVP ↑ PAP ↑ PCWP)	Tachycardia Urine output < 30 mL per hour Hypotension Agitation, restlessness, or confusion Tachypnea Pulmonary Congestion BP < 90 mm Hg, or 30 mm Hg less than baseline Cold, clammy skin with poor peripheral circulation Continuing chest discomfort
Distributive	Decreased Vascular Volume or Tone <ul style="list-style-type: none"> • Neural Sympathetic stimulation of nerves controlling blood vessels is decreased, smooth vessel muscles relax causing vasodilation • Chemical Anaphylaxis Sepsis Capillary Leak Syndrome 	Vasodilation with pooling causes decreased preload and decreases in stroke volume and CO Fluid shifted from central Vascular space Anaphylactic: (↓CO ↓CVP ↓PAP ↓PCWP) Early Sepsis: (↑CO normal or ↑ PAP + PCWP) Late Sepsis: (↓CO ↓CVP ↓PAP ↓PCWP)	Anaphylactic: damage to cells causes release of histamine which dilates vessels and increases capillary permeability causing severe hypovolemia and vascular collapse. Decreased contractility and dysrhythmias occur. Bronchial edema and pulmonary obstruction. Whole body hypoxia. Septic: Associated with DIC. Toxins and endotoxins released into blood cause Systemic Inflammatory Response Syndrome. Metabolism becomes aerobic because of ↓ MAP, clot formation in capillaries and poor cell uptake of O ₂ . Capillary Leak: fluid shift from blood to interstitial space.
Obstructive	Indirect Pump Failure <ul style="list-style-type: none"> • Cardiac tamponade • Pulmonary embolus 	Cardiac function decreased by non-cardiac factors Total body fluid volume not affected (↓ CO ↑ CVP ↑ PAP ↑ PCWP)	Cardiac tamponade: JVD, Paradoxical Pulse, ↓CO, muffled heart sounds. Pulmonary embolus: sudden onset dyspnea, pleuritic chest pain, apprehension, restlessness, cough, feeling of impending doom, hemoptysis, tachypnea, crackles, S3 or S4, diaphoresis, low grade fever, petechiae on chest and axillae, ↓ SaO ₂

Causes of Cardiogenic Shock in Children

Congenital Heart Disease			Dysrhythmias	Metabolic	Acquired/Ischemic		Trauma
Hypoplastic Left Heart	Tricuspid Atresia	Mitral Atresia	SVT	Acidosis	Kawasaki	Myocarditis	Tension PTX
Coarctation of Aorta	VSD	Mitral Stenosis	Ventricular tachycardia	Hyperkalemia	Anomalous Left Coronary	Chemotherapy Toxicity	Hemopericardium
Transposition of the Great Arteries			Atrio-ventricular block	Hypercalcemia	Scorpion Sting	Anemia	Myocardial Contusion
ASD	Aortic Stenosis			Glycogen Storage Disease	Calcium Channel Blocker	MI	Cardiac Aneurysm

Table 1. VSD=Ventricular Septal Defect. ASD=Atrial Septal Defect. MI=Myocardial Infarction. PTX=Pneumothorax.

Vasopressors and Inotropes

Alpha 1: affects arteries, ↑ vascular tone, ↑ BP (ex: Phenylephrine)
 Beta 1: heart stimulation, ↑ HR, ↑ contractility, ↑ arrhythmias (ex: Dopamine)

Neosynephrine = Alpha 1 agonist

- Powerful drug! Used when no beta stimulation is wanted or needed
- Causes vasoconstriction, bradycardia
- ↑ BP, ↑ SVR, ↑ PVR, ↑ afterload
- Coronary vasoconstriction
- May need to add dopamine to keep HR up
- Used a lot in neuro d/t the disruption of alpha system in neuro shock
- Dosing: start at 100-180 mcg/min, then 40-60
- Titrate: 5mcg q 15-minutes

Dopamine = Beta 1 & Alpha 1 agonist

- First line agent for many shock states
- Naturally-occurring catecholamine
- Precursor to norepinephrine
- 1-3 mcg/kg/min → renal, coronary, cerebral vasodilation (not renal protective!) ↑ UO
- 3-10 mcg/kg/min → Beta 1 stimulation with positive inotropic effect, ↑ HR, ↑ BP
- > 10 mcg/kg/min → Alpha 1 stimulation with potent vasoconstriction, ↑ BP, ↑ SVR

Norepinephrine = Alpha 1 & 2 agonist

- Endogenous catecholamine; has powerful inotropic and peripheral vasoconstriction effects
- Arterial and venous constriction
- ↑ BP, HR may slow, CO unchanged or ↓ d/t increased afterload
- ↑ SVR and PVR
- Dosing: 2-10 mcg/min

Epinephrine = Beta 1 & Alpha 1 agonist

- Endogenous catecholamine
- POWERFUL inotropic, peripheral and global vasoconstriction
- Not first line treatment...too potent!
- ↑ contractility and ↑ heart O₂ demands
- ↑ HR, ↑ MAP, ↑ CO, ↑ SVR and PVR
- Causes arrhythmias :-)
- Dosing: 1-4 mcg/min

Dobutamine = Beta 1 agonist

- A synthetic catecholamine
- Used for + inotropic properties when vasoconstriction undesirable, reduces preload and afterload
- Commonly used with another catecholamine or vasodilator
- ↑ contractility, ↑ CO, ↑ BP, ↑ myocardial O₂ demands, ↑ HR
- If pt is dry, it may drop the BP
- Dosing: 2.5 - 20 mcg/kg/min
- Titrate: 1-2 mcg/kg/min q 5-10 min

Vasopressin = Vasopressin 1 agonist

- Anti-diuretic hormone
- Used in ACLS for pulseless VT and VF
- Smooth muscle constriction (including bronchioles)
- Less constriction at coronary and renal beds
- Vasodilates cerebral vasculature
- May enhance platelet aggregation in septic shock
- ↑ BP, ↑ MAP, ↑ SVR, ↑ UO
- Dosing usually .03 or .04 units/min



Milrinone can ONLY be mixed with NS!

Milrinone = PDE inhibitor

- Positive inotrope and vasodilator
- Cleared by the liver
- Increases cAMP → more Ca into cells → improves myocardial contractility while inhibiting vasoconstriction.
- ↑ CO, ↓ CVP, ↓ SVR
- Loading dose: 50 mcg/kg over 10 min
- Maintenance dose: 0.375-0.75 mcg/kg/min

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Vasopressor / Inotrope	Receptor				Physiologic Effects
	alpha-1	beta-1	beta-2	Dopamine Receptor	
Norepinephrine	+++	++	0	0	↑↑ SVR +/- CO
Dobutamine	+/-	+++	++	0	↑ CO ↓ SVR
Epinephrine	+++	+++	++	0	↑↑ CO ↓ SVR (low dose) ↑ SVR (high dose)
Dopamine (mcg/kg/min)					
1 to 3	0	+	0	++	CO
5 to 10	+	++	0	++	↑ CO ↑ SVR
> 10	++	++	0	++	↑↑ SVR
Phenylephrine	+++	0	0	0	↑↑ SVR +/- CO

CO: Cardiac Output
+++ Strong effect

SVR: Systemic Vascular Resistance
++ Moderate Effect

+ Weak Effect

0 No effect

ECG Leads and Artery Localization MEMO

<p>Cx or LAD I High Lateral</p>	<p>Left Main Coronary Artery aVR</p>	<p>Anterior Descending V1 Septal</p>	<p>Anterior Descending V4 Anterior</p>
<p>RCA or LCX II Inferior</p>	<p>Cx or LAD aVL High Lateral</p>	<p>Anterior Descending V2 Septal</p>	<p>circumflex-LCX or LAD V5 Lateral</p>
<p>RCA or LCX III Inferior</p>	<p>RCA or LCX aVF Inferior</p>	<p>Anterior Descending V3 Anterior</p>	<p>circumflex-LCX or LAD V6 Lateral</p>
LIMB LEADS		PRECORDIAL LEADS	

ORLANDO FIRE DEPARTMENT EMS QA QUICK GUIDE

This form is designed to assist personnel with writing QA compliant narratives. The following information and rationale(s) should be included in your SOAP narrative *in addition* to the standard requirements. Multiple categories may apply (i.e. CP and STEMI)

ALL PATIENTS MUST HAVE A HEAD-TO-TOE ASSESSMENT

ALL TRANSPORTS MUST INCLUDE ENROUTE ASSESSMENT

ALS= O2/etCO2/SpO2/Meds/ECG/IV

Asthma / COPD

- ALS
- Re-assessment
- Response to treatment?
- CPAP Indicated?
- First unit treatment/events
- How was patient moved to stretcher?
- TOT (RN, Trauma Team, etc.)?

Angina / Myocardial Infarction

- ALS
- STEMI Alert? (see STEMI info)
- O2 per protocol
- ED medications prior 48 hours?
- First unit treatment/events
- How was patient moved to stretcher?
- TOT (RN, Trauma Team, etc.)?

STEMI Alert

- Pain evaluation (OPQRST)
- ST elevation which leads/name of the infarction site?
- ASA given?
- Changes w/tx?
- First unit treatment/events
- STEMI Alert Checklist
- Alert called? How?
- Multiple 12 leads

Acute Abdominal Pain

- ALS
 - Examine all quadrants (document)
 - 12 Lead if above Umbilicus
 - Location/Description of pain
 - Last Bowel Movement?
 - Dysuria/Hematuria?
 - First unit treatment/events
 - How was patient moved to stretcher?
 - TOT (RN, Trauma Team, etc.)?
- Women of Childbearing Age
- Last Menstrual Period
 - Fever
 - Vaginal Discharge

Allergic Reaction / Anaphylaxis

- ALS
- Contributing factors
- Lung Sounds
- Urticaria /Swelling?
- Difficulty swallowing?
- Progression of signs/symptoms
- Re-assess of Lung Sounds & pt
- First unit treatment/events
- How was patient moved to stretcher?
- TOT (RN, Trauma Team, etc.)?

Altered Mental Status / Syncope

- ALS
- 12 lead ECG /Advanced Airway?
- Known ETOH/Substance?
- Blood Glucose Level
- Trauma? Spinal Immobilization?
- First unit treatment/events
- How was patient moved to stretcher?
- TOT (RN, Trauma Team, etc.)?

Burns

- ALS
- Scene safe?
- BSA %
- Wound care as needed
- Pain Management?
- Trauma Alert Criteria?
- How was patient moved to stretcher?
- First unit treatment/events
- HazMat
 - Pt removed from hazard and decontaminated?
 - Followed HazMat Medical Protocols?
 - What PPE was used?
 - HazMat alert?
- TOT (RN, Trauma Team, etc.)?

Cardiac Arrest

- Activity Prior
- Down Time?
- Obvious Injuries?
- CPR PTA?
- Presenting Rhythm
- EtCO2
- C-collar (post intubation)
- Interventions?
- Changes?

Crime Scene

- Names of personnel on scene
- Room/area condition
 - Weapons?
 - Type?
 - Location
 - Moved? Who? Why?
 - Medication Containers?
 - Items moved? Why?Who?
- Original position of body
- Obvious injuries?
- Lividity / Rigor present?
- Equipment left on body/scene?
- Scene left with ?

Drowning /"Near" Drowning

- ALS
- Spinal Immobilization needed?
- Estimated submersion time
- Body Temperature
- Pt warming? (if Hypothermic)
- Interventions PTA?
- First unit treatment/events
- How was patient moved to stretcher?
- TOT (RN, Trauma Team, etc.)?

Emergency Childbirth

- ALS
- Proper positioning of patient
- Due date?
- Prenatal care / complications
- Para / Gravida
- Contractions (Frequency/Duration)
- Water ruptured? Fluid clear?
- Delivery of Neonate
 - Breech? Prolapsed cord?
 - Time of birth?
 - APGAR at 1 & 5 minutes
 - Bulb syringe suctioning?
 - Resuscitation, if needed
 - Delivery of Placenta and transported to ER?
- How was patient moved to stretcher?
- First unit treatment/events
- TOT (RN, Trauma Team, etc.)?
- 2nd ePCR REQ. FOR INFANT

Gastrointestinal / Digestive

- ALS
- Nausea , Vomiting , Diarrhea
- Last solid food intake
- Trauma?
- Dark, bloody emesis or stool?
- Malaise
- Fever?
- Skin Turgor
- Vertigo?
- Last Bowel Movement?
- First due tx?
- How was patient moved to stretcher?
- TOT (RN, Trauma Team, etc.)?

Head Injury

- ALS
- GCS
- Blood Glucose Level
- O2 Sat before tx
- O2 Sat after
- LSB/CID?
- Distal PMS x 4?
- If BVM, rate of ventilations
- Trauma Alert?

Heat Emergencies

- Approx ambient air temperature
- Estimated exposed time
- Type of environment
- Loss of consciousness?
- Fluid Intake
- Skin Turgor
- ETOH/Substance involvement?
- Fluid boluses? Lung Sounds?
- Cooling of patient?
- Proper positioning of patient
- First unit treatment/events
- How was patient moved to stretcher?
- Radio Report
- TOT (RN, Trauma Team, etc.)?

Hyperglycemia

- ALS
- BGL
- ETOH/Substance involvement?
- Insulin dependent? Compliant?
- Fluid Bolus w/ lung sound assessed
- How was patient moved to stretcher?
- Radio Report
- First unit treatment/events
- TOT (RN, Trauma Team, etc.)?

Hypoglycemia

- ALS
- BGL (before and after D50 admin)
- ETOH/Substance involvement?
- Insulin Dependent? Compliant?
- First unit treatment/events
- How was patient moved to stretcher?
- Radio Report
- TOT (RN, Trauma Team, etc.)?

Motor Vehicle Crash

- Mechanism Of Injury
- Type of Impact
- Damage to Vehicle
- Reported speed of vehicle(s)
- Patient location in vehicle/restrained?
- Patient presentation upon arrival

Overdose / Poisoning

- Name of drug/substance
 - Route of poisoning
 - Amount
 - Time since
 - Vomiting? How many times?
 - Circumstances surrounding event
 - ETOH Involvement?
 - Oral mucosa burns?
 - Poison Control Center contacted?
 - (call taker, time, orders)
 - First unit treatment/events
 - How was patient moved to stretcher?
 - TOT (RN, Trauma Team, etc.)?
- If pill bottles are found on scene:
- Name of prescription
 - Date filled
 - Amount of prescription
 - Prescript dose(ex: 5mg q 4 hrs)
 - Amount of prescription left

Pain Management

- Activity at onset?
- Provoke? Palliate? Radiation?
- Pain description
- Pain Scale / Duration?
- Numbness?
- Nausea/Vomiting?
- Dyspnea?
- If Extremity, distal PMS?
- Change after interventions?

Pregnancy Induced Hypertension

- ALS
- Proper positioning of patient
- Edema?
- Headache / Visual Disturbances?
- Confusion/Agitation?
- Seizure Activity?

Pregnancy Induced HTN (cont'd)

- Prenatal care / complications
- How many weeks pregnant?
- First due treatment/events
- How was patient moved to stretcher?
- TOT (RN, Trauma Team, etc.)?

Psychological / Behavioral

- Scene safety est. and maintained
- Patient threat assessed
- Presence of Law Enforcement
- Verbal de-escalation attempted?
- Restraints required? Why?
 - Position/Method used
 - Distal PMS x 4 after restraint
- How was patient moved to stretcher?
- First unit treatment/events
- TOT to (RN, Trauma Team, etc.)?

Pulmonary Edema

- ALS
- CPAP / Advanced Airway?
- First unit treatment/events
- How was patient moved to stretcher?
- TOT (RN, Trauma Team, etc.)?

Refusals

- ALS assessment as needed
- Competent to Refuse? Age?
 - A/O x 4 ?
 - Normal gait/stance ?
 - Slurred Speech ?
 - Suicidal/Homicidal?
 - Proper insight/judgment?
- Blood glucose per protocol
- 12 lead per protocol
- Appropriate signatures
- Risks explained/understood

Seizures - Adult

- ALS
- Blood Glucose Level
- Witnessed seizure/
- Seizure type (petit mal, focal, etc)
- Duration and number of seizures?
- Trauma? Injuries noted?
- Compliant with Seizure meds?
- Proper positioning of patient
- First unit treatment/events
- How was patient moved to stretcher?
- TOT (RN, Trauma Team, etc.)?

Seizures - Pediatric Febrile

- ALS
- Blood Glucose Level
- Recent Fever? Duration?
- Clothing removed?
- Moved to cooler environment?
- Cooling measures taken?
- Urine output
- Mucosa (pink, white, moist, dry)
- Skin Turgor
- Witnessed seizure?
- Seizure Type (petit mal, focal, etc)
- Duration and number of seizures
- Injuries noted due to seizure?
- First unit treatment/events
- How was patient moved to stretcher?
- TOT (RN, Trauma Team, etc.)?

Sexual Assault

- Scene safe?
- Law Enforcement contacted?
- Persons in room when pt is examined
- *Exactly* what is done during the exam
- Relevant quotes from patient
- Clothing removed? Disposition?
- Notable injury pattern?
- Patient surroundings?
- Evidence handled? Who? Why?

Stroke / TIA

- ALS
- Proper positioning of patient
- Rule out Stroke mimics
 - Hypoglycemia/Trauma/ETOH
- Cincinnati Stroke Scale
- O2 per protocol
- Aphasic?
- Stroke Alert Criteria met?
- First unit treatment/events
- How was patient moved to stretcher?
- TOT (RN, Trauma Team, etc.)?

Stroke Alerts

- Alert called?
- All Criteria met?
- Onset of signs/symptoms
- Blood Glucose Level
- Trauma?
- First unit treatment/events

Sickle Cell Anemia Crisis

- ALS
- Blood Glucose Level
- Date of patients last crisis
- Blood transfusion? When?
- Fluid Bolus/lung sound assess.
- Pain management
- First unit treatment/events
- How was patient moved to stretcher?
- TOT (RN, Trauma Team, etc.)?

Suspected Abuse (child, elder)

- Scene safe?
- Law Enforcement contacted?
- Who is on scene with the patient
- Relevant quotes?
- Notable injury pattern?
- Patient surroundings?
- Evidence handled?
- First unit treatment/events
- TOT (RN, Trauma Team, etc.)?

Trauma Alerts

- ALS
- (O2/etCO2/SpO2/Meds/ECG/IV)
- Alert Called?
- Criteria? Time?
- Distal PMS
 - Before/after LSB
 - Injured extremity
- Extrication time?
- First unit treatment/events

**PLEASE ENSURE THAT PROPER
SIGNATURES ARE OBTAINED FOR
ALL REPORTS.**

<ul style="list-style-type: none"> • 0.45% NaCl in Water • Crystalloid Solution • Hypotonic (154 mOsm) 	<ul style="list-style-type: none"> • Water replacement • Raises total fluid volume • DKA after initial normal saline solution and before dextrose infusion • Hypertonic dehydration • Sodium and chloride depletion • Gastric fluid loss from nasogastric suctioning or vomiting. 	<ul style="list-style-type: none"> • Use cautiously; may cause cardiovascular increase in intracranial pressure. • Don't use in patients with liver disease burns. • Useful for daily maintenance of body value for replacement of NaCl deficit • Helpful for establishing renal function • Fluid replacement for clients who die glucose (diabetics)
<p>Lactated Ringer's (LR)</p> <ul style="list-style-type: none"> • Normal saline with electrolytes and buffer • Isotonic (275 mOsm) 	<ul style="list-style-type: none"> • Replaces fluid and buffers pH • Hypovolemia due to third-space shifting. • Dehydration • Burns • Lower GI tract fluid loss • Acute blood loss 	<ul style="list-style-type: none"> • Has similar electrolyte content with contain magnesium. • Has potassium therefore don't use failure as it can cause hyperkalemia • Don't use in liver disease because it metabolize lactate; a functional liver bicarbonate; don't give if patient's liver • Normal saline with K+, Ca++, and • Often seen with surgery
<p>D₅W</p> <ul style="list-style-type: none"> • Dextrose 5% in water Crystalloid solution • Isotonic (in the bag) • *Physiologically hypotonic (260 mOsm) 	<ul style="list-style-type: none"> • Raises total fluid volume. • Helpful in rehydrating and excretory purposes. • Fluid loss and dehydration • Hyponatremia 	<ul style="list-style-type: none"> • Solution is isotonic initially and become dextrose is metabolized. • Not to be used for resuscitation; cause hyperglycemia • Use in caution to patients with renal can cause fluid overload • Doesn't provide enough daily calories may cause eventual breakdown of liver • Provides 170-200 calories/1,000cc • Physiologically hypotonic -the dextrose metabolized quickly so that only water hypotonic fluid
<p>D₅NS</p> <ul style="list-style-type: none"> • Dextrose 5% in 0.9% saline • Hypertonic (560 mOsm) 	<ul style="list-style-type: none"> • Hypotonic dehydration • Replaces fluid sodium, chloride, and calories. • Temporary treatment of circulatory insufficiency and shock if plasma expanders aren't available • SIADH (or use 3% sodium chloride). • Addisonian crisis 	<ul style="list-style-type: none"> • Do not use in patients with cardiac because of danger of heart failure & edema. • Watch for fluid volume overload
<p>D₅ 1/2 NS</p> <ul style="list-style-type: none"> • Dextrose 5% in 0.45% saline • Hypertonic (406 mOsm) 	<ul style="list-style-type: none"> • DKA after initial treatment with normal saline solution and half-normal saline solution - prevents hypoglycemia and cerebral edema (occurs when serum osmolality is reduced rapidly). 	<ul style="list-style-type: none"> • In DKA, use only when glucose falls • Most common postoperative fluid • Useful for daily maintenance of body nutrition, and for rehydration.
<p>D₅LR</p> <ul style="list-style-type: none"> • Dextrose 5% in Lactated Ringer's • Hypertonic (575 mOsm) 	<ul style="list-style-type: none"> • Same as LR plus provides about 180 calories per 1000cc's. • Indicated as a source of water, electrolytes and calories or as an alkalizing agent 	<ul style="list-style-type: none"> • Contraindicated in newborns (≤ 28 separate infusion lines are used (risk -calcium salt precipitation in the newborn bloodstream). • Contraindicated in patients with a known hypersensitivity to sodium lactate.

PRESSOR	RECEPTOR	MAIN EFFECT	MAIN SHOCK USE	OTHER
EPINEPHRINE	$\alpha 1$ $\alpha 2$ $\beta 1$ $\beta 2$	VASOCONSTRICTION IONOTROPY DROMOTROPY CHRONOTROPY	AAA - Anaphylaxis, Asthma, Arrest (Cardiovascular)	DIRTY - Nonselective α and β receptors FLOGs the Heart
NOREPINEPHRINE	$\alpha 1$ $\beta 1$	VASOCONSTRICTION IONOTROPY	SEPTIC SHOCK Most commonly used in US for most kinds of shock	First line for most kinds of shock
PHENYLEPHRINE	$\alpha 1$	VASOCONSTRICTION	Hypotension (often used as "push dose" pressor in anesthesia and ED)	BRADYCARDIA - may cause reflex bradycardia
DOBUTAMINE	$\beta 1$ $\beta 2$	IONOTROPY MILD VASODILATION	CARDIOGENIC SHOCK	Minimal changes in heart rate FLOGs the Heart
DOPAMINE	$\alpha 1$ $\alpha 2$ $\beta 1$ $\beta 2$ DA	VASOCONSTRICTION (higher doses) IONOTROPY DROMOTROPY CHRONOTROPY	Hypotension but second line, per surviving sepsis in septic shock	TACHYDYSRHYTHMIAS - main side effect Commonly used prehospitally
VASOPRESSIN	V1	VASOCONSTRICTION	ADJUNCT- Norepinephrine sparing effect at low dose Used by some in cardiac arrest	
MILRINONE	Phosphodiesterase inhibitor	IONOTROPY Reduces preload and afterload	Decompensated heart failure	May cause DYSRHYTHMIAS, HYPOTENSION

DRUG FAMILY NAMES

CNS / NEUROMUSCULAR

FAMILY NAME	TYPE OF DRUG	EXAMPLE
-chol	Muscarinic Agonist	Carbachol
-trop- Scop-	Muscarinic Blocker	Atropine ← Scopolamine
-stigmine	Achase Inhibitor	Neostigmine
-curium -curonium	Nondepolarizing Neuromuscular Blocker	Atracurium Mivacurium Pancuronium
-ane	Inhaled Anesthetic	Halothane
-caine	Local Anesthetic	Lidocaine
-pam or -lam	Benzodiazepine	Diazepam Lorazepam
-tal	Barbiturate	Phenobarbital Thiopental
Nal...-one	Opioid Antagonist	Naloxone Naltrexone
-zine	Typical Antipsychotic <i>or</i> Antihistamine	Chlorpromazine Thioridazine
-apine -idone	Atypical Antipsychotic	Clozapine Risperidone
-capone	COMT Inhibitor for Parkinson's Disease	Tolcapone Entacapone

CARDIOVASCULAR AND RENAL

FAMILY NAME	TYPE OF DRUG	EXAMPLE
-olol	Beta Blocker	Propranolol
-alol -ilol	Beta Blocker + Something Else	Sotalol Carvedilol
-dipine	Vascular CCB	Nifedipine
-zosin	Alpha-1 blocker	Prazosin Doxazosin Terazosin
-pril	ACE-I	Captopril
-sartan	ARB	Losartan
-darone	Antiarrhythmic	Amiodarone
-statin	HMG CoA Reductase Inhibitor	Lovastatin
-zolamide	Carbonic Anhydrase Inhibitor	Acetazolamide Dorzolamide
-semide	Loop Diuretic	Furosemide
-parin	Low Molecular Weight (LMW) Heparins	Enoxaparin
-rudin	Direct Thrombin Inhibitor	Bivalirudin Lepirudin

ONCOLOGY

FAMILY NAME	TYPE OF DRUG	EXAMPLE
Vin-	Microtubule Inhibitors	Vincristine Vinblastine
-rubicin	Cancer Drug	Doxorubicin Daunorubicin
-mab	Monoclonal Antibody Drug	Rituximab Trastuzumab
-tinib	Tyrosine Kinase Inhibitor	Imatinib

INFECTIOUS DISEASE

FAMILY NAME	TYPE OF DRUG	EXAMPLE
-penem	Cell wall inhibitor (very broad spectrum)	Imipenem Meropenem
-floxacin	Fluoroquinolone	Ciprofloxacin Levofloxacin
-conazole "azole" drugs	Antifungal	Ketoconazole Fluconazole Itraconazole
-quine	Antimalarial	Chloroquine Primaquine
-ovir	Antiviral (Herpes)DNA Polymerase Inhibitors	Acyclovir Ganciclovir Valacyclovir
-ivir	Antiviral (Influenza) Neuraminidase Inhibitor	Zanamivir Oseltamivir
-avir	Antiviral (AIDS/HIV) Protease Inhibitor	Indinavir Ritonavir

GI SYSTEM

FAMILY NAME	TYPE OF DRUG	EXAMPLE
-tidine	H2 blocker	Cimetidine Ranitidine
-prazole	PPI	Omeprazole
-glitazone	PPAR Gamma Activators (Diabetes)	Pioglitazone
-gliptin	DPP-4 Inhibitors (Diabetes)	Sitagliptin
-setron	5HT3 Blocker (Antiemetic)	Ondansetron Granisetron

MISCELLANEOUS

FAMILY NAME	TYPE OF DRUG	EXAMPLE
-lukasts	Leukotriene Receptor Antagonists	Zafirlukast Montelukast
-coxib	Selective COX2 Inhibitors	Celecoxib
-prost-	Prostaglandin drug	Misoprostol Alprostadil
-dronate	Bisphosphonate (Osteoporosis)	Alendronate Pamidronate
-fil	PDE 5 Inhibitor for Erectile Dysfunction	Sildenafil
-rinone	PDE 3 Inhibitor for CHF	Amrinone
-triptan	5HT1d Receptor Agonist	Sumatriptan



Hemodynamics of Shock

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Red arrow indicates primary abnormality	PCWP (preload)	Cardiac Output	SVR (afterload)	Treatment
Hypovolemic shock	↓	↑	↑	IV fluids
Cardiogenic shock	↑	↓	↑	Inotropes Revascularization
Distributive shock (septic, neurogenic)	↓	↑	↓	Pressors IV fluids

PCWP = pulmonary capillary wedge pressure SVR = systemic vascular resistance

Cold shock – 10 cases		Warm shock – 12 cases	
<i>Therapy prior to ECHO and invasive lines</i>			
Cold shock and normal BP – 4 cases Dobutamine 5-10µ	Cold shock and low BP – 6 cases Adrenaline 0.3-1 µ ± dobutamine 5-10µ	Warm shock and normal BP – 7 cases Fluid titration, dopamine 5-10 µ ± pressors as per MAP and perfusion	Warm shock and low BP – 5 cases Fluid titration, dopamine 5-10 µ ± pressors as per MAP and perfusion
<i>Findings after invasive BP monitoring and number intubated</i>			
Intubated: 4/4 Vasoconstricted shock: 3/4 Vasodilatory shock: 1/4	Intubated: 6/6 Vasoconstricted shock: 1/6 Vasodilatory shock: 5/6	Intubated: 3/7 Vasoconstricted shock: 0/7 Vasodilatory shock: 7/7	Intubated: 4/5 Vasoconstricted shock: 0/5 Vasodilatory shock: 5/5
<i>Bedside ECHO findings (IVC dimensions + phasic variation; cardiac function) and post ECHO therapy</i>			
<ul style="list-style-type: none"> • IVC collapsed: 1/4 <i>Fluid boluses</i> • IVC Normal/full: 3/4 <i>Fluid ceased</i> • Poor LV/RV function: 2/4 <i>Inotropes augmented</i> • Normal LV/RV function: 2/4 <i>Inotropes ceased/continued</i> • Vasodilatory shock: 1/4 <i>Pressor commenced as per MAP</i> 	<ul style="list-style-type: none"> • IVC collapsed: 5/6 <i>Fluid boluses</i> • IVC normal/full: 1/6 <i>Fluid ceased</i> • Poor LV/RV function: 3/6 <i>Inotropes augmented</i> • Normal/hyperdynamic LV/RV function: 3/6 <i>Inotropes ceased/discontinued</i> • Vasodilatory shock: 5/6 <i>Pressor commenced as per MAP</i> 	<ul style="list-style-type: none"> • IVC collapsed: 2/7 <i>Fluid boluses</i> • IVC normal/full: 5/7 <i>Fluid ceased</i> • Poor LV/RV function: 2/7 <i>Inotropes augmented</i> • Normal/hyperdynamic LV/RV function: 5/7 <i>Inotropes ceased/discontinued</i> • Vasodilatory shock: 7/7 <i>Pressor commenced as per MAP</i> 	<ul style="list-style-type: none"> • IVC collapsed: 4/5 <i>Fluid boluses</i> • IVC normal/full: 1/5 <i>Fluid ceased</i> • Poor LV/RV function: 3/5 <i>Inotropes augmented</i> • Normal/hyperdynamic LV/RV function: 2/5 <i>Inotropes ceased/discontinued</i> • Vasodilatory shock: 5/5 <i>Pressor commenced as per MAP</i>
<i>Shock resolution and outcomes</i>			
Shock resolved: 3/4 Survived: 3/4	Shock resolved: 5/6 Survived: 4/6	Shock resolved: 5/7 Survived: 5/7	Shock resolved: 4/5 Survived: 4/5
Shock resolved 17/22 (77%), survived 16/22 (73%)			

Vasopressors and Inotropes

Alpha 1: affects arteries, ↑ vascular tone, ↑ BP (ex: Phenylephrine)
 Beta 1: heart stimulation, ↑ HR, ↑ contractility, ↑ arrhythmias (ex: Dopamine)

Neosynephrine = Alpha 1 agonist

- Powerful drug! Used when no beta stimulation is wanted or needed
- Causes vasoconstriction, bradycardia
- ↑ BP, ↑ SVR, ↑ PVR, ↑ afterload
- Coronary vasoconstriction
- May need to add dopamine to keep HR up
- Used a lot in neuro d/t the disruption of alpha system in neuro shock
- Dosing: start at 100-180 mcg/min, then 40-60
- Titrate: 5mcg q 15-minutes

Dopamine = Beta 1 & Alpha 1 agonist

- First line agent for many shock states
- Naturally-occurring catecholamine
- Precursor to norepinephrine
- 1-3 mcg/kg/min → renal, coronary, cerebral vasodilation (not renal protective!) ↑ UO
- 3-10 mcg/kg/min → Beta 1 stimulation with positive inotropic effect, ↑ HR, ↑ BP
- > 10 mcg/kg/min → Alpha 1 stimulation with potent vasoconstriction, ↑ BP, ↑ SVR

Norepinephrine = Alpha 1 & 2 agonist

- Endogenous catecholamine; has powerful inotropic and peripheral vasoconstriction effects
- Arterial and venous constriction
- ↑ BP, HR may slow, CO unchanged or ↓ d/t increased afterload
- ↑ SVR and PVR
- Dosing: 2-10 mcg/min

Epinephrine = Beta 1 & Alpha 1 agonist

- Endogenous catecholamine
- POWERFUL inotropic, peripheral and global vasoconstriction
- Not first line treatment...too potent!
- ↑ contractility and ↑ heart O₂ demands
- ↑ HR, ↑ MAP, ↑ CO, ↑ SVR and PVR
- Causes arrhythmias :(
- Dosing: 1-4 mcg/min

Dobutamine = Beta 1 agonist

- A synthetic catecholamine
- Used for + inotropic properties when vasoconstriction undesirable, reduces preload and afterload
- Commonly used with another catecholamine or vasodilator
- ↑ contractility, ↑ CO, ↑ BP, ↑ myocardial O₂ demands, ↑ HR
- If pt is dry, it may drop the BP
- Dosing: 2.5 - 20 mcg/kg/min
- Titrate: 1-2 mcg/kg/min q 5-10 min

Vasopressin = Vasopressin 1 agonist

- Anti-diuretic hormone
- Used in ACLS for pulseless VT and VF
- Smooth muscle constriction (including bronchioles)
- Less constriction at coronary and renal beds
- Vasodilates cerebral vasculature
- May enhance platelet aggregation in septic shock
- ↑ BP, ↑ MAP, ↑ SVR, ↑ UO
- Dosing usually .03 or .04 units/min



Milrinone can ONLY be mixed with NS!

Milrinone = PDE inhibitor

- Positive inotrope and vasodilator
- Cleared by the liver
- Increases cAMP → more Ca into cells → improves myocardial contractility while inhibiting vasoconstriction.
- ↑ CO, ↓ CVP, ↓ SVR
- Loading dose: 50 mcg/kg over 10 min
- Maintenance dose: 0.375-0.75 mcg/kg/min

Source: AACN Certification CCRN Review Manual