



Maimonides  
Medical Center

# Emergency Medicine

Medical Student Clerkship

Pocket Guide



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<b>RESUS:</b>	
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RSI / Vent .....	6
Shock / Sepsis .....	7
<b>CV:</b>	
EKG .....	8, 9
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**Maimonides Medical Center—Emergency Medicine Clerkship:**

Clerkship Director: Anna Pickens, MD (apickens@maimonidesmed.org)  
 EMin5.com @AnnaEMin5

Clerkship Coordinator: Grace Mannino (gmannino@maimonidesmed.org)

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 clinical judgment, and seek a second opinion if you suspect an inconsistency.

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**Killer first line:**

OLD CARTS / ROS:

DDX #1: \_\_\_\_\_

For:	Against:
------	----------

DDX #2: \_\_\_\_\_

For:	Against:
------	----------

DDX #3: \_\_\_\_\_

For:	Against:
------	----------

DDX #4: \_\_\_\_\_

For:	Against:
------	----------

Most Likely <i>"I'm concerned it could be this."</i>	Need to Rule out <i>"Based on the hx /risks, we need to rule it out."</i>	Not likely <i>"I thought about it, and I'm not concerned."</i>
1) 2) ...	1) 2) ...	1) 2) ...
↓ <b>PLAN</b>	↓ <b>PLAN</b>	<del>DONE</del>

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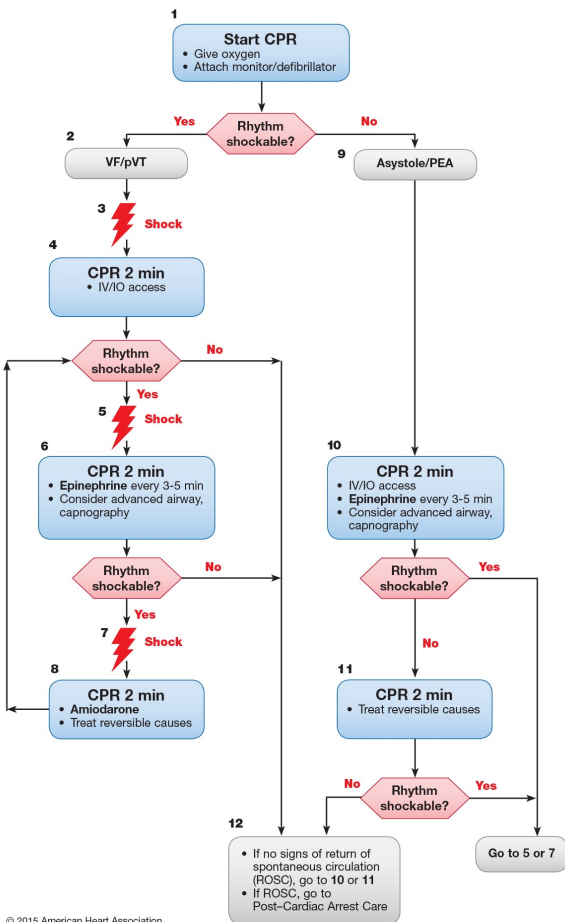
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# ADULT CARDIAC ARREST

## Adult Cardiac Arrest Algorithm—2015 Update



CPR Quality	
• Push hard (at least 2 inches (5 cm) and fast (100-120/min) and allow complete chest recoil.	
• Minimize interruptions in compressions.	
• Avoid excessive ventilation.	
• Rotate compressor every 2 minutes, or sooner if fatigued.	
• If no advanced airway, 30:2 compression-ventilation ratio.	
• Quantitative waveform capnography	
– If PETCO <sub>2</sub> <10 mm Hg, attempt to improve CPR quality.	
• Intra-arterial pressure	
– If relaxation phase (diastolic) pressure <20 mm Hg, attempt to improve CPR quality.	
Shock Energy for Defibrillation	
• Biphasic: Manufacturer recommendation (eg, initial dose of 120-200 J; if unknown, use maximum available. Second and subsequent doses should be equivalent, and higher doses may be considered.	
• Monophasic: 360 J	
Drug Therapy	
• Epinephrine I/IO dose: 1 mg every 3-5 minutes	
• Amiodarone I/IO dose: First dose: 300 mg bolus. Second dose: 150 mg.	
Advanced Airway	
• Endotracheal intubation or supraglottic advanced airway	
• Waveform capnography or capnometry to confirm and monitor ET tube placement	
• Once advanced airway in place, give 1 breath every 6 seconds (10 breaths/min) with continuous chest compressions	
Return of Spontaneous Circulation (ROSC)	
• Pulse and blood pressure	
• Abrupt sustained increase in PETCO <sub>2</sub> (typically >40 mm Hg)	
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Reversible Causes	
• Hypovolemia	
• Hypoxia	
• Hydrogen ion (acidosis)	
• Hypo-/hyperkalemia	
• Hypothermia	
• Tension pneumothorax	
• Tamponade, cardiac	
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# ADULT

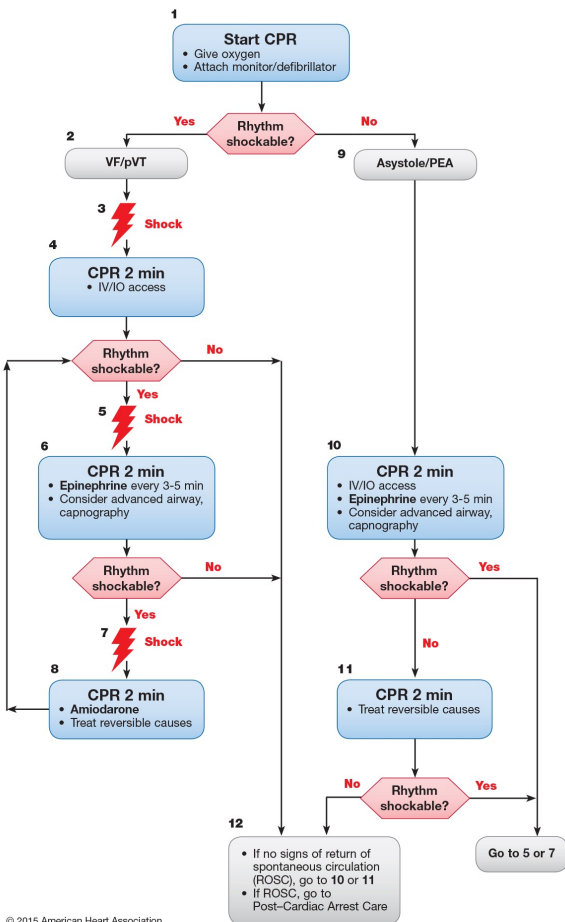
# ...COMMON MEDS

<b>HA Cocktail:</b>	Reglan 10 mg IV	
	Benadryl 25mg IV	+ IVF
	Toradol (ketorolac) 15-30 mg IV	
	Dexamethasone 8-10mg PO or IV	
<b>HTN Emerg:</b>	labetolol 20 mg IV (over 2 min) q 10min, then 40-80mg IV (max 300)	
	Hydralazine 10-20 mg IV	(see p. 25 for full list!)
<b>Hyper K:</b>	Insulin regular 10 Units IV	
	D50 50 mL (1amp)	
	Ca-Gluconate 1-2 amp	
	Albuterol 15 mg	
	Kayexalate 15 g PO	
<b>Pain:</b>	Dilaudid 0.5-1 mg IV/IM	
	Morphine 4-10 mg IV	
	Fentanyl 0.5-1 mcg/kg IV	
<b>Pressors:</b>	Norepi 0.03-0.3mcg/kg/min	
	Phenylephrine 0.3-3mcg/kg/min (30-300mcg/min)	
	Vasopressin 0.04 U/min (on/off)	
	Dobutamine 5-20mcg/kg/min	
	Dopamine 5-20 mcg/kg/min	
	Epinephrine 0.03-0.3 mcg/kg/min (3-30 mcg/min)	
<b>Psych Sedation:</b>	Haldol 5-10 mg IM	
	Ativan (loraz) 2 mg IM	
	Midazolam 5 mg IM	
	Geodon 10 mg-20mg IM	
<b>RSI:</b>	Succ 1-1.5 mg/kg (100mg)	
	Edomidate 0.3 mg/kg (30 mg)	
	Roccuronium 1 mg/kg (100mg)	
	Vecuronium 0.15mg/kg (15mg)	
	Ketamine 1-1.5 mg/kg (100-150 mg)	
	Midaz 0.3 mg/kg (30 mg)	
	Atropine 0.02 mg/kg (pretreatment peds)	
	Lidocaine 1.5 mg/kg (150 mg) (pretreatment incr ICP)	
<b>Seizure:</b>	Ativan (loraz) 2 mg IV x2	OR Midaz (versed) 10-20 mg IM x2
	Fosphenytoin 20 mg/kg in PE	OR Phenytoin 20 mg/kg over 25 mg/min
	Phenobarbital 10-20 mg/kg IV (2 amps) x2	
	Valproic (Depakote) 15-20 mg/kg IV	
	Keppra 1g IV or PO	
<b>Vent Sedation:</b>	Propofol 20-50-100mcg/kg/min (bolus 100mcg)	
	Fentanyl 50-100 mcg/hr	
	Midazolam -10mg/hr (bolus 2mg)	

<b>EMPIRIC ABX THERAPY</b>	Mono TX: Imipenem, Meropenem, Pip/Tazo (Zosyn), Amp/Sulbactam (Unasyn)
	Combo:
	Anaerobes: Metronidazole (GI), Clindamycin (resp)
	GNs + Pseudomonas: Cefepime, Levoflox, FQ, Aztreonam, TMP-Sulfa
	GNs: Ceftriaxone
	Pseudomonas: Gent, Tobra
	GP: MSSA Nafcillin, Oxacilin
	MRSA Vancomycin, Linezolid
	Example: Ceftriax + gent + vanc + flagyl -OR- cefepime + vanc + flagyl -OR- Zosyn

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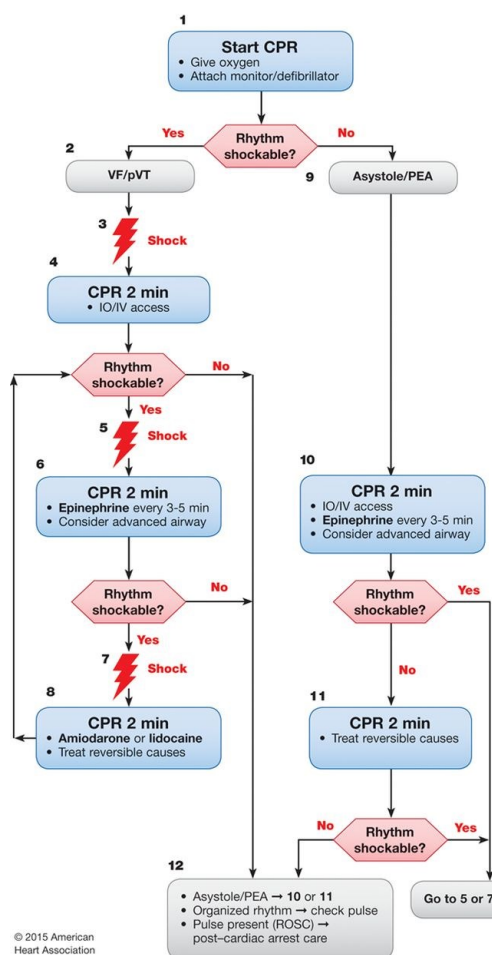
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<b>HTN Emerg:</b>	labetolol 20 mg IV (over 2 min) q 10min, then 40-80mg IV (max 300)	
	Hydralazine 10-20 mg IV	(see p. 25 for full list!)
<b>Hyper K:</b>	Insulin regular 10 Units IV	
	D50 50 mL (1amp)	
	Ca-Gluconate 1-2 amp	
	Albuterol 15 mg	
	Kayexalate 15 g PO	
<b>Pain:</b>	Dilaudid 0.5-1 mg IV/IM	
	Morphine 4-10 mg IV	
	Fentanyl 0.5-1 mcg/kg IV	
<b>Pressors:</b>	Norepi 0.03-0.3mcg/kg/min	
	Phenylephrine 0.3-3mcg/kg/min (30-300mcg/min)	
	Vasopressin 0.04 U/min (on/off)	
	Dobutamine 5-20mcg/kg/min	
	Dopamine 5-20 mcg/kg/min	
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	Fosphenytoin 20 mg/kg in PE	OR Phenytoin 20 mg/kg over 25 mg/min
	Phenobarbital 10-20 mg/kg IV (2 amps) x2	
	Valproic (Depakote) 15-20 mg/kg IV	
	Keppra 1g IV or PO	
<b>Vent Sedation:</b>	Propofol 20-50-100mcg/kg/min (bolus 100mcg)	
	Fentanyl 50-100 mcg/hr	
	Midazolam -10mg/hr (bolus 2mg)	

<b>EMPIRIC ABX THERAPY</b>	Mono TX: Imipenem, Meropenem, Pip/Tazo (Zosyn), Amp/Sulbactam (Unasyn)
	Combo:
	Anaerobes: Metronidazole (GI), Clindamycin (resp)
	GNs + Pseudomonas: Cefepime, Levoflox, FQ, Aztreonam, TMP-Sulfa
	GNs: Ceftriaxone
	Pseudomonas: Gent, Tobra
	GP: MSSA Nafcillin, Oxacilin
	MRSA Vancomycin, Linezolid
	Example: Ceftriax + gent + vanc + flagyl -OR- cefepime + vanc + flagyl -OR- Zosyn

COMMON MEDS...	ADULT	
<b>A Fib:</b>	Metoprolol Diltiazem Esmolol	5 mg IV (afib) 20mg IV over 2min; then 25mg after 15 min 0.5mg/kg IV over 1 min (500mcg/kg) (drip): THEN 25-50 mcg/kg/min, titrate q 10-20 min
<b>ACS / MI:</b>	ASA NTG Morphine Ticagrelor -or- Clopidogrel (Plavix) Heparin OR Enoxaparin Metoprolol Simvastatin/Atorvast	325mg chewed, then 81mg daily SL PRN 4mg PRN 180mgPO (exclude: h/o bleed/CVA/COPD/asthma, HR<50, hepatic insuf) 600mg, then 75mg daily 60U/kg bolus (max 5,000U), then 12U/kg/hr (max 1,000U/hr) 1mg/kg BID (with cards approval) 5mg IV q15min x3; then 50mg PO q6 hrs 80mg ASAP
<b>Allergy:</b>	Benadryl (H1) Famotidine (H2) Methylprednisone OR Prednisone Epi	25-50mg PO/IV (H1) 20mg IV (H2) 125mg IV 60mg PO 0.3-0.5 mg SQ (1:1000) OR 0.1 mg IV (1:10,000) over 5-10min
<b>AMS</b>	D50 D25 (kids)/D10 (baby) Naloxone Thiamine	1-2 amps (= 25g) 0.5-1.0 g/kg Naloxone 0.4mg IV increments (2mg if hypoxic) (0.01-0.2mg/kg IV) 100mg IV
<b>Asthma:</b>	Bolus NS Albuterol Ipratropium Methylprednisolone Mag Epi	1L NS 2.5-5mg neb q20 min or 15mg continuous 0.5mg neb q20 min 125mg IV x1, then 40-60mg IV q 6 hrs 2 g IV push 0.3-0.5 mg SQ (1:1000) q20 min x3
<b>CHF:</b>	Lasix 40-80mg IV Nitroglycerine Nitroprusside Dobutamine	40-80mg IV SL 0.8-1.2 mg; Derm 1-2inches (drip): 20-40 mcg/min, titrate up to 100-200 mcg/min 1-10 mcg/kg/min 2.5-10mcg/kg/min (cardiogenic shock / hypotensive)
<b>CODE:</b>	Epi 1mg Amiodarone Magnesium Atropine Adenosine	1 mg (0.01 mg/kg IV (1:10,000) q5-15min (Epi pen adult 0.3mg; Epi Jr peds 0.15mg) (1:000) 300mg x1; then 150 mg VT: 150mg IV over10min; then 1mg/min IV 6hrs 2g IV 0.5mg IV (repeat up to 3mg) (brady) 6mg → 12 mg (SVT)
<b>Conscious sedation:</b>	Ketamine Fentanyl Brevital Etomidate Propofol Glycopyrrolate	1-2 mg/kg IV (slow push) 2-3 mcg/kg IV cocktail: 2mg Midaz + 100mcg fent 0.75-1 mg/kg IV 0.05-0.1 mg/kg IV (5-10mg) 40mg IVP q 10 sec until sedated 0.1mg IV / IM
<b>GI Bleed:</b>	Nexium/Protonix (PPI)	80 mg bolus IV, then 8 mg/hr
<b>Incr ICP:</b>	Kepra Mannitol	1g IV 1g / kg IV

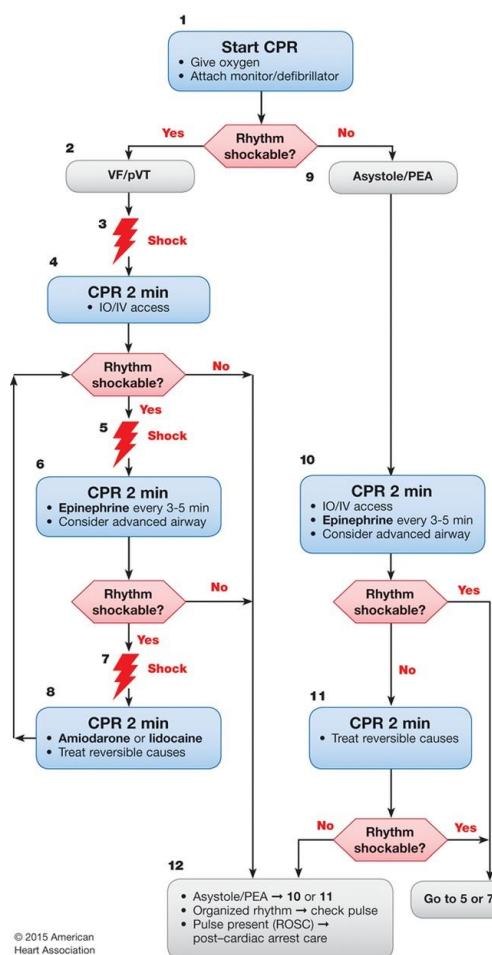
### Pediatric Cardiac Arrest Algorithm—2015 Update



CPR Quality
<ul style="list-style-type: none"> <li>Push hard (2/3 of anteroposterior diameter of chest) and fast (100-120/min) and allow complete chest recoil.</li> <li>Minimize interruptions in compressions.</li> <li>Avoid excessive ventilation.</li> <li>Rotate compressor every 2 minutes, or sooner if fatigued.</li> <li>If no advanced airway, 15:2 compression-ventilation ratio.</li> </ul>
Shock Energy for Defibrillation
First shock 2 J/kg, second shock 4 J/kg, subsequent shocks ≥4 J/kg, maximum 10 J/kg or adult dose
Drug Therapy
<ul style="list-style-type: none"> <li><b>Epinephrine IO/IV dose:</b> 0.01 mg/kg (0.1 mL/kg of 1:10,000 concentration). Repeat every 3-5 minutes. If no IO/IV access, may give endotracheal dose: 0.1 mg/kg (0.1 mL/kg of 1:1000 concentration).</li> <li><b>Amiodarone IO/IV dose:</b> 5 mg/kg bolus during cardiac arrest. May repeat up to 2 times for refractory VF/pulseless VT.</li> <li><b>Lidocaine IO/IV dose:</b> Initial: 1 mg/kg loading dose. Maintenance: 20-50 mcg/kg per minute infusion (repeat bolus dose if infusion initiated &gt;15 minutes after initial bolus therapy).</li> </ul>
Advanced Airway
<ul style="list-style-type: none"> <li>Endotracheal intubation or supraglottic advanced airway</li> <li>Waveform capnography or capnometry to confirm and monitor ET tube placement</li> <li>Once advanced airway in place, give 1 breath every 8 seconds (10 breaths/min) with continuous chest compressions</li> </ul>
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Reversible Causes
<ul style="list-style-type: none"> <li>Hypovolemia</li> <li>Hypoxia</li> <li>Hydrogen ion (acidosis)</li> <li>Hypoglycemia</li> <li>Hypo-/hyperkalemia</li> <li>Hypothermia</li> <li>Tension pneumothorax</li> <li>Tamponade, cardiac</li> <li>Toxins</li> <li>Thrombosis, pulmonary</li> <li>Thrombosis, coronary</li> </ul>

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**PRE-TREATMENT:**

**SOAP ME:** (RSI equipment)  
Suction, O2 (+BVM), Airway (+ backup), Positioning, Mech Equipment, Meds

**Pre-O2 / BMV / Cricoid pressure / Apneic O2 (15L NC)**

Lidocaine 1mg/kg IV/ETT (blunt incr ICP)  
Atropine 0.02 mg/kg IV/ETT (pediatrics, prevent reflexive brady))

**RSI- INDUCTION:**

**Etomidate 0.3 mg/kg IV** (less drop in BP than some)  
Ketamine 1-2 mg/kg IV (asthma= bronchodilator; avoid in incr ICP)  
Fentanyl 2-5 mcg/kg IV  
Midaz 0.3 mg/kg IV (can cause drop in BP, HR, RR)

**RSI- PARALYSIS**

**Succ 1mg/kg IV**  
**Roc 1mg/kg IV** (use instead of succ in hyper K, Dialysis, Burns)  
\*\*onset 1 min (give before induction), lasts 30min

**POST- RSI**

**SEDATION:**

propofol 20-50-100mcg/kg/min (bolus 100mcg)  
fentanyl 50-100 mcg/hr  
midazolam 1-10mg/hr (bolus 2mg)

**VENT:**

	Tidal Vol Vt (mL/kg)	RR	I/E ratio	PEEP	FI02
Normal Lung	8 mL/kg (4-6L)	10-12	1:2	5	100%
Asthma/COPD	6	5-8	1:4	5	100%
ARDS	6	10-12	1:2	10-15	100%
Hypovolemia	8	10-12	1:2	0-4	100%

Measure	Art Blood	Venous Blood
pH	7.4	7.37
VpH+0.03=ApH		
PO2(mmHg)	80-100	40
O2Sat of Hb	95-99%	60-80%
PCO2(mmHg)	40	45
Dis CO2(mL/L)	27	29
HCO3(meq/L)	25	

**PLACEMENT:** EtCO2 waveform, color change, bilat breath sounds, condensation, equal chest rise

**DOPE** (Trouble shooting): Dislodged/Obstructed tube, PTX, Equipment failure

**CXR:** to check placement— 2-3cm above carina

**ABG:** consider 30 min after intubation

1yr (10kg)	2yr (12kg)	4yr (15kg)	6yr (20kg)	8yr (25kg)	10yr (35kg)	15yr (50kg)
100-140	90-140	80-110	75-100	75-100	75-100	60-90
24-40	24-40	22-34	18-30	18-30	18-30	12-16
75-100	80-112	82-112	84-120	84-120	84-120	94-140
4	4.5	5	5.5	6c	6c	7c
1s	2 or 3	3	3	3	3	3
16	20	24	28	28	32	36
100mL	120mL	150mL	200mL	1U	1U	1U
24mL/hr	27mL/hr	32mL/hr	40mL/hr	47mL/hr	60mL/hr	74mL/hr

Ped SBP = 70 + (2\*age)

**Asthma**

Albuterol 15 mg neb cont over 1 hr; 2.5 mg INH  
Atrovent 1 mg neb over 1 hr  
Methylpred 2 mg/kg IV (125 mg max)  
Prednisolone 1-2 mg/kg (orapred)  
Mag sulfate 50 mg/kg IV over 20 min (2g max)  
Terbutaline 10 mcg/kg IV, then 0.1-6 mcg/kg/min  
Epi 0.01 mg/kg 1:1000 IM (0.5mg max)

**Hypoglycemia**

Glucose 2 mL/kg D25W or 2-4 mL/kg D10W  
Glucagon 0.05 mg/kg IV/IM/SQ (1 mg max)

**Incr ICP**

Lidocaine 1 mg/kg IV (pre-RSI)  
Mannitol 0.25-1 g/kg IV

**Sed Reversal**

Naloxone 0.1 mg/kg IV/IM/ETT (2mg max) opioids  
Flumazenil 0.01 mg/kg IV (0.2mg max) benzos

**SEIZURE**

Loraz 0.05-0.1 mg/kg IV over 2-5min; repeat once  
Diazepam 0.2-0.3 mg/kg IV  
Fosphenytoin 15-20 mg PE/kg IV (rate 150mg PE/min)  
Phenobarbital 15-20 mg/kg IV (rate 1mg/kg/min, slow)  
Phenytoin 15-20 mg/kg IV SLOW! MAX rate 1mg/kg/min

**Stridor**

Decadron 0.6-1 mg/kg PO/IM/IV (16mg max)  
Racemic Epi 0.5 mL neb

Adapted from EMRA Ped Qwic Card / U of Chicago Comer Ped ER ref Card

**PRE-TREATMENT:**

**SOAP ME:** (RSI equipment)  
Suction, O2 (+BVM), Airway (+ backup), Positioning, Mech Equipment, Meds

**Pre-O2 / BMV / Cricoid pressure / Apneic O2 (15L NC)**

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midazolam 1-10mg/hr (bolus 2mg)

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100-140	90-140	80-110	75-100	75-100	75-100	60-90
24-40	24-40	22-34	18-30	18-30	18-30	12-16
75-100	80-112	82-112	84-120	84-120	84-120	94-140
4	4.5	5	5.5	6c	6c	7c
1s	2 or 3	3	3	3	3	3
16	20	24	28	28	32	36
100mL	120mL	150mL	200mL	1U	1U	1U
24mL/hr	27mL/hr	32mL/hr	40mL/hr	47mL/hr	60mL/hr	74mL/hr

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Mag sulfate 50 mg/kg IV over 20 min (2g max)  
Terbutaline 10 mcg/kg IV, then 0.1-6 mcg/kg/min  
Epi 0.01 mg/kg 1:1000 IM (0.5mg max)

**Hypoglycemia**

Glucose 2 mL/kg D25W or 2-4 mL/kg D10W  
Glucagon 0.05 mg/kg IV/IM/SQ (1 mg max)

**Incr ICP**

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**Sed Reversal**

Naloxone 0.1 mg/kg IV/IM/ETT (2mg max) opioids  
Flumazenil 0.01 mg/kg IV (0.2mg max) benzos

**SEIZURE**

Loraz 0.05-0.1 mg/kg IV over 2-5min; repeat once  
Diazepam 0.2-0.3 mg/kg IV  
Fosphenytoin 15-20 mg PE/kg IV (rate 150mg PE/min)  
Phenobarbital 15-20 mg/kg IV (rate 1mg/kg/min, slow)  
Phenytoin 15-20 mg/kg IV SLOW! MAX rate 1mg/kg/min

**Stridor**

Decadron 0.6-1 mg/kg PO/IM/IV (16mg max)  
Racemic Epi 0.5 mL neb

Adapted from EMRA Ped Qwic Card / U of Chicago Comer Ped ER ref Card

SIZES

	Age	Adult (70kg)	Lg Adult (100kg)	Premie (2 kg)	NB (3.5kg)	3mo (5-6kg)	6mo (8kg)
HR		60-100	60-100	140-160	140-160	130-160	120-160
RR		12-16	12-16	40-60	40-60	30-60	30-60
SBP		95-140	95-140	40-70	40-70	60-90	75-100
ETT size	(age/4) +4	7.5c	8c	2.5	3	3.5	3.5
Blade	4	4	4	0s	1s	1s	1s
Cm @ lip	Size ETT x3						
Chest tube		36-42 fr	36-42 fr	8	10	10	12
Fluid bolus	20mL/kg						
PRBCs(1U = 250mL)	10mL/kg	1U	1U	20mL	35mL	50mL	80mL
Fluid maint	BSA**	90mL/hr	110mL/hr	8mL/hr	12mL/hr	16mL/hr	20mL/hr

\*\*Fluid maint by BSA equation:  $[(wt*4)+7]*1200 / [(90+wt)*24]$

PEDS

**ANALGESIA / SEDATIVES**

Acetaminophen	15 mg/kg PO q 4-6 hrs
Etomidate	0.3 mg/kg IV (not approved <10yo)
Fentanyl	1-2 mcg/kg IV/IM
Hydrocodone	0.1-0.2 mg/kg PO q 4-6 hrs
Ibuprofen	10 mg/kg/dose q 6-8 hrs
Ketamine	1-2mg/kg IV
Ketorolac	0.5 mg/kg IV
Midazolam	0.1 mg/kg IV/IM
Morphine	0.1-0.2 mg/kg IV/IM q2-4 hrs
Oxycodone	0.1 mg/kg PO q 4-6 hrs (max 10mg/dose)
Propofol	0.25-0.5 mg/kg IV, repeat q 2-4 min (titrate)

**ANAPHYLAXIS**

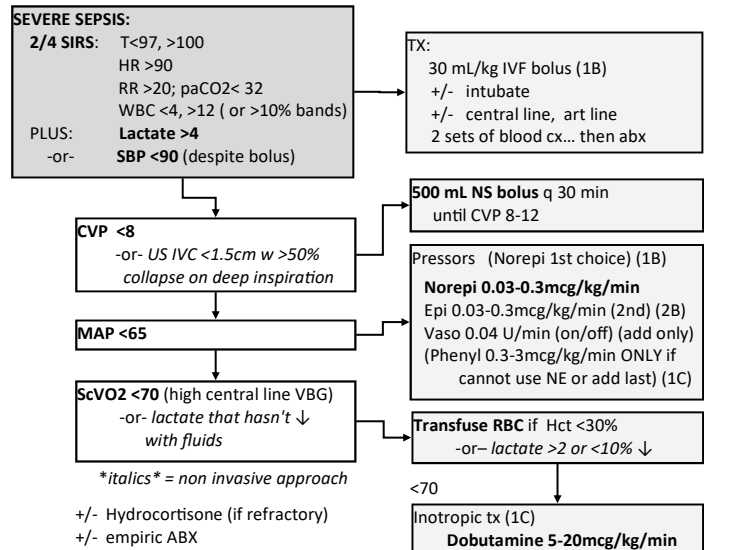
Epi	0.01 mg/kg 1:10,000 IV or 0.01mg/kg 1:1000 IM q15min
Benadryl	1-2 mg/kg IV
Dexamethasone	0.6 mg/kg IV/IM
Methylpred	2-4 mg/kg IV bolus, then 2mg/kg/day divided q6 hrs
Ranitidine	1.5 mg/kg IV/PO

**ANTIBIOTICS**

Acyclovir	10 mg/kg IV q 8hr
Ampicillin	50-100 mg/kg/day divided q 6-12hr
Cefazolin (ancef)	30 mg/kg IV TID
Cefotaxime	150 mg/kg/day q 8-12 hr
Ceftriaxone	50-100 mg/kg/day q 12-24 hr (after 1 mo old)
Clindamycin	25-40 mg/kg/day IV divided q 6-8hr
Gentamycin	Age-related (monitor levels)
Vancomycin	15 mg/kg/dose q 8-24 hr (monitor levels)

		Pre-load PCWP JVP	Pump Fn CO	After-load SVR	Perfusion O2 Sat	TX
<b>Hypovolemic</b>	Intravascular vol loss - hemorrhagic - fluid loss	↓	↓	↑	↓	Fluids
<b>Cardiogenic</b>	- Arrhythmia - AMI, valve failure - cardiomyopathy - pericarditis/PE	↑	↓	↑	↓	Norepi Dobutamine (5-20mcg/kg/min)
<b>Distributive</b>	Vasodilatory-↓ SVR - septic shock/ SIRS / TSS - Anaphylaxis - neurogenic shock - Drug/toxin - Addisonian crisis	↓/—	↑	↓	↑	Norepi (neurogenic, septic) Epi (anaphylaxis) Phenyl (neurogenic) Dopamine
<b>Obstructive</b>	- Tension PTX - Tamponade - PE	↑	↓	↑	↓	Thoracostomy, pericardiocentesis

A Pickens, MD



Surviving Sepsis Campaign: International Guidelines for Management of Severe Sepsis and Septic Shock. Crit Care Med. 2013 Feb;41(2):580-637.

SIZES

	Age	Adult (70kg)	Lg Adult (100kg)	Premie (2 kg)	NB (3.5kg)	3mo (5-6kg)	6mo (8kg)
HR		60-100	60-100	140-160	140-160	130-160	120-160
RR		12-16	12-16	40-60	40-60	30-60	30-60
SBP		95-140	95-140	40-70	40-70	60-90	75-100
ETT size	(age/4) +4	7.5c	8c	2.5	3	3.5	3.5
Blade	4	4	4	0s	1s	1s	1s
Cm @ lip	Size ETT x3						
Chest tube		36-42 fr	36-42 fr	8	10	10	12
Fluid bolus	20mL/kg						
PRBCs(1U = 250mL)	10mL/kg	1U	1U	20mL	35mL	50mL	80mL
Fluid maint	BSA**	90mL/hr	110mL/hr	8mL/hr	12mL/hr	16mL/hr	20mL/hr

\*\*Fluid maint by BSA equation:  $[(wt*4)+7]*1200 / [(90+wt)*24]$

PEDS

**ANALGESIA / SEDATIVES**

Acetaminophen	15 mg/kg PO q 4-6 hrs
Etomidate	0.3 mg/kg IV (not approved <10yo)
Fentanyl	1-2 mcg/kg IV/IM
Hydrocodone	0.1-0.2 mg/kg PO q 4-6 hrs
Ibuprofen	10 mg/kg/dose q 6-8 hrs
Ketamine	1-2mg/kg IV
Ketorolac	0.5 mg/kg IV
Midazolam	0.1 mg/kg IV/IM
Morphine	0.1-0.2 mg/kg IV/IM q2-4 hrs
Oxycodone	0.1 mg/kg PO q 4-6 hrs (max 10mg/dose)
Propofol	0.25-0.5 mg/kg IV, repeat q 2-4 min (titrate)

**ANAPHYLAXIS**

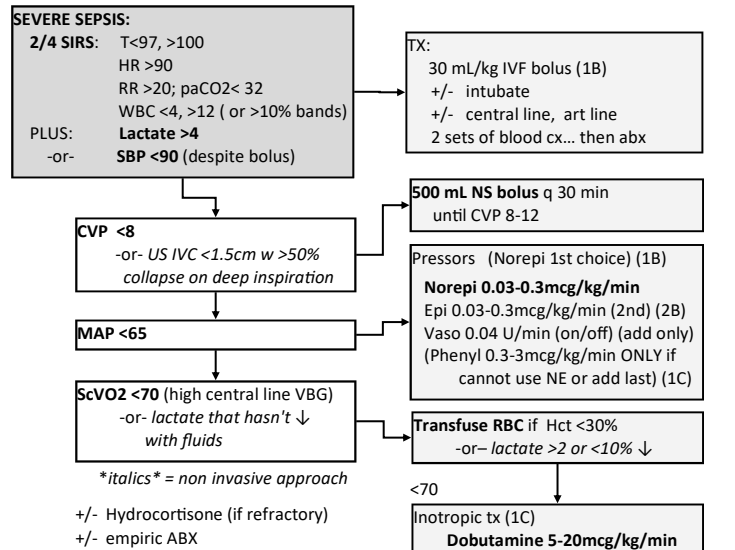
Epi	0.01 mg/kg 1:10,000 IV or 0.01mg/kg 1:1000 IM q15min
Benadryl	1-2 mg/kg IV
Dexamethasone	0.6 mg/kg IV/IM
Methylpred	2-4 mg/kg IV bolus, then 2mg/kg/day divided q6 hrs
Ranitidine	1.5 mg/kg IV/PO

**ANTIBIOTICS**

Acyclovir	10 mg/kg IV q 8hr
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Cefazolin (ancef)	30 mg/kg IV TID
Cefotaxime	150 mg/kg/day q 8-12 hr
Ceftriaxone	50-100 mg/kg/day q 12-24 hr (after 1 mo old)
Clindamycin	25-40 mg/kg/day IV divided q 6-8hr
Gentamycin	Age-related (monitor levels)
Vancomycin	15 mg/kg/dose q 8-24 hr (monitor levels)

		Pre-load PCWP JVP	Pump Fn CO	After-load SVR	Perfusion O2 Sat	TX
<b>Hypovolemic</b>	Intravascular vol loss - hemorrhagic - fluid loss	↓	↓	↑	↓	Fluids
<b>Cardiogenic</b>	- Arrhythmia - AMI, valve failure - cardiomyopathy - pericarditis/PE	↑	↓	↑	↓	Norepi Dobutamine (5-20mcg/kg/min)
<b>Distributive</b>	Vasodilatory-↓ SVR - septic shock/ SIRS / TSS - Anaphylaxis - neurogenic shock - Drug/toxin - Addisonian crisis	↓/—	↑	↓	↑	Norepi (neurogenic, septic) Epi (anaphylaxis) Phenyl (neurogenic) Dopamine
<b>Obstructive</b>	- Tension PTX - Tamponade - PE	↑	↓	↑	↓	Thoracostomy, pericardiocentesis

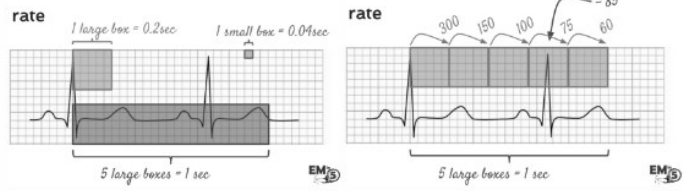
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# 1. Rate / Rhythm

<60 = bradycardic  
60-100 = normal  
>100 = tachycardic



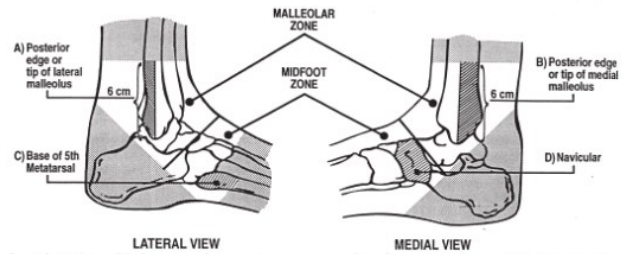
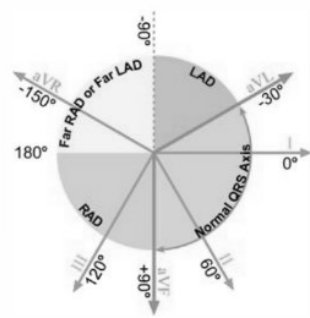
rhythm  
spacing → Regular or Irregular?

P wave before every QRS?  
(originating from SA node)  
YES! = sinus  
NO = ventricular/jxn

normal sinus sinus tachy/brady  
atrial fibrillation AfT sinus arrhythmia (atrial flutter) AVRT/AVRT

# 2. Axis

I	aVF	AXIS
+	+	Normal
+	-	Lead II: + Normal LAD
-	+	RAD
-	-	extreme RAD



**OTTOWA Ankle rule:** Xray if...  
Pain in **malleolar zone** PLUS any 1 of the following:  
o Medial malleolus bony tenderness, OR  
o Lateral malleolus bony tenderness, OR  
o Non-weight bearing immediately and in ED (4 steps)

**OTTOWA Foot rule:** Xray if...  
Pain in **midfoot zone** PLUS any 1 of the following:  
o Base of **5th metatarsal** bony tenderness, OR  
o **Navicular** bony tenderness, OR  
o Non-weight bearing immediately and in ED (4 steps)

**OTTOWA Knee rule:** Xray if...  
Acute knee injury with 1 of the following:  
o Age > 55  
o Head of **fibula** tenderness  
o Isolated tenderness of **Patella**  
o Inability to flex **90°**  
o Non-weight bearing immediately and in ED (4 steps)

**PEDS ELBOW:**  
Appropriate ossification centers:

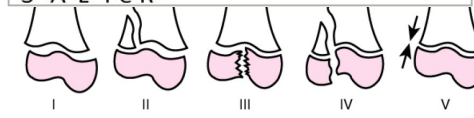
CRITOE:	(age seen):
C: Capitulum	1
R: Radial head	3
I: Internal (med) epicondyle	5
T: Trochlea	7
O: Olecranon	9
E: External (lat) epicondyle	11

Ant humeral line: draw line through middle 1/3 of capitulum; If hyperextension, goes through ant 1/3 or in front of it

Radial head alignment: should point toward capitulum (otherwise suspect disloc / monteggia fx)

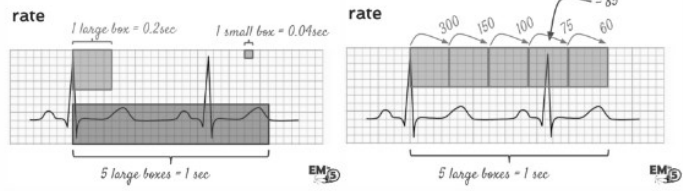
Fat pads? Effusion?  
Normal: can see ant (thin), not post  
Abnormal: fat elevated/ant("sail sign") + posterior visible  
\*\* elevated = effusion/hemarthrosis pushing pads up  
\*\* may indicate occult fracture

Separate Above Lower Through cRush



# 1. Rate / Rhythm

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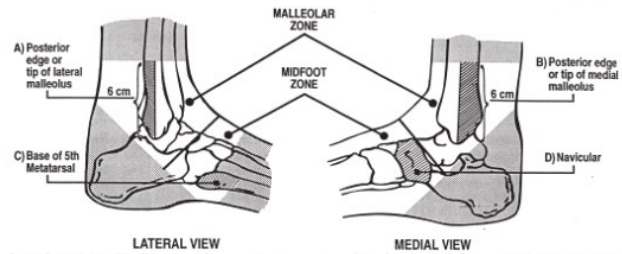
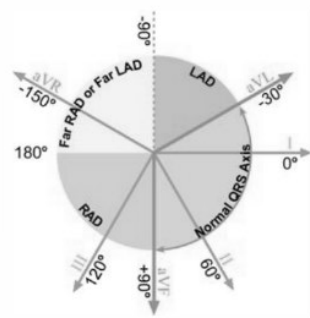
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# 2. Axis

I	aVF	AXIS
+	+	Normal
+	-	Lead II: + Normal LAD
-	+	RAD
-	-	extreme RAD



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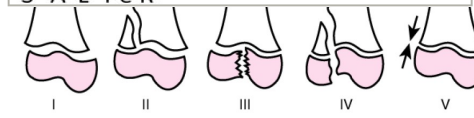
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\*\* elevated = effusion/hemarthrosis pushing pads up  
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Separate Above Lower Through cRush





Splinting Materials:

Fiberglass



Cotton (Webril) Stockinette



-OR-



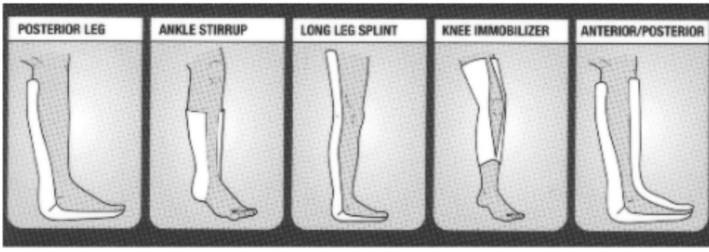
Water



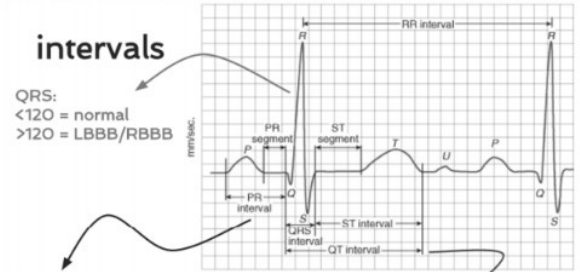
UPPER EXTREMITY



LOWER EXTREMITY



3. Intervals



QRS:  
<120 = normal  
>120 = LBBB/RBBB

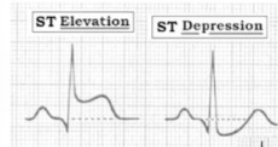
PR:  
< 120 = preexcitation (WPW)  
120-200 = normal

QT:  
<470 = normal  
>470 = predisposes VT/VF



4. Ischemia

ischemia



✓ ST segments

✓ T waves

✓ Q waves (pathologic)

>1mm wide  
>2mm deep  
any in V1-3



Splinting Materials:

Fiberglass



Cotton (Webril) Stockinette



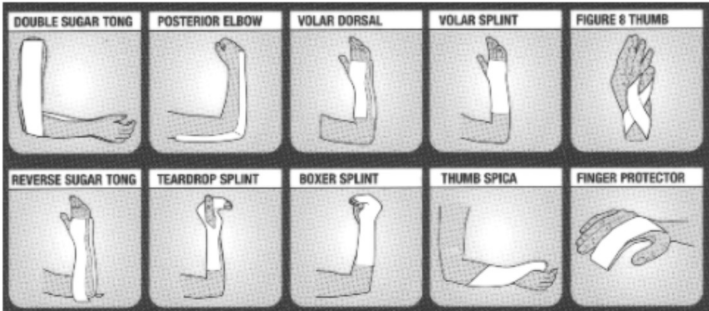
-OR-



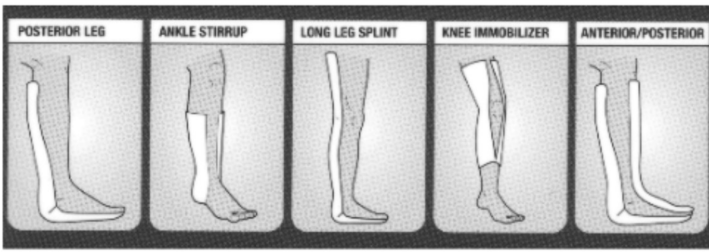
Water



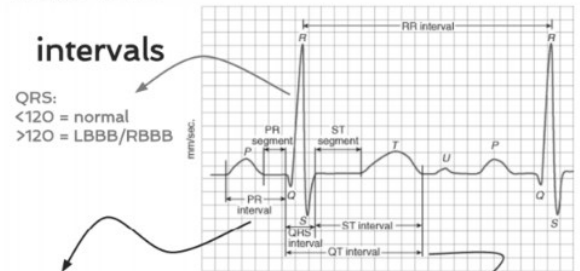
UPPER EXTREMITY



LOWER EXTREMITY



3. Intervals



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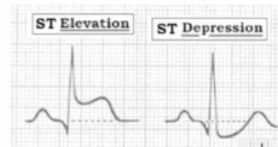
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4. Ischemia

ischemia



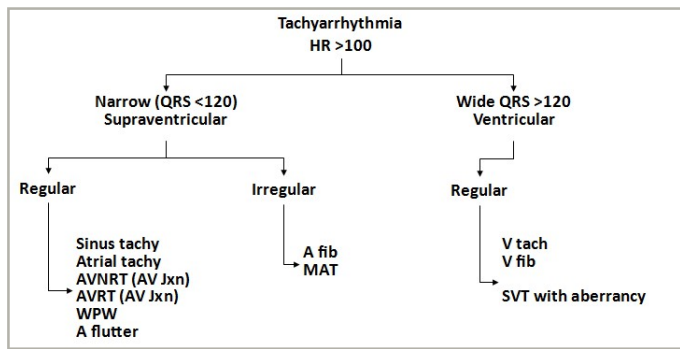
✓ ST segments

✓ T waves

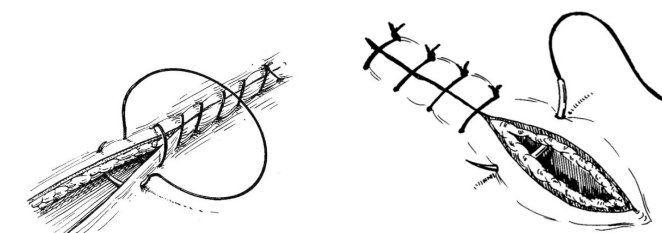
✓ Q waves (pathologic)

>1mm wide  
>2mm deep  
any in V1-3





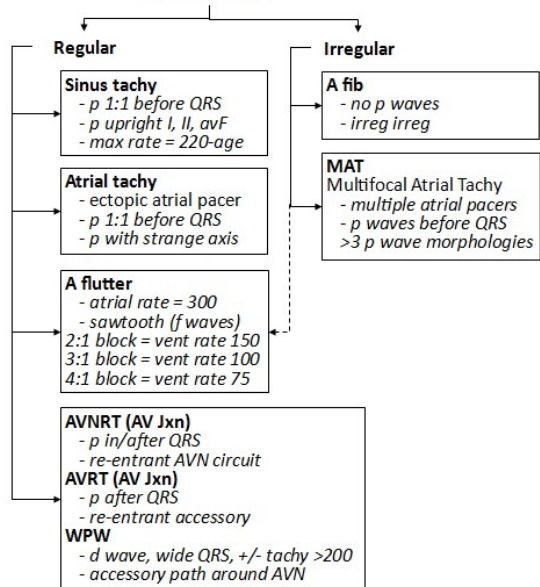
A Pickens, MD



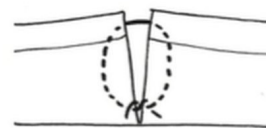
Continuous / Running

Simple Interrupted

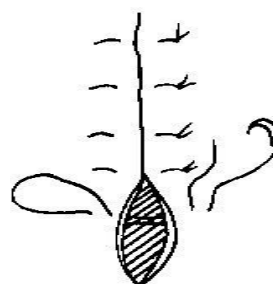
**Narrow (QRS < 120) Supraventricular**



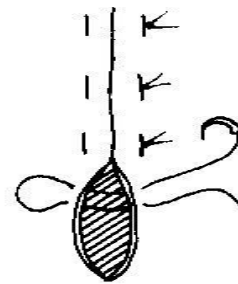
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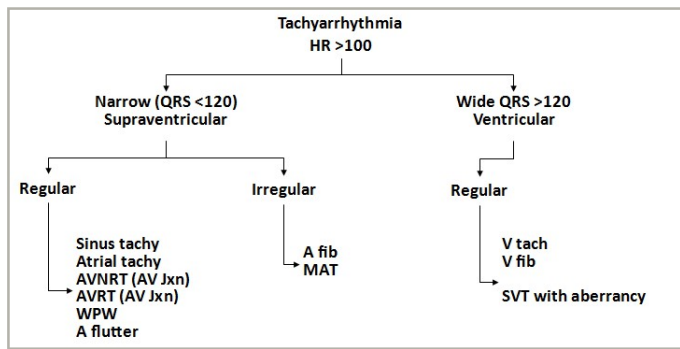
Simple Interrupted with buried knot



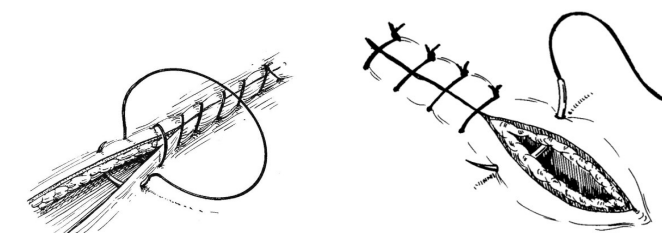
Vertical Mattress



Horizontal Mattress



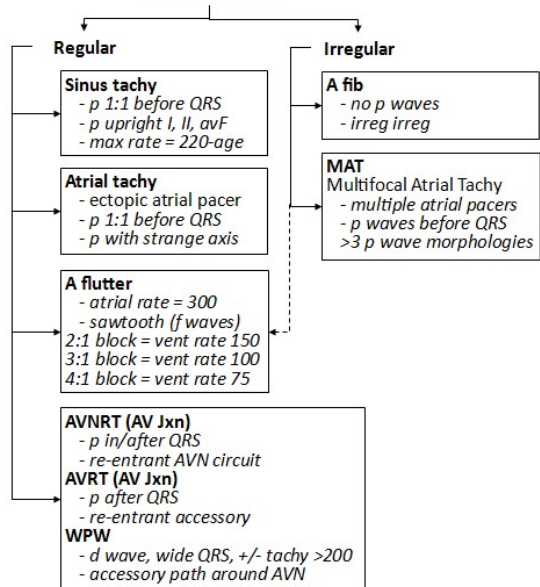
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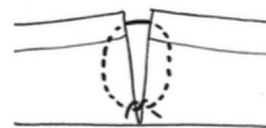
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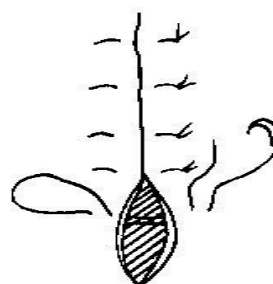
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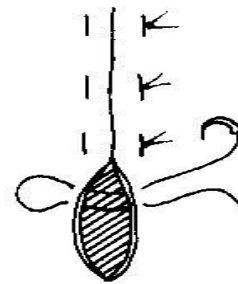
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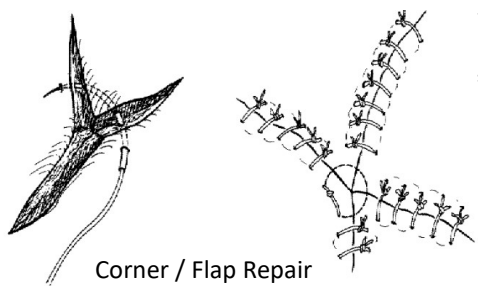
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SUTURE SELECTION

Location	Size	Remove
Face	5-0 to 6-0	3-5 days
Scalp	3-0 to 5-0, staples	7-10 days
Torso / Extremities	3-0 to 4-0	7-14 days
Hand	4-0 to 5-0	7-10 days
Oral	4-0 to 5-0 absorbable	

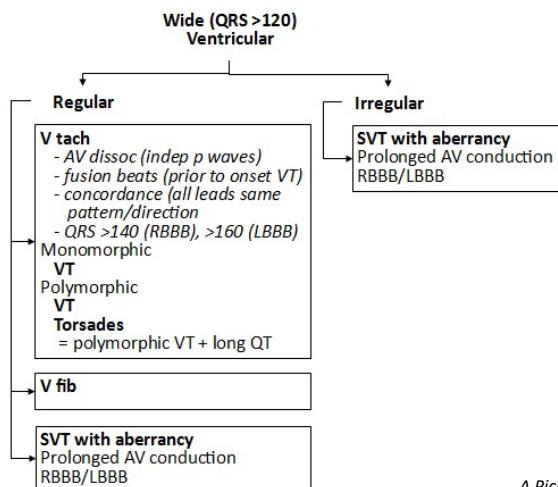
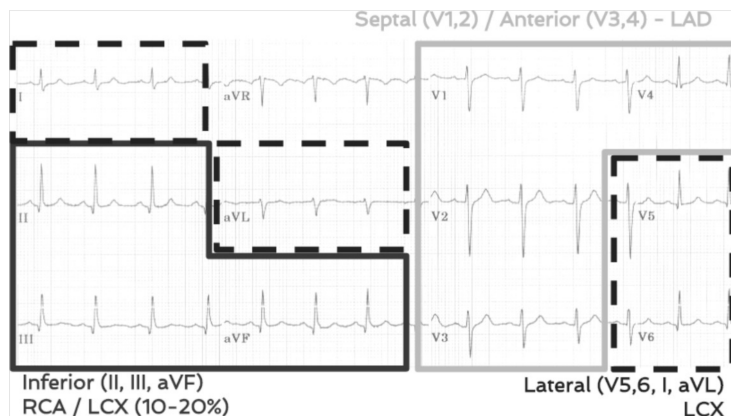
Tetanus Prophylaxis:

History of Previous Immunization	Clean, Minor Wounds	Dirty Wounds
<b>Uncertain or &lt;3 prior doses</b>	Vaccine (Td)	Vaccine (Td) Immunoglobulin (Ig)
<b>≥3 prior doses</b>	Vaccine (Td) if >10 yrs since last dose	Vaccine (Td) if >5 years since last dose



Corner / Flap Repair

<http://www.jpatrik.net/WND/woundcare.html>

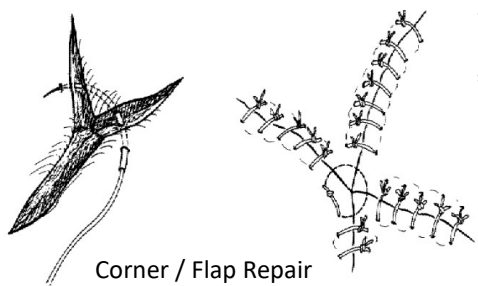


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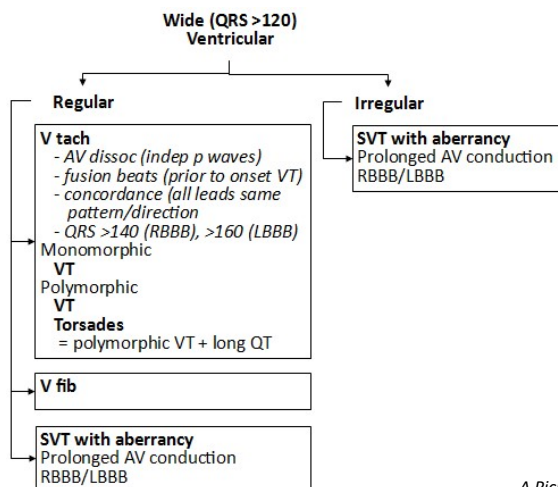
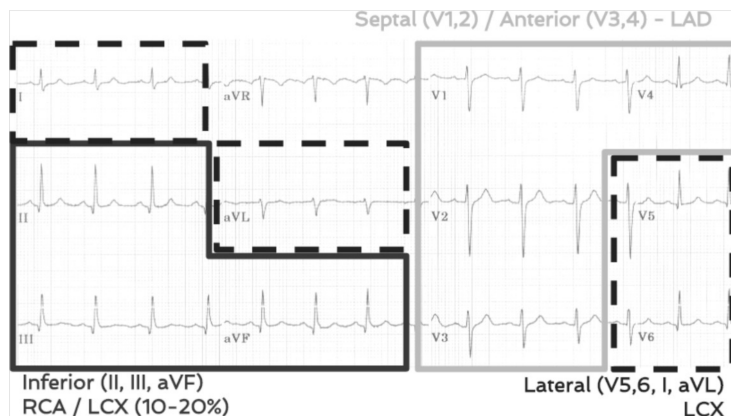
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IV, O2, MONITOR

PRIMARY SURVEY

Airway-  
Intact: Patent, protected, phonating;  
- Or - Intubated / Surgical airway  
ET size End CO2 confirmed.  
Post intubation CXR reviewed.

Breathing  
Spontaneous  
Symmetrical chest rise  
Equal breath sounds bilaterally  
Breathing regular / tachy / shallow / labored  
Trachea midline Crepitus (Y/N)

Circulation  
IV access  
Heart sounds  
Peripheral pulses palpable  
Skin color (good / pale / cyanotic)  
Skin warm / cold / diaphoretic  
No hemorrhage

Disability  
GCS (15): E(4) V(5) M(6)  
Pupils equal, round, reactive (mm)  
Neck / C-spine; MAEW

Exposure  
Visualize ALL skin  
(axilla, groin, under c-collar)  
Warm Blankets

FAST:  
Right abd  
Left abd  
pelvis  
pericardium  
(E-FAST: add PTX)

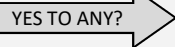
**BP estimation by pulse**  
(pulse present = BP > than number)

Radial = 90mmHg pressure  
Brachial = 80  
Femoral = 70  
Carotid = 60

Hemorrhage Classification	Blood loss	HR	BP	MS
I (compensated)	<15%	N	N	N
II (mild)	15-30%	↑	Ortho-stasis	anxious
III (mod)	30-40%	↑	↓ (SBP<90)	Confused, agitated
IV (severe)	>40%	↑	↓↓ (SBP<80)	obttunded

**NEXUS Criteria (Imaging for C-spine)**

1. Midline C spine tenderness?
2. Intoxication?
3. AMS?
4. Focal neuro deficit?
5. Distracting injury?



**IMAGE**

6 THINGS TO DX IN 1<sup>o</sup> SURVEY:

- **Airway obstruction** (Tx=intubate, or surgical airway)
- **Tension pneumothorax** (Tx= 14G needle or chest tube)
- **Open pneumothorax** (sucking chest wound) (Tx= 3 sided dressing + chest tube)
- **Flail chest** (more than 3 continuous ribs fractured in 2 locations) Tx= intubate
- **Cardiac tamponade** (Beck's triad = muffled heart sounds, high neck veins, and hypotension) Tx= pericardiocentesis
- **Hemothorax** (decreased breath sounds dull to percussion) Tx = Chest tube

Tox Physical Exam	Opiate/opioid (opioids, heroin, methadone, morphine)	Cholinergic (muscarinic, pesticides, nerve agents)	Anti-Ach (Benadryl, TCAs, atropine, belladonna, jimson, shrooms)	Sympathomimetic (cocaine, ecstasy, amphetamines, caffeine, ephedrine)
Pupils	↓	↓	↑	↑
Skin	Hypothermia	Flushed/wet	Hot/dry	Hot/wet
Bowel sounds	↓	↑	↓	↑
Pulse	↓	↓	↑	↑
Tx	<b>Naloxone</b>  - Titrate dose to desired resp rate - Half-life shorter than many common opiates; may require re-dosing	<b>Atropine +/- pralidoxime</b>  - Aggressively manage secretions; may require very large doses of atropine to reverse bronchorrhea	<b>Supportive care</b> (benzos, cooling) +/- Physostigmine  - Physostigmine only in refractory cases of pure anti-Ach intox, may precipitate asystole with TCAs	<b>Supportive care</b> (benzos, cooling)
Notes	Opiates may cause non-cardiogenic pulmonary edema	<b>DUMB BELLS</b> (or SLUDGE) <b>D</b> iarrhea <b>U</b> rination <b>M</b> iosis/muscle weakness <b>B</b> ronchorrhea <b>B</b> radycardia <b>E</b> mesis <b>L</b> acrimation <b>S</b> alivation/sweat	Hot as a Hare (hyperthermia) Blind as a Bat (mydriasis) Mad as a Hatter (AMS) Red as a Beet (flushed) Dry as a bone (anhidrosis)	Findings may vary depending on degree of α- v. β- v. mixed-adrenergic activity



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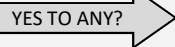
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SX: Dyspnea, orthopnea, PND, LE edema, ascites, fatigue, weakness, AMS  
SEVERE: dyspnea, anxious, diaphoretic, cool, pale, HTN (massive vasoconstriction), tachy  
Signs: Crackles, peripheral edema, elevated JVP, S3, S4,

Labs: ABG  
BNP (to distinguish SOB from other cause):  
myocardial wall stretch  
<100 = unlikely due to CHF  
>500 = very likely due to CHF

NYHA Classes:  
Class I: sx w exercise  
Class II: sx w normal activity (stairs)  
Class III: sx w minimal activity (out of bed)  
Class IV: sx at REST

Imaging:  
CXR (signs may lag up to 12 hrs behind sx)  
PCWP 12-18 mmHg: cephalization (more blood flow to upper lung)  
PCWP 18-25 mmHg: Kerley B lines (fluid in interstitial space)  
PCWP >25 mmHg: pulmonary/alveolar edema  
Cardiomegaly

EKG (to rule out ACS as cause)

HR	X	SV	=	CO
Preload		Contractility		Afterload
PWP				SVR

TREATMENT:  
IV, O2, Monitor  
Elevate HOB / sit up / legs over side  
NIPPV (Non-invasive Positive Pressure ventilation):  
- BiPAP (setting: "10 over 5" =10 insp press/ 5 expir press)

Mild-Mod:  
NTG (SL 0.8-1.2 mg) (PO 20-40mg)  
(derm 1-2inches)- lower preload  
Furosemide (Lasix) IV (40-80mg)- diuresis  
Rate control any arrhythmias  
CCB, amiodarone, (caution with BB)  
HTN should correct with above tx

Precipitants:  
Med/diet non-compliance, AMI, HTN crisis, Arrhythmia, Sepsis/ Infection, Anemia  
Less common: PE, myocarditis, peripartum cardiomyopathy, infective endocarditis, valvular HD, tamponade, hyperthyroidism)  
Drugs: cocaine, amphetamines, excessive bronchodilators, NSAIDS

Acute Pulm Edema: (HYPERTENSIVE)  
IV NTG drip 20-40 mcg/min (large dose = arterial dilation)  
or nitroprusside (nipride)  
Furosemide IV 40-80mg  
ACEI: Captopril PO/SL 12.5-25mg; Enalapril IV 0.004mg/kg bolus

Acute Pulm Edema: (HYPOTENSIVE)

Inotropes: dobutamine 2.5-10mcg/kg/min (+vasodil)- 1st line ADHF  
Milrinone 0.25-0.75 mcg/kg/min (+vasodil) A Pickens, MD

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## SECONDARY SURVEY

LOOK FOR: Deformity, contusions, abrasions, punctures, burns, tenderness, lacerations, swelling, tenderness, instability, crepitus

Head normocephalic, atraumatic  
Face stable (No TTP of bony orbits, no midface deformity)  
No Hemotympanum  
PERRL, EOMI  
Nasopharynx clear (no septal hematoma)  
Oropharynx clear; No Malocclusion, dentition intact (teeth in line)

Neck  
C-collar in place / Normal ROM  
No C-spine TTP, step offs, soft tissue swelling, bruits, hematoma, palp thrill  
Trachea midline, no stridor  
No Distended neck veins

Chest  
No evidence external trauma, no TTP,  
No crepitus  
No seatbelt sign

Heart  
RRR, S1S2, No m/r/g

Lungs  
CTAB, non-labored

Abdomen  
Soft/rigid, nt, nd (-) guarding/rebound  
No external trauma; no seat belt sign

Back  
No spinous process tenderness,  
Nostep offs or deformity

Rectal  
Good tone, no gross blood

Pelvis  
Stable (to AP and lateral compression)

GU  
No blood at urethral meatus  
Urine clear (U-preg); no vag bleeding

Extremities:  
MAE x4, No TTP, edema, deformity, abrasions/lacs/contusions  
Pulses 2+ x4  
Sensation intact

Neuro:  
AAOx4. CN II-XII intact. 5/5 strength UE/Les. Gait.  
GCS  
(CTLs: tenderness, stepoffs, contusions/abrasions/lacerations)  
FAST exam: LUQ, RUQ, bladder, pericardium

## GCS

(PEDS score)

Eye  
4 open spontaneously  
3 open to command (open to voice)  
2 opens to pain  
1 does not open

Verbal  
5 appropriate /oriented (age-appropriate)  
4 confused (less; irritable cry)  
3 inappropriate words (cries to pain)  
2 incomprehensible (moans to pain)  
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Motor  
6 obeys commands  
5 localizes to pain  
4 withdraws from pain  
3 decorticate posturing—flexion  
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If intubated, omit verbal. Highest score is then 10T.

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**TIPS AEIOU**

Trauma (hypovolemia, TBI)  
 Temperature (heat stroke, hypothermia, NMS)  
 Toxins (CO, ASA, etoh, opiates, toxidrome, OD, withdrawal)  
 Infection (UTI, PNA, meningitis, encephalitis, etc)  
 Psychiatric  
 Space-occupying lesions/conditions (epidural/subdural hematoma, CVA, tumor, SAH)  
 Seizures  
 Alcohol  
 Endocrine; Electrolytes (DKA,  $\uparrow\downarrow$  Na, thyroid storm, myxedema coma, acidosis)  
 Insulin (Hypoglycemia, DKA)  
 Oxygen (hypoxia, hypercarbia)  
 Opiates  
 Uremia, hypertensive crisis, hepatic encephalopathy

ABCs (IV, O<sub>2</sub>, monitor) +/- intubate;**ALGORITHM:**

Rapidly reversible cause?

Hypoglycemia? **D50(adults) 1-2 amps;** D25 (kids)/D10 (neonates) 0.5-1.0 g/kg  
 OD? **Naloxone- 0.4mg increments;** 2mg if hypoxic (0.01-0.2mg/kg IV)  
 Nutr Def? **Thiamine 100mg IV**

Neuro exam: (pupils, MAE, GCS) focal deficits? Trauma? --&gt; CT head

Vitals:

HTN (encephalopathy)  
 $\downarrow$  BP (shock, sepsis)  
 $\uparrow$  Temp (sepsis, NMS, toxidrome, heat stroke) Rectal Temp  
 $\downarrow$  Temp (hypothermia)

Labs (see TIPS AEIOU)

Glucose ( $\uparrow\downarrow$ )  
 ABG (DKA? Hypoxia? hypercarbia?)  
 CBC, BMP, Ca, Mag  
 Serum tox screen  
 UA, U-tox, U preg  
 +/- LFTs, ammonia (suspect Liver dz)  
 +/- LP +/- Cultures  
 TSH

Infection suspected? Fever? Source?

--&gt; CXR, UA, LP, Cultures

Empiric Abx:

**Ceftriaxone 2gm IV**  
 +/- **Vancomycin 1g IV**  
 +/- **Acyclovir 10mg/kg +/- flagyl**

Other: Seizure? Psych?

ACEP Clinical Practice AMS (1999)

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**DKA TX PROTOCOL:**

A Pickens, MD

ABCs

Fluids:

Deficit typically 50-100mL/kg (5-10L)

Initial:	<b>1L NS IV/ hr x 1-2</b>
Ongoing:	<b>1/2 NS IV @ 250-500mL/hr</b> (or NS if vitals, exam, UOP don't normalize) <b>When Glu &lt;200, change to D5 1/2 NS @ 150-250mL/hr</b>

**PEDS:** <50mL/kg in first 4hr (20mL/kg or 1.5 maint fluids)- risk cerebral edema no insulin bolus, no bicarb

Electrolytes: Most are K+ depleted even if initial K is elevated- NO INSULIN until check K

K+	<3.3	Give K BEFORE insulin <b>10mEq/hr IV +/- PO</b> (If necessary, 15-20mEq/hr thru central line)
	3.3-5.3	Give K with fluids and insulin 10mEq/hr IV
Mg	2mg	

Insulin:

Check K first, start insulin if &gt; 3.3

Bolus: **0.1 U/kg regular insulin IV**Drip: **0.1 U/kg/hr IV** until Glu <200; Goal = 150-200

Glu &lt;200: Insulin 0.05-0.1 U/kg/hr IV

Switch fluids to D5 1/2 NS (see above)

**Resolution:** (When Bicarb > 18, AG <16, pH > 7.3, Glu <200)

Insulin:	0.3 U/kg Lantus SQ
Continue 2 hrs AFTER Lantus:	0.1 U/kg/hr IV insulin drip D5 1/2 NS

**WAIT 2 hrs**

Then...

D/c fluids, insulin drip  
 Give meal (if NPO: continue fluids, insulin drip)  
 Humalog (lispro) 0.03 U/kg SC (after meal)

Ongoing...

Recheck Glu q 1hr, electrolytes q 2-4 hrs

**Dispo:**

Home: Mild DKA due to insulin non-compliance

Gen Med: hemodynamically stable, baseline mental status, insulin drip off

MICU: unstable, serious precipitating factor (sepsis), electrolyte abnormality persists

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**TIPS AEIOU**

Trauma (hypovolemia, TBI)  
 Temperature (heat stroke, hypothermia, NMS)  
 Toxins (CO, ASA, etoh, opiates, toxidrome, OD, withdrawal)  
 Infection (UTI, PNA, meningitis, encephalitis, etc)  
 Psychiatric  
 Space-occupying lesions/conditions (epidural/subdural hematoma, CVA, tumor, SAH)  
 Seizures  
 Alcohol  
 Endocrine; Electrolytes (DKA,  $\uparrow\downarrow$  Na, thyroid storm, myxedema coma, acidosis)  
 Insulin (Hypoglycemia, DKA)  
 Oxygen (hypoxia, hypercarbia)  
 Opiates  
 Uremia, hypertensive crisis, hepatic encephalopathy

ABCs (IV, O<sub>2</sub>, monitor) +/- intubate;**ALGORITHM:**

Rapidly reversible cause?

Hypoglycemia? **D50(adults) 1-2 amps;** D25 (kids)/D10 (neonates) 0.5-1.0 g/kg  
 OD? **Naloxone- 0.4mg increments;** 2mg if hypoxic (0.01-0.2mg/kg IV)  
 Nutr Def? **Thiamine 100mg IV**

Neuro exam: (pupils, MAE, GCS) focal deficits? Trauma? --&gt; CT head

Vitals:

HTN (encephalopathy)  
 $\downarrow$  BP (shock, sepsis)  
 $\uparrow$  Temp (sepsis, NMS, toxidrome, heat stroke) Rectal Temp  
 $\downarrow$  Temp (hypothermia)

Labs (see TIPS AEIOU)

Glucose ( $\uparrow\downarrow$ )  
 ABG (DKA? Hypoxia? hypercarbia?)  
 CBC, BMP, Ca, Mag  
 Serum tox screen  
 UA, U-tox, U preg  
 +/- LFTs, ammonia (suspect Liver dz)  
 +/- LP +/- Cultures  
 TSH

Infection suspected? Fever? Source?

--&gt; CXR, UA, LP, Cultures

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**DIABETIC KETOACIDOSIS****Definition:** Hyperglycemia, metabolic acidosis, ketonemia

Glucose >250 mg/dL  
 PH < 7.30  
 Bicarb < 18mEq/L  
 Ketonemia  
 AG >16

**Precipitating causes:**

Insulin Non-compliance  
 Infection  
 MI (silent?)  
 CVA  
 Pregnancy  
 Trauma  
 Other stressors

**Orders:**

POC Glucose  
 CBC  
 CMP, Mg, Phos  
 VBG with K  
 Ketones  
 Cardiac Enzymes  
 UA, U-preg

CXR  
 EKG

**DKA vs NKHS**

	DKA	NKHS
Course	Hrs-days	Days-weeks
Fluid deficit	5-8L	10L
Glu	500 (250-800)	>600-800
Osm	variable	>320-350
Urine ketones	LARGE	Small
BHB	>0.03mmol/L	<0.03mmol/L
pH	<7.3	>7.3
Bicarb HCO3	<15	>15
AGA	>16	<16

Consider (precipitating factor / AMS work up):  
 lactate, AST/ALT, amylase/lipase, tox  
 screen, cultures, salicylate level, CT head, LP

**Non-Ketotic Hyperosmolar Coma:**

Osmotic diuresis --> dehydration (9-12 L fluid deficit); +/- hx of DM  
 Presentation: dehydration, orthostatic, tachy, neuro findings (seizure, AMS, tremors, etc),  
 hyperglycemia

Ddx: DKA, AKA, other causes AMS

Orders: POC glucose, BMP, CBC, ketones, serum osm, UA, ABG, cultures, LFTs, amylase  
 CXR, EKG

Tx: (much the same as DKA)

ABCs  
 Fluids: 1-2L NS over 1st hour, then 1L/hr for a few hours  
 K replacement PRN

NOTE: hyperglycemia should resolve with fluids, but can give insulin (0.1 U/kg/hr regular insulin) if  
 hyper K, acidotic or in renal failure

Dispo: ICU

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**STROKE ACTIVATION:** (for <6hrs sx onset)**ACUTE STROKE****INITIAL ASSESSMENT:**

ABCs; IV (NS 80-100mL/hr), O2 (>95% goal), Monitor  
 Lay HOB flat, NPO  
 NIH stroke scale (NIHSS)  
 POC glucose

**IMAGING:**

**STAT CT head w/o contrast**  
 EKG, +/- CXR (port)

**LABS: \*\* CT head first if >5 min delay**  
 CBC, plts, BMP, PT/INR, T&S;  
 +/- Utox, etoh, sz med levels, Upreg

**TX:** CT w/o ICH → sx <3 hrs → consider tPA thrombolysis  
 → tPA not indicated → ASA 325mg x1, admit to neuro tele vs ICU  
 CT with SAH or ICH → call NSG

**BP Control:**

t-PA: keep <185/110 **labetalol 10-20mg IV push x2**  
**nicardipine gtt 5mg/hr** (titrate up 2.5mg/hr q 5-15min)  
 (decrease to 3mg/hr when at goal)

no tPA: Keep <220/120 (unless sx)  
 ICH: Keep <120-150 systolic (same as above, but can repeat labetalol q10-20min)

**Guidelines for IV t-PA...****CONTRAINDICATIONS:**

Time stroke onset unknown  
 Last seen normal >4.5 hrs prior  
 Rapidly improving neuro deficit  
 Isolated mild neuro deficit (NIHSS <4, ataxia/dysarthria/  
 sensory loss/mild weakness alone)

Sz at onset with post-ictal deficits  
 Prior major stroke/head injury <3mos  
 Hx ICH

GI/urinary bleed <21 days -or- gross hematuria/rectal bleeding  
 Major surgery /trauma <14 days

Arterial puncture non-compressible site <7days  
 MI <3 mos

SBP > 185 despite meds, DBP >110 despite meds  
 Heparin <48 hrs, prolonged PTT  
 INR > 1.7

Therapeutic dose LMWH, direct thrombin inhibitor  
 Blood Glu <50

CT showing ICH / Sx suggestive of SAH

**Relative:** NIHSS >22 (severe deficit), plts <100, CT head with multilobar infarct, pregnancy, age <18**INDICATIONS:**

Ischemic stroke  
 <4.5 hrs since onset  
 Clearly defined last known well  
 CT head neg for hemorrhage

**t-PA dosing:**

0.9 mg/kg over 1 hour, give 10%  
 of total dose as initial bolus over  
 1 min (max 90mg)

15

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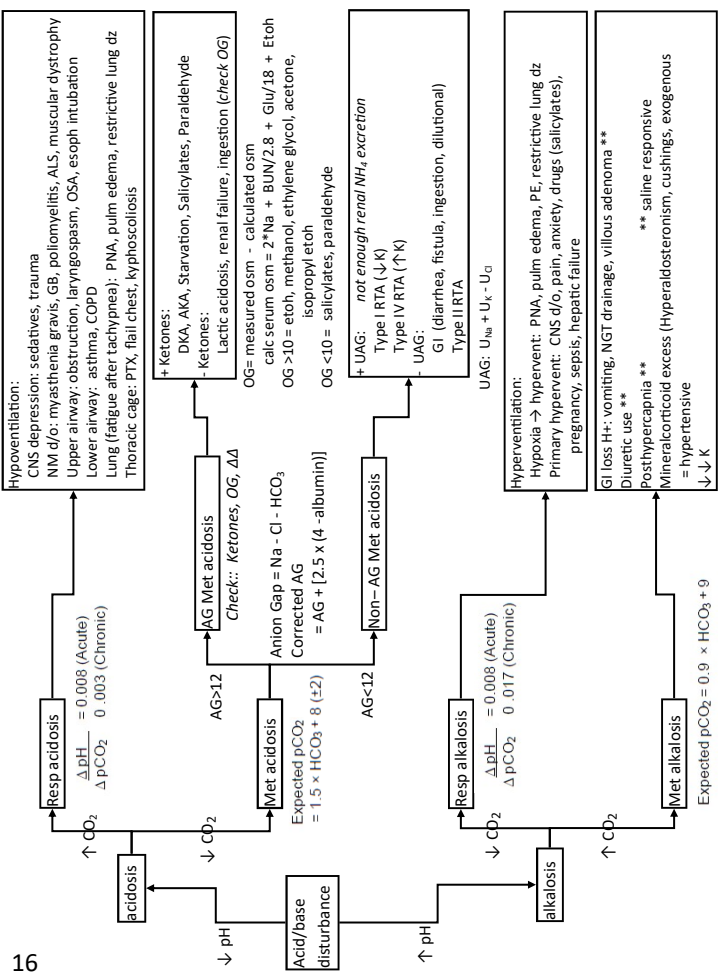
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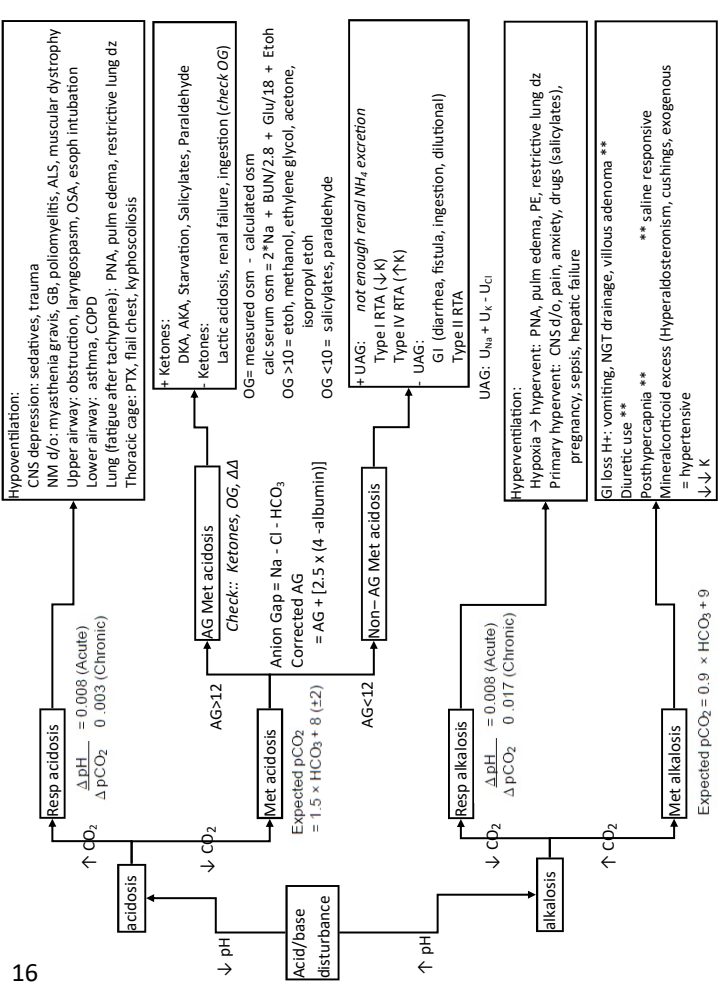


**Anion Gap Metabolic Acidosis:**  
**MUDPILERS**  
 Methanol  
 Uremia  
 DKA/Alcoholic KA  
 Paraldehyde  
 Isoniazid  
 Lactic Acidosis  
 Etoh/Ethylene Glycol  
 Rhabdo/Renal Failure  
 Salicylates

**ΔΔ:** (check ΔΔ if ↑AG)  
**< 0.4** Hyperchloremic non-AG met acidosis  
**< 1** AG + **non-AG met acidosis**  
**1 - 2** Pure AG met acidosis  
 (lactic acidosis average 1.6; DKA usually ~ 1)  
**> 2** ↑AG met acidosis + **met alkalosis**  
 $\Delta\Delta = \Delta AG / \Delta HCO_3$   
 = (calculated AG - expected AG) / (24 - HCO<sub>3</sub>)  
 = (calculated AG - [albumin] \* 2.5) / (24 - HCO<sub>3</sub>)

Corrected Na = Serum Na + (0.016 x (serum Glu - 100))  
 Note: If ↑ a Glu, use measured (not corrected) Na for AG calculation

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