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PARAMETERS FOR VITALS AND PROCEDURES BY AGE AND WEIGHT

<u>Age</u>	<u>Wt (kg)</u>	<u>HR</u>	<u>Avg HR</u>	<u>Avg RR</u>	<u>SBP</u>	<u>MBP</u>	<u>DBP</u>	<u>ETT</u>	<u>Blade</u>	<u>Temperature</u>	
Newborn	<1	100-160	150	30-60	30-60	15-30	15-30	2.5	0	C	F
Newborn	1-2	100-160	150	30-60	40-60	35-45	20-40	3.0	0	36.5	97.7
Newborn	2-3	100-160	130	30-60	50-70	40-50	30-45	3-3.5	0-1	37	98.6
Newborn	>3	100-160	130	30-60	50-70	>45	30-45	3.5	1	37.5	99.5
1 mo	4	120-160	130	30-60	60-80	65	30-50	4	1	38	100.4
6 mo	7	110-160	130	25-40	70-90	70	50-70	4	1	38.5	101.3
1 yr	10	90-150	120	20-30	80-100	75	50-70	4-4.5	1	39	102.2
2-3 yr	12-15	90-150	115	20-30	80-100	75-80	50-70	4.5	1-2	39.5	103.1
4-5 yr	16-18	80-120	100	20-30	85-110	75-80	40-80	5-6	2	40	104
6-8 yr	20-26	80-120	100	18-24	85-110	75-80	40-80	6-6.5	2-3	40.5	104.9
10-12 yr	32-42	60-110	75	16-22	90-120	75-80	50-70	7	2-3	41	105.8
>14 yr	>50	60-110	70	14-18	90-120	>80	50-70	7.5-8.5	3		

OTHER ESTIMATIONS

ETT size in mm = (Age in Years + 16) / 4

Hypotension SBP = 70 + (2 × Age in Years)

Length: To convert inches to centimeters, multiply by 2.54

Weight: To convert kilograms to pounds, multiply by 2.2

Surface Area in m² = 0.03 × (Weight in kg)

Weight in kg (age 1-10) = (2 × Age in Years) + 9

HIGH RISK DIAGNOSES FOR PEDIATRICS

Remember to include these in your notes when applicable

SEPSIS

SIRS	Any 2: Temp > 38 or < 36, ↑HR, ↑RR, ↓or ↑WBC or > 10% bands (one must be temp or WBC count)
Sepsis	SIRS + suspected/proven infection
Severe Sepsis	Sepsis + end organ damage (AMS, ARF, heart or liver dysfunction, DIC, ARDS)
Septic shock	Sepsis + fluid refractory hypotension or poor perfusion (lactic acidosis, poor cap refill, etc.)
Bacteremia	Bacteria in blood (without SIRS)
** Avoid "urosepsis"***	

SHOCK (inadequate tissue perfusion)

	CO	SVR	SvO2 (~70%)	Pre-load
Cardiogenic	↓	↑	↓	↑
Hypovolemic	↓	↑	↓	↓
Distributive	↑	↓	↑	↓/nl

HEART FAILURE

Consider diagnosis in any patient requiring diuretics or inotropes for cardiac problem; **consider if EF < 30%**

Systolic	DCM, HCM, myocarditis, L → R shunt on congenital, valve disease on meds
Diastolic	RCM
Systolic + Diastolic	Single ventricle physiology

HYPERTENSION

Systolic and/or diastolic BP ≥95th percentile measured on 3 or more occasions; include **cause** if possible

PANCYTOPENIA/ANEMIA

Anemia	Include cause or indication for transfusion: e.g., posthemorrhagic, iron deficiency, hemolytic
Pancytopenia	Include cause : e.g., chemotherapy-induced, drug-induced

MALNUTRITION

Mild/Mod	<2.3%ile (< 2 SD) for weight, height, or weight for height
Severe	<0.14%ile (< 3 SD) for weight, height, or weight for height

Remember: include **acuity** (e.g., acute, chronic), **severity** (e.g., mild, moderate, severe), **etiology** (e.g., due to...), **complications** (e.g., complicated by...), **response** (e.g. improving, stable, worsening)

RESPIRATORY FAILURE

Acute	PaO ₂ < 60 OR PaCO ₂ > 45 OR requiring intubation
Chronic	Same as above + may have compensatory metabolic process; also include chronically vent-dependent kids

ACUTE KIDNEY INJURY (pRIFLE criteria)

Injury	Cr x 2 OR UOP < 0.5cc/kg/hr x 16h
Failure	Cr x 4 OR eCCI < 35 OR UOP < 0.3cc/kg/hr x 24h OR anuric x 12h
Loss	Persistent failure x 1-3 months
ESRD	Persistent failure > 3 months

Schwartz equation: $eGFR/eCCI (ml/min/1.73m^2) = [Ht \times k] / sCr$

CHRONIC RENAL FAILURE

Stage I	Kidney damage with normal GFR > 90
Stage II	GFR 60 - 89
Stage III	GFR 30 - 59
Stage IV	GFR 15 - 29
Stage V/ESRD	GFR < 15

Schwartz equation for eGFR/eCCI (ml/min/1.73m²) = [Ht x k] / sCr

EPILEPSY

Epilepsy	2 or more unprovoked seizures > 24 hours apart OR one unprovoked seizure with a high risk of further seizures
Intractable Epilepsy	Epilepsy that has not responded to trials of two or more AEDs (i.e. seizure in the past 6 months)

Be sure to **include type**: convulsive vs. nonconvulsive (e.g. subclinical, absence), focal vs. generalized, infantile spasms, etc.

COMA

Unresponsive & unarousable even to vigorous stimulation. May have grimace or movement but not purposeful. Reflexes may be intact. No sleep/wake cycles.

ELECTROLYTE DISORDERS

Specify **diagnosis**, not just treatment: e.g., alkalosis, acidosis, etc.

Revised 5/4/16

DELIVERY ROOM RESUSCITATION

Warm, Dry, Suction, Stimulate APGAR SCORES

	Sign	0 Points	1 Point	2 Points
A	Activity (Muscle Tone)	Flaccid	Some Flexion	Flexed, MAEs
P	Pulse	Absent	<100 bpm	>100 bpm
G	Grimace (Reflex Irritability)	No Response	Grimace/Weak	Crying
A	Appearance (Skin Color)	Blue- gray/pale	Acrocyanosis	Pink All Over
R	Respiration	Absent	Weak, Irregular	Good, Crying

DR to NICU:

1. <2300 gm (Cedars), <2500 gm (RRMC), <2000 gm (SM)
2. <35 weeks GA (Cedars/SM), <36 weeks GA (RRMC)
3. O₂ requirement
4. Apnea
5. Seizures
6. Congenital malformations requiring surgery

Nursery to NICU:

1. Apnea
2. RR >90/min × 2 episodes, greater than 4 hours of life
3. Feeding intolerance after 24 hours
4. Drug withdrawal – eg. NAS >8 x2
5. Hypoglycemia not responding to feeds per protocol
6. Seizures

Cedars Low Birthweight/Late Preterm Protocol (NICU admission):

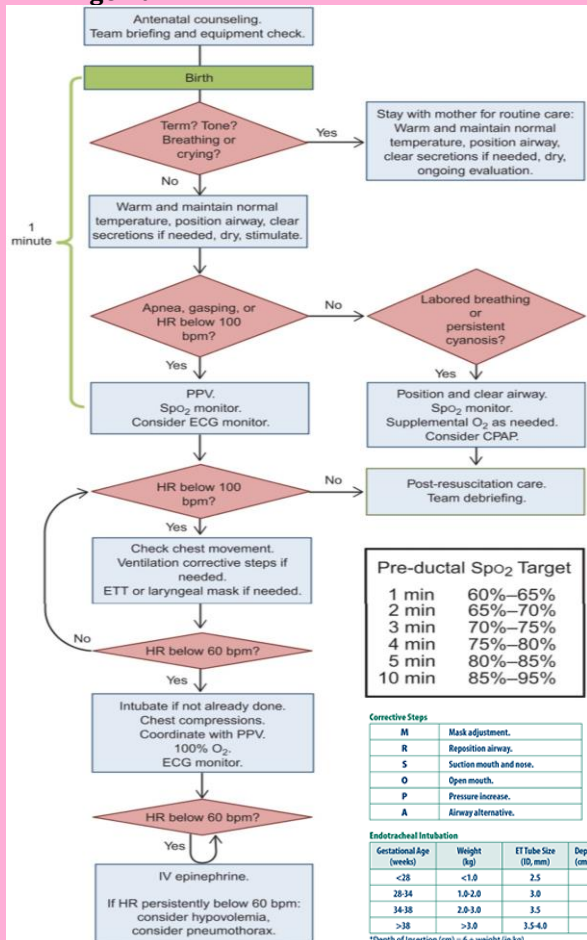
- 34w0d to 35w6d OR 1800g to 2300g

- Can bond up to **2 hrs** in L&D if appropriate blood glucose & stable temps

Lines

Lines	Depth	Level	Size	IVF
UAC	(3 × wt) + 9	T6-9	3.5 Fr (>1.5kg)	½ unit/cc heparin
		L3-4	3.5 Fr (<1.5kg)	
UVC	UAC/2 + 1	0.5-1cm above the diaphragm	5 Fr	½ unit/cc heparin

NRP Algorithm



Pre-ductal SpO₂ Target

1 min	60%–65%
2 min	65%–70%
3 min	70%–75%
4 min	75%–80%
5 min	80%–85%
10 min	85%–95%

Corrective Steps

M	Mask adjustment.
R	Reposition airway.
S	Suction mouth and nose.
O	Open mouth.
P	Pressure increase.
A	Airway alternative.

Endotracheal Intubation

Gestational Age (weeks)	Weight (kg)	ET Tube Size (ID, mm)	Depth of Insertion* (cm from upper lip)
<28	<1.0	2.5	6-7
28-34	1.0-2.0	3.0	7-8
34-38	2.0-3.0	3.5	8-9
>38	>3.0	3.5-4.0	9-10

*Depth of Insertion (cm) = 6 + weight (in kg)

- PPV: 40-60 breaths/min.
- If doing chest compressions: compress 90/min; Ratio = 3 compressions:1 breath
- Decels: variable = cord compression; late = placenta problem

Breastfeeding

Common Breastfeeding Problems:

Engorgement:

- Common causes:
 - Insufficient frequency of breastfeeds
 - Insufficient emptying of the breast
 - Poor positioning or poor attachment to the breast (→ insufficient emptying)
- **Treatment:**
 - Express breastmilk by hand, or pump, before feeds; enough to soften the areola so baby can latch
 - Breastfeed more frequently and/or for longer periods
 - Improve infant positioning/attachment
 - Moist heat and gentle massage before feeding; cool packs after, pain meds

Cracked/Sore Nipples:

- Common causes:
 - Poor positioning and attachment of infant on the breast
 - Inappropriate suckling technique
 - Candidiasis mother and baby
- **Treatment:**
 - Assist with positioning and attachment
 - Continue breastfeeding
 - Treat both mother and baby for Candidiasis
 - Pain meds

Mastitis:

- Common causes:
 - Nipple abrasions
 - Milk stasis
- **Treatment:**
 - Treat nipple abrasions and assure effective suckling
 - Nurse more frequently (mastitis is an infection of the breast, not the milk)
 - Apply moist heat for several minutes before each feeding
 - Pain meds
 - Take appropriate antibiotics as prescribed for 10 to 14 days
 - Rest as much as possible for at least 24 hours

“Not Enough Milk”:

- Common causes:
 - Ineffective and/or infrequent suckling
- **Treatment:**
 - Check for effective suckling position
 - Increase feeding frequency, am & pm
 - Apply moist heat before feeding
 - Massage breasts before and during feeding
 - Reassurance (if weight gain is healthy)
 - Temporarily supplement with expressed BM if possible or with breastmilk substitute if not gaining weight well

Possible Medical

Reasons for Supplementation (with expressed breastmilk, donor milk, or formula)

- Inborn errors of metabolism, i.e., galactosemia. SPECIAL FORMULA ONLY
- Asymptomatic hypoglycemia and blood sugar does not respond to breastfeeding or breastmilk feeding.
- Significant (>10% dehydration not responsive to skilled dx/tx breastfeeding)
- Mothers who are infected with HIV (if replacement feeding is acceptable, feasible, affordable, sustainable and safe. Use donor milk or formula)
- Mother who is severely ill postpartum to pump, i.e., psychosis, eclampsia, unresponsive. Pumping should still be discussed with her/her family, even in ICU.
- Mothers taking medications contraindicated when breastfeeding (rare). When supplementing, mother's milk supply should be maintained in most cases
- Late Preterm Infant status

- For full list see: 2009 Academy of Breastfeeding Medicine Protocol: Supplementary Feedings
www.bfmed.org

Why Do Mothers Stop Breastfeeding?

Timing and Reason	Counseling Points
<p>First 2 weeks:</p> <ul style="list-style-type: none">- Problems such as sore nipples- Lack of support	<p>Attachment assessment and help support groups (Pump Station, etc)</p>
<p>3-4 weeks:</p> <ul style="list-style-type: none">- Mother's breasts no longer feel firm between feedings	<p>The milk supply has adjusted to baby's needs</p>
<p>3-6 weeks:</p> <ul style="list-style-type: none">- "Appetite spurt" or "growth spurt"	<p>More frequent feeding will increase the milk supply and satisfy the baby until the next spurt</p>
<p>Return to work/school; belief that breastfeeding and work/school are not compatible</p>	<p>Express & store breast milk Feed during breaks at nearby childcare facility Take baby to work</p>
<p>5-7 months:</p> <ul style="list-style-type: none">- Eruption of teeth	<p>Gentle motion of baby's tongue over the lower gum are unchanged when teeth have erupted</p>
<p>6 months:</p> <ul style="list-style-type: none">- Introduction of solids	<p>Breastmilk continues to provide nourishment and protection from infection</p>
	<p>© WELLSTART INTERNATIONAL</p>

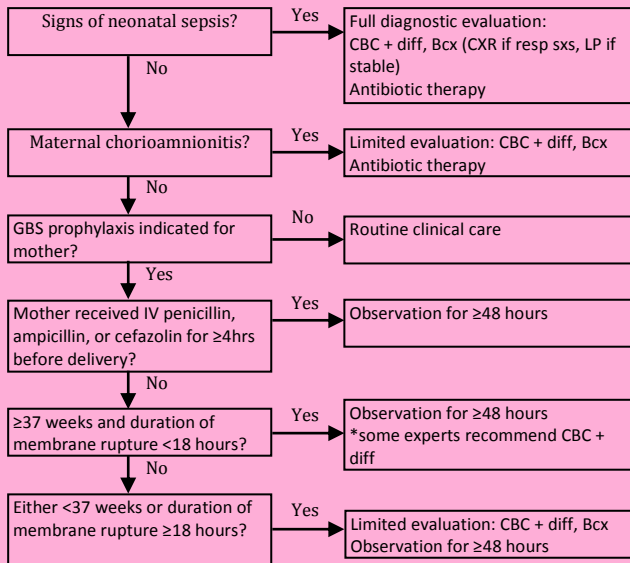
NEONATOLOGY: Neonatal Sepsis

Symptomatic infant – low BP, temperature instability, lethargy, irritability, hypotonia, poor perfusion, cyanosis, mottling, feeding intolerance, tachypnea, respiratory distress, apnea, tachycardia, low glucose, metabolic acidosis.

Abnormal CBC: WBC <5,000, >35,000, or I:T (bands/(polys + bands)) ratio >0.2

AMPICILLIN (IM/IV)			
0-7d	≤2000g	50 mg/kg/dose q12h; 100 mg/kg/dose q12h	
0-14d	<1000g	(meningitis)	
	>2000g	50 mg/kg/dose q8h; 50-100 mg/kg/dose q8h	
		(meningitis)	
> 14d	<1000g	50 mg/kg/dose q12h; 50 mg/kg/dose q8h	
		(meningitis)	
> 7d	1000-2000g	50 mg/kg/dose q8h; 50 mg/kg/dose q8h	
		(meningitis)	
> 7d	>2000g	50 mg/kg/dose q6h; 50-75 mg/kg/dose q6h	
		(meningitis)	
UCLA GENTAMICIN (IM/IV) (NEOFAX)			
<i>* Peak = 5-15, trough = 0.5-1.5</i>			
<29 weeks	0-7d	5 mg/kg/dose q48h	
	8-28d	4 mg/kg/dose q36h	
	>29d	4 mg/kg/dose q24h	
30-34 weeks	0-7d	4.5 mg/kg/dose q36h	
	>8d	4 mg/kg/dose q24h	
>35 weeks	ALL	4 mg/kg/dose q24h	
CEDARS GENTAMICIN (IM/IV)			
	0-7d	7-28d	>28d
0-1000g	2.5mg/kg/dose q24h	2.5mg/kg/dose q24h	2.5mg/kg/dose q12h
1000-2000g	3mg/kg/dose q24h	4mg/kg/dose q24h	2.5mg/kg/dose q12h
2000-3000g	3mg/kg/dose q24h	4mg/kg/dose q24h	2.5mg/kg/dose q8h
>3000g	3.5mg/kg/dose q24h	4mg/kg/dose q24h	2.5mg/kg/dose q8h
VANCOMYCIN (IV)			
<i>* Trough 5-20 depending on infection</i>			
0-7d	<1200g	15 mg/kg/dose q24h	
	1200-2000g	10-15 mg/kg/dose q12-18h	
	>2000g	10-15 mg/kg/dose q8-12h	
> 7d	<1200g	15 mg/kg/dose q24h	
	1200-2000g	10-15 mg/kg/dose q8-12h	
	>2000g	15-20 mg/kg/dose q8h	
CEFOTAXIME (IM/IV)			
0-14d	<1000g	50 mg/kg/dose q12h	
0-7d	1000-2000g	50 mg/kg/dose q12h	
0-7d	>2000g	50 mg/kg/dose q12h	
> 14d	<1000g	50 mg/kg/dose q8-12h	
> 7d	1000-2000g	50 mg/kg/dose q8-12h	
> 7d	>2000g	50 mg/kg/dose q8h	

NEONATOLOGY: Neonatal Sepsis



Intrapartum GBS prophylaxis indicated	Intrapartum GBS prophylaxis not indicated
<ul style="list-style-type: none"> • Positive GBS screening in late gestation • Previous infant w/ invasive GBS disease • GBS bacteriuria during ANY trimester of current pregnancy • Unknown GBS status at onset of labor and any of the following: <ul style="list-style-type: none"> ○ Delivery <37 wks gestation ○ ROM ≥18h ○ Intrapartum temp >100.4° F (38.0° C) ○ Intrapartum NAAT + for GBS 	<ul style="list-style-type: none"> • Negative late gestation screening (regardless of intrapartum risk factor) • Colonization w/ GBS in previous pregnancy (unless current indication present) • GBS bacteriuria in previous pregnancy (unless current indication present) • C-section delivery prior to onset of labor w/ intact membranes

NICU NUTRITION

Formula	kcal/cc
Breastmilk / Enf20	0.67
Breastmilk 1:50 HMF	0.7
Breastmilk 1:25 HMF / Enf24	0.8
MCT Oil	7

cc/kg/day	DOL 0	DOL 1	DOL 2	DOL 3+
Term, enteral or mixed	80	100	120	150
Term, parenteral	80	100	120	120
VLBW: 1-1.5kg	60-80			
VLBW: 0.75-1.0kg	100			
VLBW: <0.75kg	120			

	Initial preterm	Initial term	Advance preterm	Advance term	Preterm needs	Term needs	Max
GDR mg/kg/min	5-7	7-9	1.5-2.5	1.5-2.5	-	-	16-19
Protein gm/kg/d	1-2	2-2.5	0.5	1	2.5-3	2-2.5	3-3.5
Lipid gm/kg/d	0.5	0.5-1	0.5	0.5-1	0.25-3	0.5-3	3-3.5

Calorie Goals: 110-140 kcal/kg/day if <1500g / 80-120 kcal/kg/day if term

NaCl: 3-4 mEq/kg/day

Ca Gluconate: 200-400 mg/kg/day

KCl: 2-3 mEq/kg/day

DEXTROSE:

- Dextrose % = $(\text{GDR} \times \text{kg} \times 144) / \text{total vol}$
- GDR = $(\text{Dextrose \%} \times \text{total volume}) / (\text{kg} \times 144)$
- Dextrose kcals: $(\%D \times \text{total volume} \times 3.4) / 100$

AMINO ACID:

- Protein % = $(\text{gm/kg} \times \text{kg} \times 100) / \text{total vol}$
- Protein gm/kg = $(\% \text{ protein} \times \text{total vol}) / (\text{kg} \times 100)$
- Protein kcals: $(\% \text{ protein} \times \text{total vol} \times 4) / 100$
- Note: Liquid protein fortifier (LPF) = 1g (4kcal)/6ml LPF

FAT:

- Lipid ml = $\text{gm/kg} \times \text{kg} \times 5$
- Lipid gm/kg = $(\text{total vol} \times 0.2) / \text{kg}$
- Lipid kcals: $\text{total vol} \times 2$

Note: RPMC NICU may start use of 19kcal/oz formula (Ross/Similac) based on new studies of BM caloric density, for initiation of feedings in premature infants

Compatibility:

Dextrose %	Max Protein %
17.5	4.5
20	4.25
22.5	4
25	3.75
30	3.5
32.5	3.25
35	3

Polycythemia

Hct >65, repeat with central draw; if 65-69 observe. If 65-69 partial exchange transfusion IF SYMPTOMATIC. If HCT ≥70 partial exchange regardless of sx.

Ductal Dependent Lesions

Pulm atresia, +/- VSD, Preductal coarct, Tricuspid atresia, HLHS, Interrupted aortic arch.

TREATMENT: Start PGE 0.03 mcg/kg/min IV (central line)

May decrease to 0.01 mcg/kg/min

SIDE EFFECTS: APNEA, fever, bradycardia, hypotension, and diarrhea.

PDA

S/Sxs: +/- harsh holosystolic murmur, palmar pulses, bounding pulses, widened pulse press, ↑HR, ↑RR, Pulm edema, hyperactive precordium, metabolic acidosis.

TREATMENT:

1) Conservative - fluid restriction, diuretics, ventilatory support

2) Medical -

a. Indomethacin - If <48h, give 0.2 mg/kg for 1st dose, then 0.1 mg/kg for 2nd and 3rd doses. If 2-7 days, 0.2 mg/kg for 3 doses. Don't give if Cr >1.8 or Plt <80. If uop <0.5, then give Lasix 1mg/kg.

b. Acetaminophen - Obtain LFTs before; 15 mg/kg/dose q6hr for 72hrs

3) Surgical - Ligation (if medical management fails)

PPHN

S/Sxs: Cyanosis, progressive hypoxia, increased A-a gradient, low CVP and BP

TREATMENT: ventilation - *Adequate MAP for lung expansion*, high FiO2, sedation, prevent/correct acidosis, volume, pressors.

Inhaled nitrous oxide. (esp if FiO2 >60%)

Consider ECMO if OI >40. $OI = (MAP \times FiO_2) / PaO_2$

Seizures

Phenobarbital: load 15-20 mg/kg over 10-15 minutes then maintenance 3-5 mg/kg/day Q Day. Therapeutic levels 15-40. Monitor for apnea & ↓BP.

IVH - Screening Head Ultrasound

All infants <1500g or <32 weeks at birth

Also for 5 min apgar <6, seizures, micro/macrocephaly, TORCH, dysmorphism
Optimal age 7-10 days of life

-infants >1250g with history of asphyxia or signs and symptoms of IVH

Follow-up at 1 month of life, sooner if larger hemorrhage

IVH - Stages

I - subependymal (germinal matrix); II - intraventricular, no dilatation;

III - intraventricular, with dilatation; IV - intraparenchymal

Apnea of Prematurity

Caffeine: loading dose 10-20 mg/kg PO/IV, then maintenance dose 5-10 mg/kg/dose daily. Consider administration of loading dose on DOL #0 for patients <30 weeks gestation (neuroprotective effects)

Retinopathy of Prematurity (ROP) Screening

BW <1300g or <30 wks, even if not on oxygen

BW <1800g or <35 wks, if oxygen given

First exam: 5-7 weeks after birth and before discharge home

HIE Cooling Criteria

1. ≥ 36 weeks gestation, ≥ 1800 g
2. Probable Hypoxic Ischemic Event as defined by:
 - a. Cord or <1 HOL blood gas pH ≤ 7
 - b. Cord or <1 HOL blood gas BE ≤ -16 (-15 for Cedars)
 - c. Acute perinatal event with 10min Apgar ≤ 5
 - d. Acute perinatal event with ventilation initiated at birth and continued for 10min
3. Moderate or severe encephalopathy at <6 hrs of age defined by:
 - a. *Seizures (automatically qualifies as encephalopathy)
 - b. OR 3/6 Categories consistent with Mod-Severe encephalopathy

Neurological examination	Moderate encephalopathy	Severe encephalopathy
Level of consciousness	Lethargic	Stupor or coma
Spontaneous movement	Decreased activity	No activity
Posture	Distal flexion	Decerebrate
Tone	Hypotonia (focal, general)	Flaccid
Primitive reflexes		
Suck	Weak	Absent
Moro	Incomplete	Absent
Autonomic system		
Pupils	Constricted	Dilated, nonreactive
Heart rate	Bradycardia	Variability: Narrow or wide
Respiration	Periodic breathing	Apnea

Within 6 h of birth, achieve and maintain Core body temperature between 33.5°C and 34.5°C . (Core temperature is monitored continuously using rectal probe)

EXCLUSION: <36 wk, <1800 g, Severe PPHN, Severe hemodynamic compromise, Coagulopathy with active bleed, ECMO, Severe congenital anomalies, inability to cool within 6HOL.

Expected During Cooling

Decreased HR

Increased BP initially due to peripheral vasoconstriction, then decreased BP

- Consider dopamine gtt if needed

Increase in urine output initially, then decreased UOP (retention)

- Consider foley placement

Decrease in magnesium, sodium, and potassium; labile glucoses

- Frequent lab checks

Decreased metabolic rate, and shivering

- Consider morphine gtt

The total period of cooling will be 72 h. Upon completion of 72 h, infants will be gradually re-warmed

Neonatal Hypoglycemia Protocol (1st 24 Hours of Life ONLY and Healthy)

Screening and Management of Postnatal Glucose Homeostasis in Late Preterm and Term SGA, IDM/LGA Infants

((LPT) Infants 34 – 36^{6/7} weeks and SGA (screen 0-24 hrs); IDM and LGA \geq 34 weeks (screen 0-12 hrs))

Symptomatic and <40 mg/dL \longrightarrow IV glucose

ASYMPTOMATIC

Birth to 4 hours of age

INITIAL FEED WITHIN 1 hour

Screen glucose 30 minutes after 1st feed

Initial screen <25 mg/dL

Feed and check in 1 hour

<25 mg/dL

↓
IV glucose*

25–40 mg/dL

↓
Refeed/IV glucose*
as needed

4 to 24 hours of age

Continue feeds q 2-3 hours

Screen glucose prior to each feed

Screen <35 mg/dL

Feed and check in 1 hour

<35 mg/dL

↓
IV glucose*

35 – 45 mg/dL

↓
Refeed/IV glucose*
as needed

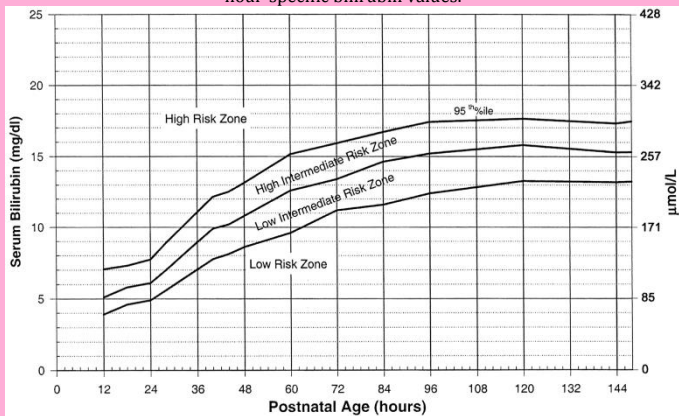
Target glucose screen ≥ 45 mg/dL prior to routine feeds

* Glucose dose = 200 mg/kg (dextrose 10% at 2 mL/kg) and/or IV infusion at 5–8 mg/kg per min (80–100 mL/kg per d). Achieve plasma glucose level of 40-50 mg/dL.

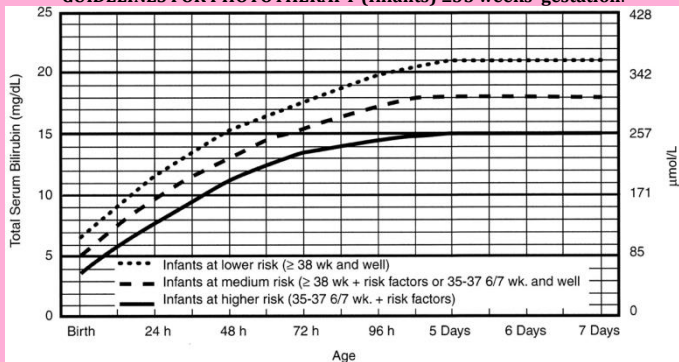
Symptoms of hypoglycemia include: Irritability, tremors, jitteriness, exaggerated Moro reflex, high-pitched cry, seizures, lethargy, floppiness, cyanosis, apnea, poor feeding.

HYPERBILIRUBINEMIA

Nomogram for well newborns at ≥ 36 weeks' gestational age with birth weight of ≥ 2000 gm or ≥ 35 more weeks' gestational age and birth weight ≥ 2500 gm based on hour-specific bilirubin values.



GUIDELINES FOR PHOTOTHERAPY (Infants) ≥ 35 weeks' gestation.



- Use total bilirubin. Do not subtract direct reacting or conjugated bilirubin.
- Risk factors = isoimmune hemolytic disease, G6PD deficiency, asphyxia, significant lethargy, temperature instability, sepsis, acidosis, or albumin $< 3.0\text{g/dL}$ (if measured)
- For well infants 35-37 6/7 wk can adjust TSB levels for intervention around the medium risk line. It is an option to intervene at lower TSB levels for infants closer to 35 wks and at higher TSB levels for those closer to 37 6/7 wk.
- It is an option to provide conventional phototherapy in hospital or at home at TSB levels 2-3 mg/dL (35-50 $\mu\text{mol/L}$) below those shown but home phototherapy should not be used in any infant with risk factors.

Major Risk Factors:	Minor Risk Factors:
Pre-discharge Bilirubin level in the high-risk zone	Pre-discharge Bilirubin level in the high intermediate-risk zone
Gestational age 35-36 wk	Gestational age 37-38 wk
Jaundice observed in the first 24hrs	Jaundice observed before discharge
Previous sibling received phototherapy	Previous sibling with jaundice
Blood group incompatibility with positive direct antiglobulin test, other known hemolytic disease	Macrosomic infant of a diabetic mother
Cephalohematoma or significant bruising	Maternal age <25 yr
Exclusive breastfeeding, particularly if nursing is poorly and weight loss is excessive	Male gender
East Asian race	
Polycythemia	
Increase Bilirubin rate of rise (>0.5mg/dl/hr)	
Septic, hypoxemic, acidotic, or hypoalbuminemia	

	<u>Infants at lower risk (38 weeks and well):</u>	<u>Infants at medium risk (≥ 38 weeks + risk factor OR < 38 weeks and well):</u>	<u>Infants at Higher Risk (< 38 weeks + risk factor):</u>
Low Risk Zone	If d/c <72 HOL, follow up according to age and other clinical concerns	If d/c <72 HOL, follow up within 48-72 hrs	If d/c <72 HOL, follow up within 48 hrs
Low Intermediate Risk Zone	If d/c <72 HOL, follow up according to age and other clinical concerns	If d/c <72 HOL, follow up within 48 hrs	If d/c <72 HOL, follow up within 48 hrs and consider TcB/TSB at follow up
High Intermediate Risk Zone	Follow up within 48 hrs and consider TcB/TSB at follow up	Evaluate for phototherapy and check TcB/TSB within 24 hrs	Evaluate for phototherapy and check TcB/TSB in 4-24 hrs.
High Risk Zone	Evaluate for phototherapy and check TSB in 4-24 hrs.	Evaluate for phototherapy and check TSB in 4-24 hrs.	Evaluate for phototherapy and check TSB in 4-24 hrs.

CARDIOLOGY

Murmurs

Common Innocent Murmurs

- **Pulmonary flow murmur of newborn:** 1-2/6 early-mid systolic, low pitched. Max at LUSB, radiates to back, axilla, L/R chest. Age: premie and full term infants, disappears by 6 mo.
- **Peripheral Pulmonic Stenosis:** 2-3/6 early-mid systolic, low pitched. Max at axilla, but heard in LUSB, L/R chest. Age: premie and full term infants, disappears by 6 mo
- **Still's:** 2-3/6 mid-systolic, low pitched, vibratory/musical, louder supine. Max at URSB, MLSB or apex. Age: 2-10 yr.
- **Venous hum:** 1-3/6 continuous, low pitched. Max at R or L supra/infraclavicular areas. Inaudible when supine; decreases w/ head rotation and jugular vein compression. Age: 3-6 yr.
- **Pulmonary ejection murmur:** 1-3/6 early-mid systolic, blowing. Max at LUSB, little radiation. Age 8-14 yr.
- **Carotid bruit:** 2-3/6 systolic, occasional thrill over carotid. Max at carotids and R supraclavicular area. Age: any.

Common Pathologic Murmurs: Suspect with systolic murmur that's loud or long or harsh, diastolic murmur, abnormal heart sounds, clicks, abnormally strong or weak pulses, cyanosis, symptoms, abnormal ECG, or abnormal CXR (abnormal heart shape or size, abnormal pulm vasculature)

- **VSD:** 2-5/6 early/holosystolic, blowing/harsh, max at LLSB
- **ASD:** 2-3/6 systolic ejection, wide fixed split S2, max at LUSB
- **PDA:** 2-4/6 continuous machinery, max at L infraclavicular area

Hypertensive Urgency/Emergency





- **Urgency** = no end-organ damage (sx = HA, blurred vision, N/V)
 - Goal: lower MAP by 20% over 1hr, return to baseline over 24-48hr
 - PO agents may be adequate (e.g. nifedipine, minoxidil)
- **Emergency** = end-organ damage (e.g. renal failure, sz, stroke)
 - Goal: lower MAP by 1/3 of goal over 6hr, next 1/3 over the next 24-36hr, final 1/3 over next 48hr
 - After elevated ICP ruled out, don't delay treatment
 - Usually requires IV agents
- Initial studies: lytes, BUN, Cr, RUA, CXR, EKG

Tet Spells (aka Hypoxic/Cyanotic Spells)

- Sudden dec SVR (e.g. after exercise) or increase in heart rate and PVR (e.g. crying) → inc R-L shunt → hypoxia → tachycardia → → inc R-L shunt ...
- Treatment
 - Keep calm (dec PVR)
 - Knee-chest positive (inc SVR, increase venous return)
 - Oxygen
 - Fluid Volume Repletion
 - Morphine 0.1-0.2 mg/kg IV/IM/SC (dec HR, sympathetic tone, and SVR)
 - Propranolol 0.1-0.25 mg/kg IV slow push (dec RVOT spasm)
- **Tet spell treatment**
 - Phenylephrine 0.01-0.02 mg/kg IV, 0.1 mg/kg IM (inc SVR)
 - Bicarbonate 1-2 mEq/kg IV (dec acidosis → dec PVR increase SVR)
 - Correct anemia, hypovolemia, hypoglycemia
 - Correct arrhythmias, avoid inotropes

ECG BASICS

- 1) **Rhythm:** Check for P before every QRS (QRS after each P)
- 2) **Rate:** 300 beats per min \div # of big boxes, (300, 150, 100, 75, 60, 50, etc),
(1mm = 0.4 sec, 5mm = 2 sec)
- 3) **Axis** (definition of axis deviation is age-dependent, esp. for newborns)

Lead I	Lead aVF	Axis
+	+	0° to +90°  Normal
+	-	0° to -90°  LAD
-	+	90° to 180°  RAD
-	-	-90° to 180°  Extreme RAD

4) Intervals

- PR and QRS both age specific
- Check PR intervals for first degree AV Block (see below)
- Check QRS intervals for BBB (see below)
- $QTc = QT/\sqrt{RR}$ (Normal male ≤ 0.44 sec or female ≤ 0.46)

5) Hypertrophy

- **RAE:** large diphasic P waves, tall (>3mm) initial component
- **LAE:** large diphasic P waves, wide (>0.1sec) terminal component
- **RVH:** No R wave amplitude progression from V₁ to V₆, deep S wave persists in V₅ and V₆
- **LVH:** S wave in V₁ + R wave in V₅ = more than 35 mm
- Also: LAD, slightly widened QRS, Leftward Rotation, left atrial enlargement

6) Infarction

- Scan all leads for **Q waves** (nl small "septal q waves" in V₅, V₆ and II, III, and aVF). Pathologic Q waves are typically wide >0.04 s and deep (>3 mm).
- **Inverted T waves, ST segment** elevation or depression (>2mm) (T wave inversion physiologic in V₁ until late adolescence).

7) AV Block

- **1°** Prolonged PR interval
- **2° Wenckebach (Mobitz I):** PR lengthens with each cycle until P wave is dropped
- **2° Mobitz II:** some P waves don't produce QRS
- **2° 2:1 AV Block:** may be Mobitz I or II
- **3° Complete AV Block:** No P wave produces a QRS

8) BBB

- **Right BBB:** "Bunny ears," RsR' waves in V₁, V₂, aVR, slurred S wave in leads I and V₆
- **Left BBB:** R' larger than R wave in V₅ or V₆, slurred S in V₁
- Note: with BBB, most criteria for Ventricular Hypertrophy cannot be used.

9) Wolff-Parkinson-White (WPW): Short PR, Delta wave, Wide QRS

CARDIAC MEDS

Antihypertensive Meds (useful for urgency/emergency)

- Nifedipine – 0.25-0.5 mg/kg PO Q4-6 hr, max 10mg/dose (Do not use Ca++ blockers in < 1 yr of age)
- Hydralazine – 0.1-0.2 mg/kg IV/IM Q4-6 hr; may cause prolonged hypotension
- Nitroprusside – 0.3-0.5 mcg/kg/min IV, titrate to max 10 mcg/kg/min; watch for cyanide toxicity (follow thiocyanate level)
- Labetolol – 0.4-1 mg/kg/hr IV, titrate to max 3 mg/kg/hr
- Nicardipine – 0.5-5 mcg/kg/min IV; may cause edema, headache, N/V (Do not use Ca++ blockers in < 1 yr of age)
- Nitroglycerin – 0.25-0.5 mcg/kg/min; may increase by 0.5-1 mcg/kg/min Q3-5 min prn (usually 1-5 mcg/kg/min)

Other Antihypertensive Meds

- Captopril – ACEI, 0.3-0.5 mg/kg/dose PO BID-TID, max 6mg/kg/day
- Clonidine – Central alpha agonist, TTS #1,2,3 (0.1, 0.2, 0.3 mg/24 hr)
- Enalapril – ACEI, 0.1 mg/kg PO ÷ Q12-24 hr, max 0.6mg/kg/24h
- Propranolol – Beta blocker, 0.5-1 mg/kg PO ÷ Q6-8 hr
- Verapamil – Ca channel blocker, 4-8 mg/kg PO ÷ Q8 hr (contraindicated <1yr)

Antiarrhythmic Meds

- Amiodarone – Class III antiarrhythmic, load with 10-15 mg/kg PO ÷ Q12-Q24 hr for 4-14 days, then 5 mg/kg ÷ Q12-24 hr (for >1 yr)
- Amiodarone IV: Load with 5 mg/kg over 1 hour, may repeat time one if no effect, treat hypotension with Calcium and volume. Use with caution in neonates.
- Digoxin – TDD = Total Digitalizing Dose. Initially give ½ TDD then ¼ TDD Q8-18 hr × 2 doses, obtain EKG 6 hr after to assess for toxicity. Then maintenance dose ÷ BID for <10 yr, daily for >10 yr. Monitor K and EKG (hold dose if PR >0.12 sec). 75-80% of PO = IV dose. Therapeutic levels 0.8-2 ng/ml.
- Procainamide – Class Ia, for ventricular tachycardia load 15mg/kg IV over 30min, alternatively 5mg/kg x3 over 5 min each. Max dose 1gm/dose.
- Propranolol – Beta blocker, 0.01-0.1 mg/kg IVP over 10min, then Q6-8 hr prn
- Verapamil – Ca channel blocker, for PSVT 0.1-0.3 mg/kg IV × 1, may repeat(contraindicated <1yr)

Diuretics

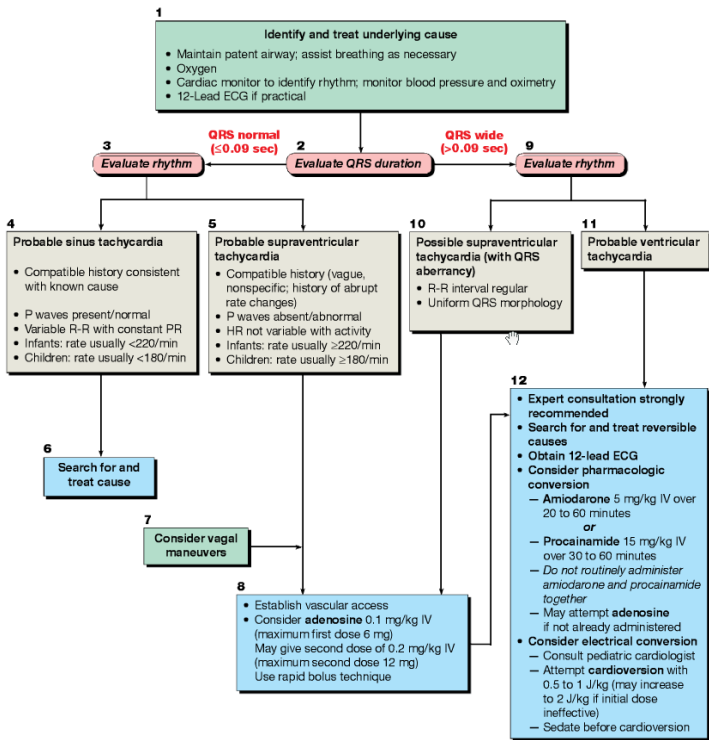
- Acetazolamide – Carbonic anhydrase inhibitor, 5 mg/kg/dose PO/IV QD-QOD
- Spironolactone – Aldosterone antagonist (K sparing), 1-3.3 mg/kg PO ÷ QD-QID
- Bumetanide – Loop, 0.015-0.1 mg/kg PO/IM/IV QD-QOD
- Chlorothiazide – Thiazide, 20-40 mg/kg PO/IV ÷ Q12 hr
- Furosemide – Loop, 0.5-2 mg/kg/dose PO/IM/IV Q6-12 hr; watch for low Na/K, alkalosis, ototoxicity, increased Ca excretion
- Mannitol – Osmotic, 0.25-0.5 gm/kg/dose IV Q4-6 hr
- Metolazone – Thiazide-like, 0.2-0.4 mg/kg PO ÷ Q12-24 hr

NORMAL PEDIATRIC ECG PARAMETERS

Age	HR - bpm (mean)	QRS Axis (mean)	PR Interval - sec (mean)	QRS Duration - sec (95%tile)	Lead V ₁			Lead V ₆		
					R Wave Amplitude - mm (95%tile)	S Wave Amplitude - mm (95%tile)	R/S Ratio	R Wave Amplitude - mm (95%tile)	S Wave Amplitude - mm (95%tile)	R/S Ratio
0-7 days	95-160 (125)	+30 to 180 (110)	0.08-0.12 (0.10)	0.05 (0.07)	13.3 (25.5)	7.7 (18.8)	2.5	4.8 (11.8)	3.2 (9.6)	2.2
1-3 wk	105-180 (145)	+30 to 180 (110)	0.08-0.12 (0.10)	0.05 (0.07)	10.6 (20.8)	4.2 (10.8)	2.9	7.6 (16.4)	3.4 (9.8)	3.3
1-6 mo	110-180 (145)	+10 to +125 (+70)	0.08-0.13 (0.11)	0.05 (0.07)	9.7 (19)	5.4 (15)	2.3	12.4 (22)	2.8 (8.3)	5.6
6-12 mo	110-170 (135)	+10 to +125 (+60)	0.10-0.14 (0.12)	0.05 (0.07)	9.4 (20.3)	6.4 (18.1)	1.6	12.6 (22.7)	2.1 (7.2)	7.6
1-3 yr	90-150 (120)	+10 to +125 (+60)	0.10-0.14 (0.12)	0.06 (0.07)	8.5 (18)	9 (21)	1.2	14 (23.3)	1.7 (6)	10
4-5 yr	65-135 (110)	0 to +110 (+60)	0.11-0.14 (0.12)	0.07 (0.08)	7.6 (16)	11 (22.5)	0.8	15.6 (25)	1.4 (4.7)	11.2
6-8 yr	60-130 (100)	-15 to +100 (+60)	0.12-0.16 (0.14)	0.07 (0.08)	6 (13)	12 (24.5)	0.6	16.3 (26)	1.1 (3.9)	13
9-11 yr	60-110 (85)	-15 to +110 (+60)	0.12-0.17 (0.14)	0.07 (0.09)	5.4 (12.1)	11.9 (25.4)	0.5	16.3 (25.4)	1.0 (3.9)	14.3
12-16 yr	60-110 (85)	-15 to +100 (+60)	0.12-0.17 (0.14)	0.07 (0.10)	4.1 (9.9)	10.8 (21.2)	0.5	14.3 (23)	0.8 (3.7)	14.7
>16 yr	60-100 (80)	-15 to +110 (+60)	0.12-0.20 (0.15)	0.08 (0.10)	3 (9)	10 (20)	0.3	10 (20)	0.8 (3.7)	12

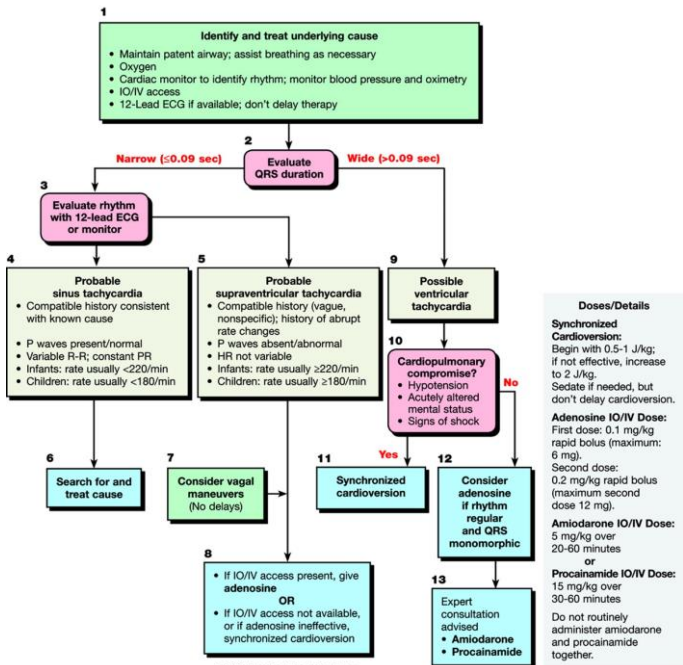
Pediatric Tachycardia with a Pulse and Adequate Perfusion Algorithm

Pediatric Tachycardia With a Pulse and Adequate Perfusion Algorithm



Pediatric Tachycardia with a Pulse and Poor Perfusion

Pediatric Tachycardia With a Pulse and Poor Perfusion



Doses/Details

Synchronized Cardioversion:
Begin with 0.5-1 J/kg; if not effective, increase to 2 J/kg. Sedate if needed, but don't delay cardioversion.

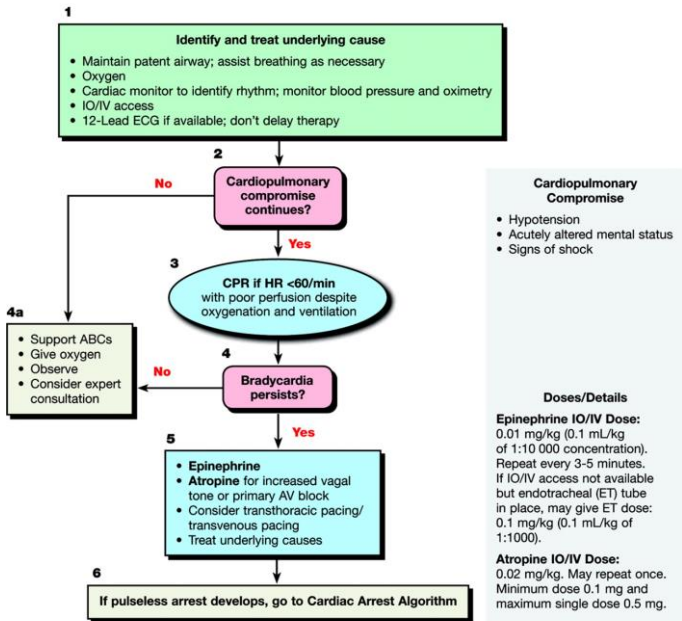
Adenosine IO/IV Dose:
First dose: 0.1 mg/kg rapid bolus (maximum: 6 mg).
Second dose: 0.2 mg/kg rapid bolus (maximum second dose 12 mg).

Amiodarone IO/IV Dose:
5 mg/kg over 20-60 minutes
or
Procainamide IO/IV Dose:
15 mg/kg over 30-60 minutes

Do not routinely administer amiodarone and procainamide together.

Pediatric Bradycardia with a Pulse and Poor Perfusion

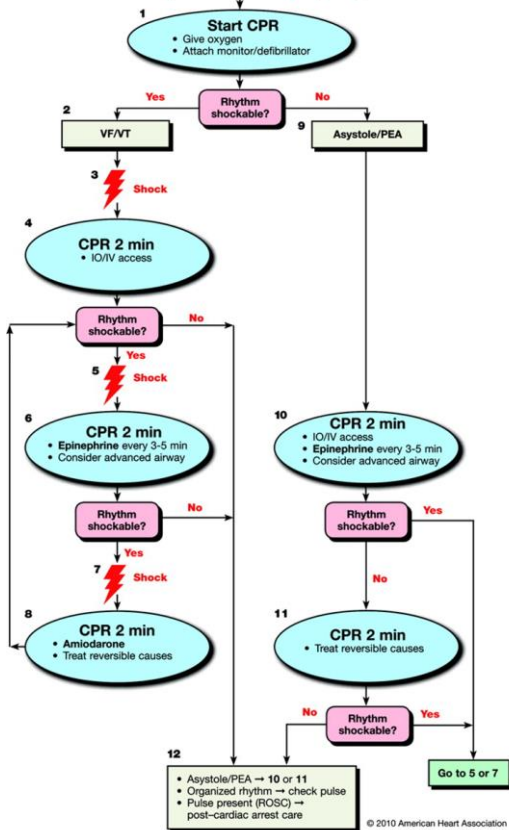
Pediatric Bradycardia With a Pulse and Poor Perfusion



Pediatric Cardiac Arrest

Pediatric Cardiac Arrest

Shout for Help/Activate Emergency Response



Doses/Details

CPR Quality

- Push hard ($\geq 1/3$ of anterior-posterior diameter of chest) and fast (at least 100/min) and allow complete chest recoil
- Minimize interruptions in compressions
- Avoid excessive ventilation
- Rotate compressor every 2 minutes
- If no advanced airway, 15:2 compression-ventilation ratio. If advanced airway, 8-10 breaths per minute with continuous chest compressions

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

- **Epinephrine IO/IV Dose:** 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).
- **Amiodarone IO/IV Dose:** 5 mg/kg bolus during cardiac arrest. May repeat up to 2 times for refractory VF/pulseless VT.

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 6-8 seconds (8-10 breaths per minute)

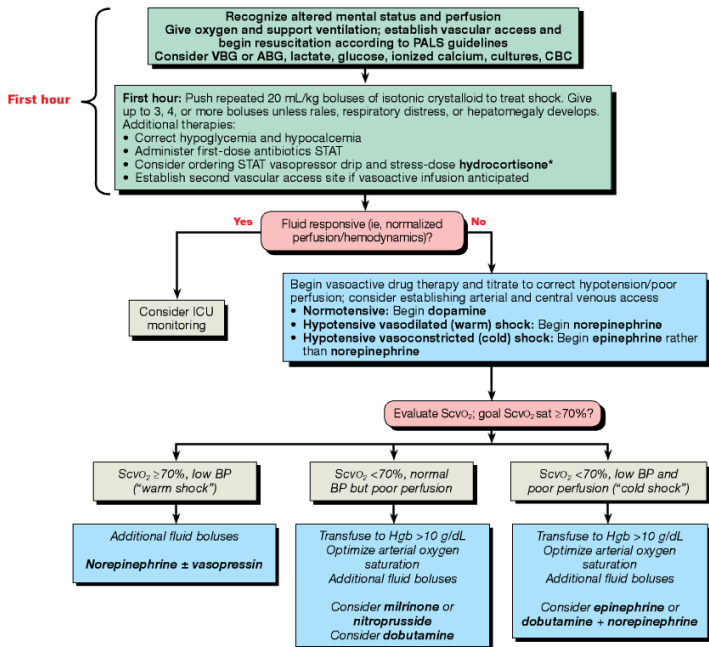
Return of Spontaneous Circulation (ROSC)

- Pulse and blood pressure
- Spontaneous arterial pressure waves with intra-arterial monitoring

Reversible Causes

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

Pediatric Septic Shock Algorithm



*Fluid-refractory and dopamine- or norepinephrine-dependent shock defines patient at risk for adrenal insufficiency.

If adrenal insufficiency is suspected give hydrocortisone ~2 mg/kg bolus IV, maximum 100 mg

Draw baseline cortisol; consider ACTH stimulation test if unsure of need for steroids

Drugs Used in PALS

Drugs Used in PALS

Drug	Dosage (Pediatric)	Remarks
Adenosine	0.1 mg/kg (up to 6 mg) 0.2 mg/kg for second dose	Rapid IV push Max single dose: 12 mg
Amiodarone: for refractory pulseless VT/VF	5 mg/kg rapid IV/IO	Max 15 mg/kg/day
for perfusing tachycardias	Loading: 5 mg/kg IV/IO over 20-60 min	Repeat to max 15 mg/kg/day IV.
Atropine sulfate*	0.02 mg/kg IV/IO/TT	Min dose: 0.1 mg Max single dose: 0.5 mg child, 1 mg adolescent May double for 2nd dose.
Ca ²⁺ chloride 10%	20 mg/kg IV/IO (0.2 mL/kg)	Give slowly
Dobutamine	2-20 µg/kg/min	Titrate to desired effect.
Dopamine	2-20 µg/kg/min	α-adrenergic action predominates at higher infusion rates
Epinephrine for bradycardia*	IV/IO: 0.01 mg/kg (1:10 000, 0.1 mL/kg) TT: 0.1 mg/kg (1:1000, 0.1 mL/kg)	
Epinephrine for asystolic or pulseless arrest*	First dose: IV/IO: 0.01 mg/kg (1:10 000, 0.1 mL/kg) TT: 0.1 mg/kg (1:1000, 0.1 mL/kg)	Subsequent doses: • Repeat every 3-5 minutes during CPR • Consider a higher dose (0.1 to 0.2 mg/kg; i.e., 0.1 to 0.2 mL/kg of 1:1000) for special conditions
Epinephrine infusion	0.1-1 µg/kg/min	Titrate to desired effect
Glucose	0.5-1 g/kg IV/IO. (1-2 mL/kg of 50% solution)	Alternative: 5% = 10-20 mL/kg, 10% = 5-10 mL/kg, 25% = 2-4 mL/kg, (in large vein)
Lidocaine*	1 mg/kg	IV/IO/TT
<i>Infusion</i>	20-50 µg/kg/min (after 1 mg/kg loading dose)	
Magnesium Sulfate	25-50 mg/kg IV/IO over 10-20 min	Max dose: 2 g
Naloxone*	If <5 years old or ≤20 kg: 0.1 mg/kg If ≥5 years old or >20 kg: 2 mg	Titrate to desired effect.
Prostaglandin E ₁	0.05-0.1 µg/kg/min	Titrate, monitor for apnea, hypotension, hypoglycemia, hypocalcemia.
Sodium bicarbonate	1 mEq/kg per dose	Infuse slowly and only if ventilation is adequate.

*For TT administration, dilute medication with NS to a volume of 3-5 mL and follow with several positive-pressure ventilations.

Pulmonology

Ventilator Types

SIMV: predetermined synchronous resp. rate for better V/Q matching, follows lung compliance.

A/C: fully assists all spontaneous respirations.

P control: adjusts ΔP (or PIP) to adjust tidal volume

P support: gives initial pressure when patient takes a spontaneous breath.

HFOV: increases in MAP, increases pO₂. Increases in Amp, decreases pCO₂. Start with MAP on conventional vent + ~2-4 (neonate) or +4-8 (children). Start with Hz = 10-15.

Basic Adjustments

FiO₂	Increases will raise pO ₂ but not change pCO ₂
RR	Increases will lower pCO ₂ but not change pO ₂
PIP	Increases will decrease pCO ₂ and probably increase pO ₂
PEEP	Increases will raise pO ₂ and probably increase pCO ₂ (effect depends upon type of vent – if TV constant, pCO ₂ shouldn't change). Physiologic is 3 – 5; watch for barotrauma and pneumothorax. Too much PEEP will decrease SVR, increase PVR, thus decreasing cardiac output.
TV	Increases will decrease pCO ₂ and probably increase pO ₂ TV = 6 – 8 cc/kg (child), 4-6 cc/kg (neonate)
I-time	Increases will raise pO ₂ but not change pCO ₂ . Newborns 0.3-0.4; infants/child 0.7.

Basic equation:

Compliance = $\Delta V / \Delta P$

Minute Ventilation = RR × TV

Oxygenation Index = $(MAP \times FiO_2) / PaO_2$

Golden Rules:

Acute change of pCO₂ by 10 causes changes of pH by 0.8.

Change in base by 10 results in change in pH of 0.15.

INTUBATION

ETT/ Blade	ETT Size = 4 + (age in years / 4) or (Age + 16) / 4 Blade = Premie: 0, FT-3 yr: 1, 4-10 yr: 2, 10-14 yr: 2-3, >14 yr: 3 Length @ lip = 12 + ½ (age yrs) = ETT size × 3 Length for Neonates = weight + 6	
Rapid Sequence Intubation	<ol style="list-style-type: none"> 1. Preoxygenate with 100% O₂, PPV prn 2. Intubation Meds: Adjuncts, Sedative-Hypnotics, then Paralytics 3. Cricoid pressure to prevent aspiration 4. Open mouth w/ R thumb & index finger using scissoring technique 5. Hold laryngoscope in L hand. Insert blade into R side of mouth, sweeping tongue to left out of line of vision. Advance blade to epiglottis and lift blade to elevate epiglottis and visualize cords. 6. Pass ETT from the right corner of the mouth through the cords. 7. Verify ETT placement, observe chest wall movement, auscultation in both axillae and epigastrium, colorimetric capnometer (Yellow Mellow), end-tidal CO₂ detection, water vapor in tube, improvement of oxygen saturation, CXR. 	
Adjuncts (First)	Atropine: 0.01-0.02 mg/kg (min 0.1mg; max 1mg)	+ Vagolytic
	Lidocaine: 1-2 mg/kg	+ Blunts ICP spike
Sedative-Hypnotics (Second)	Thiopental: 1-5 mg/kg	+ Decreases cerebral blood flow. Good for increased ICP. - Decreases SBP. Avoid if CV instability - Bronchospasm. Avoid in asthma.
	Ketamine: 1-3 mg/kg	+ Bronchodilation; good for asthma + Catecholamine release, good if HD unstable - May incr BP, HR, secretions & ICP - Avoid in eye injuries
	Etomidate: 0.2-0.3 mg/kg	+ No hemodynamic compromise; decreases ICP - Inhibits 11-beta hydroxylase, consider co-administration of steroids if in shock, caution in septic shock
	Fentanyl: 1-5 mcg/kg	+ Few hemodynamic effects - May cause chest wall rigidity
	Midazolam: 0.05-0.1 mg/kg	+ Amnestic/anticonvulsant properties - Respiratory depression, hypotension
Paralytics (Third)	Rocuronium: 0.6-1.2 mg/kg	+ Onset 30-60 sec; duration 30-60 min + Minimal effect on HR or BP
	Vecuronium: 0.1-0.2 mg/kg	+ Onset 70-120 sec; duration 30-90 min + Minimal effect on HR or BP
	Succinylcholine: 1-2 mg/kg	+ Onset 30-60 sec; duration 3-10 min - Irreversible, contraindicated in burns, massive trauma, neuromuscular disease, eye injuries, malignant hyperthermia

Anatomic Etiologies of Pulmonary Emergencies

Upper airway

- Supra-glottic
 - Peritonsillar abscess –Retropharyngeal abscess
- Glottic
 - Epiglottitis –Croup
- Foreign body aspiration

Lower airway

- Tracheitis
- Asthma
- Pneumonia
- Foreign body aspiration
- Bronchiolitis
- Pneumothorax

Causes of Hypoxia

•Hypoventilation

1. Depression of respiratory center (drugs)
2. Brain stem disease
3. Cervical spinal cord injury
4. Anterior horn cell disease (polio)
5. Nerves of respiratory muscles (SMA)
6. Neuromuscular junction (myasthenia gravis)
7. Respiratory muscle weakness (muscular dystrophy)
8. Small/constricted thoracic cage (scoliosis)
9. Upper airway obstruction

•V/Q mismatch

- Atelectasis –Bronchospasm –Partial airway obstruction
- “Complete” airway obstruction → shunt

•Right → left shunt

•Diffusion abnormality (rare; decreased cardiac output)

•Decreased ambient O₂ (high altitude)

Emergency Tracheostomy and Ventilator

Tracheostomy Assessment:

1. Look for chest movement
2. Listen for the sounds of air movement
3. Feel air from the tracheostomy, mouth, or nose
4. Consult ENT if there are concerns for tracheostomy size

Treatment of Trach Patient in Respiratory Distress

1. Give two breaths with BAG
2. If difficulty to bag, or poor chest rise, SUCTION the trach
3. CHANGE the tracheostomy if blocked or in doubt
4. Treatment options when unable to replace tracheostomy:
 - a. Place facemask for oxygen, occlude stoma
 - b. Bag patient, occlude stoma
 - c. Place oxygen over stoma

Ventilator Assessment

1. Assess the patient
 - a. Chest movement/exam
 - b. Oxygen saturation
 - c. End tidal CO₂
2. Check all ventilator connections
3. Look at alarms
4. Obtain chest radiograph

Treatment of Ventilator Patient in Respiratory Distress

1. Troubleshoot tracheostomy
2. If problem not easily detectable, disconnect from ventilator and BAG MASK VENTILATE

Pediatric Asthma Score (PAS)

Score	0	1	2
SpO2	>95% on RA	91 – 95%	Requires O2
Inspiratory Breath Sounds	Normal	Selectively diminished	Globally decreased/ absent
Accessory Muscle Use	Normal	Present	≥3 of: subcostal, intercostal, substernal, suprasternal, supraclavicular, nasal flaring
Expiratory Wheezing	None	Present	Marked: may include inspiratory & expiratory
Mental Status	Normal	Depressed/ Agitated	Very lethargic; almost no movement; very slow to respond
Breathlessness	None	Mild – moderate	Severe SOB
Vocalization	Speech/ Cry Normal	Partial sentences, short cry or poor po	Absent: short phrases, grunting or unable to po
Orthopnea	Tolerates being supine	Resists being supine	
Respiratory Rate	<1 yr: < 50 1 – 5 yr: < 40 6 – 14 yr: <30 >14 yr: <25	<1 yr: > 50 1 – 5 yr: > 40 6 – 14 yr: >30 >14 yr: >25	If score >2, consider PICU If score ≥4, mandatory PICU consult

Communicate with Your Child's Doctor About His/Her Asthma

Asthma also includes reactive airway disease, regular coughing, wheezing, or difficulty breathing with or without colds.

Your child's name: _____ Today's Date: _____

When was your child's last asthma visit? _____ If your child has never had an asthma visit, check here:

Please check one answer for each of the following questions. Your answers will help your doctor give you the best asthma care.

Questions 1-5 ask about how your child's asthma has been over the past 12 months, not just today. If your child has had asthma for less than 12 months, then think about how things have been since he/she started having breathing problems.

Over the past 12 months	Direction		
1. How has your child's asthma been?	Getting Better	Staying The Same	Getting Worse
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Over the past 12 months	Bothered		
2. How much have you been bothered by your child's asthma?	Not Bothered	Somewhat Bothered	Very Bothered
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Over the past 12 months	Risk				
<u>Before</u> today:	0	1	2	3	≥4
3. How many times has your child been to <u>urgent care</u> for asthma?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. How many times has your child been to the <u>emergency room</u> for asthma?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. How many times has your child been <u>hospitalized</u> for asthma?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. How many times has your child used <u>an oral steroid</u> (Orapred, steroid pill, steroid liquid or steroid syrup) for asthma? Don't include today.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

FOR CLINICIAN USE ONLY:	Controlled	Partly Controlled	Mildly Uncontrolled	Moderately Uncontrolled	Severely Uncontrolled
Assign patient's <u>level of chronic asthma control</u> by looking at the box checked <i>farthest to the right</i> on questions 3-6. Match the box color to the level of asthma control in this section.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Take Medicine					
7. How often do you give your child's <u>daily</u> asthma medicine when he/she feels fine?	My child is not supposed to take a daily asthma medicine	All of the time	Most of the time	Some of the time	None of the time
Daily asthma medicines include: Advair, Alvesco, Asmanex, Budesonide, Flovent, QVAR, Pulmicort, Singulair, Symbicort	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

PLEASE TURN OVER

FOR CLINICIAN USE: If any of the answers in red are selected, this may be consistent with poorly controlled and/or undertreated asthma. Further assessment and follow-up in 2-6 weeks is recommended.

Sub-Acute Asthma

These questions are about your child's recent asthma symptoms.

Page 2/2

Asthma Symptoms

Days

8. During the past week, how many days has your child had asthma symptoms? For example:

*Cough

*Chest tightness

*Shortness of breath

*Sputum (spit, mucous, phlegm when coughing)

*Difficulty taking a deep breath

*Wheezing or whistling sound in the chest

0



1-2



3-6



Every day
(not all day long)



Every day
(all day long)



Reliever Use

Days

9. During the past week, how many days have you had to give your child medicine to quickly relieve asthma symptoms? For example:

*Albuterol/Proventil/Proair/Ventolin/Xopenex via Inhaler/Spray/Pump or Machine/Nebulizer

0



1-2



3-6



Every day
(not all day long)



Every day
(all day long)



Attacks

Days

10. During the past week, how many days did your child have an asthma attack? For example:

*When it is harder for your child to breathe

*When you give your child more quick-relief asthma medicine (e.g., Albuterol)

*When the asthma medicine does not work

0



1



2-3



4-7



Activity Limitation

11. During the past week, how much has asthma limited your child's activities?

Not at all



Slightly



Moderately



Very much



Completely



Nighttime Symptoms

12. During the past TWO weeks, how many nights did your child's asthma keep your child from sleeping or wake him/her up?

0



1



2



3-7



8-14



13. Please write down any concerns or anything else you would like your doctor to know about your child's asthma.

PLEASE GIVE THIS TO YOUR PROVIDER. THANK YOU!

FOR CLINICIAN USE ONLY:

Control/Severity Assignment:

Assign patient's current level of asthma control by looking at the box checked farthest to the right on questions 8 – 12 and match the box color to the level of asthma control in this section.



Controlled/
Intermittent



Partly Controlled/
Mild Persistent



Uncontrolled/
Moderate



Poorly Controlled/
Severe

Sub-Acute Asthma Severity/Control Classification

Instrumento de Comunicación y Control del Asma Pediátrica para el Departamento de Emergencias

El asma también incluye la enfermedad reactiva de las vías respiratorias, tos regular, silbidos al respirar, o dificultad al respirar con o sin resfriados.

Nombre de su niño: _____ Fecha: _____

¿Cuándo fue la última visita por asma de su niño(a) con su doctor regular? _____

Si su niño(a) nunca ha tenido una visita por asma con un doctor, marque aquí

Por favor marque una respuesta para cada una de las siguientes preguntas. Sus respuestas ayudan al doctor a darle a su niño un mejor cuidado de asma.

Las preguntas del 1 al 5 le preguntan cómo ha estado el asma de su niño **durante los últimos 12 meses**, no solamente el día de hoy. Si su niño ha tenido asma por menos de 12 meses, entonces piense como han estado las cosas desde que él/ella comenzó a tener problemas de respiración.

Durante los últimos 12 meses	Dirección		
1. ¿Cómo ha estado el asma de su niño?	Ha estado mejorando <input type="checkbox"/>	Está igual <input type="checkbox"/>	Ha estado empeorando <input type="checkbox"/>

Durante los últimos 12 meses	Molestia		
2. ¿Qué tan molesto para usted ha sido el asma de su niño?	Nada molesto <input type="checkbox"/>	Algo molesto <input type="checkbox"/>	Muy molesto <input type="checkbox"/>

Durante los últimos 12 meses	Riesgo				
Antes del día de hoy:	0	1	2	3	≥4
3. ¿Cuántas veces ha ido su niño a la sala de emergencias por su asma?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. ¿Cuántas veces ha sido hospitalizado su niño por su asma?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. ¿Cuántas veces a usado su hijo prednisona (Orapred, esteroides en pastilla, líquido o jarabe) para su asma? No incluya el día de hoy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

FOR CLINICIAN USE ONLY:

Control Assignment: Assign patient's chronic level of asthma control by looking at the box checked *farthest to the right* on questions 1-5 and match the box color to the level of asthma control in this section.

Chronic Asthma Control Classification

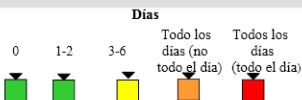
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Controlled	Partly Controlled	Mildly Uncontrolled	Moderately Uncontrolled	Severely Uncontrolled

	Tomar medicina				
6. Cuando su niño se siente bien ¿qué tan seguido le da su medicina diaria para el asma? Las medicinas diarias para el asma incluyen: Aerobid, Advair, Asmanex, Azmacort, Budesonide, Flovent, QVAR, Pulmicort, Singulair,	Mi hijo no debe de tomar medicina diaria para el asma <input type="checkbox"/>	Todo el tiempo: 5 a 7 días por semana <input type="checkbox"/>	Casi todo el tiempo: 3 a 4 días por semana <input type="checkbox"/>	Parte del tiempo: 1 a 2 días por semana <input type="checkbox"/>	Nunca <input type="checkbox"/>

Síntomas de asma

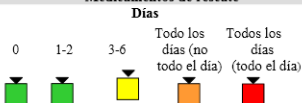
7. Durante los **últimos 7 días**, ¿cuantos días ha presentado su hijo(a) síntomas de asma?

*Por ejemplo: tos, presión o dolor de pecho, falta de aire, flema (escupe, moco, flema al toser), dificultad para respirar profundo, tiene silbidos o hace día)



Medicamentos de rescate

8. Durante los **últimos 7 días**, ¿cuantos días le ha dado a su hijo(a) medicamento para alivio rápido de los síntomas de asma? Por ejemplo: Albuterol, Inhalador, spray, Bomba, Máquina, nebulizador



Ataques o Crisis Días

9. Durante los **últimos 7 días**, ¿cuantos días a su hijo(a) un ataque de asma? Por ejemplo: cuando le cuesta trabajo respirar; cuando usted tiene que darle más medicamento; cuando las medicinas no funcionan.



Limitación a la actividad física

10. Durante los **últimos 7 días**, ¿qué tanto ha limitado el asma la actividad física de su hijo?



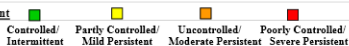
Síntomas nocturnos

11. En las **últimas dos semanas**, ¿cuantas noches el asma de su hijo(a) lo ha despertado o no lo ha dejado dormir?



12. Por favor escriba cualquier otra cosa que usted quiere que su doctor sepa acerca del asma de su hijo(a).

FOR CLINICIAN USE ONLY: Control/Severity Assignment



Assign patient's current level of asthma control/severity by looking at the box checked *farthest to the right* on questions 7-11 and match the box color to the level of asthma control/severity in this section.

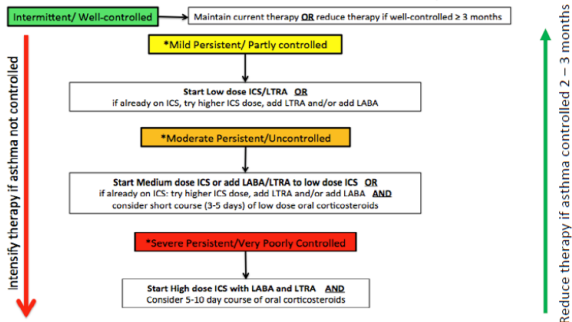
Severity categories are for patients **not on controller therapy**. Control categories are for patients **currently taking controller therapy**.

The goal for all patients is to have **controlled** asthma with the least amount of medication and no side effects.

If asthma is **not controlled**, possible explanations include: acute respiratory infection, under-treatment with daily controller medications, poor inhaler technique, poor adherence, environmental allergies and/or exposures, comorbid conditions (see treatment algorithm on page 3).

Follow-up in 2 – 6 weeks is recommended.

Treatment Recommendations Based on Asthma Control or Severity Level



* IF ASTHMA IS NOT CONTROLLED, ALSO CONSIDER EACH OF THE FOLLOWING:

- Acute Respiratory Infection: patient may benefit from regular use of Albuterol (e.g., 4 times a day) during the acute illness
- Inhaler technique: is patient using spacer with MDI? have patient demonstrate inhaler technique
- Medication adherence: review patient response to PACCI adherence question review pharmacy record of filled medications
- Environmental allergies and exposures: has patient been allergy tested? is there secondhand smoke exposure?
- Comorbid conditions: allergic rhinitis sinusitis obesity gastro-esophageal reflux
- Asthma specialist referral: systemic steroids ≥ 2 times/year intubation/ICU admit uncontrolled asthma on high dose ICS

Inhaled Corticosteroids (ICS)	Child 0-4 years old			Child 5-11 years old			>12 years old								
	Low Dose	Medium	High Dose	Low Dose	Medium	High Dose	Low Dose	Medium	High Dose						
Beclomethasone/QVAR MDI	40mcg 80mcg	N/A	N/A	N/A	2-4 puffs 1-2 puffs	>2-4 puffs	>4 puffs	2-4 puffs 1-3 puffs	>3-6 puffs	>6 puffs					
Budesonide/Pulmicort DPI Flexhaler	90mcg 180 mcg	N/A	N/A	N/A	2-4 inhal 1-2 inhal	>2-4 inhal	>4 inhal	2-6 inhal 1-3 inhal	4-6 inhal	>6 inhal					
Budesonide/PulmicortRespule neb	0.25mg 0.5mg	2 nebs 1 neb	>2 nebs 2 neb	>2 nebs	2 nebs 1 neb	4 nebs 2 nebs	4 nebs	N/A	N/A	N/A					
Fluticasone/Flovent MDI	44 mcg 110 mcg 220 mcg	4 puffs 1 puff	5-8 puffs 1-3 puffs 1 puff	>8 puffs >3 puffs >1 puff	2-4 puffs 1 puff	5-8 puffs 3 puffs 1 puff	>8 puffs >3 puffs >1 puffs	2-6 puffs 2 puffs 1 puff	6-10 puffs 2-4 puffs 1-2 puffs	>10 puffs >4 puffs >2 puffs					
Fluticasone/Flovent Diskus DPI	50 mcg 100 mcg 250 mcg	N/A	N/A	N/A	2-4 inhal 1-2 inhal	3-4 inhal 1 inhal	>4 inhal >2 inhal	2-6 inhal 1-3 inhal 1 inhal	6-10 inhal 4-5 inhal 2 inhal	>10 inhal >5 inhal >2 inhal					
Mometasone/ Asmanex Twisthaler DPI	200mcg	N/A	N/A	N/A	N/A	N/A	N/A	1 inhal	2 inhal	>2 inhal					
Combination Drugs—ICS + LABA: patient should not take more than: 2 puffs per dose of the combo MDI or 1 puff per dose of the combo DPI															
Fluticasone/ 45/21 mcg MDI	Salmeterol	115/21 mcg (Advair)	230/21 mcg	N/A	N/A	N/A	1-2 puffs	2-4 puffs	2 puffs	1 puff	1-3 puffs	3-4 puffs	2-3 puffs	3-4 puffs	1-2 puffs
Fluticasone/100/50 mcg MDI	Salmeterol	250/50 mcg (Advair)	500/50 mcg	N/A	N/A	N/A	1 inhal	1-2 inhal	1 inhal	1 inhal	1 inhal	1-2 inhal	1 inhal	1- inhal	
Budesonide/ 80/4.5mcg Formoterol 160/4.5mcg MDI	Symbicort			N/A	N/A	N/A	N/A	N/A	N/A	N/A	1-3 puffs	4 puffs	2-3puffs	3-4 puffs	
Mometasone/Formoterol (Dulera) 100/5mcg MDI				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1 puff	2 puffs		

Notes: MEDICATION DOSES of puffs or nebs in the chart are for **TOTAL DOSES PER DAY** (e.g., 2 puffs = 2 total puffs per day).

Combination drugs are assumed to be equivalent to doubling of the ICS dose alone (e.g., 1 puff of Fluticasone/Salmeterol 45/21 = 2 puffs of Fluticasone 44)

N/A and blank areas indicate that there is no on-label recommended dosing available. **INHAL:** inhalation of DPI

ICS: inhaled corticosteroid; **LTRA:** leukotriene receptor antagonist; **LABA:** long acting beta₂-agonist; **MDI:** metered dose inhaler; **DPI:** dry powder inhaler



Allergy & Asthma Network
Mothers of Asthmatics

Respiratory Inhalers At a Glance

2013

Allergy & Asthma Network Mothers of Asthmatics (AANMA) is a 501(c)(3) national nonprofit organization that provides award-winning patient education, advocacy and community outreach services.

Helping families breathe easier

aanma.org 800.878.4403

☐ = DOSE COUNTER
ⓐ = ASTHMA
ⓑ = COPD

Short-acting bronchodilators relax tight muscles in airways and offer quick relief of symptoms such as coughing, wheezing and shortness of breath for 3-6 hours

ProAir[®] HFA
albuterol sulfate
ⓐ ⓑ

Proventil[®] HFA
albuterol sulfate
ⓐ ⓑ

Ventolin[®] HFA
albuterol sulfate
ⓐ ⓑ

Xopenex HFA[®]
levalbuterol tartrate
ⓐ ⓑ

Long-acting bronchodilators relax tight muscles in airways and offer lasting relief of symptoms such as coughing, wheezing and shortness of breath for at least 12 hours

Arcapta[™] Neohaler[™]
indacaterol inhalation powder
ⓐ ⓑ

Foradil[®] Aerolizer[®]
formoterol fumarate inhalation powder
ⓐ ⓑ

Serevent[®] Diskus[®]
salmeterol xinafoate inhalation powder
ⓐ ⓑ

Inhaled corticosteroids reduce and prevent swelling of airway tissue; they do not relieve sudden symptoms of coughing, wheezing or shortness of breath

Asmanex[®] Twisthaler[®]
110 mcg
220 mcg
mometasone furoate inhalation powder
ⓐ ⓑ

Alvesco[®] HFA
80 mcg
160 mcg
ciclesonide
ⓐ ⓑ

Flovent[®] Diskus[®]
50 mcg
100 mcg
250 mcg
fluticasone propionate inhalation powder
ⓐ ⓑ

Flovent[®] HFA
44 mcg
110 mcg
220 mcg
fluticasone propionate
ⓐ ⓑ

Pulmicort Flexhaler[®]
90 mcg
180 mcg
budesonide inhalation powder
ⓐ ⓑ

QVAR[®] (HFA)
40 mcg
80 mcg
beclomethasone dipropionate
ⓐ ⓑ

Combination medications contain both long-acting bronchodilator and inhaled corticosteroid

Advair Diskus[®]
100/50
250/50
500/50
fluticasone propionate and salmeterol inhalation powder
ⓐ ⓑ

Advair HFA
45/21
115/21
230/21
fluticasone propionate and salmeterol
ⓐ ⓑ

Breo[™] Ellipta[™]
100/25 mcg
fluticasone furoate and vilanterol
ⓐ ⓑ

Dulera[®]
100/5
200/5
mometasone furoate and formoterol fumarate
ⓐ ⓑ

Symbicort[®] (HFA)
80/4.5
160/4.5
budesonide and formoterol fumarate dihydrate
ⓐ ⓑ

Anticholinergics relieve cough, sputum production, wheeze and chest tightness associated with chronic lung diseases

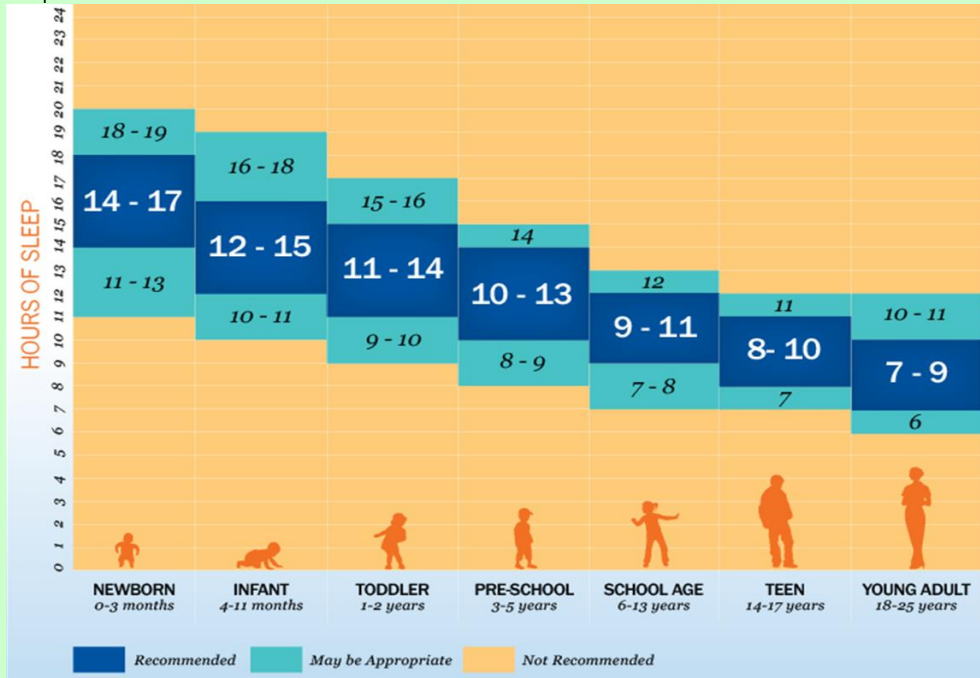
Atrovent[®] HFA
ipratropium bromide
ⓐ ⓑ

Combivent[®] Respimat[®]
ipratropium bromide and albuterol
ⓐ ⓑ

Spiriva[®] HandiHaler[®]
tiotropium bromide inhalation powder
ⓐ ⓑ

Tudorza[™] Pressair[™]
acclidinium bromide inhalation powder
ⓐ ⓑ

Sleep Duration Recommendations



NEUROLOGY

STATUS EPILEPTICUS

Assessment: Causes include fever, subtherapeutic anticonvulsant levels, CNS infections, trauma, toxic ingestion, metabolic abnormalities

Acute Management:

1. ABC, vitals, O2, IV access, correct hypoglycemia, consider thiamine
2. Labs: Chem10, LFTs, CBC, tox screen, anticonvulsant levels, blood cx.
3. Meds:

Initial

- Lorazepam (Ativan): 0.1 mg/kg IV (max 2 mg). May repeat twice. (Adult max dose 8mg)
- OR Diazepam (Valium): 0.2-0.5 mg/kg IV (max IV dose 5mg) or 0.5 mg/kg PR (PR dose range 2.5-20mg)
- If no IV access, can use intranasal, buccal, or IM midazolam 0.1mg/kg

If seizures persist, load with:

- Fosphenytoin: 20 mg PE/kg IV at 3mg/kg/min PIV (max 150 mg PE/min)
**Fosphenytoin preferred over phenytoin due to risk of avascular necrosis from phenytoin extravasation & less cardiac side effects.*
- OR Phenytoin: 20 mg/kg IV slow 1 mg/kg/min via central line. Maintenance 5 mg/kg/day BID; therapeutic level 10-20 mg/L
- *Do not use Fosphenytoin or phenytoin in patients with known SCN1A mutations (Dravet, GEFS+).*
- OR Phenobarbital: 20 mg/kg IV at 1 mg/kg/min; then 5 mg/kg/dose Q 15-30 min max 30 mg/kg; maintenance: 5 mg/kg/day BID; therapeutic levels: 15-40.

If still persistent, consider:

- Levetiracetam: 20-30 mg/kg IV at 5mg/kg/min
 - Valproate: 20 mg/kg IV at 5mg/kg/min
4. Diagnostic workup when stable: CT, MRI, EEG, LP
 5. If CNS infection is suspected, give antibiotics and/or acyclovir early
 6. Call Pediatric Neurology

Febrile Seizures

(Note: Evaluate source of fever as indicated)

Simple	Complex
Associated with febrile illness (usually with rise of fever) Generalized tonic/clonic Less than 15 min duration 6 months to 6 years Neurologic Exam is non-focal No underlying neurological disorders Family history: Only 10-20%	Does not meet criteria for a simple febrile seizure Can be associated with neurologic deficits Neuro Consult required Needs workup: LP, CT, EEG

Lumbar Puncture

Ages 4–13 yrs, CSF volume ranges between 65 and 150 mL. Fully replenished ~q4–6 h. The volume removed by a routine lumbar puncture (3–5 mL) is reconstituted in < 1 h.

Steps:

1) LP consent form.

2) LP kit (supply closet or central supply) contains: 22G x 1.5" spinal needle, 3 iodine swab sticks, 1% lidocaine +25G needle + 5cc syringe, drapes, gauze, 4 collection tubes, +/- manometer. Get extra 22G needles for multiple attempts. Needle length: 1.5in for <3 yrs, 3in for >3yrs.

3) Order CSF studies.

Cultures & cell count from the clearest CSF. 1. Gram-stain & bac culture; 2. glu & total protein; 3. Cell count (WBC c diff & RBC); PCR if desired (e.g., enteroviruses, HSV, EBV, Borrelia burgdorferi).

4) Position in lateral decub position, max flex at the waist & neck, maintaining adequate ventilation. Alternatively, seated position, w/ legs over side of exam table, flexed at the waist. Find L3-L4 interspace via **horizontal line between bilateral superior iliac.**

a) Clean skin using iodine in widening concentric circles out to superior iliac. Sterile drapes covering the iliac crests.

b) Insert needle towards umbilicus w/ bevel facing up in lying position. In sitting position, bevel face either right or left of the patient. Advance the needle through the **skin, subQ, supraspinous ligament, interspinous ligaments, ligamentum flavum, epidural space, dura, and pierce the arachnoid** into the subarachnoid space between the nerve roots of the cauda equine. Remove stylet & check for CSF flow.

- "Cincinnati" method: spinal needle introduced with stylet in place, until completely beneath the epidermis and dermis. Remove stylet and advance spinal needle. Reinsert stylet after CSF collection prior to withdrawing the needle.

- CSF opening pressure: manometer is attached to a three-way stopcock, which is inserted into the hub of the spinal needle, and CSF is allowed to flow and fill the cylinder until reaching equilibrium.

Contraindications

•••

- hypotension, epidural abscess, increased ICP, coagulopathy, seizure, lumbar skin infection

Comfort/Sedation

•••

- oral sucrose; EMLA cream; subcutaneous lidocaine; or a short-acting sedative like oral or intravenous midazolam. Sedation is reserved for highly anxious or very uncooperative patients.

	BACTERIA	VIRAL	FUNGAL	TUBERCULAR
OPENING PRESSURE	ELEV	NL	VARIABLE	VARIABLE
WBC, Differential	>1000/uL, PMNs	<100/uL Lymphs	VARIABLE, Lymphs	VARIABLE, Lymphs
PROTEIN	ELEV	NL-ELEV	ELEV	ELEVATED
CSF-TO-SERUM GLUCOSE	NL-DEC	NL	DEC	DECREASED

NEUROLOGY

PAIN and SEDATION MEDS

Codeine	0.5-1 mg/kg/dose PO; duration 3-4 hrs; may cause severe nausea
Meperidine	1-2 mg/kg/dose IV/PO; ↑HR; don't use with MAO inhibitors, can cause seizures, low dose stops shivering
Oxycodone	0.1 mg/kg/dose PO; duration 3-4 hrs
Methadone	0.1 mg/kg/dose PO/IV; duration 4-24 hrs
Morphine	0.1 IV / 0.1-0.2 IM/SC / 0.3-0.5 PO mg/kg/dose; releases histamine
Hydromorphone	0.015 IV/SC / 0.02-0.1 PO mg/kg/dose; less sedation, nausea, pruritus
Fentanyl	1 mcg/kg/dose IV; duration 30 min - 1 hr; drip 0.5-1 mcg/kg/hr; pruritus, bradycardia, chest wall rigidity (treat with naloxone or neuromuscular blockade), respiratory depressant
Benzodiazepine	(Ativan, Versed, Valium) 0.05-0.1 mg/kg/dose IV; can use PR (Valium 0.2-0.5 mg/kg/dose); ↓HR/RR/BP
Chloral Hydrate	25-100 mg/kg/dose PO/PR ÷ Q6-8 hr, max 2 gm/dose
Ketamine	0.25-0.5 mg/kg/dose IV, 1.5-2 mg/kg/dose IM, 5 mg/kg/dose PO; general anesthetic; ↑HR/BP/ICP, secretions

Topical:

- **EMLA:** (Eutectic mixture of local anesthetics) = Lidocaine 2.5% & Prilocaine 2.5%; apply at least 60 min prior to procedure and cover with occlusive dressing.
- **LET:** Lidocaine 4%, Epinephrine 0.1%, and Tetracaine 0.5%; apply 20-30 min prior, not for nose, pinna of ear, penis and digits, avoid mucus membranes, vasoconstriction.

NEUROLOGY

Increased Intracranial Pressure

- **History:** Trauma, vomiting, fever, headache, neck pain, unsteadiness, seizures, neurologic condition, visual change, gaze preference, change in mental status. In infants: irritability, poor feeding, lethargy, and bulging fontanelle.
- **Examination:** Cushing response (hypertension, bradycardia, abnormal respiratory pattern), neck stiffness, photophobia, pupillary response, cranial nerve dysfunction (esp paralysis of upward or lateral gaze), papilledema, absence of venous pulsations on eye grounds, neurologic deficit, abnormal posturing, and abnormal mental status examination.
- **Management:** DO NOT lower BP if elevated ICP. C-spine immobilization if trauma.
- **Stable Child:** (not comatose, stable vital signs, no focal findings): Cardiac monitor, Elevated head of bed 30 degrees, CBC, lytes, glucose, blood culture prn. Urgent head CT, emergent neurosurgical consult, antibiotics if meningitis.
- **Unstable Child:** Emergent neurosurgical consult & management.
 - Elevate head of bed 30 degrees, C-spine immobilization if trauma.
 - Use normal saline or hyperosmolar solutions for maintenance fluids, maintain normoglycemia
 - 3% NaCl, 2-5 ml/kg or Mannitol 0.25-0.5 g/kg IV for temporary relief.
 - Reserve hyperventilation for acute management; keep PCO₂ at 30-35 mmHG. Neuroprotective intubation (consider lidocaine, atropine, thiopental, rocuronium; avoid ketamine). Continue paralysis & sedation.
 - Emergent Head CT and shunt series if VP shunt in place.
 - LP CONTRAINDICATED due to herniation risk. Do not delay antibiotics if meningitis. If tumor/abscess consider dexamethasone to reduce cerebral edema.
 - Cerebral perfusion pressure (CPP) = MAP – ICP.
 - Prevent hyperthermia, goal temp < 37.5°C
 - Avoid hypotension, hypoxia, hypercarbia, hyperglycemia, & hypovolemia

Signs of Impending Herniation

- Cushing's triad (hypertension, bradycardia, abnormal respiratory pattern).
- Asymmetric response to pain, Decorticate/decerebrate postures.
- Asymmetric or diminished pupillary response

NEUROLOGY

Glasgow Coma Scale (GCS) Score:

Best Motor Response		Eye Opening		Best Verbal Response	
Obeys commands	6	Spontaneous	4	Oriented	5
Localizes pain	5	To speech	3	Confused (irritable)	4
Withdraws to pain	4	To pain	2	Inappropriate words (cries to pain)	3
Abnormal flexion	3	None	1	Incomprehensible (moans to pain)	2
Abnormal extension	2			None	1
None	1				

Coma

- **History:** Trauma, ingestion, infection, fasting, drug use, diabetes, seizure, other neuro disorder
- **Examination:** HR, BP, respiratory pattern, Glasgow Coma Scale, temperature, pupillary response, funduscopy, rash, abnormal posturing, and focal neurologic signs.
- **Management: ABC DON'T:** Airway (C-spine immobilization), Breathing, Circulation, Dextro stick, Oxygen, Naloxone, Thiamine.
- **Lab Tests:** CBC, Lytes, LFTs, NH₃, lactate, tox screen, ABG/VBG, serum osmolality, PT/PTT, Blood/Urine Cultures, plasma amino acids, urine organic acids, etc.
- Consider LP, CT Scan, EEG.

Spinal Cord Injury

- **Signs:** Motor and/or Sensory dysfunction, neck/back pain, loss of bowel/bladder control.
- **Treat** underlying cause (trauma, tumor, infarct, fracture, infection), neurosurgery consult.
- **Trauma:** immobilize neck/back, within 8 hours of injury for efficacy:
- **Supportive care:** maintain airway, aspiration precautions, DVT prophylaxis, foley catheter, caution for autonomic instability.

NEUROLOGY

PECARN 2009 Head Trauma Algorithm

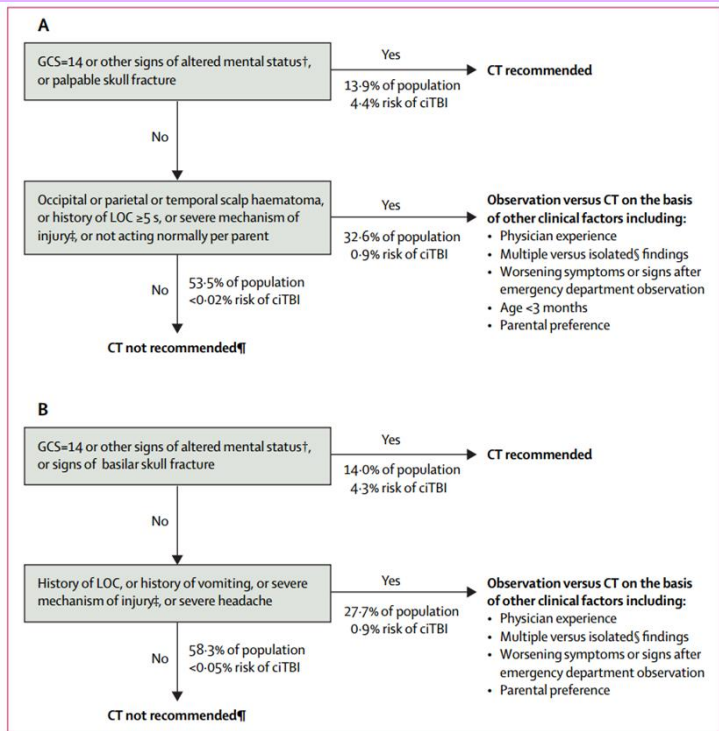


Figure 3: Suggested CT algorithm for children younger than 2 years (A) and for those aged 2 years and older (B) with GCS scores of 14–15 after head trauma*

NEPHROLOGY

Oliguria or Anuria

- Flush foley, make certain foley is patent.
- Decide if prerenal, renal or postrenal.
- Labs: lytes, BUN, Cr, uric acid, PO₄, Urine Analysis, Specific Gravity, Urine sodium, Urine urea, Urine Cr
- Adjust all meds to renal dosing.

	BUN/Cr	S.G.	UNa	Uosm	FENa	FEUrea
Prerenal	>20	>1.020	<20	>500	<1%	>50%
Renal	<10	<1.020	>40	<350	>3%	<35%

$$FENa = [(UNa \times PCr) / (PNa \times UCr)] \times 100$$

$$FEUrea = [(Urea \times PCr) / (Purea \times UCr)] \times 100 \text{ ** (if on diuretics)}$$

Indications for Acute Dialysis

- Indicated when metabolic or fluid derangements are not controlled by aggressive medical therapy alone. General criteria include the following and consult a nephrologist to help guide:
 - Volume overload with evidence of pulmonary edema or hypertension that is refractory to therapy
 - Hyperkalemia >6 if hypercatabolic or 6.5 despite conservative measures
 - Metabolic acidosis with pH <7.2 or HCO₃ <10
 - BUN >100
 - Uremia or electrolyte related neuro symptoms
 - Ca or Phos imbalance refractory to medical therapy
- Indicated in presence of dialyzable toxin or poison (lactate, ammonia, alcohol, barbiturates, ethylene glycol, isopropanol, methanol, salicylates, theophylline)

Hypertensive Urgency/Emergency

- Emergency: Acute severe symptomatic elevation in BP WITH evidence of end-organ damage and/or encephalopathy
- Urgency: Acute severe elevation in BP WITHOUT evidence of end-organ damage and/or encephalopathy
- Treatment options:
 - Nifedipine: 0.1-0.25mg/kg/dose PO, max 10mg, q4-6hr
 - Clonidine 0.05-0.1mg/kg/dose PO, can rpt, max dose 0.8mg total, spot clonidine dosing only works if already on clonidine routinely (ie with patch)
 - Labetalol iv 0.25-0.3 mg/kg/hour iv (to PICU)
 - Nicardipine gtt (to PICU): 0.5mcg/kg/min, titrate

GASTROENTEROLOGY

Stress Ulcer Prophylaxis

- Famotidine (Pepcid) 0.5-1 mg/kg/dose PO/IV Q12 hr (Max 20mg q12)
- Ranitidine (Zantac) 1-2 mg/kg/dose PO Q12 hr or 2-4 mg/kg/day ÷ IV Q6-8 hr
- Pantoprazole (Protonix) 1 mg/kg/day PO/IV Q24 hr (max 40mg/dose)
- Avoid simultaneous PPI and H2 blocker – In select cases, can administer both, but give the PPI at a different time

GI Bleeding

- Pantoprazole (Protonix) 1 mg/kg/dose PO/IV Q12hr (max 40mg/dose)
- If patient has portal HTN/esophageal varices, consider octreotide drip (start with bolus 1-2 mcg/kg, then continuous infusion of 2 mcg/kg/hour, can titrate up to 5 mcg/kg/hour for severe GI bleed, adult dose 50mcg/hr)
- Keep plts>50-75, INR<1.5-2, Fib>100-150 for active GI bleed
- UGI bleed: Place large NGT (Salem Sump) – even if varices or coagulopathy
 - 2 large bore IVs
 - Obtain T&S, CBC, Coags
 - Lavage with room temp NS or sterile H2O (2-4 oz) x3, look for clearance

Motility Agents

- Metoclopramide (Reglan) 0.1-0.2 mg/kg/dose PO/IV/IM Q6h, 15min before meals (Max 10mg/dose)
- Erythromycin 3-10mg/kg/dose PO Q6-8h, 15min before meals (Max 250mg/dose)

Constipation

- Miralax starting dose ½ (8.5g) to 1 capful (17g) PO QD-BID. Titrate to effect.
- Mineral Oil 5-15 ml/24 hr ÷ PO QD-TID (NOT <1 year old, risk of aspiration)
- Lactulose 7.5ml/24 hr PO QAM. Titrate to effect. (for hepatic enceph only)
- Docusate (Colace) 10 mg/year age/dose ÷ PO QD-QID (max 500 mg/dose)
- Bisacodyl (Dulcolax) 0.3 mg/kg/24 hr PO; <2yrs 5mg, >2yrs 10mg PR prn.

Emesis

- Kytril (Granisetron) (10-20 mcg/kg IV 30 min prior to chemo)
- Zofran (Ondansetron) 0.15 mg/kg/dose IV Q4 hr
- Reglan 0.1-0.2 mg/kg/dose Q2-6 hr
- Benadryl (Diphenhydramine) 1 mg/kg/dose Q6 hr PO/IV/IM
- Scopolamine patch 1mg/day over 3 days, q72 hr transdermal 2nd line
- Always use Phenergan, Compazine, or Reglan with Benadryl to prevent dystonic reactions
- Compazine (Prochlorperazine) 0.1 mg/kg/dose PO/PR Q6 hr
- Promethazine (Phenergan) 0.25-1 mg/kg/dose IV/IM/PO/PR Q4-6 hr

Transplant Meds

- Bactrim for PCP ppx: 150 mg TMP/m²/day once daily Mon-Fri for ITx recipients, ÷ BID QSat/Sun for LTx recipients
- Ganciclovir for EBV/CMV ppx: 5mg/kg/dose IV BID (early post-tx or active viremia), 6mg/kg/dose IV daily (later post-tx)
- IVIG replacement therapy for hypogammaglobulinemia: 400-500 mg/kg IV

Steroids

$$\text{BSA (in m}^2\text{)} = \sqrt{(\text{wt} \times \text{ht}/3600)}$$

Dosing*		
Maintenance Replacement	Hydrocortisone 10-15 mg/m ² /day div Q8-12h	
Mild Stress Mild-moderate febrile illness	2-3x maintenance ~20-50 mg/m ² /day div Q8-Q12h	
Severe Stress Major illness, shock, trauma, surgery, unable to take PO	100 mg/m ² /day div Q8h IV/IM	
Age-based Stress Estimate	< 5 years = 25mg 5-12 years = 50mg >12 years = 100mg	
Conversion*		
	Potency	Half-Life
Short-Acting		
Cortisone	0.8x	8-12h
HCT (Cortef, Solu-cortef)	1x	8-12h
Intermediate-Acting		
Prednisone	4x	18-36h
Prednisolone	4x	18-36h
Methylprednisolone (Solumedrol)	5x	18-36h
Long-Acting		
Dexamethasone (Decadron)	25x	36-54h

* Expressed in terms of hydrocortisone

ENDOCRINOLOGY - HYPOGLYCEMIA

FOR ANY POC BG < 50 MG/DL

- Draw critical blood sample before feeding or IV dextrose
 - Always send **serum glucose** immediately to confirm POC as a true low
 - Prioritize the following labs based on amount of blood able to collect:
 - Beta hydroxybutyrate or acetoacetate
 - Serum insulin level
 - Bicarbonate
 - Lactate
 - Growth hormone
 - Cortisol
 - Uric acid
 - Free fatty acid
 - TSH and free or total T4
 - Total/free/esterified carnitine
 - Acylcarnitine profile
 - Ammonia
- Always place bag to collect next urine void, send RUA & urine organic acid
- Then give glucagon 1mg IV
- Draw serum glucose 30 minutes after glucagon
- Then give feed or dextrose bolus to treat hypoglycemia
- A glycemic response of > 30 mg/dL following glucagon stimulation is consistent with a diagnosis of hyperinsulinism

ENDOCRINOLOGY: DKA

PICU Admission:

- Altered mental status, GCS <8

StepDown Admission:

- Arterial pH < 7.3 or venous pH < 7.25
- Bicarb or CO₂ < 15
- Severe vomiting/dehydration
- Glucose > 600

Equations:

- Anion gap $[Na] - ([Cl] + [HCO_3])$
 - *nl AG 12±2, AG>14 suggests DKA*
- Osmolality
 $2 \times Na + (glc/18) + (BUN/2.8)$
- Corr Na = measured Na + $(0.016 \times (glc - 100))$
 - *NOT used for Osm or AG calcs*

<i>Insulin Preparations</i>	Onset (hr)	Peak (hr)	Duration (hr)
Rapid-Acting			
Aspart (Novolog)	5-15 min	45-75 min	2-4
Lispro (Humalog)			
Glulisine (Apidra)			
Regular	0.5-1	2-4	5-8
Intermediate-Acting			
NPH	2	4-12	18-28
Long-Acting			
Glargine (Lantus)	2	None	20-24
Detemir (Levemir)	2	3-9	6-24* *(dose-dep)

Diabetic Ketoacidosis Management

****Please use "Ped Diabetic Ketoacidosis (DKA) Admission" - Orderset****

1. Fluids:

- a. Resuscitation (ED)
 - i. Bolus 10mL/kg of NS
 - ii. Second bolus 10mL/kg NS only if continued hemodynamic instability
- b. Fluid deficits + maintenance (ED/PICU)
 - i. Calculate fluid deficit, estimated for DKA at 5-10% dehydration
 - ii. Subtract fluid amount given during resuscitation
 - iii. Distribute the remainder during the next 48h, or if severe hyperosmolality at onset, distribute over 72h
 - iv. In addition to replacing fluid deficits, add maintenance fluids to the hourly rate
 - v. TOTAL IVF is often estimated at 1.5x MIVF
 1. 2 bag system → variable rate IVF with constant rate insulin gtt

Non-dextrose Bag:	Dextrose Bag:
NS+Kacetate 20mEq/L+KPhos 20mEq/L	D10% NS+Kacetate 20 mEq/L+KPhos 20mEq/L
**Consider <u>HOLD</u> KCl & KPhos if K > 5.0 **Consider 2/3 NS esp if age <5y	**Consider <u>HOLD</u> KCl & KPhos if K > 5.0 **Consider 2/3 NS esp if age <5y

c. For initial BG > 800 mg/dL

BG	Non-dextrose bag+Dextrose bag = total fluids (1.5xM)	
>501	100%	0
401-500	75%	25%
301-400	50%	50%
201-300	25%	75%
<200	0	100%
<60	0	125%

d. For initial BG < 800 mg/dL

BG	Non-dextrose bag+Dextrose bag = total fluids (1.5xM)	
>350	100%	0
301-350	75%	25%
251-300	50%	50%
201-250	25%	75%
<200	0	100%
<60	0	125%

*continued on back

2. Insulin Therapy

- a. Regular Insulin gtt: 0.05-0.1 units/kg/hr
- b. If acidosis persists despite normal BG, continue IV insulin at current rate and increase dextrose concentration in IVF to D12.5%
- c. Transition to SC insulin: AG normalized (<16), Bicarb normalized (>20)
 - i. Overlap SC Lantus/Levemir/NPH w/ insulin gtt by 2hr, Novolog by 30min-1hr w/ insulin gtt
 - ii. Carb-cover 1st meal with SC Novolog

3. Special Considerations

- a. Bicarbonate administration
 - Use ONLY with approval of the attending physician (i.e. if arterial pH < 6.9)
 - Dose: 1-2 mEq/kg IV over 2-4 hours.
- b. K replacement
 - Usually required by the 2nd hour of treatment
 - Addition of K-acetate in IVF – see 2 bag system above
 - After IVF d/c'd- if still hypoK prefer PO replacement (PO KCl)
 - Dose: 2-5 mEq/kg/day in divided doses, not to exceed 1-2 mEq/kg as a single dose

4. Monitoring

- a. Exam:
 - Neuro assessments Q 1 hour (risk of cerebral edema)
 - Hydration status, continuous strict I/Os
- b. Labs
 - Admission: serum glucose, serum ketones, ABG/VBG, BMP, Ca/Mg/Phos, CBC, urinalysis
 - For new-onset DM: TSH, automated free T4, C-peptide, HbA1c, GAD-65 antibody, islet cell antibody (ICA-512 Ab), insulin antibody (IAA), sendout (Quest) ZnT8 Ab, IA-2 Ab (CPT code for both 86341)
 - On-going
 - Q 1 hour BG while on gtt: should not fall faster than 50 mg/dL/hr
 - Q 4 hour BMP, Ca/Mg/Phos +/- VBG until AG closed

5. Classification of DKA

- Dx: BG >250, + ketones, pH <7.3, bicarb <16, AG >16
- By definition all patients admitted with DKA have dehydration, so dehydration should be noted as a diagnosis on the patient's problem list

	Mild	Moderate	Severe
pH	7.2-7.3	7.1-7.2	<7.1
Bicarbonate	10-15	5-10	<5
Mental status	Alert	Alert/drowsy	drowsy

* Utilize the SC Insulin Order Set when transitioning to subcutaneous insulin and the Diabetes Discharge Medications/Supplies order set for discharge*

FLUIDS AND ELECTROLYTES

NS = 154 mEq/L Na, ½ NS = 77mEq/L Na

3% NaCl = 513 mEq/L Na

D5W = 5 gm dextrose/100 ml

Maintenance fluid requirement:

(Euvolemic, Normal Renal Function, & Normal BP)

- D5 NS + 20 mEq/L KCl (D10 NS if <6mos, D5 NS+10mEq/L KCl if <10kg).
100 cc/kg/day for 1st 10 kg body weight
50 cc/kg/day for next 10 kg
20 cc/kg/day for each kg above 20 kg
- Rate (ml/kg/hr): First 10 kg: 4; Second 10 kg: 2; Each additional kg: 1

Dehydration

Weight Change <1y	Mild (5%)	Mod (5-10%)	Severe (>10%)
Weight Change >1y	Mild (3%)	Mod (6%)	Severe (9%)
Urine Output	Normal - ↓	Oliguria	Anuria
HR	Normal	↑HR	↑↑HR
BP	Normal	Orthostatic	↓BP
Perfusion	Normal	≥ 2 sec	> 3 sec
Membranes	Moist	Dry	Parched
Skin Turgor	Normal	Tenting	None
Tears	Present	Reduced	None
Fontanelle	Flat	Soft	Sunken

Rehydration therapy

- NS 20 cc/kg IV bolus as needed to restore BP and perfusion.
- IVF = Maintenance + deficit fluid volume - bolus fluids given
 - Deficit Fluid Volume = Pre-illness Wt (kg) x %dehydration
- Isotonic & Hyponatremic: Give half of replacement therapy in addition to maintenance needs over the first 8 hr and the second half over the next 16 hr.
- Hypernatremic: Losses should be measured and may require replacement every 6-8 hr. Deficit and maintenance should be evenly replaced over 48-72 hrs. Avoid dropping serum Na > 10mEq/L per 24 hrs, follow Na levels Q4 hrs.

Diet Order Manual:

<http://www.mednet.ucla.edu/Policies/pdf/ww/UCLADietManual.pdf?facility=ww>

FLUIDS AND ELECTROLYTES

Electrolyte Deficit: $mEq \text{ required} = (CD - CP) \times fD \times wt$ (pre-illness)
 CD = Concentration desired (mEq/L) i.e. Na 135; CP = Concentration present (mEq/L) i.e. Na 126; fD = distribution factor as fraction of body weight (L/kg) (Na: 0.6-0.7) (Cl: 0.2-0.3) (HCO₃: 0.4-0.5); wt = baseline weight before illness (kg)

Hyponatremia	Seizures caused by hyponatremia 3-5 mL/kg 3% NaCl over 20-30 min
Hypernatremia	Always with dehydration. Replace half of free water and all of the solute deficit over 24 hrs, avoid dropping serum Na > 10mEq/L per 24 hrs to minimize cerebral edema. Free water needed to decrease serum Na by 1 mEq/L is 4 ml/kg for Na < 170. Correct over 48 hrs, check Na Q 4 hr. Goal is change of <0.5 mosm/L/hr.
Hypokalemia	KCl 0.5-1 mEq/kg/dose IV over 2 hrs. (max 10 mEq in IV bolus). Use 0.5 if renal or cardiac disease.
Hyperkalemia	K = 6-7: Eliminate K from diet and IVF, Cardiac monitor, Consider Kayexalate 1-2 g/kg PO/PR Q6 hr. K > 7: Above plus Ca Gluconate (10%) 100 mg/kg/dose over 3-5 min (may repeat in 10 min, will normalize membrane NOT lower K concentration); NaHCO ₃ 1-2 mEq/kg IV over 5-10 min; Insulin 0.1 U/kg IV with D50W 1cc/kg over 30 min (central line) or D20W 2.25cc/kg over 30min (PIV) (rpt 30-60min, if needed, run Dex before insulin, monitor glucose Q1 hr); consider albuterol; consider furosemide if normal kidney function; consider dialysis if unsuccessful.
Hypomagnesemia	MgSO ₄ 25-50 mg/kg/dose IV Q4-6 hr × 3 doses (max single dose 2 gm)
Hypocalcemia	Ca Gluconate 10% 50 mg/kg IV
Hypercalcemia	Hydrate to inc UOP and Ca excretion. If GFR & BP are stable, NS with maintenance K at 2-3 × maintenance rate until Ca normalized; diuresis with Lasix; hemodialysis for severe/refractory cases.
Hypophosphatemia	NaPhos or KPhos 0.3 mmol/kg IV over 6 hr
Hyperphosphatemia	Restrict dietary phosphate; phosphate binders (calcium carbonate, aluminum hydroxide, Renvela

HEMATOLOGY

Blood Products

PRBC	10 ml/kg over 4 hr, for Hgb > 5. If Hgb < 5: transfuse 5 mL/kg over 4 hr, then repeat if needed.
Platelet	10 ml/kg Transfuse if bleeding to keep plt > 50,000. Consider prophylactic transfusion for plt < 20,000.
FFP	10-15 ml/kg
Cryoprecipitate	1 unit / 10 kg
Albumin	5% = 50 mg/ml; 25% = 250 mg/ml 0.5-1 g/kg/dose IV over 30-120 min = 10-20 cc/kg of 5% (hypovolemia) or 2-4 cc/kg of 25% (hypoproteinemia) Often followed with Lasix.
Prothrombin complex concentrate (PCC)	4 PCC (Kcentra): INR 2-4: 25units/kg; INR 4-6: 35units/kg; INR>6: 50units/kg - *always give w/ VitK Activated PCC (Feiba), Only for hemophilia with inhibitor: 50-100units/kg q6-12hrs

Iron Deficiency

Normal Values	Fe level: 50-120 Ferritin level: 7-140
1 Year	Min Hgb 11 / MCV 70
5 Year	Min Hgb 11.5 / MCV 75
10 Years	Min Hgb 12 / MCV 77
Ferrous Sulfate (elemental iron)	3-6 mg/kg/day PO ÷ QD-TID Recheck level in 1 month, Hgb should increase by >1.
Elemental Iron preparation:	Ferinsol drops 15 mg Fe/1 ml. Elixir 44 mg/5 ml.
IV Iron Sucrose (Venofer) - for non-CKD	5-7mg/kg (max 100mg) IV, repeat qweek until goal Goal repletion= 0.6 x Kg x [100-(Hgb/12 x 100)] (if 12 is goal Hgb)
IV Iron Sucrose (Venofer) - for CKD with EPO	0.5mg/kg (max 100mg) IV q 4weeks x3 doses (for non-dialysis and PD) 0.5mg/kg (max 100mg) IV q 2weeks x6 doses (for HD)

ANTI-COAGULATION THERAPY

Heparin Loading:

- 50-75 U/kg, then start 28 U/kg/hr if < 1 yr or 20 U/kg/hr if > 1 yr.
- Check PTT Q4 hr after load and every change.
- Stable heparin: check PTT QD and plt QOD.

PTT	<50	50-59	60-85	86-95	96-120	>120
Bolus - Hold	Bolus 50	No bolus	No change	No change	Hold 30 min	Hold 60 min
Change Rate	+ 10%	+ 10%	No change	- 10%	- 10%	- 15%

Low Molecular Weight Heparin (LMWH) Dosing:

- 1 mg/kg SC BID
- Goal Anti-Xa level: 0.5-1, measure 4-6 hours after 4th dose

Coumadin Loading:

Day 1, load 0.2 mg/kg PO QHS (max dose 10 mg)

Day 2-4, dose QHS as below. Check INR QD.

Short Term Adjustment

INR	1.1-1.3	1.4-1.9	2-3	3.1-3.5	>3.5
Dose Change	Repeat load	50% of load	50% of load	25% of load	Hold until <3.5 then 50% less

Long Term Adjustment

Check INR 5-7 days after new dose. Check Q month while on Coumadin.

INR	1.1-1.4	1.5-1.9	2-3	3.1-3.5	>3.5
Dose Change	+ 20%	+ 10%	No change	- 10%	Hold until <3.5 then - 20%

Reversal:

Heparin/LMWH: Protamine 1 mg/100 U heparin, consider time since last heparin dose and adjust accordingly.

Coumadin:

INR 5-7: Low risk of bleeding, hold 1-2 doses; high risk of bleeding low dose Vit K orally (1-2.5 mg for adults).

INR 7-9: Low risk of bleeding, hold and consider Vit K; high risk of bleeding Vit K orally (3-5mg for adults) or IV and FFP*

INR ≥10 or life threatening bleeding: Vit K IV (10mg for adults) and FFP*, repeat Q12 hr

*Consider use of prothrombin complex concentrate (PCC) instead of FFP for correction (if available)

BLOOD BANK

Ordering irradiated and CMV seronegative blood products

Leukoreduced blood products: filtered, majority of leukocytes removed; reduces infection risks & febrile nonhemolytic transfusion reactions

At UCLA + Cedars all RBCs + platelets are automatically leukoreduced

Irradiated blood products (IRR): irradiation inactivates lymphocytes reducing risk of transfusion associated GVHD d/t donor WBC cell engraftment in an immune-compromised recipient.

***At UCLA, you must request irradiated products if indicated → please see chart below.** At Cedars, all RBCs + platelets are irradiated. *

CMV seronegative blood products: from CMV neg donors; may be considered for CMV negative pts in order to reduce CMV infection risks.

***At UCLA + Cedars, you must request CMV negative products if indicated → please see chart below.** * However, please note for education purposes that leukoreduced products are generally considered CMV safe/equivalent.

*** if pt has ever had positive IgM, IgG, or PCR, they are not candidates for CMV seronegative products.**

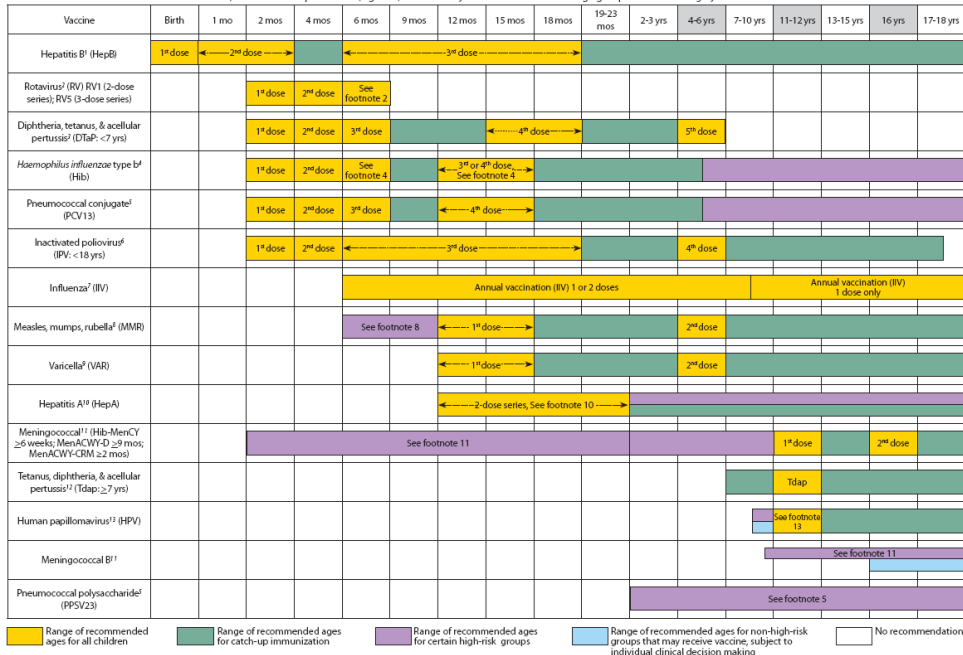
UCLA recommendations for special blood products

	CMV neg	IRR
Transplant candidate/recipient		
Heart adult/peds	Yes	No
Heart neonate (<4 months)	Yes	Yes
Liver adult	No	No
Liver peds	Yes	No
BM/PBSC candidate candidate/recipient	Yes	Yes
Allogeneic donor before/during harvest	Yes	Yes
Lung	Yes	Yes
Kidney Adult	No	Yes
Kidney Peds	Yes	No
Other medical situations		
Chemo/radiation	No	On request
AIDS/HIV	Yes	On request
ECMO neonate/peds (</=10 kg)	On request	On request
ECMO peds/adult (>10 kg)	No	No
Neonate <1300 g	Yes	Yest
Congenital immunodeficiency	Yes	Yes
DiGeorge's Syndrome	Yes	Yes
Sickle Cell/ThalasseMIas	No	No

Figure 1. Recommended Immunization Schedule for Children and Adolescents Aged 18 Years—United States, 2017.

(FOR THOSE WHO FALL BEHIND OR START LATE, SEE THE CATCH-UP SCHEDULE [FIGURE 2]).

These recommendations must be read with the footnotes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars in Figure 1. To determine minimum intervals between doses, see the catch-up schedule (Figure 2). School entry and adolescent vaccine age groups are shaded in gray.



NOTE: The above recommendations must be read along with the footnotes of this schedule.

Children age 4 months through 6 years

Minimum Interval Between Doses

Vaccine	Minimum Age for Dose 1	Dose 1-2	Dose 2-3	Dose 3-4	Dose 4-5
Hepatitis B	Birth	4 weeks	8 weeks <i>and</i> at least 16 weeks after first dose. Minimum Age for final dose is 24 weeks		
Rotavirus	6 weeks. Max age: <15 wks	4 weeks	4 weeks. Maximum age: <8 months		
DTaP	6 weeks	4 weeks	4 weeks	6 months	6 months
HIB	6 weeks	4 weeks - if first dose was administered before the 1st birthday. 8 weeks (as final dose) - if first dose was administered at age 12 through 14 months. No further doses needed if first dose was administered at age 15 months or older.	4 weeks - if current age is younger than 12 months and first dose was administered at younger than age 7 months, and at least 1 previous dose was PRP-T (ActHib, Pentacel) or unknown. 8 weeks <i>and</i> age 12 through 59 months (as final dose): • if current age is younger than 12 months <i>and</i> first dose was administered at age 7 through 11 months (wait until at least 12 months old); OR • if current age is 12 through 59 months <i>and</i> first dose was administered before the 1st birthday, and second dose administered at younger than 15 months; OR • if both doses were PRP-OMP (PedvaxHIB; Comvax) <i>and</i> were administered before the 1st birthday (wait until at least 12 months old). No further doses needed - if previous dose was administered at age 15 months or older.	8 weeks (as final dose) - This dose only necessary for children age 12 through 59 months who received 3 doses before the 1st birthday.	
PCV	6 weeks	4 weeks - if first dose administered before the 1st birthday. 8 weeks (as final dose for healthy children) - if first dose was administered at the 1st birthday or after. No further doses needed - for healthy children if first dose administered at age 24 months or older.	4 weeks - if current age is younger than 12 months and previous dose given at <7months old. 8 weeks (as final dose for healthy children) - if previous dose given between 7-11 months (wait until at least 12 months old); <i>OR</i> if current age is 12 months or older and at least 1 dose was given before age 12 months. No further doses needed for healthy children if previous dose administered at age 24 months or older.	8 weeks (as final dose) - This dose only necessary for children aged 12 through 59 months who received 3 doses before age 12 months or for children at high risk who received 3 doses at any age.	
IPV	6 weeks	4 weeks	4 weeks	6 months (minimum age 4 years)	
MMR	12 months	4 weeks			
VZV	12 months	3 months			
HAV	12 months	6 months			
MCV	6 weeks	8 weeks	* Standard age is 11-12 years for 1st dose, booster at 16 years. * If 13-15yrs give first dose, then booster 16-18yrs (w/ min 8 weeks between). * If 16-18yrs give single dose.		
Children and adolescents age 7-18 years					
MCV	N/A	8 weeks	*see above notes		
Tdap	7 years	4 weeks	4 weeks - if first dose of DTaP/DT was administered before the 1st birthday. 6 months (as final dose) - if first dose of DTaP/DT or Tdap/Td was administered at or after the 1st birthday.	6 months - if first dose of DTaP/DT was administered before the 1st birthday.	
HPV	9 years	* Routine dosing intervals recommended			
HAV	N/A	6 months			
Hepatitis B	N/A	4 weeks	8 weeks <i>and</i> at least 16 weeks after first dose.		
IPV	N/A	4 weeks	4 weeks		
MMR	N/A	4 weeks			
VZV	N/A	3 months if younger than age 13 years. 4 weeks if age 13 years or older.			

Abridged Footnotes: Details at:

<http://www.cdc.gov/vaccines/schedules/hcp/imz/child-adolescent.html>

1. Hepatitis B (HepB) vaccine. (Minimum age: birth)

Routine vaccination:

At birth:

- Administer HepB vaccine to all newborns before hospital discharge.
- For infants born to hepatitis B surface antigen (HBsAg)-positive mothers, administer HepB vaccine and 0.5 mL of hepatitis B immune globulin (HBIG) within 12 hours of birth. These infants should be tested for HBsAg and antibody to HBsAg (anti-HBs) 1 to 2 months after completion of the HepB series, at age 9 through 18 months (preferably at the next WCC).
- If mother's HBsAg status is unknown, within 12 hours of birth administer HepB vaccine regardless of birth weight. For infants weighing less than 2,000 grams, administer HBIG in addition to HepB vaccine within 12 hours of birth. Determine mother's HBsAg status as soon as possible and, if mother is HBsAg positive, also administer HBIG for infants weighing 2,000 grams or more as soon as possible, but no later than age 7 days.

Doses following the birth dose:

- The second dose should be administered at age 1 or 2 months. Monovalent HepB vaccine should be used for doses administered before age 6 weeks.
- Infants who did not receive a birth dose should receive 3 doses of a HepB-containing vaccine on a schedule of 0, 1 to 2 months, and 6 months starting as soon as feasible. See Figure 2.
- Administer the second dose 1 to 2 months after the first dose (minimum interval of 4 weeks), administer the third dose at least 8 weeks after the second dose AND at least 16 weeks after the first dose. The final (third or fourth) dose in the HepB vaccine series should be administered no earlier than age 24 weeks.
- Administration of a total of 4 doses of HepB vaccine is permitted when a combination vaccine containing HepB is administered after the birth dose.

2. Rotavirus (RV) vaccines. (Minimum age: 6 weeks)

Routine vaccination:

Administer a series of RV vaccine to all infants as follows:

1. If Rotarix is used, administer a 2-dose series at 2 and 4 months of age.
2. If RotaTeq is used, administer a 3-dose series at ages 2, 4, and 6 months.
3. If any dose in the series was RotaTeq or vaccine product is unknown for any dose in the series, a total of 3 doses of RV vaccine should be administered.

Catch-up vaccination:

- The maximum age for the first dose in the series is 14 weeks, 6 days; should not be initiated for infants aged 15 weeks, 0 days or older.

3. Diphtheria and tetanus toxoids and acellular pertussis (DTaP) vaccine.

(Minimum age: 6 weeks. Exception: DTaP-IPV [Kinrix]: 4 years)

Routine vaccination:

- Administer a 5-dose series of DTaP vaccine at ages 2, 4, 6, 15 through 18 months, and 4 through 6 years. The fourth dose may be administered as early as age 12 months, provided at least 6 months have elapsed since the third dose.

4. Haemophilus influenzae type b (Hib) conjugate vaccine. (Minimum

age: 6 weeks for PRP-T [ACTHIB, DTaP-IPV/Hib (Pentacel)] and Hib-MenC (MenHibrix)], PRP-OMP [PedvaxHIB or COMVAX], 12 months for PRP-T [Hiberix])

Routine vaccination:

- Administer a 2- or 3-dose Hib vaccine primary series and a booster dose (dose 3 or 4 depending on vaccine used in primary series) at age 12 through 15 months to complete a full Hib vaccine series.
- The primary series with ActHib, MenHibrix, or Pentacel consists of 3 doses and should be administered at 2, 4, and 6 months of age. The primary series with PedvaxHib or COMVAX consists of 2 doses and should be administered at 2 and 4 months of age; a dose at age 6 months is not indicated.
- One booster dose (dose 3 or 4 depending on vaccine used in primary series) of any Hib vaccine should be administered at age 12 through 15 months. An exception is Hiberix vaccine. Hiberix should only be used for the booster (final) dose in children aged 12 months through 4 years who have received at least 1 prior dose of Hib-containing vaccine.

5. Pneumococcal vaccines. (Minimum age: 6 weeks for PCV13)

Routine vaccination with PCV13:

- Administer a 4-dose series of PCV13 vaccine at ages 2, 4, and 6 months and at age 12 through 15 months.
- See details for high risk populations for PCV23

6. Inactivated poliovirus vaccine (IPV). (Minimum age: 6 weeks)

Routine vaccination:

- Administer a 4-dose series of IPV at ages 2, 4, 6 through 18 months, and 4 through 6 years. The final dose in the series should be administered on or after the fourth birthday and at least 6 months after the previous dose.

7. Influenza vaccines. (Minimum age: 6 months for inactivated influenza vaccine [IV], 2 years for live, attenuated influenza vaccine [LAIV])

Routine vaccination:

- Administer influenza vaccine annually to all children beginning at age 6 months. Live attenuated influenza vaccine (LAIV) is NOT RECOMMENDED

For children aged 6 months through 7 years:

- Administer 2 doses (separated by at least 4 weeks) to children who are receiving influenza vaccine for the first time.

For persons aged 9 years and older:

- Administer 1 dose.

8. Measles, mumps, and rubella (MMR) vaccine. (Minimum age: 12 months for routine vaccination)

Routine vaccination:

- Administer a 2-dose series of MMR vaccine at ages 12 through 15 months and 4 through 6 years. The second dose may be administered before age 4 years, provided at least 4 weeks have elapsed since the first dose.
- Administer 1 dose of MMR vaccine to infants aged 6 through 11 months before departure from the United States for international travel. These children should be re-vaccinated with 2 doses of MMR vaccine, the first at age 12 through 15 months (12 months if the child remains in an area where disease risk is high), and the second dose at least 4 weeks later.
- Administer 2 doses of MMR vaccine to children aged 12 months and older before departure from the United States for international travel. The first dose should be administered on or after age 12 months and the second dose at least 4 weeks later.

9. Varicella (VAR) vaccine. (Minimum age: 12 months)

Routine vaccination:

- Administer a 2-dose series of VAR vaccine at ages 12 through 15 months and 4 through 6 years. The second dose may be administered before age 4 years, provided at least 3 months have elapsed since the first dose. If the second dose was administered at least 4 weeks after the first dose, it can be accepted as valid.

10. Hepatitis A (HepA) vaccine. (Minimum age: 12 months)

Routine vaccination:

- Initiate the 2-dose HepA vaccine series at 12 through 23 months; separate the 2 doses by 6 to 18 months.
- Children who have received 1 dose of HepA vaccine before age 24 months should receive a second dose 6 to 18 months after the first dose.
- For any person aged 2 years and older who has not already received the HepA vaccine series, 2 doses of HepA vaccine separated by 6 to 18 months may be administered if immunity against hepatitis A virus infection is desired.

11. Meningococcal conjugate vaccines. (Minimum age: 6 weeks for Hib-MenCY [MenHibrix], 9 months for MenACWY-D [Menactra], 2 months for MenACWY-CRM [Menveo])

Routine vaccination:

- Administer a single dose of Menactra or Menveo vaccine at age 11 through 12 years, with a booster dose at age 16 years.
- Adolescents aged 11 through 18 years with human immunodeficiency virus (HIV) infection should receive a 2-dose primary series of Menactra or Menveo with at least 8 weeks between doses.
- For children aged 2 months through 18 years with high-risk conditions

12. Tetanus and diphtheria toxoids and acellular pertussis (Tdap) vaccine. (Minimum age: 10 years for Boostrix, 11 years for Adacel)

Routine vaccination:

- Administer 1 dose of Tdap vaccine to all adolescents aged 11 - 12 years.
- Tdap may be administered regardless of the interval since the last tetanus and diphtheria toxoid-containing vaccine.
- Administer 1 dose of Tdap vaccine to pregnant adolescents during each pregnancy (preferred during 27 through 36 weeks gestation) regardless of time since prior Td or Tdap vaccination.

13. Human papillomavirus (HPV) vaccines. (Minimum age: 9 years)

Routine vaccination:

- Administer a 2-dose series of HPV vaccine on a schedule of 0 and 6-12 months to all adolescents aged 11 through 12 years.
- The vaccine series may be started at age 9 years.
- For persons initiating vaccination before age 15, the recommended immunization schedule is 2 doses of HPV vaccine at 0, 6-12 months.
- For persons initiating vaccination at age 15 years or older, the recommended immunization schedule is 3 doses of HPV vaccine at 0, 1-2, 6 months

Verbal **SIGNOUT** Mnemonic Example

Sick or not	This is a sick patient.
ID	JS is a febrile 7-year-old female with moderate persistent asthma admitted to the PICU for status asthmaticus.
General hospital course	1. Resp distress 2. Dehydration She was briefly intubated for 24 hours but responded to heliox and terbutaline gtt on top of steroids and nebs. She has been extubated for 2 days and was starting to improve on albuterol neb q2h and methylprednisolone.
New events	Today she developed a new fever to Tmax 38.4 and new rales on the right. CXR shows a new consolidation, likely vent-associated pneumonia. She was started on Zosyn. Unfortunately her breathing has worsened through this afternoon.
Overall clinical status	She has moderate-sever respiratory distress. She is awake but SOB with only 3 word sentences. She's on continuous albuterol neb 5mg/hr, ipratropium 0.5mg NEB q4h, and O2 via facemask at 10L. She's NPO for respiratory distress and possible intubation or BiPAP.
Upcoming events	Tonight, please check on her early. There is a VBG that will result at 20:30.
Tasks with if/then statements	<u>If</u> she is looking tired or has worsening hypoxemia AND PCO2 is still <40, <u>then</u> consider BiPAP. <u>If</u> PCO2 >40, <u>then</u> reintubate her. <u>If</u> difficulty after intubation, <u>then</u> ketamine can be added. <u>If</u> appears septic, <u>then</u> please start vancomycin on top of the Zosyn.
?s	Any questions?

*When you don't want to be paged (e.g. at clinic or off at home), please do one of two things:

- 1) Forward your pager to your covering resident. OR
 - 2) Use the paging website OR call the page operator to make yourself "Not Available On Pager".
- Please do not solely turn off your pager by using the power button. Pages will be missed.

**Do not forget to sign into virtual consult pagers and code pagers!

Common Signout Abbreviations

- ALCAPA: Anomalous Left Coronary Artery from the Pulmonary Artery, a congenital heart defect
- ALL: Acute Lymphoblastic Leukemia
- BAFK: Biliary Atresia, Failed Kasai. The Kasai operation is used to treat biliary atresia; when it fails, the patients usually go into liver failure and require liver transplant.
- BTS: Blalock-Taussig Shunt. Shunt from systemic artery (usually subclavian) to pulmonary artery.
- BiPAP: Biphasic Positive Airway Pressure, a form of assisted ventilation
- CPAP: Continuous Positive Airway Pressure, a form of assisted ventilation
- CRT: Cadaveric Renal Transplant
- CVC: Central Venous Catheter
- CVVH: Continuous Veno-Venous Hemofiltration, a form of hemodialysis
- DCM: Dilated Cardiomyopathy
- ESRD: End-Stage Renal Disease
- GT: Gastrostomy Tube
- HFOV: High Frequency Oscillatory Ventilation
- HLH: Hypoplastic Left Heart Syndrome, a congenital cardiac defect usually requiring a staged operation for repair (see Educational Resources: Cardiology for more information)
- HOCM: Hypertrophic Obstructive Cardiomyopathy
- HSCT: Hematopoietic Stem Cell Transplantation
- HUS: Hemolytic-Uremic Syndrome
- IFALD: Intestinal Failure Associated Liver Disease
- ITP: Idiopathic or Immune Thrombocytopenia
- IVH: Intraventricular Hemorrhage, a complication usually seen in preterm infants
- JIA: Juvenile Idiopathic Arthritis
- JT: Jejunostomy Tube
- KD: Kawasaki Disease
- LRRT: Living Related Renal Transplant
- MAPCA: Major Aorto-Pulmonary Collateral Artery
- MCD: Mixed Connective Tissue Disease
- MR/CP: Mental Retardation / Cerebral Palsy (not all CP children have MR!)
- NC: Nasal Cannula
- NG: Nasogastric Tube
- NIPPV: Nasal Intermittent Positive Pressure Ventilation
- OLT: Orthotopic Liver Transplant (orthotopic means the transplanted organ replaces the native organ)
- OHT: Orthotopic Heart Transplant
- PCA: Patient Controlled Analgesia, an IV pain medication administration device which can dispense a constant (basal dose) as well as PRN doses.
- PD: Peritoneal Dialysis
- PHTN: Pulmonary Hypertension
- PICC: Peripherally Inserted Central Catheter, a kind of central intravenous line
- PRN: *Pro Re Nata*, or as needed
- PT: Pancreatic Transplant. The PT usually just goes along when there is an OLT&SBT so as to not disrupt the anatomy.
- SBT: Small Bowel Transplant (often paired with OLT)
- SIMV: Synchronous Intermittent Mechanical Ventilation (most common form of pediatric mechanical ventilation)
- SLE: Systemic Lupus Erythematosus
- TOF/PA: Tetralogy of Fallot (with or without) Pulmonary Atresia
- UOP: Urine Output

Patient-Centered Communication Templates

... for effective difficult conversations in patient care ...

Risk Communication by Vincent T. Covello, PhD

<p>Compassion, Conviction, Optimism TEMPLATE</p>	<p>BRIDGE TEMPLATES</p>	<p>AGL-4 TEMPLATE (AVERAGE GRADE LEVEL MINUS FOUR TEMPLATE)</p>
<p>Use when asked a question with high-emotion</p>	<p>Use when you want to return to your key points or redirect the communication</p>	<p>Use when responding to any high stress or emotionally charged question</p>
<p>1. Compassion 2. Conviction 3. Optimism Example: (1) "I am very sorry to hear about..." (2) I believe that... (3) In the future, I believe that</p>	<p>"Before we continue, let me emphasize that..." "What this information tells us/me is..." "This is an important point because..."</p>	<p>Recommendation: Provide information at four or more grade levels below the average grade level of the audience.</p>
<p>"WHAT IF" TEMPLATE</p> <p>Use when asked a about a low probability "what if, what might happen" question</p>	<p>"Before we continue, let me take a step back and summarize that..." "With this in mind, if we look at the bigger picture..." "If we take a broader perspective, ..." "With this in mind, if we take a look back..."</p>	<p>RULE OF 3 TEMPLATE</p> <p>When responding to any high stress or emotionally charged question</p>
<p>1. Repeat question (without negatives) 2. Bridge to "what is" 3. State what you know factually Example (1) "You've asked me what might happen if.... (2) I believe there is value to talk about what IS, what we know now (3) And what we know is..."</p>	<p>"And what's most important to remember is" "And what this all means is..." "However, what is more important to look at is..." "What's most important to know is..."</p>	<p>Provide no more than three messages, ideas, or points at a time Example: My three main points are: (1) ... (2).... and (3)....</p>
<p>GUARANTEE TEMPLATE</p>		<p>PRIMACY/RECENCY TEMPLATE</p>
<p>Use when asked to guarantee an event or outcome</p>	<p>IDK (I DON'T KNOW) TEMPLATE</p>	<p>Use when responding to any high stress or emotionally charged question</p>
<p>1. Indicate the question is about the future 2. Indicate the past and the present help predict the future 3. Bridge to known facts, processes or actions Example (1) "You've asked me for a guarantee, to promise something about the future (2) The best way I know to talk about the future is to talk about what we know from the past and the present" (3) And what we know at this point is..." OR "What I can guarantee [assure; promise; tell you] is..."</p>	<p>Use when you don't know, can't answer, or aren't best source</p> <p>1. Repeat the question (without negatives) 2. Say "I wish I could answer that" or "My ability to answer is limited by..." or "I don't know" 3. Say why you can't answer</p>	<p>Recommendation: Provide the most important items or points first and last</p> <p>FALSE ALLEGATION TEMPLATE</p> <p>Use when responding to a hostile question, false allegation, or criticism</p> <p>1. Repeat/paraphrase the question without repeating the negative; repeat instead the opposite; the underlying value or concern, or use more neutral language 2. Indicate the issue is important 3. Indicate what you have done, are doing, or will do to address the issue</p>
<p>YES/NO TEMPLATE</p>		
<p>Use when asked a yes/no question that cannot be answered yes or no</p>	<p>4. Provide a follow up with a deadline 5. Bridge to what you can say Example: (1) "You've asked me about...; (2) I wish I could answer; (3) We're still looking into it; (4) I expect to be able to tell you more by ...; (5) What I can tell you is..."</p>	<p>Example: (1) "You've raised a serious question about "x" (2) "x" is also VERY important to me and (3) We are doing the following to address "x."</p>
<p>1. Indicate you have been asked a yes/no question 2. Indicate it would be difficult to answer the question yes or no (and why)* 3. Respond to the underlying concern</p>		<p>*Also see Acknowledging Uncertainty next page</p>

HIGH Concern Patient Centered Communication Templates

Advanced templates to create effective messages in high concern, high stress situations

Trust, Benefit, Control TEMPLATE	Know, Do, Go TEMPLATE	CARING/SHARING TEMPLATE
<p>When responding to questions or concerns indicating high perceived risks or outrage.</p> <p>(T)rust Message (For example, messages communicating listening, caring, honesty, transparency, or competence)</p> <p>(B)enefit Message (For example, messages communicating benefits to the individual, treatment plan, family)</p> <p>(C)ontrol Message (For example, messages that give people things to do or that increase their sense of hope or self-efficacy.</p> <p>Example: <i>(T) I hear your concern and I understand there is conflicting or confusing information. I would like to help with that by sharing with you more information. (B) The reason why we recommend this option is because of the benefits to this treatment. Typical benefits of this option include... (C) I'd like to share with you some resources that are helpful (or I find helpful) to understand the recommendation...</i></p>	<p>Use to give upset people a greater sense of control in a situation.</p> <p>(K)now Message: Share what is most important for people to know.</p> <p>(D)o Message: Share what is most important for people to do</p> <p>(G)o Message: Share where people should go for credible information, support, or do...</p> <p>Example: <i>(K) I'm sorry, I know this is an overwhelming situation. I want you to know what we think is most important right now... (D) I think our next steps are to do... (G) I'd like to offer you some supportive resources...</i></p>	<p>Use when responding to a question or statement containing incorrect information.</p> <p>Caring Message: State what you and the person holding incorrect information have in common.</p> <p>Sharing (1) Message: Invite the person holding incorrect information to share their information with you</p> <p>Sharing (2) Message: Re-share your information</p> <p>Example (1) <i>"I assume you asked this question because you care about ..., which I also care about; (2) I would greatly appreciate your sharing with me all the information/thoughts you have so I can review; (3) In the meantime, the information I have indicates..."</i></p>
<p>Caring, Action, Perspective TEMPLATE</p> <p>Use when responding to a high concern question or statement</p>	<p>AAF Template</p> <p>Use when the immediate goal is build, maintain, or restore trust</p>	<p>*Acknowledging Uncertainty: Sample Statements</p>
<p>(C)aring Message: Provide a message indicating caring, concern, empathy, or compassion. The message should communicate the seriousness of the situation.</p> <p>(A)ction Message: State actions you have, are, or will take to address the issue or problem. For example, the message might indicate you are cooperating with other specialists or conducting an investigation.</p> <p>(P)erspective (Normalization) Message: Provide information that puts the issue in perspective, context, normal timeframes</p>	<p>(A)knowledge Uncertainty* Message: Identify knowledge gaps and challenges.</p> <p>(A)ction Message: State actions you have, are, or will take to address the issue. For example, the message might indicate you are cooperating with other organizations or conducting an investigation.</p> <p>(F)ollow Up Message: Provide information on where people can obtain timely and credible information.</p>	<p>"I wish we knew more."</p> <p>"There are still many uncertainties."</p> <p>"I wish our answers were more definite."</p> <p>"It must be difficult to hear how uncertain we are."</p> <p>"There is still much that we do not know..."</p> <p>"The evidence is still mixed and very confusing."</p> <p>"Some of what we now think may turn out later to be wrong."</p>
<p>GENERAL TRUST / COMPASSION / RESOLUTION TEMPLATE</p> <p>Use when the immediate goal is resolve goals, build, maintain, or restore trust (May be used widely)</p> <ol style="list-style-type: none"> 1. Demonstrate Empathy 2. State what you know 3. State what you don't know 4. What is proposed gameplan and allow suggestions 5. Commit to finding a solution 		<p>"There are many unanswered questions and there may be exceptions."</p> <p>"There is a range of expert opinion on this issue."</p>

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Rezkalla, Joshua	33511
Thorp, Marguerite	33512

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Greenblatt, Ethan	32509
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Troy, Michael	32512

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Hardin, Kaitlyn	31600
Virata, Rebecca	31601

Med-Peds-4

Agnihotri, Neha	30693
Lonquich, Brian	30694
Phung, Jennifer	30695
Stutz, Matthew	30696

Ronald Reagan UCLA Medical Center

310 area code

Prefixes: (20)-6, (26)-7, (82)-5, (79)-4

3rd Floor Nursing Station 77320
3F Charge RN 77338
5 West Nursing Station 77530
5W Charge RN 77502
Anesthesia Team Captain 78699
Blood Bank 78150
Cards Fellow 78213
Chief's Office 79568
Consult Hospitalist: 76673, p90054
Dialysis 77820
ECHO 78085
ER Main Line 78400
ER Charge Nurse 78444
GI Rounding Room 79539
GI Resident 77568
Gold/Silver Room 77012, 77010
Gold Senior Phone 78210
Heme-Onc Rounding Room 77340
Heme-Onc Fellow 78219
Heme-Onc Resident 77569
Home Health 41400
Interpreter Services 78001
Interventional Radiology 78700
Lab Main Lab line 78100
 Stat Lab 78149
 ER Stat Lab 78159
 Micro 42748
 Chemistry 78141
 Heme 78130, 78131
 Coags 78164
 Urinalysis 78133
 Issues at night-Lavita
 78105, p92726
Neuro Fellow Phone 78221
Newborn Nursery 77518
NICU Fellow 76819
NICU Main Line 77565
NICU Resident 76818
PCC Backline 55820
Pharmacy
 Outpatient 78524
 Outpatient Fax 73661
 5th Floor 77521
 Fax 43970
 Night Pharmacy 77621

PICC Nurse 79793, p92788
PICU Fellow 78215
PICU Main Line 77540
Radiology 78700
 Nuclear Med 41005
 MRI 78745
 CT 78786
Ray (sedation) 76468, Fax 73612
Peds Rads Reading Rm 78717 or 78718
Renal Fellow 78220
Security/Card Access Issues 77100
Silver Senior Phone 78211
Silver Hospitalist: 76663
Transfer Center 50909
UCLA Medical Home 60514

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Senior Pager: 35507
Senior Phone: 99633

ECHO tech p93109, 94815
SM ED: 98405
Lab: 94508
SM NICU: 99253
Nursing Supervisor: p92651, 94747
SM Nursery: 99243
Peds Floor: 94835
Peds Floor Fax: 94478
SM Radiology: 96107
Transfer Center: 50909
SM Work Room: 99627

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Anesthesia on call pager 818-529-0372
Audiology 73198/73396
Blood Bank 74062
Cafeteria 74222
Chaplain 73080
Dietician 74224
DME (PT department) 74250
Echo tech Andy 626-419-0438
EEG Lab 73946
ENT Clinic 65630, (p)818-313-0316
Employee Health (for needle sticks)
73404
ER
Charge Nurse 74324
Attending Area 73648, 73649
Triage Rooms 73440
Grey Zone (peds) 74936, 74937
Grey Zone Nurse 74970
Financial (outpt clinic clearance) 74262
Home Health 73352
IT Help Desk 74522
Lactation 74190 (pager 818-529-5629)
Lab 73476
ER Lab 74977, 74978
Blood gases 73314
Phlebotomy 74039
Micro 66045
Pathology 74025
Linens 66168
MAC 866-940-4401
Medical Records 74124
NICU 74463
Nursery 74458
Nursing Admin 73157
OB Clinic 73137
Occupational Therapy 66167
Operators
Olive View 747-210-3000 (0)
LAC/USC 323-226-2622
CHLA 323-660-2450
Harbor UCLA 310-222-2345
Ophtho Clinic 65630
OR 74364

Ortho Clinic 73407
Ortho tech pgr 818-529-5135
Peds Cottage S 73233
Peds Call Room 74385 (Code: 2-4-1)
Peds Conference Room 65550 (5-3-1)
Peds Clinic 73144
Peds Clinic Back Room 74848
Peds Clinic Fax 4784
Peds Clinic Side Nursing Room 74542
Peds Pager 818-313-1739
Peds Ward 74381
Pharmacy
Inpatient 73791
Outpatient 73066
Physical Therapy 74250
Plastics/Hand pager 818-313-1659
Podiatry Clinic 73676, 73582 (back room)
Psych (consults)
ER and after hrs 73950, 73953,
74341
Ward pt during business hours
pager 818-529-0381
Radiology 74086
Appointments (except MRI) 74086
Dr. Chawla 74863
In-house Radiology wknds 74971
CT 74089
MRI (including appts) 73535
Nuclear Med 74094
Ultrasound 73877
Xray 74567
To get copies (file room) 74085
Recovery Room 74362
Respiratory Therapy
Ward 4C pager 818-313-1986
ED pager 4055* then dial 1392
Sheriff 73409
Social Work
Main Office 74236
Peds pager 818-226-4998
Speech Therapy 73771
Surgery on call pager 818-313-0776
Urology Clinic 73129
Utilization Review 73962
ER Utilization Review 74890

CEDARS DIRECTORY

PAGING		Blood Bank	35411
In House	"103" + ID		
Outside	(310) 423-5520 +ID	PHARMACY	
		4NE	35633
Chief Resident Office	310-423-7982	Outpatient:	35604
Housestaff Lounge	310-423-4421		

PAGERS		RADIOLOGY	38000
Sr. Ward Resident	0731		32723
Ward intern	2284	CT Scan	32CAT
Sr. Nursery Resident	0531	MRI	32MRI
Nursery Intern	1493	Reading Room	35720
Housestaff Attg On-Call	310-250-7699		

PHONES		PICC Procedure center	31763
Ward Sr	310-384-0244	ER	
	*73556	Main	30808
Floor Charge Nurse	*35599	ER Lab	36537
NSY/NICU Hospitalist	*77599 (Day)	ER Charge Nurse	37206
	*38371 (Night)		

NICU Attg	*38369	SOCIAL WORK	
NSY Sr	*86986	Office	31786
NSY Inter	*38368	Ph	323-719-9652
PICU Attg	*87908		
PICU Charge Nurse	*36435		

4NE	34401	CHILD LIFE	
ED	30808	Office	38054
Transfer Center	32400	Pager	1689

Bed Reservation	33761	SURGERY	2980
NICU	34451		

NURSERY		Hospitality	34444
3 North	33351	Interpreter	35353
3 South	34242		
L&D	33601		

LABORATORY			
Main Lab	35431		
Lab Supervisor	32227		
Microbiology	34777		
Stat Lab	35431		
ER Lab	37537		

Community Resources for Pediatric Patients

Abuse

UCLA Scan Team p96672 Contact: Dr. Claudia Wang
DCFS Hotline of LA County 1-800-540-4000

Adolescent Health

Planned Parenthood of L.A. 1-800-576-5544 www.plannedparenthood.org/los-angeles
ANAD 630-577-1330 National Association of Anorexia Nervosa and
Associated Disorders
L.A. Gay & Lesbian Center 323-993-7400 Advocacy/Support, LGBT youth center

Breastfeeding

Women, infant and children (888) WIC-BABY Supplemental nutrition for low income pregnant
(WIC) www.phfewic.org women and children under 5 years
WIC Lactation Consultant (888) 278-6455 Free group meetings and home visits by lactation
specialist, breast pump loans
La Leche League-LA http://www.llli.org/ Breastfeeding support and weekly meetings
Westside webus.html
Drug and Lactation Database http://toxnet.nlm.nih.gov Free database with full references and scientific
evidence
WHO Breastfeeding and Maternal Meds http://whqlibdoc.who.int/hq/2002/55732.pdf Meds listed by disease class with infant side effects

Childcare

Connections for Children (310) 452-3325 R&R, directory, info on subsidies
www.cfc-ca.org

LAC Public Social Services Directory
Crystal Stairs (888) KIDS247 Referral hotline, info on subsidies

Disabilities

Regional Center (RC) http://arcanet.org 21 independent CA centers helping those with
-Westside 310.258.4000 developmental disabilities make use of public
-Northern LA County 818.778.1900 and private services (medical/dental,
-East LA 626.299.4700 educational, recreational, vocational, social,
emotional).
Early Start (800) 515-BABY RC services to children up to three years of age
who are at high risk of a developmental
disability.
Westside Family Resource (310) 258-4063 Info and emotional support to families of kids
http://wfrec.org with disabilities. *Spanish-speaking groups are
available. *Free
Children and adults with (800) 233-4050 Local chapter in west LA with monthly meetings.
ADHD chaddonline.org

Education

Head Start 1-877-773-5543 Education/developmental services for low-
income families/pregnant women with children
0-3yo (early) and 3-5yo (regular). Must be <FPL.
IEP Parent Resource 1-800-933-8133 Parental assistance with special education
Network of LAUSD programs.
Literacy Network of Greater 1-800-707-READ Adult basic reading/math, ESL, children's
LA literacy, citizenship.

Dental Resources

Denti-Cal Hotline 1-800-322-6384
UCLA Venice Dental Clinic 310-392-4103 \$45/cleaning

Housing

United Way 211 Hotline for health/human services 24/7
Upward Bound Family Place (310) 458-7779 Transitional/emergency housing
Ocean Park Comm. Center (310) 450-4050 Shelter/assistance
Housing Rights Center (800) 477-5977 Education/advocacy for fair housing

Community Resources for Pediatric Patients

Insurance Types

Medi-Cal	1-877-597-4777	CA's Medicaid program for children and pregnant women at 100-200% FPL. Undocumented eligible for emergency Medi-Cal.
Healthy Families	1-800-880-5305	0-18yo, low cost insurance for those that do not qualify for Medi-Cal.
Healthy Kids	1-888-347-7855	0-5yo, if not eligible for Medi-Cal or Healthy Families (up to 300% FPL).
California Children's Services (CCS)	1-800-288-4584	0-21yo, chronic medical problems, low income
Child Health Disability Prevention Program (CHDP)	1-800-993-2437	OR spend >20% income on health care Free preventative health care 0-21yo. No inquiries made into immigration status.

Legal Aid

Legal Aid Foundation of LA	(800) 399-4529 www.lafla.org	Hotline, emergency assistance re: housing, deportation, violence, etc.
Child Support Services Dept.	(866) 901-3212	Assistance w/ getting appropriate child support http://cssd.lacounty.gov/wps/portal/cssd

Mental Health

Saint John's Child and Family Development Center	(310) 829-8921 Santa Monica	Outpatient mental health services; services for deaf and hard of hearing, therapeutic preschool. *accepts Medi-Cal
Didi Hirsch Mental Health Service	(888) 807-7250	In-home and outpatient mental health services, parenting classes, suicide support group. *accepts Medi-Cal
Suicide Prevention Lifeline	(800) 273-TALK	24 hour 7 days/week Crisis Line, bilingual

Obesity

Boys & Girls Club	(323) 221-9111	Some pick kids up at school.
LA Parks Free Summer Lunch	(818) 546-2383	http://www.laparks.org/foodprogram/
LA Kids Program	(213) 485-4841	Free rec activities and sports http://www.laparks.org/lakids/index.htm
Kids Eat Right	eatright.org/kids	Resource for healthy eating
PowerPlay LA	(310) 289-8242	8 wk wt loss/fitness program, refer pts online
Kidshape	(888) 600-6444	9 wk programs for overweight 6-14 yo & families
KP Kids (through Venice Family Clinic)	(310) 664-7831	Educational/exercise program for parents + kids 5-12yo. Nancy: NYRodriguez@mednet.ucla.edu

Parenting Resources

UCLA's Parenting & Children's Friendship Prog	310-825-0142	Dir: Cynthia Williams. 10 wk course for parents of kids 2-12yo. \$50/week
Latino Resource Org	310-578-6069	Parent education classes, tutoring.
Family Service of SM	310-451-9747	Overcoming shyness, parenting groups
Text4baby.org	BABY to 511411	3 health tips/wk during pregnancy-1yo

Transportation

Access Paratransit	1-800-827-0829	Disabled individuals unable to use public transit. Need initial evaluation for eligibility.
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QI: Model for Improvement

What are we trying to accomplish?

How will we know that a change is an improvement?

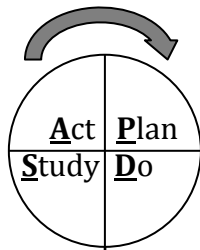
What change can we make that will result in an improvement?

← AIM

← MEASURE

← CHANGE

SMART Aims: Specific, Measurable, Actionable, Relevant, Time-limited



Hunches
Theories
Ideas



Small Scale
Testing

Evidence & Data



Follow-up
Tests



Learning and Improvement

Test new conditions



Implementation of
Change

Changes That
Result in
Improvement

*Multiple PDSA Cycles –
Sequential Building of
Knowledge – include a wide
range of conditions in the
sequence of test before
implementing the change*

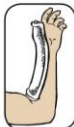
3M™ Scotchcast™ Splinting Guide



Ulnar Gutter Splint
Common Uses
 5th Metacarpal Fracture,
 4th Metacarpal Fracture



Volar Splint
Common Uses
 Wrist Sprains/Strains, Carpal Tunnel, Lacerations, Night Splints



Thumb Spica Splint
Common Uses
 Navicular Fracture, Thumb Dislocation, Jammed Thumb, Bennett's Fracture



Sugar Tong Splint
Common Uses
 Colles' Fracture, Forearm Fracture (Radial/Ulnar)



Sugar Tong Splint
Common Uses
 Humeral Fracture



Posterior Long-Arm Splint
Common Uses
 Supracondylar Fractures, Elbow Sprains/Strains



Posterior Short-Leg Splint
Common Uses
 Tibia/Fibula Fracture, Ankle Fracture, Metatarsal Fracture



Posterior Long-Leg Splint
Common Uses
 Ligamentous Injuries of the Knee, Dislocation of the Knee Joint, Tibia and Fibula Shaft Fractures, Femoral Shaft Fracture



Stirrup Splint
Common Uses
 Ankle Fractures, Ankle Sprains/Strains



Medial-Lateral Long-Leg Splint
Common Uses
 Ligamentous Injuries of the knee, Tibia and Fibula Fractures

SPLINTING

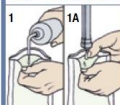
Splint Wetting Techniques

Water Bottle Technique



1 Dribble water onto backing material and rub beaded water to penetrate backing material.

Water Bottle/Faucet Technique



1 Pour minimal amount of water down back side of fiberglass using faucet or water bottle to dampen splint.



2 Squeeze splint to spread water into fiberglass.

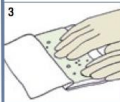
Opening Splint Cover Technique



1 Peel back one side of backing material to expose splint.



2 Dribble water onto exposed splinting material.



3 Rub water to penetrate splint material.



4 Replace backing material.

Dipping in Bucket Technique



1 Squeeze one or two times while immersed in water.



2 Squeeze out excess water.



3 Wrap flat in towel and press to blot out remaining excess water.

Table 7. RRUMC: Pediatrics (≤ 21 y.o.) Gram-negative Bacteria – Non-Urine Isolates, % Susceptible

Organism	No. Isolates	Penicillins			Cephalosporins				Carbapenems			Aminoglycosides			Fluoroquinolone	Other
		Ampicillin	Ampicillin-sulbactam	Piperacillin-tazobactam	Cefazolin	Cefepime	Ceftazidime	Ceftriaxone ¹	Ertapenem	Imipenem	Meropenem	Amikacin	Gentamicin	Tobramycin	Ciprofloxacin ²	Trimethoprim – sulfamethoxazole
<i>Enterobacter cloacae</i>	22 ³	R ⁴	R	82	R	96	—	—	91	99	99	99	99	99	99	91
<i>Escherichia coli</i>	45	31	43	96	53	84	84	77	96	98	98	99	89	86	66	58
<i>Klebsiella pneumoniae</i>	42	R	81	91	81	88	88	88	98	98	98	98	88	88	86	81
<i>Serratia marcescens</i>	18 ³	R	R	94	R	99	—	—	99	99	99	99	99	99	94	99
<i>Pseudomonas aeruginosa</i>	81	R	R	80	R	86	89	R	R	89	94	98	95	98	89	R

¹ Cefotaxime and ceftriaxone have comparable activity against *Enterobacteriaceae*.

² Ciprofloxacin is associated with arthropathy and histological changes in weight-bearing joints of juvenile animals and is currently not FDA approved for pediatric use.

³ Calculated from fewer than the standard recommendation of 30 isolates.

⁴ R = intrinsic resistance (inherent or innate antimicrobial resistance).

⁵ 3rd generation cephalosporins should not be used for serious infections.

Table 8. RRUMC: Pediatrics (≤ 21 y.o.) Gram-negative Bacteria – Urine Isolates, % Susceptible

Organism	No. Isolates	Penicillins		Cephalosporins			Carbapenems			Aminoglycosides			Fluoroquinolone	Other		
		Ampicillin	Ampicillin-sulbactam	Oral Cephalosporins	Cefepime	Ceftazidime	Ceftriaxone ¹	Ertapenem	Imipenem	Meropenem	Amikacin	Gentamicin	Tobramycin	Ciprofloxacin ²	Trimethoprim – sulfamethoxazole	Nitrofurantoin
<i>Enterobacter cloacae</i>	20 ³	R ⁴	R	R	95	— ⁵	—	80	99	99	99	99	—	99	85	26
<i>Escherichia coli</i>	407	60	67	93	—	—	95	99	99	99	99	93	—	89	77	95
<i>Klebsiella pneumoniae</i>	47	R	79	89	—	—	92	99	99	99	99	92	—	98	85	21
<i>Proteus mirabilis</i>	46	83	87	96	—	—	98	94	ND	99	99	89	—	99	74	R
<i>Pseudomonas aeruginosa</i>	30	R	R	R	87	87	R	R	87	90	99	97	97	90	R	R

¹ Cefotaxime and ceftriaxone have comparable activity against *Enterobacteriaceae*.

² Ciprofloxacin is associated with arthropathy and histological changes in weight-bearing joints of juvenile animals and is not FDA approved for pediatric use.

³ Calculated from fewer than the standard recommendation of 30 isolates.

⁴ R = intrinsic resistance (inherent or innate antimicrobial resistance).

⁵ — = Not routinely tested and/or not applicable.

Table 9. RRUMC: Pediatrics (≤ 21 y.o.) Gram-positive Cocci, % Susceptible

Organism	Location	No. Isolates	Penicillins			Cephalosporins		Aminoglycosides		Other											
			Ampicillin	Oxacillin	Penicillin	Ceftriaxone	Cefotaxime	Gentamicin synergy	Streptomycin synergy	Ciprofloxacin ¹	Clindamycin	Daptomycin	Doxycycline	Erythromycin	Linezolid	Quinu- pristin- dalopristin	Rifampin ²	Trimethoprim- sulfamethoxazole	Vancomycin	Ceftaroline	
<i>Staphylococcus aureus</i> (All) ³	OP	187	— ⁴	82	<10	—	—	—	—	78	76	99	99	55	99	99	99	99	99	99	100
	IP	91	—	79	<10	—	—	—	—	79	88	99	99	69	99	99	99	99	99	99	100
Oxacillin-resistant <i>S. aureus</i> (MRSA) ³	OP	34	—	R ⁵	R	R	R	—	—	19	76	99	99	6	99	99	99	97	97	99	100
	IP	19 ⁵	—	R	R	R	R	—	—	26	90	99	99	32	99	99	99	99	99	99	100
Oxacillin-susceptible <i>S. aureus</i> (MSSA)	OP	154	—	100	<10	—	—	—	—	90	75	99	99	64	99	99	99	99	99	99	100
	IP	73	—	100	<10	—	—	—	—	92	84	99	99	78	99	99	99	99	99	99	100
Coagulase negative <i>Staphylococcus</i> (sterile body sites)	OP	37	—	50	<10	—	—	—	—	87	67	99	95	32	99	99	97	68	99	—	
	IP	52	—	25	<10	—	—	—	—	73	39	99	92	23	98	99	99	79	99	—	
<i>Enterococcus</i> spp. ⁷	All	39	85	—	—	R	R	84	76	74	R	97	44	R	99	—	51	R	87	—	
<i>Enterococcus faecalis</i> ⁸	All	13 ⁷	99	—	—	R	R	77	85	92	R	99	23	R	99	R	62	R	99	—	
<i>Enterococcus faecium</i> ⁸	All	6 ⁷	17	—	—	R	R	99	83	0	R	99	50	R	99	99	0	R	17	—	

OP, outpatient (includes EMC); IP, inpatient (includes ICU)

¹ Ciprofloxacin is associated with arthropathy and histological changes in weight bearing joints of juvenile animals and is not FDA approved for pediatric use.

² Rifampin should not be used as monotherapy.

³ *Staphylococcus* resistant to oxacillin are resistant to cefazolin, cephalixin, ceftriaxone and all other beta-lactams except ceftaroline.

⁴ — = Not routinely tested and/or not applicable.

⁵ Calculated from fewer than the standard recommendation of 30 isolates.

⁶ R = intrinsic resistance

⁷ Includes isolates tested from all body sites.

⁸ 11% High-level resistance to both gentamicin and streptomycin. Includes isolates tested from sterile body sites only.

Table 9. RRUMC: Pediatrics (≤ 21 y.o.) Gram-positive Cocci, % Susceptible (cont.)

Organism	No. Isolates	Penicillins		Cephalosporins		Other				
		Amoxicillin	Penicillin	Cefotaxime	Ceftriaxone	Clindamycin	Doxycycline	Erythromycin	Trimethoprim – sulfamethoxazole	Vancomycin
<i>Viridans group Streptococcus (sterile body sites)</i>	14 ¹	— ²	64	79	79	—	—	—	—	100
<i>Streptococcus pneumoniae</i>	16 ¹	100		—	—	94	81	81	69	100
Meningitis ³		—	69	94	100	—	—	—	—	—
Non-meningitis ⁴		—	100	100	100	—	—	—	—	—

¹ Calculated from fewer than standard recommendation of 30 isolates

² — = Not routinely tested and/or not applicable.

³ % susceptible for penicillin, cefotaxime and ceftriaxone applies to patients with meningitis.

⁴ % susceptible for penicillin, cefotaxime and ceftriaxone applies to patients without meningitis.

Digital UCLA Pediatric Code Cards

Original Transfer to Digital Format by Neekesh Dharia

For questions/corrections/comments contact:

Alan Chin: aschin@mednet.ucla.edu

Version: 2017.04.14

Changes in Latest Version:

* Annual Update