

## NORMAL PEDIATRIC VITAL SIGNS

	HR Beats/ min	RR Breaths /min	BP systolic mm/Hg	BP diastolic mm/Hg
<b>Newborn 0-1 month</b>	100-180	30-60	73-92	52-65
<b>Infant 1-12 months</b>	80-150	30-60	90-109	53-67
<b>Toddler 1-3 years</b>	75-130	25-35	95-105	56-68
<b>Pre-School 3-5 years</b>	75-120	22-32	99-110	55-70
<b>School Age 5-12 years</b>	70-110	20-30	97-118	60-76
<b>Adolescent 13-18 years</b>	65-105	16-22	110-133	63-83

## GLASGOW COMA SCALE (GCS)

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

Sources for the Pediatric Surge Quick Reference Guide can be found online at:  
<http://ems.dhs.lacounty.gov>  
[www.CHLA.org/DisasterCenter](http://www.CHLA.org/DisasterCenter)

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**EMERGENCY MEDICAL SERVICES AGENCY**  
LOS ANGELES COUNTY

## Pediatric Surge Quick Reference Guide

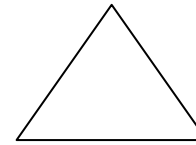
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## PEDIATRIC RISKS DURING DISASTERS

System / Area	Risk
Respiratory	<ul style="list-style-type: none"> <li>Higher breaths/minute increases exposure to inhaled agents</li> <li>Nuclear fallout and heavier gases settle lower to the ground and may affect children more seriously</li> </ul>
Gastrointestinal	<ul style="list-style-type: none"> <li>May be more at risk for dehydration from vomiting and diarrhea after exposure to contamination</li> </ul>
Skin	<ul style="list-style-type: none"> <li>Higher body surface area increases risk of skin exposure</li> <li>Skin is thinner and more susceptible to injury from burns, chemicals and absorbable toxins</li> </ul>
Endocrine	<ul style="list-style-type: none"> <li>Increased risk of thyroid cancer from radiation exposure</li> </ul>
Thermoregulation	<ul style="list-style-type: none"> <li>Less able to cope with temperature problems with higher risk of hypothermia</li> </ul>
Development	<ul style="list-style-type: none"> <li>Less capability to escape environmental dangers or anticipate hazards</li> </ul>
Psychological	<ul style="list-style-type: none"> <li>Prolonged stress from critical incidents</li> <li>Susceptible to separation anxiety</li> </ul>

## PEDIATRIC ASSESSMENT TRIANGLE (PAT)

**AIRWAY & APPEARANCE**  
Mental status  
Muscle tone  
Body position



**BREATHING**  
Visible movement  
Work of breathing (normal/increased)

**CIRCULATION**  
Color

AVPU: Alert, Voice, Pain, Unresponsive - Used to assess level of consciousness or alertness in PAT

Component	Abnormal Signs
Appearance	Abnormal or absent cry or speech. Decreased response to parents or environmental stimuli. Floppy or rigid muscle tone or not moving
Breathing	Increased/excessive (nasal flaring, retractions or accessory muscle use) or decreased/absent respiratory effort or noisy breathing
Circulation	Cyanosis, mottling, paleness/pallor or obvious significant bleeding

## PEDIATRIC SIGNS OF RESPIRATORY DISTRESS AND RESPIRATORY FAILURE

Respiratory distress is apparent when a child fails to maintain adequate gas exchange. As the child tires, effort and / or function deteriorate and gas exchange cannot be maintained.

Respiratory failure *requires* intervention to prevent deterioration to cardiac arrest.

Indicators may vary with severity.

Respiratory Distress	Respiratory Failure
Tachypnea	Marked tachypnea (early)
Increased respiratory effort (nasal flaring, retractions)	Increased, decreased or no respiratory effort
Inadequate respiratory effort (hypoventilation, bradypnea)	Bradypnea, apnea (late)
Abnormal airway sounds (stridor, wheezing, grunting)	Poor to absent distal air movement
Tachycardia	Tachycardia (early), Bradycardia (late)
Pale, cool skin	Cyanosis
Changes in level of consciousness	Stupor, coma (late)

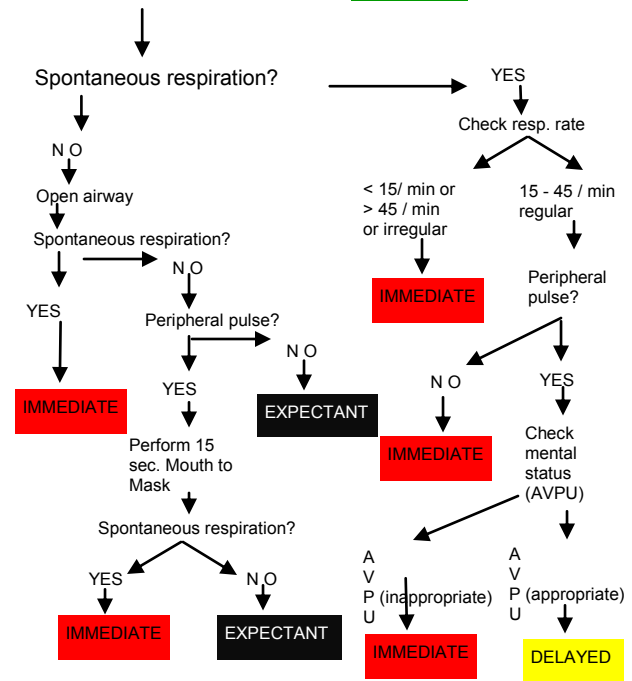
## JUMPSTART FIELD PEDIATRIC MULTICASUALTY TRIAGE SYSTEM

Patients ages 1-8 years

Identify and direct all ambulatory patients to designated Green area for secondary triage and treatment. Begin assessment of non-ambulatory patients as you come to them.

Green = Minor / Ambulatory  
Yellow = Delayed  
Red = Immediate  
Black = Expectant or Dead

Proceed as below:



## TREATMENT PRIORITIZATION

Triage category	Description
<b>Green Minor</b>	Patients with mild injuries that are self-limited and can tolerate a delay in care without increasing mortality risk
<b>Yellow Delayed</b>	Remaining patients who do not fit in the Red or Green categories
<b>Red Immediate</b>	Patients who do not obey commands <b>Or</b> do not have a peripheral pulse, <b>Or</b> are in respiratory distress, <b>Or</b> have uncontrolled major hemorrhage
<b>Black Expectant or Dead</b>	<b>Expectant:</b> Patients who have injuries incompatible with life given the current available resources <b>Dead:</b> Patients who are not breathing after life-saving interventions

## USING KILOGRAMS

<b>Weigh all children in kilograms. 1 kg = 2.2 lbs.</b>
<b>Method to estimate weight:</b> Newborn (term): usually 3 kg 1-10 yrs.: age multiplied by 2 + 10 (kg) >10 yrs.: age multiplied by 2 + 20 (kg)
If available, a length-based tape (e.g., Broselow Tape) may be used for weight estimation.

## DAILY MAINTENANCE FLUID AND ELECTROLYTE REQUIREMENTS

	Calculation
Fluids per hour	4mL/kg/hr. for first 10 kg of weight 2mL/kg/hr. for next 10 kg of weight 1mL/kg/hr. for each kg over 20 kg
Fluids per 24 hour period	<b>First 10 kg</b> body wt. give 100mL/kg <b>Next 10kg</b> body wt. give 1000mL (for 1st 10 kg) + 50mL/kg over 10 kgs <b>Each kg of body wt. over 20 kg</b> give 1500mL (for 1st 20 kgs) + 20mL/kg
Maintenance electrolyte calculations for IV fluid	<b>Sodium:</b> 3-4 mEq/kg/day or 30-50 mEq/m <sup>2</sup> /day <b>Potassium:</b> 2-3 mEq/kg/day or 20-40 mEq/m <sup>2</sup> /day

## APPROPRIATE INFANT NUTRITION

Age	
Birth - 1 mo.	2-3 ounces (60-90 mL) per feeding, breast or bottle every 2-3 hours
2-4 mos.	3-4 ounces (90-120 mL) per feeding every 3-4 hours
4-6 mos.	4-5 ounces (120-150 mL) per feeding, four or more times daily Begins baby food, usually rice cereal
6-8 mos.	6-8 ounces (180-240 mL) per feeding, four times daily Eats baby food such as rice cereal, fruits and vegetables
8-12 mos.	6 ounces (180 mL) per feeding, four times a day, Soft finger foods

Breastfeeding is best—support mothers with safe locations to breastfeed and remain hydrated

## NORMAL BLOOD VOLUME

Total blood volume varies by weight. Approximate volume is 80mL/kg.  
PRBC/Platelet/Albumin 5%/FFP = 10mL/kg

## CLINICAL FEATURES OF DEHYDRATION

Feature	Mild (<5%)	Moderate (5% to 10%)	Severe (>10%)
<b>Heart rate</b>	Normal	Slightly increased	Rapid, weak
<b>Systolic BP</b>	Normal	Normal to orthostatic, >10 mmHg change	Hypotension
<b>Urine output</b>	Decreased	Moderately decreased	Markedly decreased, anuria
<b>Mucous membranes</b>	Slightly dry	Very dry	Parched
<b>Anterior fontanel</b>	Normal	Normal to sunken	Sunken
<b>Tears</b>	Present	Decreased, eyes sunken	Absent, eyes sunken
<b>Skin</b>	Normal turgor	Decreased turgor	Tenting
<b>Skin perfusion</b>	Normal capillary refill (<2 seconds)	Capillary refill slowed (2-4 seconds); skin cool to touch	Capillary refill markedly delayed (>4 seconds); skin cool, mottled, gray

## NORMAL DEVELOPMENT

Age (years)	Growth & Development	Common Fears	Methods to Minimize Adverse Effects
0-1	Learn through senses; Seek to build trust	Needs not being met; Stranger anxiety	Speak in quiet calm voice; Involve parents in care; Be aware of stranger anxiety
1-3	Imitates others; Understands objects exist even when not seen; Attempt to control environment	Separation; Loss of control; Altered rituals	Minimize separation from family; Provide continuity of familiar routines
4-6	Vivid imagination; More independent; Shares with others	Bodily injury; Loss of control; Being left alone; Dark	Be honest; Let child make choices when able; Reinforce child not responsible for injury or illness
7-12	Understands cause and effect; Greater sense of self	Loss of control; Bodily injury; Death	Allow child to make some care decisions; Prepare before major event or surgery; Emphasize things they can do
13-18	Abstract thinking; Develops own identity	Loss of control; Altered body image; Separation from peers	Explain treatment & procedures; Encourage self-participation in care

## FLUID RESUSCITATION

- Administer 20 mL/kg of isotonic or crystalloid (NS or LR)
- Monitor: Peripheral perfusion, Urine output, Vital signs, LOC
- Repeat bolus if no improvement
- Reassess status

Consider blood products in traumatic injuries requiring >40-60 mL/kg of fluid

## HYPVOLEMIC SHOCK

- Hypovolemic shock is the most common type of shock in children.
- Children increase their cardiac output by tachycardia; therefore bradycardia is an ominous sign.

Look for:

Slow irregular breathing, grunting, bradycardia, cyanosis, hypotension, decreased LOC

## BURN TREATMENT: FLUID RESUSCITATION

### Fluid Resuscitation Formula (0 - 12 yrs.):

3 - 4 mL x kg x %TBSA burn  
(one half over 1st 8h, second 1/2 over next 16h)

**For ages 0 - 2 years:** Add maintenance fluid of D<sub>5</sub> Lactated Ringer's (in addition to resuscitation fluid above) - see fluids per hour calculation

### Pediatric Considerations

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

## EQUIPMENT ESTIMATIONS

Method to estimate Endotracheal Tube (ETT) size:

Tube diameter (mm) = [16 + age (y)] / 4

ETT Depth in cm at lip = 3x ETT size

## EQUIPMENT SIZES: NEWBORN - 6 YEARS

Equipment	Newborn	3-6 mos.	1 year	2-3 yrs.	4-6 yrs.
<b>Weight</b>	3 kg	5 kg	10 kg	15 kg	20 kg
<b>ETT</b>	3.0-3.5	3.5-4.0	4.0-4.5	4.5-5.0	5.0-5.5
<b>L Blade</b>	Miller 0-1	Miller 0-1	Miller 0-1	Miller 1-2	Miller 2
<b>Suction</b>	6-8 Fr	8-10 Fr	10 Fr	10 Fr	10 Fr
<b>NG Tube</b>	5-8 Fr	5-8 Fr	8-10 Fr	10-12 Fr	12-14 Fr
<b>Foley</b>	6-8 Fr	6-8 Fr	8-10 Fr	10-12 Fr	10-12 Fr
<b>Chest Tube</b>	10-12 Fr	12-16 Fr	16-20 Fr	20-24 Fr	24-32 Fr
<b>LMA (cuff)</b>	1 (4 mL)	1.5 (7 mL)	2 (10 mL)	2 (10 mL)	2-2.5 (14 mL)

## EQUIPMENT SIZES: 7 YEARS and OLDER

Equipment	7-9 yrs.	10-12 yrs.	13-15 yrs.	>15 yrs.
<b>Weight</b>	25 kg	30 kg	40 kg	> 50 kg
<b>ETT</b>	5.5-6.0 cuff	6.0-6.5 cuff	7.0-7.5 cuff	7.5-8.0 cuff
<b>L Blade</b>	Mil/Mac 2	Mil/Mac 2-3	Mil/Mac 3	Mil/Mac 3
<b>Suction</b>	10 Fr	10 Fr	12 Fr	12-14 Fr
<b>NG Tube</b>	12-14 Fr	14-26 Fr	14-16 Fr	16-18 Fr
<b>Foley</b>	12 Fr	12 Fr	12-14 Fr	12-14 Fr
<b>Chest Tube</b>	28-32 Fr	28-32 Fr	32-40 Fr	32-40 Fr
<b>LMA (cuff)</b>	2.5	3 (20 mL)	3 (20 mL)	4-6 (30-50 mL)