## Section 2

### Pediatric Resuscitation & Emergency Medication Protocols

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**PREM Triangle: Decision Making Tool for Resuscitation**

**AIRWAY**
- Stable, obstructed, unstable, obstructed
- Unstable: Head tilt-chin lift, suction, NG decompression
- Stable or obstructed: Position of comfort (avoid noxious stimuli, supine position or separating from mum)
- Croup: O₂ + Epinephrine neb + steroid
- Asthma: O₂ + Bronchodilators
- Respiratory distress, failure: O₂ + CPAP
- Apnea: O₂ + BVM Ventilation, ETT

**BREATHING**
- Normal
- Effortless tachypnea
- Impending respiratory failure
- Relative bradypnea
- Apnea

**CIRCULATION**
- HR: Normal (N), Bradycardia, relative bradycardia, tachycardia
- Perfusion: N, shock, cardiogenic shock, vasodilatory ±
- SBP: N, ↑, ↓; DBP: N, ↑, ↓; PP: N, wide; MAP: N, ↑, ↓
- Bradycardia + shock + ↓ SBP: Chest compression, epinephrine bolus
- Shock + ↓ SBP: NS or RL bolus (pull-push), epinephrine infusion
- Shock + N SBP: Bolus by gravity
- Post bolus wide PP shock + ↓ MAP: Dopamine
- Post bolus & Dopamine, wide PP shock + ↓ MAP: Nor-Epinephrine

**DISABILITY**
- LOC: Alert (baseline)
- T&P: Normal
- Eyes: EOM Normal
- Pupils: PERL

**INTERVENTION**
- dLOC: Correct hypoxia, shock, cardiac dysfunction, NCSE
- Metabolic: Dextrose, insulin, electrolyte correction
- CSE, NCSE: Anti-convulsant
- ICP: Anti-oedema measures

**PREM Process:** After every intervention (bronchodilator, fluid bolus, intubation, anti-convulsant etc.), perform the 1-minute modified rapid cardio-pulmonary-cerebral assessment, document, interpret vital signs and derive physiological status to decide the next step. Even if 1 sign of deterioration is noted, interrupt current intervention and reconsider. If all variables show improvement, continue till therapeutic goals are achieved (green triangle).

National Health Mission-Strengthening of Pediatric Emergency Care System in Tamil Nadu- Establishment of Pediatric Resuscitation and emergency Units under Tamil Nadu Accidents and Emergency Care Initiative under the name of PREM G.O(D)No. 539.
Progressive Hypoxia/Shock
Compensatory mechanisms: ↑ Respiratory rate (RR), ↑ Heart rate (HR) and ↑ Systolic blood pressure (SBP).

Compensation fails: RR ↓, HR ↓ and SBP ↓ fall to “normal range for age.”

VITAL SIGNS (NORMAL RANGE) ARE FAILING (RELATIVE BRADYPNEA, BRADYCARDIA, HYPOTENSION) IF OTHER PARTS OF TRIANGLE ARE ABNORMAL

DISABILITY
LOC: Pain or unresponsive
T&P: Posturing ±, floppy ±, GTCs ±
Eyes: Conjugate deviation ±, lid twitch ±, nystagmus ±
Pupils: sluggishly

AIRWAY Unstable ±, obstructed ±
BREATHING RR: “Normal” for age
Grunt ±, stridor ±
Retractions ±
Respiration: Abdominal ±
Air-entry: Bilateral
Added sounds ±
SpO₂ <94% ±

CIRCULATION
HR: “Normal” for age; HS: muffling ±, gallop ±; P&C: cool, dusky
Pulses: +/-0, +/+0; CRT: >2 seconds; Hepatomegaly
SBP: “Normal” for age; MAP: Low

Being reassured by “normal” vital signs on the monitor can be misleading and dangerous.
PREM Process: Repeated cardiopulmonary cerebral assessment, documentation, interpretation of vital signs, and derivation of physiological status (PREM triangle) are crucial to determine whether vital signs are “normal” or not. It also provides information on the trend & change in hemodynamic status.
Although, SBP may be normal or high, if diastolic BP is <50% of SBP and MAP (for age) has fallen, consider HYPOTENSION.
Triage & Resuscitate Using PREM Triangles

**NORMAL PHYSIOLOGICAL STATUS**

**AIRWAY** Stable (vocalizes)
- **BREATHING RR**: N
- **Grunt, stridor**: No
- **Retractions**: No
- **Respiration**: Thoracic
- **Air-entry**: +
- **Added sounds**: No
- **SpO₂**: >94%

**CIRCULATION**
- **HR**: N (for age)
- **HS**: No muffling or gallop
- **P&C**: Warm, pink sole of foot
- **Pulses**: +++/++
- **CRT**: <2 seconds
- **Liver span**: N
- **SBP**: N
- **DBP**: N
- **PP**: Wide
- **MAP**: N

*Pulses: Femoral (F) & Dorsalis Pedis (DP) +++/++ means both normal volume
Note: +++/+++ F = DP; +/-0 or +/0 = weak FP but no DP

**DISABILITY**
- **LOC**: Alert
- **T&P**: N
- **Eyes**: EOM
- **PERL**: Alert

**RESPIRATORY DISTRESS**

**AIRWAY** Stable
- **BREATHING RR**: ↑
- **Grunt, stridor**: ±
- **Retractions**: +
- **Respiration**: Thoracic
- **Air-entry**: ±
- **Added sounds**: ±
- **SpO₂**: >94%

**CIRCULATION**
- **HR**: ±
- **HS**: N
- **P&C**: Warm, pink sole of foot
- **Pulses**: +++/++
- **CRT**: <2 seconds
- **Liver span**: N
- **SBP**: N
- **DBP**: N
- **PP**: Wide
- **MAP**: N

**CARDIAC FAILURE**

**AIRWAY** Stable
- **BREATHING RR**: ↑
- **Grunt, stridor**: ±
- **Retractions**: +
- **Respiration**: Thoracic
- **Air-entry**: ±
- **Added sounds**: ±
- **SpO₂**: >94%

**CIRCULATION**
- **HR**: Tachycardia
- **HS**: N
- **P&C**: Warm, pink or dusky
- **Pulses**: +++/++
- **CRT**: <2 seconds
- **Liver span**: N
- **SBP**: N
- **DBP**: Low
- **PP**: Wide

**VASODILATORY CARDIOGENIC SHOCK (MAP N)**

**AIRWAY** Stable
- **BREATHING RR**: N
- **Grunt, stridor**: ±
- **Retractions**: +
- **Respiration**: Thoracic
- **Air-entry**: ±
- **Added sounds**: ±
- **SpO₂**: ≤54%

**DISABILITY**
- **LOC**: Alert
- **T&P**: N
- **Eyes**: EOM
- **PERL**: Alert

**PREM Terminology & Definitions:**
- **Breathing normal** = Normal RR + normal work of breathing
- **Respiratory distress** = Increased RR + retractions
- **Impending respiratory failure** = Grunt + respiratory distress
- **Relative bradycardia** = Heart rate within normal range for age - whilst other sides of the triangle are abnormal
- **Wide pulse pressure** = SBP - DBP > 40 mm Hg
- **Vasodilatory shock** = DBP < 50% SBP + wide PP with or without low MAP
- **Mean arterial pressure** = DBP + one-third pulse pressure
- **Liver span** = Mark lower border along right costal margin, percuss & mark upper border for liver dullness. Measure span (cm) in the mid-clavicular line. Check lower border & re-measure span after every intervention.
- **Non-convulsive status epilepticus** = LOC: Responsive to pain or unresponsive + 1 or more abnormal EOM: Conjugate deviation, nystagmus, lid twitch

**Additional Notes:**
- Normal physiological status
- Respiratory distress
- Cardiac failure
- Vasodilatory cardiogenic shock (MAP N)
- Pulses: Femoral (F) & Dorsalis Pedis (DP) +++/++ means both normal volume
- Note: +++/+++ F = DP; +/-0 or +/0 = weak FP but no DP