NON-FATAL DROWNING - PEDIATRIC

Notes/Definitions

- Hypoxia is the primary cause of injury in drowning; prioritize airway management and oxygenation.

Base Hospital Contact Required

BLS Interventions

- Refer to OCEMS General BLS Standing Orders SO-BLS.
- Spinal motion restriction if trauma is suspected (i.e. diving or shore-break accident).
- Prevent and treat hypothermia by removing wet clothing and initiating rewarming.

ALS Interventions

- Assess Pediatric Assessment Triangle (PAT)
  - General appearance: tone, interactiveness, consolability, look / gaze, speech / cry
  - Work of breathing: retractions, nasal flaring, abnormal airway sounds, positioning
  - Circulation to skin: pallor, mottling, cyanosis
- When BLS airway management cannot maintain adequate ventilation or oxygenation and criteria met, consider:
  - CPAP (PR-120)
  - Supraglottic airway insertion for $\geq$ 50 kg (PR-135).
  - Endotracheal intubation for > 36 kg (PR-030).
- Apply capnography (EtCO2) as tolerated.
  - Maintain EtCO2 between 35 and 45 mmHg.
  - If EtCO2 > 50: ensure proper positioning for adequate ventilation and suction as needed.
  - If no improvement, initiate BVM.
- Initiate cardiac monitor as needed. Interpret, monitor, and document rhythm.
- Treat cardiopulmonary arrest per SO-P-040 (Cardiac Arrest – Pediatric).
- Treat bradycardia per SO-P-045 (Bradycardia – Pediatric).
- Obtain the patient's estimated weight utilizing an appropriate length-based resuscitation tape or age-based system.
- Assess GCS. Use pediatric GCS for patients age $\leq$ 2 years. Refer to Procedure B-002.
- Obtain IV or IV if applicable.

- If hypotensive (refer to Vital Sign table below), administer:
  - ► **Normal Saline 20 mL / kg IV / IO** (max dose 250 mL) – may repeat same dose twice for total of 3 boluses.
- If wheezing, administer:
  - ► **Albuterol 3 mL (2.5 mg)** – continuous nebulization if age < 30 days old.
  - ► **Albuterol 6 mL (5 mg)** – continuous nebulization if age > 30 days old.

Transport Consideration

- Contact Base Hospital (CCERC preferred) and ALS escort to destination as directed by the Base Hospital.

Additional Considerations

- Obtain submersion history if available:
  - Submersion time / downtime
  - Witnessed event
  - Resuscitation prior to arrival
  - What the patient was doing prior to the submersion
- Aspiration may develop after rescue; monitor closely for worsening respiratory distress.
- All unwitnessed drownings in any body of water suspect spinal cord injury from diving injury.
- A shore break injury occurs when a breaking wave picks up a person in shallow water and forcefully drives them head-first or neck-first into the sand or ocean bottom. This typically happens where waves break very close to the shoreline. Also known as "over the falls".

Pediatric Vital Signs by Age

Age	Pulse	Systolic Blood Pressure	Respiratory Rate
Neonate (0-30 days)	100-180	> 60	30-60
Infant (31 days - < 1 yr)	100-160	> 60	30-60
Toddler (1 yr - < 3 yrs)	90-150	> 70	24-40
Pre-school (3 yrs - < 5 yrs)	80-140	> 75	22-34
School Aged (5 yrs - < 10 yrs)	70-120	> 80	18-30
Teen (≥ 10 yrs)	60-100	> 90	12-16

Base Hospital

- Airway and ventilation should take priority as drownings are primarily respiratory in nature. Place EtCO2 early.
- A CCERC is preferred due to their ECMO capabilities.
- For continued hypotension after the first Normal Saline bolus has been given, order:
  - ► **Push Dose Epinephrine 0.1 mL / kg (0.001 mg / kg) IV / IO** every 3 minutes (maximum single dose 1 mL), titrate to age-based SBP (refer to PR-205).

Weight	Volume
3 kg	0.3 mL
4 kg	0.4 mL
5 kg	0.5 mL
6 kg	0.6 mL
7 kg	0.7 mL
8 kg	0.8 mL
9 kg	0.9 mL
≥ 10 kg	1 mL

Destination Determination

- Transport to a Trauma Center if any of the following are present:
  - Shore break, diving, or watercraft-related incident
  - External evidence of trauma
  - Meets mechanism or traumatic injury criteria per OCEMS Policy #310.30 (Trauma Triage).
- Transport to a CCERC for ROSC or non-fatal drowning, unless Base Hospital directs transport to the nearest appropriate ERC instead, based on any of the following:
  - Unmanageable airway
  - Inadequate ventilation or poor compliance with BVM
  - No IV / IO access
  - Prolonged transport time > 20 minutes to a CCERC

Cross References:
SO-BLS General BLS Standing Orders
BLS Procedure B-001 (Pediatric Assessment Triangle)
BLS Procedure B-002 (Glasgow Coma Scale Score)
I-20 Pediatric Medication Volume Dose by Weight
PR-205 Preparation and Dosing of Push Dose Epinephrine - Pediatric
SO-P-040 Cardiopulmonary Arrest - Pediatric
SO-P-080 Shock (Symptomatic Hypotension) – Pediatric
PR-030 Endotracheal Intubation (including ETCO2)
PR-135 Supraglottic Airway Device Placement – Adult/Adolescent
Policy 310.30 or 310.31 Trauma Triage