Standing Orders for Organ Donor Management – Pediatrics

(Apply from newborn to 18 years; intended for care provided within a Pediatric Intensive Care Unit [PICU])

It is important to take the time necessary in the PICU to optimize multi-organ function for the purposes of improving transplant outcomes. Resuscitation and re-evaluation can improve reversible organ dysfunction (myocardial/cardiovascular dysfunction, oxygenation impairment related to potentially reversible lung injury, invasive bacterial infections, hypernatremia or any other potentially treatable situation) and can allow for the evaluation of temporal trends in aspartate aminotransferase (AST), alanine aminotransferase (ALT) or creatinine. This treatment period can range from 12–24 hours and should be accompanied by frequent re-evaluation to demonstrate improvement in organ function toward defined targets. Once optimized, donors should have surgical procurement procedures arranged emergently.

**There are no predefined demographic factors or organ dysfunction thresholds that preclude the consent for donation and offering of organs for transplantation.**

Note: Dosing recommendations apply to children ≤ 60 kg, beyond which adult dosing should apply.

**Standard Monitoring**
1. Urine catheter to straight drainage, strict intake and output
2. Nasogastric tube to straight drainage
3. Vital signs q1h
4. Pulse oximetry, 3-lead electrocardiogram (EKG)
5. Central venous pressure (CVP) monitoring
6. Arterial line pressure monitoring.

**Laboratory Investigations**
1. Arterial blood gas (ABG), electrolytes, glucose q4h and PRN
2. CBC q8h
3. Blood urea nitrogen (BUN), creatinine q6h
4. Urine analysis
5. AST, ALT, bilirubin (total and direct), international normalized ratio (INR) (or prothrombin time [PT]), partial thromboplastin time (PTT) q6h.

**Hemodynamic Monitoring and Therapy**

General targets: age-related norms for pulse and blood pressure (BP)
1. Fluid resuscitation to maintain normovolemia, CVP 6–10 mmHg
2. Age-related treatment thresholds for arterial hypertension:
   - Newborns–3 months > 90/60
   - > 3m – 1 year > 110/70
   - > 1 yr – 12 yrs > 130/80
   - > 12 yrs –18 yrs > 140/90
a. Wean inotropes and vasopressors, and, if necessary,
b. Start
   – nitroprusside 0.5–5.0 µg/kg/min, or
   – esmolol 100–500 µg/kg bolus followed by 100–300 µg/kg/min
3. Serum lactate q2–4h
4. Central venous oximetry q2–4h; titrate therapy to central MVO$_2$ ≥ 60%.

**Agents for Hemodynamic Support**
1. Dopamine ≤ 10 µg/kg/min
2. Vasopressin 0.0003–0.0007 U/kg/min (0.3–0.7 mU/kg/min) to a maximum dose of 2.4 U/hour
3. Norepinephrine, epinephrine, phenylephrine (caution with doses > 0.2 µg/kg/min).

**Glycemia and Nutrition**
1. Routine intravenous (iv) dextrose infusions
2. Initiate or continue enteral feeding as tolerated
3. Continue parenteral nutrition if already initiated
4. Initiate and titrate insulin infusion to maintain serum glucose 4–8 mmol/L.

**Fluid and Electrolytes**
Targets:
1. Urine output 0.5–3 ml/kg/hr
2. Serum sodium (Na) ≥ 130 ≤ 150 mM

**Diabetes Insipidus**
Defined as:
1. Urine output > 4 ml/kg/hr, associated with:
   a. Rising serum Na ≥ 145 mmol/L and/or
   b. Rising serum osmolarity ≥ 300 mosM and/or
   c. Decreasing urine osmolarity ≤ 200 mosM.

Diabetes insipidus therapy:
1. Titrate therapy to urine output ≤ 3 ml/kg/h
   a. iv vasopressin infusion 0.0003 – 0.0007 U/kg/min (0.3 – 0.7 mU/kg/min) to a maximum dose of 2.4 U/hour, and/or
   b. Intermittent 1-desamino-D-arginine vasopression (DDAVP) 0.25 to 1 µg iv q6h.

**Combined Hormonal Therapy**
Defined as:
1. Tetra-iodothyronine ($T_4$) 20 µg iv bolus followed by 10 µg/hour iv infusion (or 50-100 µg iv bolus followed by 25-50 µg iv bolus q12h)
2. Vasopressin 0.0003–0.0007 U/kg/min (0.3–0.7 mU/kg/min) to a maximum dose of 2.4 U/hour.
3. Methylprednisolone 15 mg/kg (≤ 1 gm) iv q24h.
Indications:
1. 2D echocardiographic ejection fraction ≤ 40%, or
2. Hemodynamic instability (includes shock unresponsive to restoration of normovolemia and requiring vasoactive support [dopamine >10 µg/min or any other vasopressor agent])
3. Consideration should be given to its use in all donors.

Hematology
1. Hemoglobin (Hgb) optimal ≥ 90–100 g/L for unstable donors, lowest acceptable ≥ 70 g/L
2. Platelets, INR, PTT no predefined targets, transfuse in cases of clinically relevant bleeding
3. No special transfusion requirements.

Microbiology (baseline, Q24h and PRN)
1. Daily blood cultures
2. Daily urine cultures
3. Daily endotracheal tube (ETT) cultures
4. Antibiotics for presumed or proven infection.

Heart Specific
1. 12-lead EKG
2. Troponin I or T, q12h
3. 2D echocardiography
   a. Should only be performed after fluid and hemodynamic resuscitation
   b. If 2D echo ejection fraction ≤ 40% then repeat echocardiography at q6–12h intervals.

Lung Specific
1. Chest x-ray q24h and PRN
2. Bronchoscopy and bronchial wash gram stain and culture
3. Routine ETT suctioning, rotation to lateral position q2h
4. Mechanical ventilation targets:
   a. Tidal volume (Vt) 8–10 ml/kg, positive end expiratory pressure (PEEP) 5 cm H₂O, peak inspiratory pressure (PIP) ≤ 30 cm H₂O
   b. pH 7.35–7.45, partial pressure of arterial carbon dioxide (PaCO₂) 35–45 mmHg, partial pressure of arterial oxygen (PaO₂) ≥ 80 mmHg, oxygen (O₂) sat ≥ 95%
5. Recruitment maneuvers for oxygenation impairment may include:
   a. Periodic increases in PEEP up to 15 cm H₂O
   b. Sustained inflations (PIP @ 30 cm H₂O x 30–60 sec)
   c. Diuresis to normovolemia.