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PEDIATRIC POTENTIAL ORGAN DONOR ASSESSMENT AND MANAGEMENT DEATH DETERMINATION BY NEUROLOGIC CRITERIA (DNC)

For children weighing over 60 kg or in puberty, please view the adult donor guide.

This guide[1] is a reference tool for the assessment and management of potential donors in confirmed cases of death determination by neurologic criteria (DNC) or in cases where a decision to cease active treatment has been made. An integrated approach to the care team's clinical judgment remains essential.

MINIMUM MONITORING REQUIRED

- Cardiac monitor
- Arterial cannula; note the blood pressure (BP) q1h
- Continuous oxygen saturation (SaO_2); note the saturation q1h
- Urinary catheter, strict control of intake and output; note the diuresis q1h
- Continuous or minimal core temperature q4h

ASSESSMENT OF POTENTIAL DONOR

Initial assessment

Identifying or retrieval centre

- FSC, Na, K, Cl, Glucose, Urea, Creatinine, PTT, INR, Ca, Mg, PO4, Lactate, Albumin and Protein
- AST, ALT, Alkaline phosphatase, Total and direct bilirubin, GGT, LDH, Amylase, Lipase
- CK, CKMB or Troponin I/T
- Glycated hemoglobin (HbA1c)
- Arterial blood gas
- Blood culture x 2 series
- Blood group and antibodies search
- Crossmatch (packed red blood cells in reserve, according to the care team responsible for retrieval)
- Serology, virology and histocompatibility managed by Transplant Québec
- Urinalysis, including microalbumin/creatinine ratio and protein/creatinine ratio
- Urine culture
- Sputum gram stain and culture on bronchial or endotracheal secretions
- Weight / Height
- Chest X-ray
- Abdominal ultrasound, if requested by Transplant Québec
- Abdominal and thoracic CT-scan, if requested by Transplant Québec

q. 8 h	CK, CKMB or Troponin I/T q8h x 24h If patient unstable, pursue q8h
q. 12 h	AST, ALT, Alkaline phosphatase, Total and direct bilirubin, GGT, LDH, Amylase, Lipase, Na, K, Glucose, Urea, Creatinine, FSC, PTT, INR, Lactate, Arterial blood gas
q. 24 h	Cl, Mg, Ca, PO_4
PRN	If clinical signs of infection are present, repeat: Blood culture x 2 series, Gram and bronchial sputum culture, Urine culture

Specific assessment of a potential heart donor*

- EKG QD
- Echocardiogram to carry out according to the orders of the cardiac program and after DNC determination
- Avoid administering significant inotrope support
- Notify if inotrope needs increase

* Use IV in-line filter if donor presents a patent foramen ovale or an atrial septal defect (ASD).

Specific assessment of a potential lung donor

- Arterial blood gas ± q2h using a ***hyperoxygenation test****
- Chest X-ray QD
- Bronchoscopy, if requested by Transplant Québec

* ***Hyperoxygenation test***

- Ventilate with 100% FiO_2, minimum PEEP of 5 cm H_2O and tidal volume of 8 mL/kg of ideal weight
- Arterial blood gas after 20 minutes
- ***Pulmonary recruitment maneuvers*** PRN

[1] Ref.: Ball IM, Hornby L, Rochwerg B, et al. *Management of the neurologically deceased organ donor: A Canadian clinical practice guideline*. CMAJ. 2020 April 6;192(14):E361-E369. DOI:10.1503/cmaj.190631. | Nakagawa TA, Shemie SD, Dryden-Palmer K, Parshuram CS, Brierley J. *Organ Donation Following Neurologic and Circulatory Determination of Death. Pediatric Critical Care Medicine*. 2018;19:S26-S32. DOI:10.1097/PCC.0000000000001518.1. | Weiss MJ, Blanco AP, Ben Gelbart. *Special issues in pediatric deceased organ donation. Intensive Care Medicine*. February 2019:1-3. DOI:10.1007/s00134-019-05523-2.

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MANAGEMENT OBJECTIVES AND RECOMMENDATIONS

Hemodynamics

D5% NaCl 0.9% or 0.45% or RL
depending on sodium level
+
KCl depending on potassium level
Rate according to maintenance needs
Adjust according to urine output

General objectives

- Target euvolemia[1]
- Normal HR and BP according to age group (see ***Heart rate and blood pressure***)

If hypotension and signs of hypovolemia

Bolus NaCl 0,9 % IV 10 mL/kg
q15 min x 3
or Ringer's Lactate or albumin 5%[2] PRN

If hypotension

1. Vasopressin[3] 0.0003-0.0007 U/kg/min
2. Norepinephrine 0.05-0.2 µg/kg/min
3. Epinephrine 0.05-0.2 µg/kg/min

If indicated: Hydrocortisone 1 mg/kg IV q6h max 50 mg per dose

If hypertension[4] according to age group

- 0-3 months BP > 90/60 mmHg
- 3 months-1 year BP > 110/70 mmHg
- 1-12 years BP > 130/80 mmHg
- 12-18 years BP > 140/90 mmHg

1. Wean vasosuppressors/inotropes
2. Nitroprusside 0.5-5.0 µg/kg/min and/or
3. Esmolol 100-500 µg/kg bolus followed by 100-300 µg/kg/min IV infusion

Heart rate and blood pressure

Age group	HR (beats per minute)	Systolic / diastolic BP
• 0-3 months	• 100-150	• 65-85 / 45-55 mmHg
• 3-6 months	• 90-120	• 70-90 / 50-65 mmHg
• 6-12 months	• 80-120	• 80-100 / 55-65 mmHg
• 1-3 years	• 70-110	• 90-105 / 55-70 mmHg
• 3-6 years	• 65-110	• 95-110 / 60-75 mmHg
• 6-12 years	• 60-95	• 100-120 / 60-75 mmHg
• > 12 years	• 55-85	• 110-135 / 65-85 mmHg

[1] The rate and type of IV fluids may vary according to serum sodium and potassium levels, enteral nutrition tolerance, and should target homeostasis.
[2] The use of hydroxyethyl starch products should be avoided when there is renal insufficiency.
[3] Prioritize Vasopressin for hemodynamically unstable patients, except if instability is primarily due to left ventricular dysfunction.
[4] It is recommended to monitor volume status prior to administering beta blockers.

Cardiac dysfunction

Indicated by

Echocardiogram with ejection fraction (LVEF) < 50% or hemodynamic instability

Shock unresponsive to reestablishment of volume status and that requires vasoactive support (epinephrine 0.2 µg/kg/min or more)

At the request of the care team, initiate hemodynamic monitoring (intermittent or continuous) including, but not limited to:

- Targeted echocardiogram*

or

- Other non-invasive procedures for cardiac output monitoring

Hemodynamic management according to standard care practices (consider using inotropes)

* Note that targeted echocardiograms are not intended as substitutes for trans-thoracic echocardiograms (TTE).

Mechanical ventilation

Objectives

- Minimal FiO_2 to maintain SaO_2 ≥ 95%
- pH 7.35-7.45
- $PaCO_2$ 35-45 mmHg
- Tidal volume (TV) 5-8 mL/kg of ideal weight
- PEEP ≥ 5 cm H_2O
- Peak inspiratory pressure (PIP) ≤ 30 cm H_2O

Clinical surveillance

Endotracheal suctioning q8h and PRN

Avoid pulmonary edema

Head of bed elevated at 30°

Turn and position q2h

Pulmonary recruitment maneuvers

Lungs previously deemed inadmissible for transplant may benefit from recruitment maneuvers to regain function. Refer to the hospital's internal protocol, if applicable.

The care team may also consult Transplant Québec, if needed.

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Temperature

Objective

Core T°
35.0 to 37.5°C*

< 35.0 °C

- Warming blanket
- Cover the head

> 38.0 °C

- Septic profile
- Empiric broad-spectrum antibiotics, at the request of the care team

* Ensure a core temperature of ≥ 36.0°C during death determination by neurologic criteria (DNC).

Diuresis

Objective

0.5-3.0 mL/kg/h

Oliguria

If urine output < 0.5 mL/kg/h:
NaCl 0.9% bolus (10 mL/kg), repeat PRN

If urine output < 0.5 mL/kg/h
Rule out secondary causes (postrenal obstruction)
Rule out low cardiac output and/or hypovolemia
(see ***Cardiac dysfonction***)

Polyuria

If urine output > 4 mL/kg/h
Rule out diabetes insipidus*

DDAVP 0.25-1.0 µg IV q6h or nasal spray
or
Use vasopressin as first choice
if hemodynamic support required
(0.0003-0.0007 U/kg/min IV infusion max. 2.4 U/h)

* Diabetes insipidus: Urine output > 4 mL/kg/h, Na ≥ 145 mmol/L, serum osmolarity ≥ 300 mOsm, urine osmolarity ≤ 200 mOsm, urine specific gravity < 1.005.

Glycemia

Objective

6-10 mmol/L

Capillary blood glucose* q1h

Insulin infusion PRN

* If capillary blood glucose within normal range and stable, levels may be monitored q2h, then q4h.

Electrolytes

Objectives

Na 135-155 mmol/L
K 3.5-5.0 mmol/L
Mg 0.65-1.05 mmol/L
PO_4 0.74-1.52 mmol/L
Ca 2.2-2.6 mmol/L

Correct electrolyte abnormalities

Coagulation and hematology

Objectives

- Optimal hemoglobin > 70 g/L
- Administer platelets and fresh frozen plasma if clinical signs of hemorrhage or coagulopathy
- Preventive administration of blood products is discouraged
- CMV-negative blood is not required

Contact Transplant Québec prior to administering blood products that may interfere with plasma dilution.

Prophylaxis

Pharmacological thromboprophylaxis according to clinical context or, if contraindicated, use mechanical thromboprophylaxis.

Nutrition

Standard tube feeding according to the hospital's protocol

Do not initiate parenteral nutrition. However, do not discontinue if already initiated.

Eye care

Keep eyelids closed

Avoid oily or greasy substances

The Transplant Québec team wishes to thank everyone who contributed to the revision of this document.

To download or print the guide:
https://www.transplantquebec.ca/en/procedures-and-forms
This document is overseen by Transplant Québec and is revised periodically.
Please ensure that you have the most recent version available on the website.