

Evidence Bulletins



Understanding Key Recommendations for the Medical Management of Neurologically Deceased Donors

Hypothermia

For Management of the Neurologically Deceased Donor

RECOMMENDATION:

Maintain core body temperature at 34-35°C.

CONTEXT:

Hypothermia may reduce systemic inflammation in the donor, and particularly in the kidney donor, with downstream benefits on preventing ischemia-reperfusion injury in the transplanted kidney.

BEDSIDE NOTES...

- Cool to 34-35°C core
- May stop cooling if kidney donation is not possible
- Use non-invasive methods:
 - ice packs
 - forced air cooling blanket
 - cool gel mattress pad
- Consider acetaminophen
- Monitor via rectal, gastric or esophageal probe

RESEARCH SHOWS...

- Benefit in KIDNEY TRANSPLANT FUNCTION
 - A randomized trial (N=370) reported fewer kidney recipients needing dialysis in the first week after transplantation, especially for extended criteria donors¹
 - An observational (non-randomized) study (N=487) also reported fewer kidney recipients needing dialysis in the first week after transplantation²
- No studies reported clear benefit or harm to the number of ORGANS DONATED, or to other ORGAN TRANSPLANT FUNCTION

This research supports a weak (rather than strong) recommendation.

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Lung Protective Ventilation

For Management of the Neurologically Deceased Donor

RECOMMENDATION:

Tidal volumes of 6-8 mL/kg predicted body weight (PBW), PEEP \geq 8 cm H₂O, and recruitment maneuvers (RMs) after ventilator disconnections.

CONTEXT:

Brain injury elicits a pro-inflammatory state, and brainstem death eliminates spontaneous ventilation, cough and movement. Together, these factors increase the risk of acute lung injury and progressive atelectasis.

BEDSIDE NOTES...

- Vt 6-8 mL/kg PBW
- Calculate PBW based on sex and height (inches)
 - Use: ardsnet.org/tools.shtml
- PEEP \geq 8 cm H₂O
- RMs after ventilator disconnection
 - A common RM protocol is 30 cm H₂O \times 30 sec
 - Stop the RM if acute hypotension develops

RESEARCH SHOWS...

- More LUNGS DONATED
 - A randomized trial (N= 118) reported a 2-fold increase in lungs donated¹
 - 3 observational (non-randomized) studies (N=1450) reported more lungs donated²⁻⁴
- No benefit or harm to LUNG RECIPIENT SURVIVAL
 - A randomized trial (N=118) reported no difference in 6 month survival¹
 - 2 of 3 observational (non-randomized) studies (N=1450) reported no difference in survival²⁻⁴
- No benefit to the number of other ORGANS DONATED^{1,3}

This research supports a strong recommendation.

GLOSSARY

PBW: predicted body weight; PEEP: positive end-expiratory pressure; Vt: tidal volume; RM: Recruitment maneuver

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Nutrition

For Management of the Neurologically Deceased Donor

RECOMMENDATION:

Provide enteral nutrition if not otherwise contraindicated.

CONTEXT:

Critical illness and brain ischemia both cause systemic inflammation. Inflammation increases metabolic demand, contributing to nutritional derangements, and further inflammation. Inflammation can be transmitted from donor organs to recipients. Theoretically, enteral nutrition may reduce donor inflammation. This may be particularly important for liver donors, since their recipients are typically malnourished.

BEDSIDE NOTES...

- Start enteral feeds
- Reduce aspiration risk
 - Head of bed elevation
 - Motility agents
 - Apply local practices
- On call to OR
 - Hold feeds
 - Aspirate gastric contents

RESEARCH SHOWS...

- Animal studies suggest benefit
 - Enteral nutrition reduced tissue damage and may improve allograft function¹⁻³
- Human studies for NDD donors are small and detected no effect
 - 1 randomized trial (N=36)⁴
 - No effect of enteral nutrition on number of organs donated
 - No effect on recipient organ function or 6 month survival.

This research supports a weak (rather than strong) recommendation.

GLOSSARY

OR: Operating Room; NDD: neurologically deceased donor

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Corticosteroids

For Management of the Neurologically Deceased Donor

RECOMMENDATION:

Administer corticosteroids to hypotensive donors requiring vasopressor therapy.

CONTEXT:

Brainstem ischemia can lead to shock through various pathways. Possible benefits of physiologic doses of corticosteroids include improved vascular tone, suppression of inflammation, and stabilization of capillary integrity to reduce fluid shifts.

BEDSIDE NOTES...

- Start steroids when using vasopressors for low BP
- Consider holding steroids for hyperglycemia that is difficult to control
- Consider holding steroids for recent or active GI bleed
- A common dose is: hydrocortisone 50 mg IV Q6h
- Consider a higher dose (methylprednisolone 1-2 grams IV daily) at the request of lung transplant teams

RESEARCH SHOWS...

- Possible benefit in treating HYPOTENSION
 - 2 of 4 observational (non-randomized) studies (N=557) reported an increase in donor BP¹⁻⁴
 - This benefit was not confirmed in a meta-analysis of 3 randomized trials, (N=452)⁵⁻⁸
- No clear effect on the NUMBER OF ORGANS DONATED
 - A meta-analysis (2 trials, 309 donors) reported no benefit or harm^{6,8,9}
 - 5 observational (non-randomized) studies reported more lung transplants after the initiation of treatment bundles that included respiratory consultation, early bronchoscopy, physiotherapy, corticosteroids, and fluid restriction^{4, 10-14}
- No effect on POST-TRANSPLANT ORGAN FUNCTION
 - A meta-analysis (9 trials, 1509 recipients) reported no effect of high-dose donor steroids^{5-7, 15-20}

This research supports a weak (rather than a strong) recommendation.

GLOSSARY

BP: blood pressure; GI: Gastrointestinal

REFERENCES

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Thyroid Hormone

For Management of the Neurologically Deceased Donor

RECOMMENDATION:

Do not administer thyroid hormone for routine donor management.

CONTEXT:

Theoretically, brain death can result in thyroid hormone depletion. In fact, T3 and T4 levels may fall, but TSH levels typically do not rise. This thyroid profile (euthyroid sick syndrome) does not require thyroid supplementation in other ICU populations. The incidence of true hypothyroidism among neurologically deceased donors is unknown.

BEDSIDE NOTES...

- For hypotension, consider:
 - crystalloid fluids
 - vasopressin infusion
 - hydrocortisone therapy
- For refractory hypotension, consider echo
- For hypotension due to cardiac dysfunction, consider usual care, or inotropes
 - If refractory consider thyroid hormone supplementation

RESEARCH SHOWS...

- No effect on number of ORGANS DONATED
 - 5 of 6 observational (non-randomized) studies (N=83,338) reported no benefit¹⁻⁶
- No effect on number of HEARTS DONATED
 - 4 of 4 randomized trials (N=321) reported no effect⁷⁻¹⁰
 - 4 of 6 observational (non-randomized) studies (N=64,453) reported no effect^{1-3, 11-13}
- No benefit for HEART FUNCTION
 - 3 of 3 randomized trials (N=139) reported no improvement in ejection fraction⁷⁻⁹

This research supports a weak (rather than strong) recommendation.

GLOSSARY

T3: triiodothyronine; T4: thyroxine; TSH: Thyroid-stimulating hormone

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Transfusion

For Management of the Neurologically Deceased Donor

RECOMMENDATION:

Transfuse pRBCs to maintain Hgb ≥ 70 g/L. Unless actively bleeding, avoid FFP transfusions, and transfuse platelets only if $< 10 \times 10^9/L$.

CONTEXT:

Since hemoglobin is the primary carrier of oxygen to tissues, there are theoretical benefits to blood product transfusions. However, excess transfusions increase the risk of allergic or immune transfusion reactions, volume overload, and possibly infection.

BEDSIDE NOTES...

- If no bleeding, target:
 - Hgb ≥ 70 g/L
 - Platelets $\geq 10 \times 10^9/L$
 - Avoid FFP transfusion
- If active bleeding:
 - Manage as per usual practice
- On call to OR:
 - Transfuse blood products as per operative team

RESEARCH SHOWS...

- No benefit to ORGAN FUNCTION with more transfusions
 - In 3 of 3 observational (non-randomized) studies (N=2286), aiming for higher Hgb levels in donors did not benefit recipient kidney function or survival¹⁻³
 - 2 of 2 observational (non-randomized) studies (N=212) reported no relationship between donor Hgb levels and recipient liver function⁴⁻⁵

This research supports a weak (rather than strong) recommendation.

GLOSSARY

pRBC: packed red blood cells; Hgb: hemoglobin; FFP: fresh frozen plasma

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Vasopressin & DDAVP

For Management of the Neurologically Deceased Donor

RECOMMENDATION:

For hypotension, administer vasopressin as a first-line vasoactive agent.

For diabetes insipidus, administer either vasopressin or DDAVP.

CONTEXT:

Vasopressin constricts arterioles (acting as a vasopressor) and reduces free water loss from the kidneys (acting as an antidiuretic hormone). Since most donors develop both hypotension and diabetes insipidus (DI), vasopressin is theoretically ideal given its dual effect. DDAVP is a more effective antidiuretic than vasopressin, with negligible vasopressor effect.

BEDSIDE NOTES...

Vasopressin 0-2.4 u/hr IV

DDAVP 4 mcg q6h prn, IV or SQ

- For low BP (MAP<65 mmHg)
 - Start with vasopressin
 - Add norepinephrine, prn
- For diabetes insipidus
 - Start DDAVP or vasopressin
 - DDAVP if hypertensive
 - Use both if needed
- Watch for toxicity (Na<135)
 - Stop or reduce doses at MD discretion

RESEARCH SHOWS...

- Vasopressin was associated with more ORGANS DONATED
 - 3 of 3 observational (non-randomized) studies (N>20,000) reported this benefit¹⁻³
- Benefit of less HYPOTENSION with vasopressin
 - 4 of 4 observational (non-randomized) studies reported increased BP or decreased rate of donor loss due to hemodynamic instability⁴⁻⁷
- No comparative studies of vasopressin vs. DDAVP in donors

This research supports a weak (rather than strong) recommendation.

GLOSSARY

DDAVP: desmopressin; DI: diabetes insipidus; BP: blood pressure; IV: Intravenous;
SQ: Subcutaneous Injection; MAP: Mean Arterial Pressure; Na: Serum Sodium

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