

Lucile Packard Children's Hospital
DEPARTMENT OF PATIENT CARE SERVICES

PATIENT CARE GUIDELINE:
Circuit Management of the Pediatric Patient Requiring ECMO

This guideline is intended to provide the nurse with a description of recommended courses of action to address a specific diagnosis/clinical condition or need of a particular patient population. It is not necessarily the only acceptable and appropriate approach to patient care. Patient care continues to require individualization based on patient needs and responses.

Overview:

Caring for a pediatric patient on Extracorporeal Membrane Oxygenation (ECMO) requires the nurse to have a strong understanding of the function of the cardiovascular system, respiratory system and anticoagulation status.

The bedside nurse must use proper assessment tools in caring for the pediatric patient requiring ECMO and the circuit itself. He/she must make interventions that are appropriate, as these patients typically have severe cardio-respiratory dysfunction and the circuits require constant vigilance to maintain.

Key Assessments:

Respiratory:

- Impaired gas exchange

Cardiovascular:

- Impaired tissue perfusion
- Arrhythmias
- Decreased peripheral pulses
- Hypotension
- Edema

Gastrointestinal:

- Decreased calorie intake

Neurological:

- Decreased level of consciousness

Immunology:

- Malnutrition
- Invasive cannulation

Coagulation Status:

- Bleeding

Renal:

- Impaired renal status
- Electrolyte imbalance

Family/Psychosocial History

- Stress

Circuit

- Inspection for clot, air, membrane pressures
- Constant vigilance
- Emergency preparedness

Interdisciplinary Treatment Goals:

1. Protect airway and respiratory status
2. Optimize respiratory and cardiovascular status
3. Family teaching in regards to ECMO

Common Problems:

1. Alteration in respiratory function

Nursing Orders and Interventions:

1. Follow Standards of Care
2. Record pump flow rate, gas mix and flow rate and mixed venous saturation every hour
3. Make changes on sweep gas and flow rate based on blood gases
4. Draw triple gases every eight hours with co-oximeter measurement of oxygen

	<ol style="list-style-type: none"> 5. Check gas line pop-off at the beginning of every shift 6. If CO2 is blended in to sweep gas, ensure regulator is set for 10 psi and change tank at 200 psi
2. Alteration in cardiovascular function related to inadequate cardiac output: pump failure	<ol style="list-style-type: none"> 1. Follow Standards of Care 2. Record pump flow rate and change flow rate as ordered by the ECMO physician and clinical status 3. Check laboratory values as ordered in standing orders or per physician Platelet count and triple gases with mixed venous saturation every 8 hours Every 12 hours obtain a hemtacrit Every day obtain Chem 23, CBC with diff, fibrinogen and d-dimer test 4. Follow mixed venous saturations
3. Patient Safety	<ol style="list-style-type: none"> 1. Check entire system thoroughly for clot, air and leaks every hour (or more frequently if required) 2. Assess if pump is communicating to level, pressure 1, pressure 2 and cover 3. Assess pump settings 4. Assess pressure limit and regulation thresholds are set appropriately 5. Assess alarms settings 6. Check that 5 tubing clamps are present 7. Confirm gas line pop-off setting is appropriate for circuit size 8. Confirm CO2 regulator and tanks are set appropriately 9. Assess cannula for correct placement and for evidence of bleeding 10. Check the heat exchanger water level and chart patient and water bath temperatures 11. Ensure emergency blood pack is present 12. Ensure that you have adequate supplies 13. Presence of a ECMO trained and certified nurse at the pump <i>must be</i> continuous 14. Ensure hourly checks: flashing the bridge, circuit check, pressures are documented, transducers are flushed, record pump flow rate, gas mix, sweep flow rate and venous saturation, document heater and blood temperature and an ACT is performed. Document on the ECMO flow sheet the above components. 15. Flush the rotating hemostatic valve and post-oxy sampling port every 4 hours 16. Zero transducers every shift 17. Perform electronic QC every 8 hours and wet QC with the start of each run and with each new box of cuvettes 18. Follow ECMO policies 19. Ensure the presence of at least one other person is in the room at all times 20. Ensure that break coverage is by an ECMO trained staff member who stays at the pump at all times 21. Day shift responsibilities include ensuring 48 hours of PCOT supplies are present on the unit and QC needs are met 22. Change of shift responsibilities include: bedside supply cart is checked, stocked and signed off on sign-off sheet and the ECMO billing sheets are checked for supplies utilized and co-signed; and availability of an emergency blood pack 23. Night shift responsibilities additionally include room accommodation codes are entered
4. Potential for bleeding related to anticoagulation	<ol style="list-style-type: none"> 1. Obtain ACT every 15 minutes until status is stabilized then proceed to obtain a ACT every hour 2. Initiate heparin infusion when ACT reaches 300 seconds 3. Obtain lab specimens as outlined above 4. Follow standing orders for heparin bolus with platelet transfusion 5. Ensure transfusion into appropriate access based on ECMO policies 6. Post appropriate signage 7. Observe for overt and covert bleeding
5. Potential for anxiety and fear related to knowledge deficit	<ol style="list-style-type: none"> 1. Follow Standards of Care 2. Explain all procedures in simple, concise and reassuring manner 3. Treat patient and family as one unit 4. Provide comfortable environment 5. Provide opportunities for family and significant others to be with the patient 6. Begin teaching when parents indicate readiness to learn

Complications/Contact MD:

Any changes in patient or ECMO circuit status
Change in vital signs such as decreased/ increased heart rate, hypotension, hypertension, fever.

Teaching Content:

Provide specific patient instructions related to the following and document on the plan of care on IPOC, Teaching Record and/ or Progress Note.

1. Symptom Management/ Risk Factors:

Describe changes in hemodynamics, bleeding issues, respiratory status related to ECMO
Discuss acuity and why the patient has two nurses

2. Medications:

Will vary

3. Procedures/Equipment:

Describe bedside and ECMO equipment

Related Data/Resources:

LPCH CVICU Nursing Standards of Care

Curley, M.A.Q. & Moloney-Harmon, P. A. (2001). Critical Care Nursing of Infants and Children 2nd Ed.

EMCO Specialist Manual (1999). ELSO

Written By: Sandy Staveski RN, MS, CCRN

Reviewed By: Stephen Roth MD, MPH

Approved By: Stephen Roth MD, MPH and Sandy Staveski RN, MS, CCRN

Original Date: _11/2003

_____ . doc

temp-ins.doc

S:\nurspub\guides