QUALITY STANDARDS

TRANSPORT OF PAEDIATRIC PATIENTS SUPPORTED BY EXTRACORPOREAL MEMBRANE OXYGENATION (ECMO)

The PICS Quality Standards for Specialist Paediatric Transport Service apply to all transports including those involving ECMO. These are additional standards for transporting a patient on ECMO. These standards are based on extracoporeal life support organisation (ELSO) guidelines and consensus opinion.

Ref.	Standard			
INDICATIONS AND PREPARING FOR ECMO TRANSFER				
	Indications for transport on ECMO			
BI Visit	Transferring a patient on ECMO should only be undertaken after performing a risk assessment.			
MP&S CNR	Indications for transferring a patient between hospitals include:			
Doc	a. Patient has been placed on ECMO in hospital that does not support ECMO.			
	 Patient was emergently cannulated in a non-designated lead ECMO centre which cannot support an extended run on ECMO. 			
	c. Patient needs assessment or continuing care at a heart or lung transplant centre.			
	 Patient requires diagnostic or therapeutic intervention that is only available in another centre (e.g. slide tracheoplasty). 			
RI	Involving Children and Families			
Visit MP&S	Patient or parents should be informed of the potential risks and benefits of transfer, and consent for transfer.			
CNR Doc	Families are unlikely to be able to travel along with the child on ECMO transfers due to space constraints. Alternative transport for family should be arranged.			
	Preparing Patient for transfer			
ВІ	Once the patient is on ECMO, stabilisation of the patient in the referring centre is almost always the			
Visit	priority over rapid transfer:			
MP&S CNR	a. Control of bleeding should be achieved and coagulation optimised.			
Doc	b. Any ECMO circuit problems should be resolved.			
	c. ECMO cannula must be well secured and position confirmed by radiography and			
	echocardiography if available.			
	d. Patients should be cardiovascularly stable.			

Ref.	Standard
STAFFING	3
BI Visit MP&S CNR Doc	ECMO Consultant A consultant with experience of ECMO must be present throughout the retrieval. This consultant must undertake regular clinical work within a centre which performs ECMO and have the competencies to deliver ECMO, defined by that centre. They should have the transport competencies and skills required of a consultant from a UK Specialist Paediatric Transport Service. The consultant has primary responsibility for the overall management of the patient and retrieval. If a single professional does not have substantial experience in transport and ECMO then two consultants may fulfil these requirements.
BI Visit MP&S CNR Doc	 Perfusionist A perfusionist with substantial experience of ECMO must be present throughout the retrieval. Their responsibilities include: a. Primary responsibility for ensuring all equipment on checklist is available and functional. b. Primary responsibility for management of ECMO circuit during all phases of transport.
BI Visit MP&S CNR Doc	Retrieval Nurse The nurse must have paediatric transport competencies in addition to being competent in the management of a patient on ECMO and the circuit itself. The nurse has primary responsibility for nursing care of the patient throughout the retrieval.
BI Visit MP&S CNR Doc	Surgeon If a patient requires transfer immediately after surgical cannulation or has been cannulated centrally through a sternotomy then an ECMO-competent surgeon should be present for the entire retrieval. No surgical presence is required for other retrievals or if patient has been percutaneously cannulated. If the surgeon has the required competencies of the ECMO consultant defined above then they may lead the retrieval.

Standard

FACILITIES AND EQUIPMENT

Ref.

Equipm	ent
All addi transpo	tional equipment for ECMO must be appropriately secured and should be tested for the mod rt undertaken (e.g. flight approved).
A mobil	e ECMO system should consist of the following minimum components:
a.	Centrifugal blood pump.
b.	Membrane oxygenator, appropriate for the patient size.
с.	Device(s) for heating and regulating circuit blood temperature (less critical for larger patients).
d.	Medical gas tanks, regulators, hoses, connectors, flow meters, and blenders for provision and adjustment of blended sweep gas to the oxygenator.
e.	Venous and arterial pressure monitoring device(s), core temperature monitoring.
f.	Point-of-care anticoagulation monitoring equipment (e.g. Activated Clotting Time).
g.	Emergency pump and console in the event of pump failure or power failure.
h.	Back up power source(s) capable of meeting the electrical power needs of all equipment during transfer between vehicles and in the event of vehicle power source failure.
	bridge (if not already in situ).
j.	An additional light source e.g. torch.
k.	Patient trolley must accommodate the additional equipment and supplies required for ECMC The circuit must be secured to avoid kinking and damage. The whole of the circuit should be visible. All equipment must be safely secured at all stages of transfer: on the trolley in transi the vehicle, in the vehicle, and during transfer from the vehicle to the destination unit.
١.	Available blood and blood products as required by patient status and length of retrieval
m.	Resuscitation drugs and infusions including adrenaline infusion and vasodilator.
n.	Dual oxygen/gas supplies for both the patient ventilator and the ECMO circuit.
Vehicle ECMO t	s ransport requires special consideration of vehicle capabilities and characteristics. Transitions
betwee coordin	n hospital and ambulance, and ambulance and aircraft, represent unique risk and require exper ation to mitigate these risks. Potential complications include:
a.	Sudden vertical or horizontal movement, altering patient position
b.	Cannula movement, affecting surgical site integrity or cannula tip position
С.	Circuit kinking, compression, or catching
d.	Equipment movement or trauma
	Accidental decannulation
e.	
e. Driving	or flying should be as smooth as possible to minimise the aforementioned risks during transpo
e. Driving The veh electrica require	or flying should be as smooth as possible to minimise the aforementioned risks during transpo icle should provide a power source with the voltage, current, and wattage needed to sustain al al components throughout the retrieval. The ECMO team must be familiar with the power nents of their equipment.

Ref.	Standard			
GUIDELINES AND PROTOCOLS				
BI Visit MP&S CNR Doc	The retrieval team should have a guideline in place for the transfer of patient on ECMO, which advises staff on how to fulfil the above standards. There should be clear guidance for transfer of blood products between hospitals.			