

BC Extracorporeal Life Support (ECLS) Fixed Wing Transport

Applies to: Fixed wing transports of patients on ECLS.

Audience: BCEHS CCP/ITT crews, ground paramedics, perfusionists, sending & receiving ICU teams.

Endorsed by British Columbia (BC) Extracorporeal Life Support (ECLS) Steering Committee: The committee is lead by Critical Care BC and Cardiac Services BC with representation from each Health Authority and BC Emergency Health Services. The aim of this committee is to reduce unwarranted variation and establish a provincial forum for data-driven quality improvement and patient-centric care for ECLS services across BC.

1. Purpose & Scope: To provide a single, reproducible step-by-step workflow for transport of adult and pediatric ECLS patients in BC. This guideline supports standardization but does not replace clinical or operational judgment.

Note: mode-specific deviations are recorded in the mode sections and appendices.

2. Roles & Responsibilities

Sending Site

Perfusionist	Prepare circuit, console, water lines, emergency equipment; ensure canulae are appropriately secured for transport
Most responsible nurse	Infusions and emergency medications needed for transport
Most responsible physician	Clinical handover, blood product available for transport
Bed/unit staff	Assist with patient transfer and documentation preparation

Transport Team

With critical care paramedics

Perfusionist	Circuit management during transport
Critical care paramedics	Non-ECMO equipment transition and operation during transport
Primary care paramedics	Vehicle operation and stretcher handling
Most responsible physician	In-person or on-line clinical support

*Ensure pediatric transports are accompanied by a clinical team experienced in pediatric critical care and proficient in weight-based medication dosing

Coordination

BCEHS PTCC	Coordinate logistics
BCEHS CCP Advisor	Provide operational and logistical support

Note: CCP-A is central point-of-contact to ensure appropriate BCEHS vehicle and crew are assigned to 2' ECLS transfer.

Receiving Site

Receiving perfusion/ ICU team	ETA receipt, prepare ICU bedspace and required equipment (e.g. circuit change if indicated).
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3. Supplies & Pre-pack (standard checklist)

Perfusionist

- Pack Rac / Ferno mounting hardware
 - KGH and RJH have low profile pack rack needed for clearance

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- ECMO console and accessories
- Emergency hand crank + mounting holder
- Oxygenator holder
- Clamps
- Gas line extension and gas line adaptor
- Emergency transport kit (circuits, clamps, spare tubing, syringes)
- Portable oxygen cylinder

4. Pre-Transport Coordination (timing & essentials)

Goal: complete these actions ideally 2–3 hours before BCEHS arrival.

1. **Early notification & case review** using the [BC ECLS Communication Tool](#)
 1. **Sending perfusionist, MRP, transport perfusionist, dispatch (PTCC), and BCEHS CCP-A** speak to confirm: diagnosis, ECMO platform, circuit modifications, cannula sites, height/weight, ancillary devices (Impella/IABP)
 2. **Sending perfusionist to receiving perfusionist** speak to confirm: diagnosis, ECMO platform, circuit modifications, cannula sites, height/weight, ancillary devices (Impella/IABP)
2. **Weight & fit check** — confirm combined weight (patient + all equipment) will remain within stretcher/vehicle capacity. If borderline, consider bariatric plan (see appendix A)
3. **Blood products** — arrange with blood bank (e.g., 2U PRBC and/or Albumin available if requested).
4. **Pharmacy** — prepare transport IV medication syringes/infusions.
5. **Vehicle readiness** — confirm vehicle power capacity and oxygen supply (see Appendix A).
6. **Pre-trip huddle** — once packaging plan is agreed, do a verbal checklist with all team members to confirm roles and contingency plans.

5. Immediate Pre-Transport (30–120 minutes before pickup)

- Confirm ETA with PTCC / BCEHS.
- Check/charge all batteries for consoles, monitors, pumps.
- Assemble Pack Rac / Ferno deck on the stretcher if using an ECMO deck attachment (for Cardiohelp).
- Verify oxygen cylinder availability (2 full) and confirm transport ventilator function and battery.
- Print/send documentation and request receiving team standby.

6. Transport Configuration — step-by-step

NOTE: Keep the **same sequence** each time: prepare stretcher → ensure line length → move patient (hospital bed → stretcher) → secure consoles → switch gas/power → final packaging & huddle.

NOTE: During ECLS retrievals, consider maintaining the patient on the sending site's equipment when clinically appropriate to support stability and minimize unnecessary transitions prior to departure.

6.1 Cardiohelp Setup — with ECMO stretcher attachment (preferred when available)

1. **Clear ECMO stretcher:** remove everything from ECMO stretcher leaving only the corner belts.

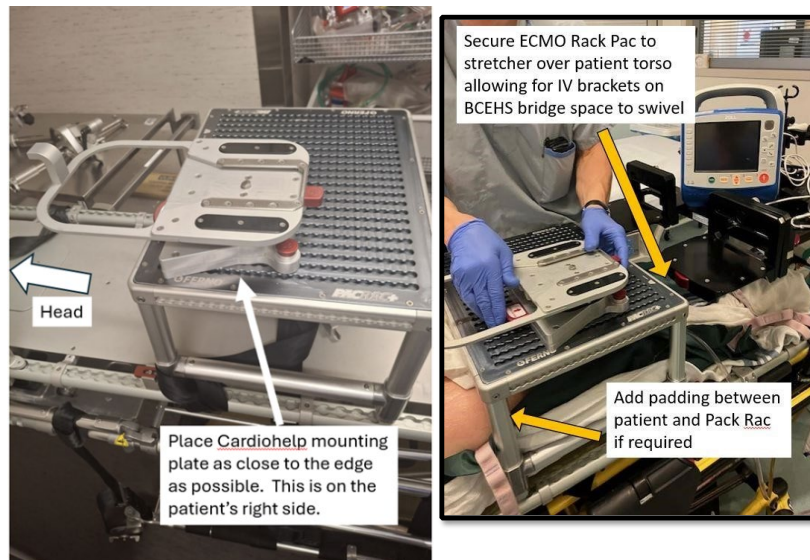
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2. **Dock ECMO stretcher:** place the ECMO stretcher on top of the stretcher; confirm ECMO stretcher wheels/feet engage the stretcher securing positions. That there should be no mattress on the stretcher. Add single Flannel to Stretcher covering the Head and Torso Gel Pads and leave equally long on either side of the stretcher (for securing patient later).
3. **Secure ECMO deck:** fasten with the 4 corner belts. Confirm no play.



4. **Check line lengths:** confirm adequate slack for ECMO circuit, IV lines, ventilator tubing, and monitoring leads before moving patient.
5. **Prepare transfer:** leave patient connected to hospital pumps/vent/ECMO. Apply soft restraints to patient hands. Use slider, clam-shell or green sling and levitate patient; slide ambulance/ECLS stretcher under patient.
6. **Patient temperature control:** Open chemical warming blanket to activate. Consider having CCP place esophageal temperature probe to more accurately monitor patient temp (especially important if warming blanket used, or during inclement weather). The standalone ECMO heater has been tested and the 360 can safely provide enough power to the heater should the need arise to bring it.
7. **BCEHS to mount lower bed bridge securely to power cot:** This will help determine best spacing for Ferno ECLS Rack Pac while ensuring space for BCEHS IV systems.
8. **Attach Cardiohelp mounting plate:** mount the Cardiohelp plate to the far side (patients' **right side**) of the Ferno Rack pack. This is required as Cardiohelp will not clear fuselage in the aircraft if positioned centrally or offset to patients left. There will be freedom to spin the mounted system to access oxygenator in flight if intervention required. Secure ECMO rack Pac to the stretcher as low down over torso as possible. Pad patient arms/contact points against Rack Pac



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9. **Install Cardiohelp adapter:** attach Cardiohelp mounting adapter to the bottom of the Cardiohelp unit



10. **Remove waterlines:** disconnect water lines per manufacturer guidance. Secure open ports.
11. **Move Cardiohelp onto Pack Rac:** lift console to Pack Rac, slide and clip the mounting plate into the minitrack; confirm mechanical lock.
12. **Position other equipment:** Gently lay heating blanket on top of patient but under the ECMO Pac Rac and BCEHS bridge. Paramedics/CCP move drug pumps, transport ventilator, and patient monitor to vehicle's transport bridge (commonly positioned over the patient's feet). Attach infusion pumps one-by-one to transport power/IV source following CCP policy.
13. **Pole mount the holder for the hand crank** due to the height restrictions. It must be mounted with a separate pole and mounting arm just forward of the ECMO pack Rac. It is recommended to anticipate a combined effort if an emergent situation requires the need to hand crank.



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6.2 Sorin SCPC and Rotaflow Setup — without ECMO stretcher attachment

1. **Stretcher:** BCEHS Bariatric stretcher will be used instead of the FERNO ECLS Stretcher
2. **Create console space:** slide the stretcher cushion toward the head of stretcher so the Sorin console will sit between the patient's legs directly on the stretcher.
3. **Check line lengths:** confirm adequate slack for ECMO circuit, IV lines, ventilator tubing, and monitoring leads before moving patient.



4. **Prepare transfer:** leave patient connected to hospital pumps/vent/ECMO. Apply soft restraints to patient hands. Use slider, clam-shell or green sling and levitate patient; slide ambulance/ECLS stretcher under patient.
5. **Patient temperature control:** Open chemical warming blanket to activate. Consider having CCP place esophageal temperature probe to more accurately monitor patient temp (especially important if warming blanket used, or during inclement weather). The standalone ECMO heater has been tested and the 360 can safely provide enough power to the heater should the need arise to bring it.
6. **Position patient:** shift patient toward the head of the stretcher and separate legs to allow console placement.

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7. **Mount oxygenator holder:** clip in poles on the stretcher and add the spare oxygenator holder. (Confirm pole mounts are secure and not in the way of devices mounted by the paramedics.)
8. **Remove waterlines:** disconnect water lines per manufacturer guidance. Secure open ports.
9. **Place Sorin console & accessories:** place Sorin console, control panel and drive between patient's legs and oxygenator to the holder on the stretcher; attach control panel and drive to top handle of console. Ensure the console screen faces the patient's head. Move the pressure transducer and pressure bags over using clip in poles as needed
10. **Mount emergency hand crank:** attach crank to a pole attached to the stretcher, ensuring appropriate distance from the pump head.

6.3 Final equipment checks and loading into the aircraft

1. **Position other equipment:** Paramedics/CCP move drug pumps, transport ventilator, and patient monitor to vehicle's transport bridge (commonly positioned over the patient's feet). Attach infusion pumps one-by-one to transport power/IV source following CCP policy. (only needed if transport to aircraft was in a non-CCP ambulance).
2. **Oxygen plan:** switch to the portable oxygen cylinder for intra-hospital move and place cylinder under stretcher for transit in hospital corridors; once inside the aircraft, connect to aircraft oxygen and stow portable cylinder per BCEHS policy.
3. **Power connection:** confirm console batteries are charged; plug ECMO console into aircraft power only after the air transport crew confirms available power capacity.
4. **Secure all tubing:** avoid kinks and eliminating loops that could be stepped on. Pad contact points.
5. **Final packaging:** once paramedics have built their bridge with monitor/vent/infusion pumps, disconnect non-essential hospital equipment and re-confirm circuit security.
6. **Pre-departure huddle:** perfusionist, CCP/ITT team, and sending MRP confirm readiness and contingency plan (including emergency hand-crank location and power loss procedure).
7. **Load into aircraft:** follow local manual handling policies — ensure patient & ECMO rack are locked onto power cot/stretcher mounting. Connect to aircraft oxygen once loaded. Confirm aircraft power capacity before plugging in the console.

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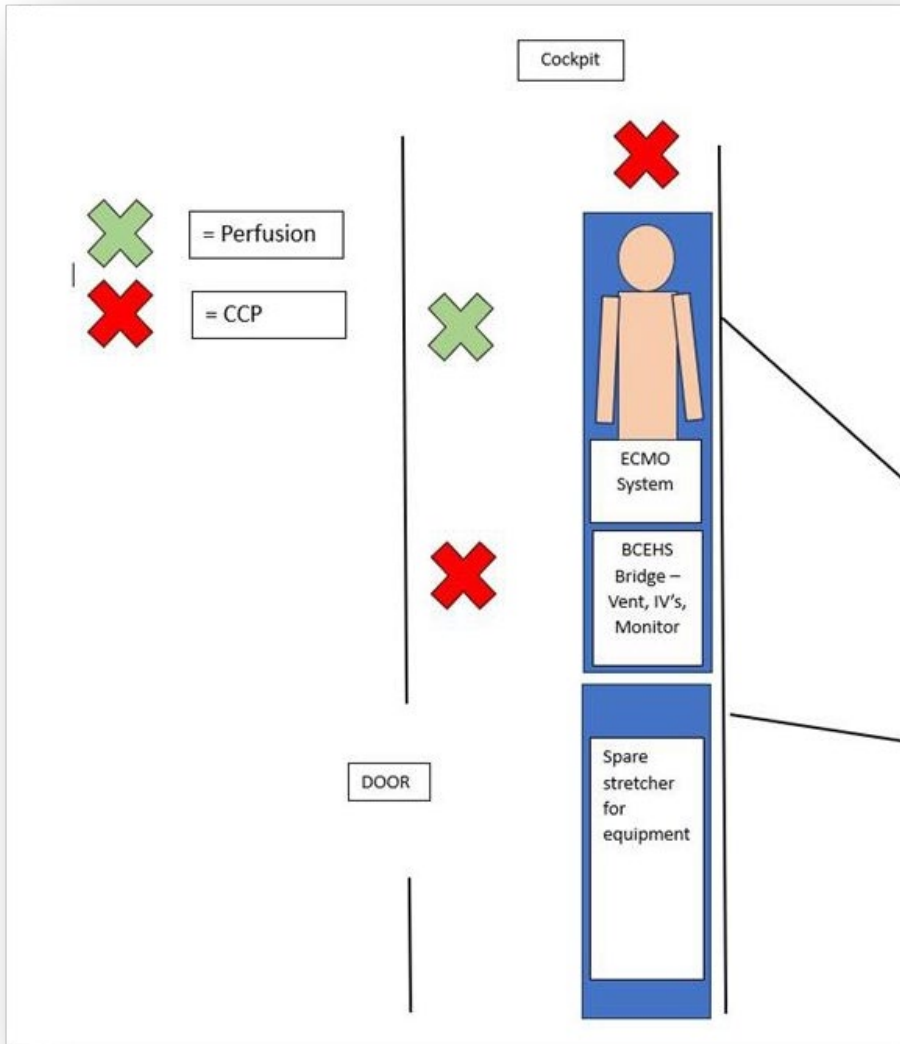


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7. Patient Transfer & In-transit Management (common steps)

1. **Confirm Roles & Responsibilities in setting of ECLS emergencies:** Define roles for perfusionist, paramedic, and other medical escorts (e.g. RN, RT, MD). Who is team leader for Code Blue? Who is ECLS support MD if not present during escort.
2. **Restraints & padding:** soft wrist restraints; pad pressure points; secure cannula and dressings.
3. **Line routing:** keep ECMO circuit directed to foot end, tape/secure lines to prevent tugging. Avoid tight loops that could kink.
4. **In-transit monitoring:** continuous monitoring of hemodynamics, SpO₂, ECLS pump flows/pressures, and circuit integrity. Perfusionist documents checks at regular intervals (e.g., q15-30 min depending on patient stability).

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5. **Contingencies:** ensure emergency hand crank is reachable; know location of clamps, spares, and emergency circuit kit. If power is lost, switch immediately to hand crank while safely proceeding to nearest safe location to troubleshoot.
 - **Complications:** Paramedic-Perfusionist huddle post-transport to confirm presence or absence of ELSO transport complications ([BC ECLS Transport Adverse Events](#)). Paramedic to document any complications in the open narrative section of the electronic patient care record (ePCR).
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8. Bariatric & Special Equipment Considerations

- **Ferno / ECMO deck load:** manufacturer rating ~405 lb (≈183.7 kg). → operational patient limits depend on deck weight and device mounting; if the combined load (patient + ECMO deck & console & other fixed items) exceeds safe limit or vehicle capacity, use the bariatric stretcher configuration. (Confirm local vehicle/bariatric load ratings.)
 - **Impella:** console must remain powered and NOT be interrupted; hand the Impella console to the perfusionist within the aircraft prior to lift if necessary so the perfusionist can monitor drive lines. Once patient is secured the Impella console can be moved to a seat in the aircraft or spare stretcher if required.
 - **IABP:** put console in standby and disconnect gas/fiberoptic for loading, then reconnect once secured in aircraft and restart therapy. The console can be moved to a seat in the aircraft or spare stretcher if required
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9. Final Handover & Documentation

- At receiving site, give structured handover: patient status, ECMO flows/pressures, anticoagulation, recent labs, blood products given, events during transport.
- Return or log all transport equipment (Pack Rac, connectors, spare tubing).
- Document any incidents and complete transport checklist.

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Appendix A — Power Availability

Transport Type	Max AC Power Available (continuous)
Ground – Non-CCP / ITT car	600 W
Ground – CCP / ITT car	1000 W
Rotary Wing – AW169	1200 W
Fixed Wing – King Air 360	1500 W

Appendix B — Equipment Weights & Power Requirements (standard reference)

Device	Weight (kg)	Weight (lbs)	Power (W)	Amps (A)
Maquet Heater Unit HU35	9.0	20.1	700	2.3
Paratherm Heater/Cooler	17.5	38.6	320	3.2
Sorin SCPC (system/control/pump)	35.5	78.1	220	2.0
Sorin ERC	3.0	6.6	included above	included above
Maquet Cardiohelp	10.0	22.0	140	1.2
CS300 IABP	35.7	78.8	420 (max)	3.5
Teleflex AC II IABP	44.7	99	420 (max)	3.5
Impella console/device	11.8	26.1	120	1.0
Ferno ECMO Deck (LVT, 3 poles)	36.6	80.7	N/A	N/A
BBraun Infusomat Space Pump x 6	1.4	3	13	0.6
Hamilton T1 Ventilator	6.5	14.3	50-100	1.25 (max)
Zoll X Series Monitor	5.2	11.6	80	2.0
STRYKER Power cot (KA360, AW169)	Weight limit ~ 318kg/700lbs			
Ferno ECMO deck (LVT, 3 poles)	Weight limit ~181kg/400 lbs			

Note: Operational limits in practice are adjusted to account for the deck weight and mounted equipment; check mode-specific patient weight caps in AW169 / fixed wing SOPs. Use Appendix B device wattages to do a pre-departure power sum and ensure the total ≤ vehicle limit in Appendix A.

Glossary:

- Primary ECLS transfer (1' ECLS transfer): A sending a team to cannulate and initiate ECMO at a referring site.
- Secondary ECLS transfer (2' ECLS transfer): An interfacility transfer (IFT) of someone who is already on ECMO.

Supporting Documents:

- [BC ECLS Transport Adverse Events](#)
- [BC ECLS Communication Tool](#)
- [BCEHS Acuity Algorithm](#)

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