

# Ontario Critical Care Clinical Practice Rounds (OC3PR): COVID-19

Jun 3 2021

**ECLS for COVID-19 Patients  
The Ontario Experience**

Chaired by Dr. Dave Neilipovitz

Presented by Dr. Faizan Amin and Dr. Eddy Fan

## Meeting Etiquette

- Participants will be muted and can use the chat function to converse with the panelists.
- Attendees can submit questions to Q&A in the chat function in the Zoom menu.
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# Disclosures

- E. Fan – none
- F. Amin – none



# Objectives

1. The Ontario experience in selecting and treating severe respiratory failure from Covid-19 with ECLS
2. The challenges of handling a surge of ECLS patients
3. The organization of the ECLS programme from the perspective of both an experienced and a newly launched centre.



# Thanks

Surgical Directors

ICU, Anesthesia, Surgery, Hematology

Cardiac Perfusion Team

Nursing

Respiratory Therapy

Pharmacy

Social Work

ICU Educators

Administrative Staff

Bioethics

Senior Organizational Leadership



# ECLS for COVID-19 ARDS: Summary of Literature



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# Extracorporeal membrane oxygenation support in COVID-19: an international cohort study of the Extracorporeal Life Support Organization registry

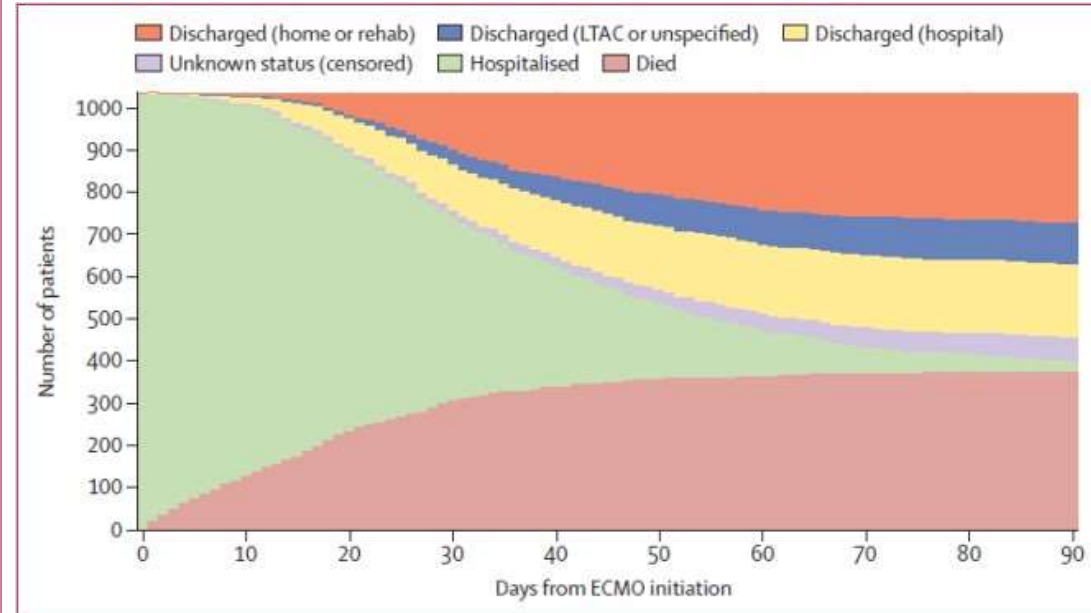
*Ryan P Barbaro\*, Graeme MacLaren\*, Philip S Boonstra, Theodore J Iwashyna, Arthur S Slutsky, Eddy Fan, Robert H Bartlett, Joseph E Tonna, Robert Hyslop, Jeffrey J Fanning, Peter T Rycus, Steve J Hyer, Marc M Anders, Cara L Agerstrand, Katarzyna Hryniewicz, Rodrigo Diaz, Roberto Lorusso†, Alain Combes†, Daniel Brodie†, for the Extracorporeal Life Support Organization‡*

- ELSO registry used for COVID-19 patients receiving ECMO between Jan 16-May 1, 2020 across 216 hospitals in 36 countries
- Data available for 1035 patients
- Primary outcome: in-hospital death in time-to-event analysis



# Survival slightly worse than non-COVID ARDS, with more complications and longer ECMO course

	Full cohort (n=1035)	ARDS cohort* (n=779)
<b>Patient status at study completion</b>		
Discharged alive to home or acute rehabilitation centre	311 (30%)	262 (34%)
Discharged alive to long-term acute care centre or unspecified location	101 (10%)	79 (10%)
Discharged to another hospital	176 (17%)	97 (12%)
Remain in the hospital (discharged from ICU)	11 (1%)	10 (1%)
Remain in the ICU	56 (5%)	40 (5%)
<b>In-hospital death</b>	<b>380 (37%)</b>	<b>291 (37%)</b>
Tracheostomy†	444 (44%)	353 (47%)
<b>Select complications‡</b>		
Seizure	6 (0.6%)	5 (0.7%)
CNS infarct	7 (0.7%)	5 (0.7%)
CNS haemorrhage	56 (6%)	44 (6%)
Haemolysis	48 (5%)	37 (5%)
Membrane lung failure	82 (8%)	63 (9%)
Pump failure	8 (0.8%)	6 (0.8%)
Circuit change	148 (15%)	99 (13%)



- Mortality 38% at 90 days

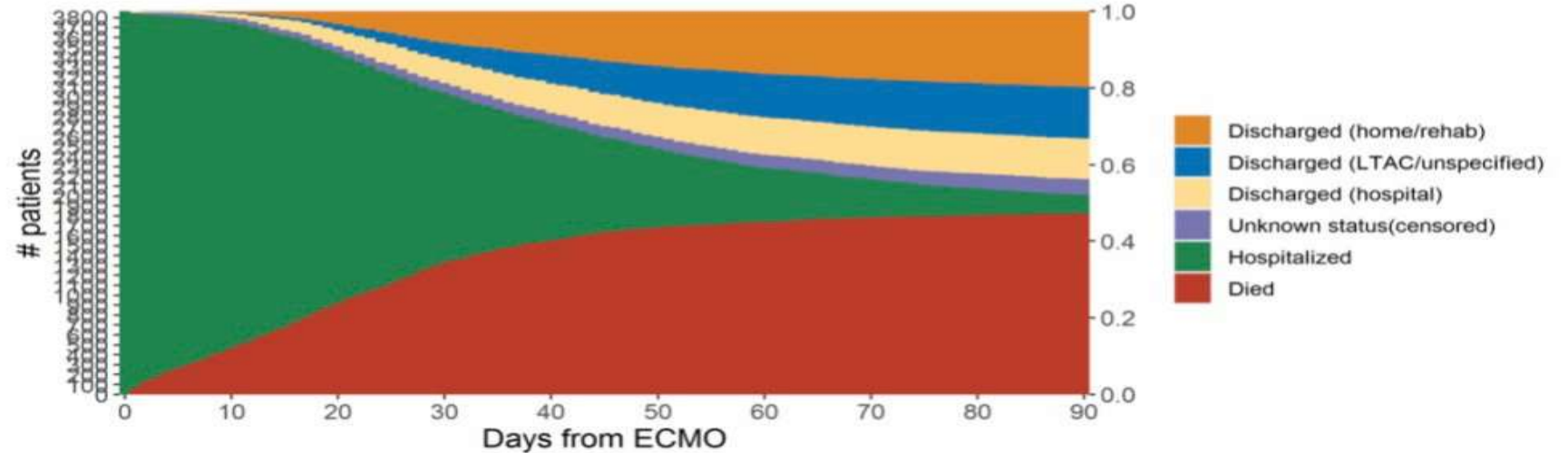


# COVID-19 Cases on ECMO in the ELSO Registry

<p>Total COVID-19 Cases</p>	<p>COVID-19 Suspected or Confirmed</p> <p><b>5196</b></p>	<p>COVID-19 Confirmed Cases</p> <p><b>5179</b></p>
<p>Total counts of COVID-19 confirmed patients and count of COVID-19 suspected but not confirmed by testing.</p>		

<p>Patients who initiated ECMO at least 90 days ago</p>	<p>COVID-19 Confirmed</p> <p><b>3867</b></p>	<p>COVID-19 In-hospital Mortality</p> <p><b>49%</b></p>
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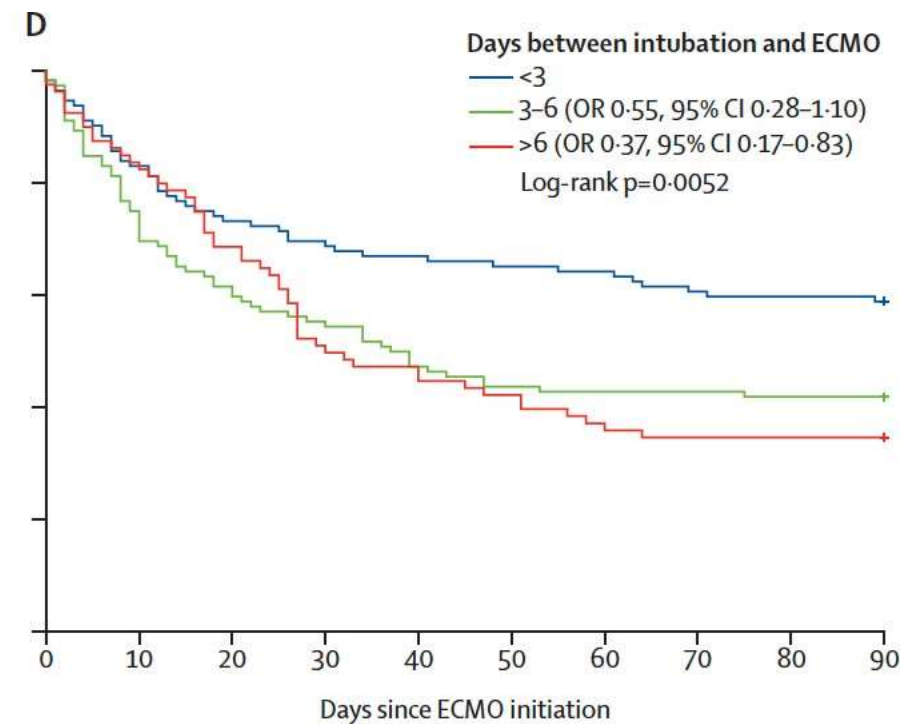
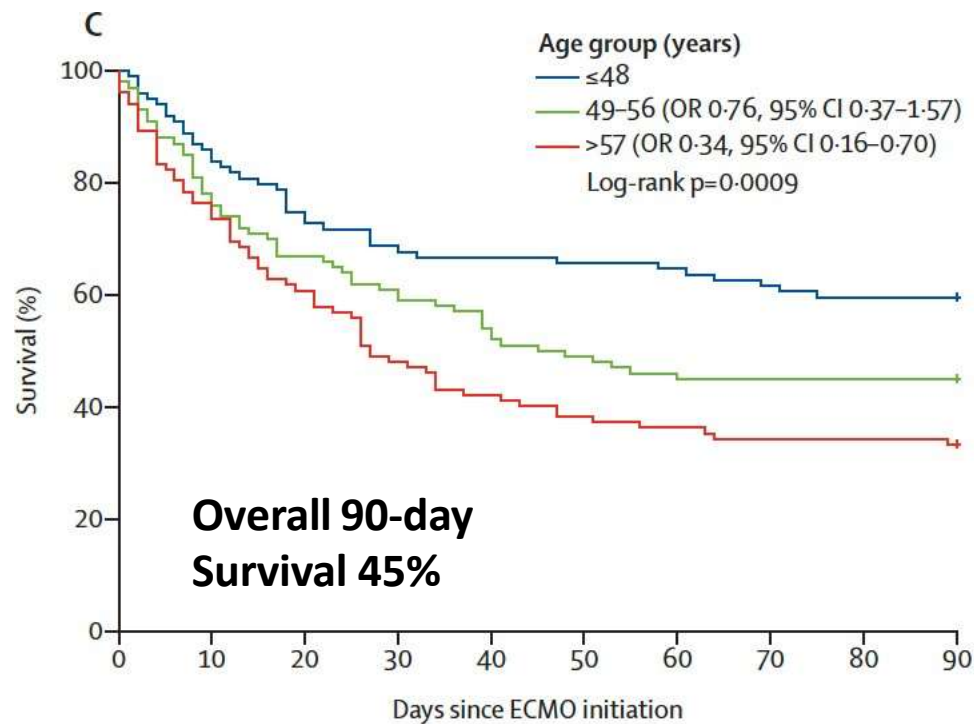
## Outcomes





# Extracorporeal membrane oxygenation network organisation and clinical outcomes during the COVID-19 pandemic in Greater Paris, France: a multicentre cohort study

Guillaume Lebreton, Matthieu Schmidt, Maharajah Ponnaiah, Thierry Folliguet, Marylou Para, Julien Guihaire, Emmanuel Lansac, Edouard Sage, Bernard Cholley, Bruno Mégarbane, Pierrick Cronier, Jonathan Zarka, Daniel Da Silva, Sebastien Besset, Igor Lacombat, Nicolas Mongardon, Christian Richard, Jacques Duranteau, Charles Cerf, Gabriel Saiydoun, Romain Sonnevile, Jean-Daniel Chiche, Patrick Nataf, Dan Longrois, Alain Combes, Pascal Leprince, and the Paris ECMO-COVID-19 investigators\*



# Lessons Learned: ECMO in COVID-19

- ECMO is indicated in COVID-19 patients who fail conventional mechanical ventilation and who do not have contraindications
  - Optimization of the ventilator and a trial of proning and NMBA is generally indicated before ECMO
- COVID-19 patients have long durations of ECMO support and prolonged hospital stay
- Complication rates are high: VAP, major bleeding, need for RRT, PE , ICH
- **Appropriate patient selection is more important than ever before, especially in times of scarce resources**



# When to Refer

## VV-ECMO Criteria:

### Indications:

1. Persistent (hrs)  $\text{PaO}_2/\text{FiO}_2 < 80$  mm Hg  
OR
  2. Persistent (hrs)  $\text{pH} < 7.25$  with  $\text{PaCO}_2 > 60$  mm Hg and driving pressure  $> 15$  cmH<sub>2</sub>O
- Gas exchange should be assessed after appropriate fluid resuscitation, sedation/paralysis, ventilator adjustments, and a trial of prone positioning (unless contraindicated).

### Contraindications:

1. Age 60 or older
2. Significant chronic comorbidity with multi-system involvement
3. BMI  $> 50$  or  $< 18$
4. Duration of mechanical ventilation  $> 10$  days
5. Prior cardiac arrest with chest compressions
6. Refractory shock
7. Multi-organ failure
8. Significant acute neurological injury
9. Chronic lung disease (e.g. COPD, IPF – not asthma)
10. Malignancy with expected life expectancy less than 5 years
11. Chronic immunosuppressed state
12. Poor baseline functional status



# ECLS Program at Hamilton General Hospital



# Program Development: Timeline



# ECLS Services at HHS

- 24/7 ECMO Physician on call via CritiCall
- Patient selection via consensus through multidisciplinary ECLS Triage Team (ICU, CVSp, Anesthesia, Cardiology +/- Resp)
- Perfusionist + Nursing combined ECMO Specialist Model



# Organizational Challenges during COVID-19 ECLS Surge

- Huge multidisciplinary collaboration across all clinical areas of the hospital
- Disproportionate impact on other clinical services
- Physical exertion (ECLS complications, bedside procedures required, transports)
- Moral distress
- Rapid uptraining of staff during pre-exhausted timelines
- Dynamic Staffing Models



# Lessons and Growth for a New ECLS Program

## **Process for Appropriate Patient Selection is Paramount**

- Implementation of a Multi-disciplinary **ECLS Triage Team** that decides on provision of ECMO by **consensus**. Original Critical care referrals reviewed by 2 ECLS Physicians

## **Opportunities for Longitudinal Feedback and Education**

- Individual Case Review after each patient for feedback from each discipline with minutes and follow-up
- Quarterly educational workshops for maintenance of competence and annual workshops for new staff

## **Internal Auditing and Research**

- Registry of referred patients (including patients accepted and declined)

## **Meeting International Standards**

- Registration with Extracorporeal Life Support Organization (ELSO)

## **Collaboration with established ECMO centres**

- Collegial collaboration with UHN and LHSC for regional and non-regional patients in order to ensure best standards and access to care

## **Continuous Standardization of Day-to-Day ECMO Care**

- Policy & Checklist development





# The future of ECLS in Ontario

- Need for a coordinated provincial approach for ECLS referrals
- Ontario ECLS Network collaboration
- Development of local ECLS transport teams
- Clinical and academic collaboration



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