A white computer keyboard is visible in the upper right corner of the image. A black stethoscope is positioned diagonally across the right side of the image, with its chest piece resting on the keyboard and its earpieces extending downwards. The background is a plain, light-colored surface.

ExtraCorporeal Life Support (ECLS) in Critically ill Paediatric Cancer Patients

Dr Robin HS Chen

Consultant

Department of Paediatric Cardiology

Queen Mary Hospital

Outline

- Background and basics of ECMO
 - Components
 - Types of ECMO
- Historical perspective
 - Registry data
- Recent trends &
- ECMO physician' s perception
- ECMO Economics

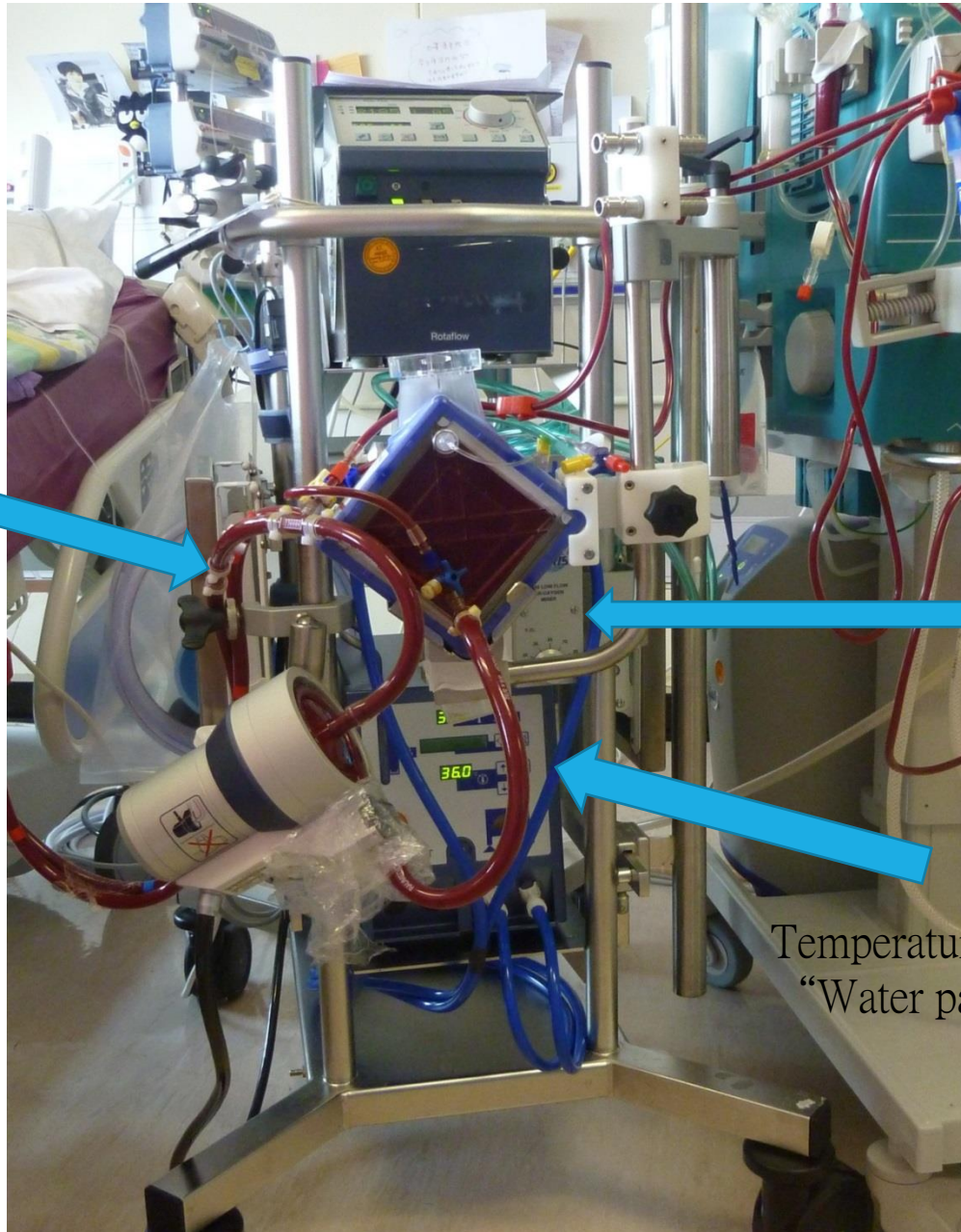


Background

- ECMO / ECLS
 - ExtraCorporeal Membrane Oxygenation
 - ExtraCorporeal Life Support
 - Goal
 - Respiratory support
 - Respiratory + Circulatory support
 - Nature
 - Life-support / sustaining
 - NOT a “treatment” of a primary disease
 - Aim
 - Bridge to recovery
 - Bridge to diagnosis
 - Bridge to decision
 - Bridge to bridge (e.g. LVAD) OR transplant
- Never put on ECMO if it’s a bridge to nothing



Main circuit
“blood path”



Sweep gas

Temperature control
“Water path”



↑ FiO₂ → improve oxygenation

↑ Gas flow → improves CO₂
clearance

Types of ECMO

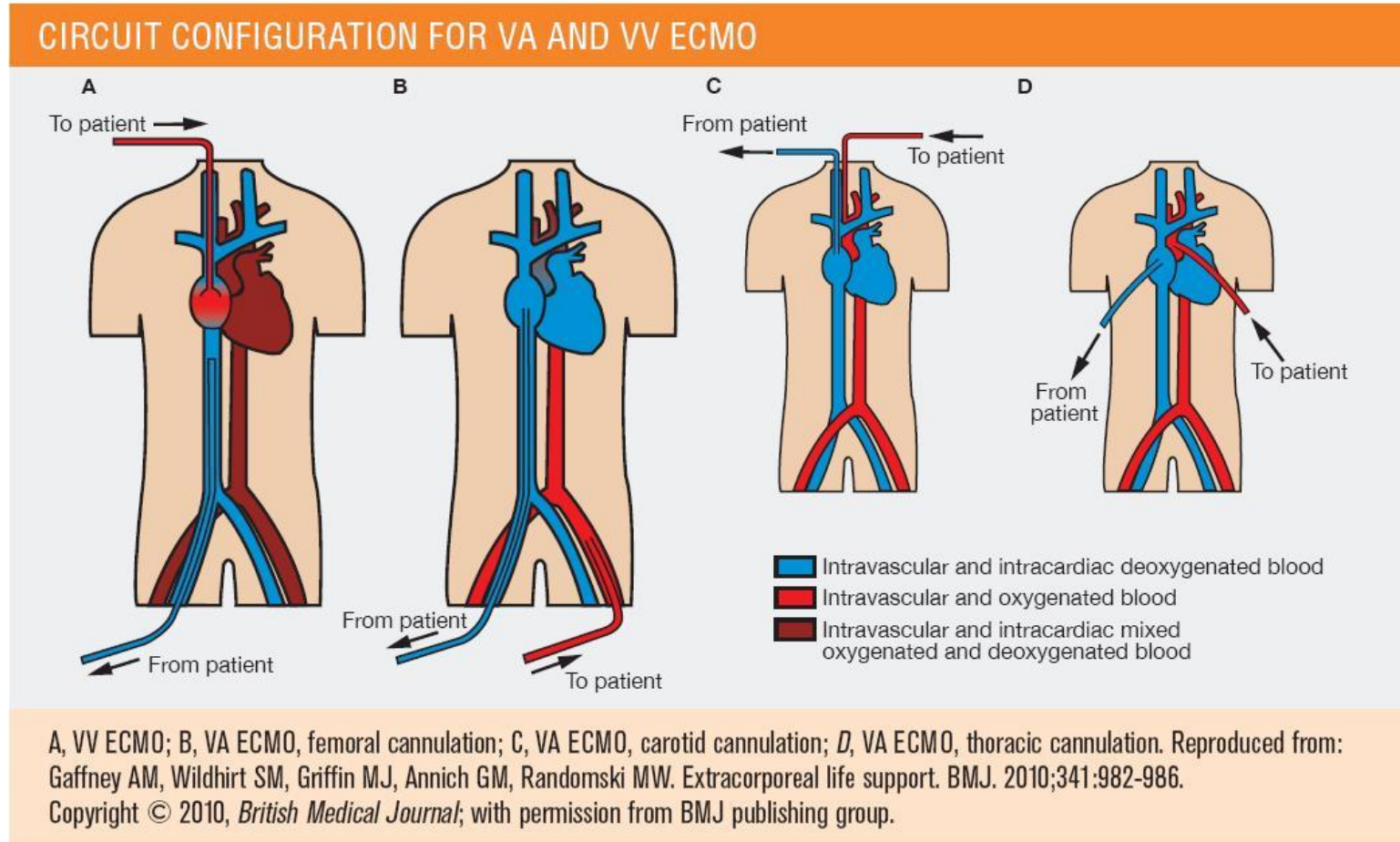
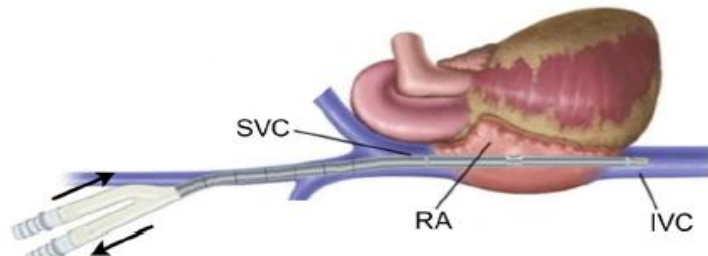
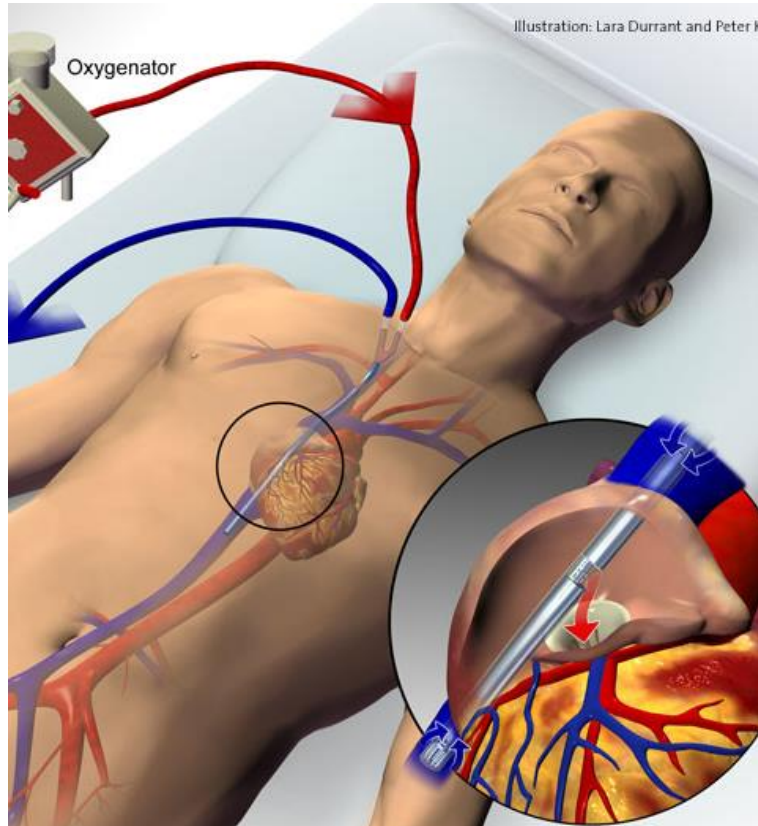


Figure 1.

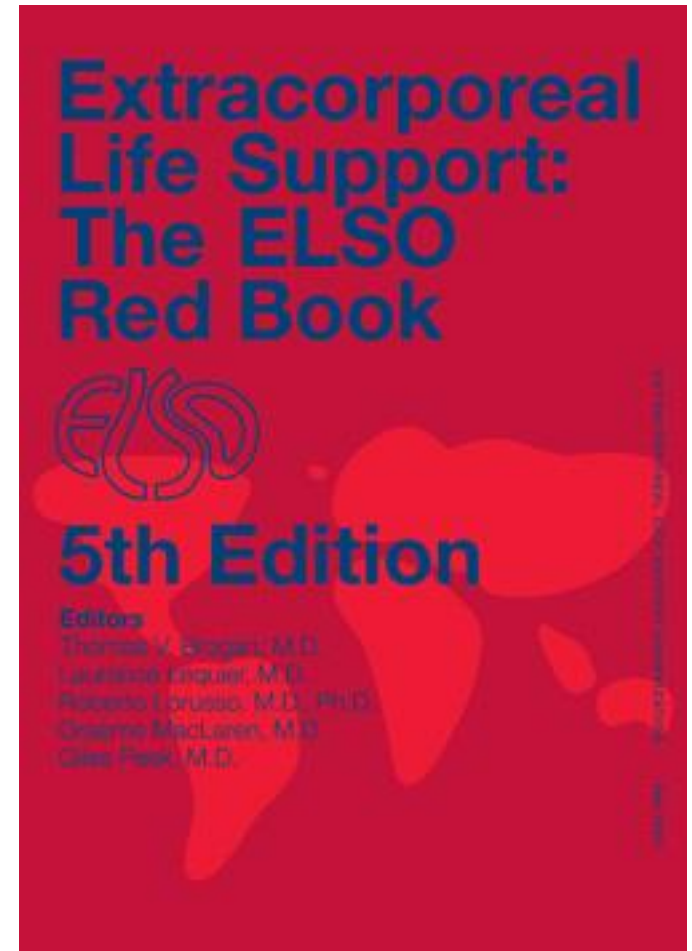
ELSO



- Extracorporeal Life Support Organization
 - International non-profit consortium of health care institutions
 - Dedicated to the development and evaluation of novel therapies for supporting failing organs
 - Primary Mission
 - Maintain ECMO registry
 - Registry data
 - Support clinical research
 - Support regulatory agencies
 - Support individual ELSO Centers
- Paediatric ECMO program QMH
 - Program started 2000
 - ELSO Center 620 (since 2017)
 - ~ 15 runs / year
 - >230 ECMO patient-days in 2019 (>median of Asia)

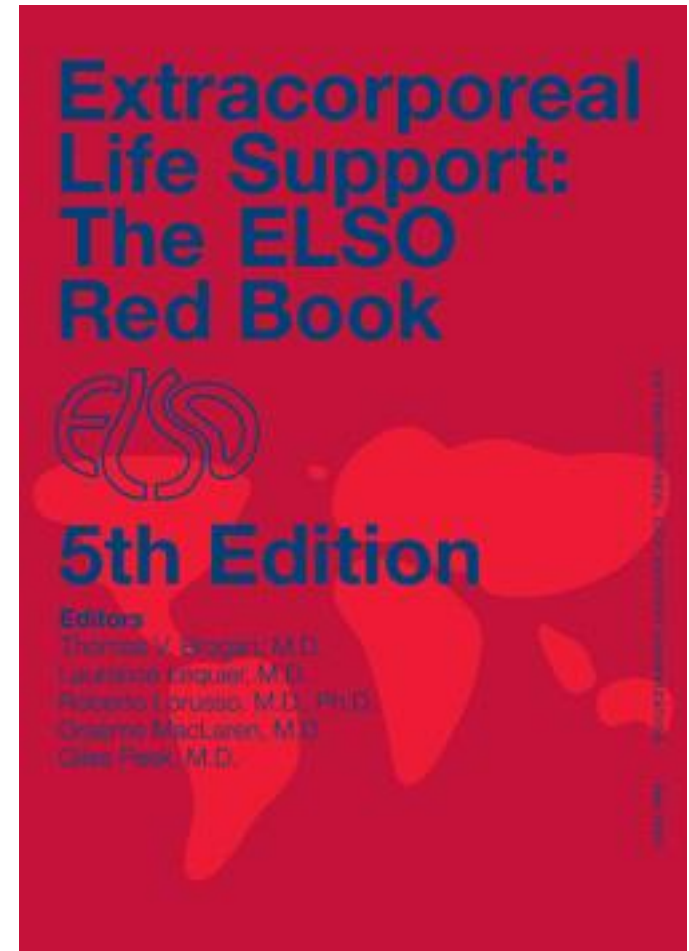
Guideline

- General principle : indication
 - Conditions that are
 - potentially reversible
 - High likelihood of mortality without ECMO support
 - Cardiac / circulatory support
 - For cardiac surgery / catheterization
 - Circulatory failure of various etiology
 - Extension of CPR → ECMO CPR (ECPR)
 - Respiratory support
 - Less well defined “absolute indications”



Guidelines

- Contraindications
 - Large intracranial bleed with mass effect
 - Cardiac arrest without adequate CPR
 - Irreversible underlying cardiac or lung condition (unless x transplant)
 - > 2/52 high pressure ventilation
 - Pulm HT with chronic lung disease
 - Chronic multi-organ dysfunction
 - Incurable malignancy
 - Allogenic BMT recipient with pulm infiltrate



ELSO

Mechanical
Oxygenator Failure
Pump Failure
Raceway Rupture
Other Tubing Rupture
Cannula Problems
Circuit Change
Heat Exchanger Malfunction
Thombosis/Clots: Circuit Component
Clots Hemofilter
Air in Circuit

Hemorrhage
GI Hemorrhage
Peripheral Cannulation Site Bleeding
Mediastinal Cannulation Site Bleeding
Surgical Site Bleeding

Neurological
Brain Death
Neurological
Seizures Clinically Determined
Seizures Confirmed by EEG
Neurological
CNS Diffuse Ischemia (CT/MRI)
CNS Infarction (US or CT or MRI)
Intra/extra Parenchymal CNS Hemorrhage (US or CT or MRI)
Intraventricular CNS Hemorrhage (US or CT or MRI)
Neurosurgical intervention performed

Pulmonary
Pneumothorax
Pulmonary Hemorrhage

Metabolic
Hyperbilirubinemia
Moderate Hemolysis
Severe Hemolysis

Patient Limb
Fasciotomy
Limb Amputation
Limb Ischemia Requiring Limb Reperfusion Cannula

Renal
Creatinine 1.5 – 3.0
Creatinine > 3.0
Renal Replacement Therapy Required

Cardiovascular
CPR Required
Cardiac Arrhythmia
Tamponade (not blood)
Tamponade (blood)

Infections (pre and those occurring on ECMO)

Oncology & ECMO

Historical Perspective

- Very small number in the ELSO registry
 - Perceived poor survival
 - From PICU series on oncology patients
 - Perceived high complication rate
 - Bleeding & infection

Extracorporeal membrane oxygenation in immunocompromised patients: Avoiding the incurable or missing opportunities?*

Crit Care Med 2008; 9: 442-3

Editorial

Heidi J Dalton, MD
PICU/Pediatric ECMO,
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USA

Extracorporeal life support for severe respiratory failure in children with immune compromised conditions*

Monika Gupta, MD; Thomas P. Shanley, MD, FCCM; Frank W. Moler, MD, MS, FCCM

- ELSO data registry (>145 centers worldwide)
- ICC subgroups:
 - immunodeficiency,
 - leukemia-lymphoma,
 - cancer,
 - opportunistic infection,
 - solid organ transplant,
 - bone marrow transplant
- ICC status: lower hospital survival (31 vs 57% $p < 0.001$)

Table 2. Comparison of hospital survival in subgroups with and without immune compromised conditions treated with ECLS for severe pediatric respiratory failure

	ICC Subgroup	No ICC Group	<i>p</i> Value
Group 1 (n = 15)	(3/15) 20.0%	(1550/2696) 57.5%	.003 ^a
Group 2 (n = 49)	(14/49) 28.8%	(1550/2696) 57.5%	<.0005 ^a
Group 3 (n = 11)	(2/11) 18.2%	(1550/2696) 57.5%	.012 ^b
Group 4 (n = 51)	(17/51) 33.3%	(1550/2696) 57.5%	.001 ^a
Group 5 (n = 72)	(25/72) 34.6%	(1550/2696) 57.5%	<.0005 ^a
Group 6 (n = 17)	(0/17) 0.0%	(1550/2696) 57.5%	<.0005 ^a
Group 7 (n = 183)	(57/183) 31.1%	(1550/2696) 57.5%	<.0005 ^a

ICC, immune compromise condition; ECLS, extracorporeal life support.

^aPearson Chi-square. ^bFisher's exact test.

Group 1 = Immune deficiency.

Group 2 = Leukemia or lymphoma, aplastic anemia, agranulocytosis.

Group 3 = Cancer (not 2).

Group 4 = Opportunistic infection.

Group 5 = Solid organ transplant (kidney, liver, heart, lung).

Group 6 = Bone marrow transplant.

Group 7 = Any ICC = (any diagnosis 1–6).

Note — ICC subgroup comparisons (groups 1–6) in the table are to a fixed group of cases with no ICC diagnosis. Nearly identical *p* value associations were also observed when the comparison group was expanded to the no ICC diagnosis group plus the other ICC subgroups.

Problem with registry data

- Voluntary reporting
- Limited to
 - 1 x primary dx
 - 4 x secondary dx
- Data capturing
 - Previous ELSO registry only captured data at ECMO initiation & termination
- Case report on BMT survivor
 - But 0 survivor and registry study

Extracorporeal membrane oxygenation for support of children after hematopoietic stem cell transplantation: the Extracorporeal Life Support Organization experience

Kenneth W. Gow^{a,*}, Mark L. Wulkan^a, Kurt F. Heiss^a, Ann E. Haight^b, Micheal L. Heard^c, Peter Rycus^d, James D. Fortenberry^c

- 19 children (age <18 y),
 - median age 9.6y (7 mo-17.5 y)
- Resp support (n=17); cardiac support (n=1), ECPR (n=1)
- Median duration of ECMO= 5.1 days
- 15 (79%) died during ECMO
- Only one (5.3%) survive to discharge
- Risk factors:
 - renal complication, development of multiorgan dysfunction

Extracorporeal life support for support of children with malignancy and respiratory or cardiac failure: The extracorporeal life support experience*

Crit Care Med 2009; 37: 1308-1316

Kenneth W. Gow, MD, FACS, FAAP; Kurt F. Heiss, MD, FACS, FAAP; Mark L. Wulkan, MD, FACS, FAAP; Howard M. Katzenstein, MD; Eli S. Rosenberg, BS; Michael L. Heard, RN; Peter T. Rycus, MPH; James D. Fortenberry, MD, FCCM, FAAP

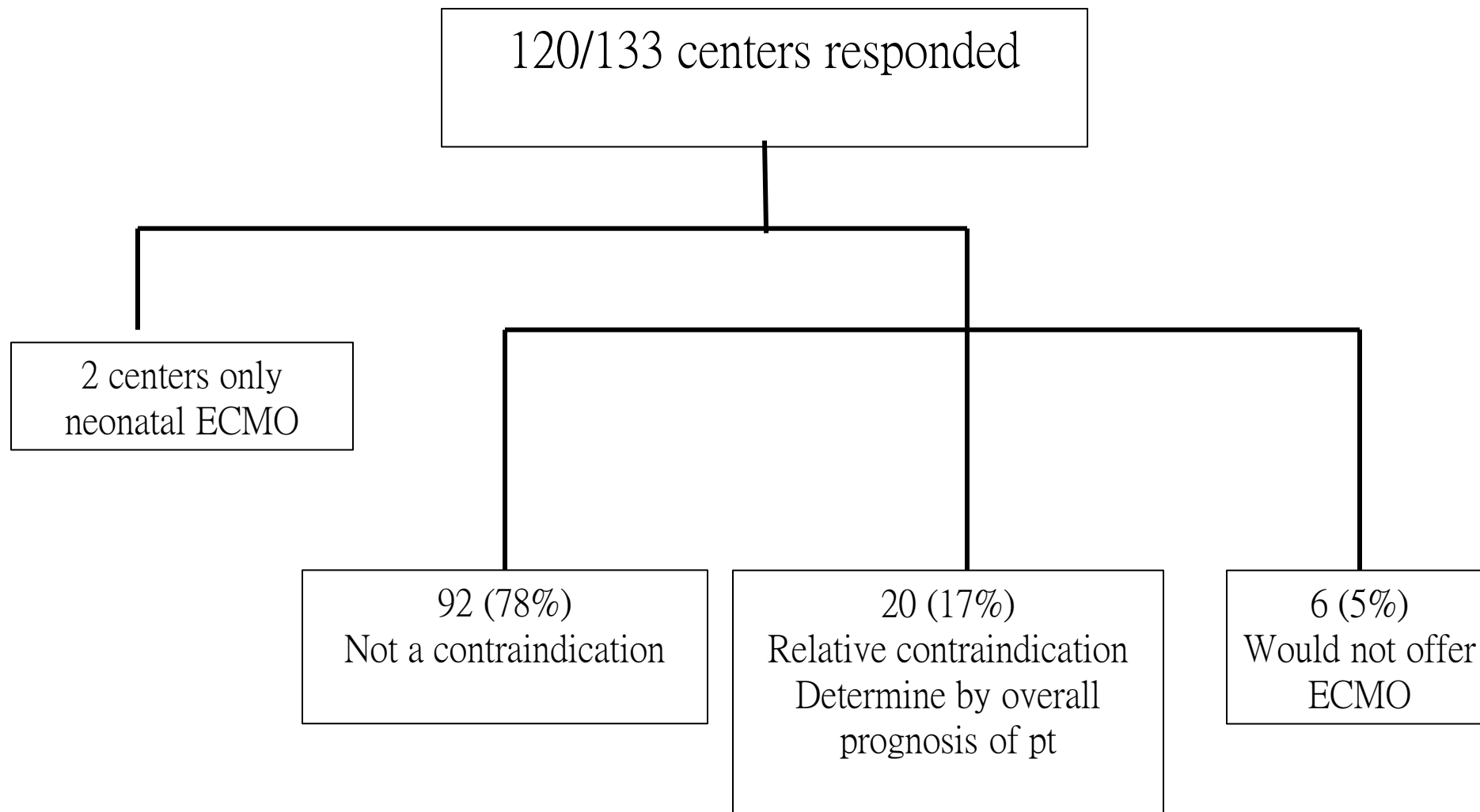
- ESLO registry
 - since 1985, >35000 cases
- 1992-2007 (age <21 y)
- Dx : malignancy, exclude HSCT
- 107 pts:
 - 73 hematological malignancy, 34 solid tumors (median age 3.7 y)
- Total 112 ECMO runs (5 pts- 2 runs)
- Pulmonary support n=86
- Median duration ECMO= 6.1 days

- Survival
 - ECMO decannulation: 42%
 - Mortality :Irreversible organ damage / Dx incompatible with life, heamorrhage , withdrawal
 - Hospital D/C: 35%
 - Haemat malignancy slightly better
- Median no. of complications: 4 per pt
- Risk factors for death:
 - Lower pO₂
 - Higher OI
 - Higher PEEP
 - Development of renal or cardiopulmonary complications

ELSO data : historical perspective

- ECMO x paediatric oncology patients
 - oncology patients (excluding HSCT)
 - Worse overall survival ~18-35% (vs 57% rest of the ELSO registry patients)
 - Solid organ cancer – apparent worse survival
 - HSCT
 - Poor survival – 0-5%

Questionnaire sent to ECMO centers



What's next...

- It turns out to be a long long wait



Matteo Di Nardo
Franco Locatelli
Kenneth Palmer
Antonio Amodeo
Roberto Lorusso
Mirko Belliato
Corrado Cecchetti
Daniela Perrotta
Sergio Picardo
Alice Bertaina
Sergio Rutella
Peter Rycus
Vincenzo Di Ciommo
Bernhard Holzgraefe

**Extracorporeal membrane
oxygenation in pediatric
recipients of hematopoietic
stem cell transplantation:
an updated analysis
of the Extracorporeal Life
Support Organization
experience**

Accepted: 4 February 2014

Published online: 21 February 2014

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Table 1 Summary of patients' diagnosis, kind of ECMO support, kind of infections before ECMO, and outcomes

Patient no.	Diagnosis	ECMO support	Infections and culture sites before ECMO	ECMO survival	Survival to hospital discharge
1	Acute myeloid leukemia	R	CMV (resp. tract) CMV (blood) <i>Aspergillus</i> (blood)	N	N
2	Myelodysplasia	R	<i>Pneumocystis carinii</i> (resp. tract)	N	N
3	Combined immunity deficiency	R	NR	N	N
4	Not specified Acute lymphoblastic leukemia	R	Parainfluenza virus (resp. tract)	N	N
5	Acute myeloid leukemia	ECPR	<i>Torulopsis glabrata</i> (blood)	N	N
6	Acute myeloid leukemia	R	<i>Escherichia coli</i> (blood)	N	N
7	Acute myeloid leukemia	R	NR	N	N
8	Acute myeloid leukemia	R	<i>Pneumocystis carinii</i> (resp. tract)	N	N
9	Combined immune deficiency	R	MRSA (blood)	N	N
10	Aplastic anemia	ECPR	NR	N	N
11	Sickle cell anemia	R	Adenovirus (resp. tract)	N	N
12	Acute lymphoblastic leukemia	R	RSV (resp. tract)	N	N
13	Hodgkin's lymphoma	R	Chlamydia and EBV (unknown culture site)	N	N
14	Inborn error of metabolism (carnitine deficiency)	R	IPS	N	N
15	Myelodysplasia	R	NR	N	N
16	Mucopolysaccharidosis	ECPR	NR	N	N
17	Acute myeloid leukemia	R	PERDS	N	N
18	Acute lymphoblastic leukemia	R	HSV (blood)	N	N
19	Acute lymphoblastic leukemia	C	CMV (resp. tract) MRSA (blood)	N	N
20	Aplastic anemia	R	CMV (blood) MRSA (blood) EBV (blood)	N	N
21	Acute lymphoblastic leukemia	C	Pulmonary edema and diffuse alveolar hemorrhage	N	N
22	Functional disorder of polymorphonuclear neutrophils	C	<i>Pneumocystis carinii</i> (resp. tract) EBV (blood)	N	N
23	Congenital neutropenia	R	CMV (blood and resp. tract) <i>Aspergillus</i> and <i>Candida albicans</i> (blood)	N	N
24	Castleman's disease	R	<i>Staphylococcus aureus</i> , RSV, and adenovirus (unknown culture site)	Y	Y
25	Unspecified disorder of metabolism	C	<i>Stenotrophomonas maltophilia</i> (unknown culture site)	Y	Y
26	Congenital amegakaryocytic thrombocytopenia	R	Adenovirus (resp. tract)	Y	N
27	Unspecified thalassemia	C	CMV and MRSA (blood)	Y	N
28	Acute lymphoblastic leukemia	R	RSV (resp. tract)	Y	Y
29	Aplastic anemia	R	Adenovirus (resp. tract) HSV (blood)	Y	N

R respiratory, C cardiac, ECPR extracorporeal cardiopulmonary resuscitation, N no, Y yes, CMV cytomegalovirus, RSV respiratory syncytial virus, MRSA methicillin-resistant *Staphylococcus aureus*, EBV Epstein-Barr virus, HSV herpes simplex virus, PERDS pericarditis, RSV respiratory distress syndrome, IPS idiopathic pneumonia syndrome, NR not reported

ELSO data - HSCT

- ELSO registry 1991 – 2012
 - 29 patients (17 male)
 - Types of support
 - 17 VA-ECMO
 - 3 VV convert to VA-ECMO
 - Median ECMO duration : 7.7d
 - 3.8 – 15.6d
 - Survival
 - Decannulation : 6/29 (21%)
 - Hospital D/C: 3/29 (~10%)
- Survivor vs non-survivors
 - OI: 15.8 vs 58
 - MAP: 14 vs 30 cmH₂O
 - PEEP: 7 vs 10 cmH₂O

*p<0.05

Problem with registry data

- No data on
 - Time from HSCT
 - Engraftment status
 - ? Neutropenia
- Relatively short ECMO duration ?

Characteristics and Outcome of Patients After Allogeneic Hematopoietic Stem Cell Transplantation Treated With Extracorporeal Membrane Oxygenation for Acute Respiratory Distress Syndrome*

Philipp Wohlfarth, MD¹; Gernot Beutel, MD²; Pia Lebiecz, MD³; Hans-Joachim Stemmler, PhD⁴; Thomas Staudinger, MD¹; Matthieu Schmidt, PhD⁵; Matthias Kochanek, MD⁶; Tobias Liebregts, MD⁷; Fabio Silvio Taccone, PhD⁸; Elie Azoulay, PhD⁹; Alexandre Demoule, PhD^{10,11}; Stefan Kluge, MD¹²; Morten Svalebjørg, MD¹³; Catherina Lueck, MD²; Johanna Tischer, MD⁴; Alain Combes, PhD⁵; Boris Böll, MD⁶; Werner Rabitsch, MD¹; Peter Schellongowski, MD¹ on behalf of Intensive Care in Hematologic and Oncologic Patients (iCHOP) and the Caring for Critically Ill Immunocompromised Patients Multinational Network (NINE-I)

Crit Care Med 2017; 45: e500-7

- Multicenter, retrospective observational study
- 12 Euro tertiary ICU
- Adult

TABLE 2. ICU and Extracorporeal Membrane Oxygenation–Related Characteristics and Outcome

Variable	All Patients (n = 37)	Nonsurvivors (n = 30)	Survivors (n = 7)	p
Characteristics at ICU admission				
Age, yr	37 (26–49)	36 (28–49)	38 (26–58)	0.69
Sex, female	17 (46)	15 (50)	2 (29)	0.42
Charlson Comorbidity Index (16)	0 (0–1)	0 (0–1)	1 (1–1)	0.36
Simplified Acute Physiology Score II score	56 (42–67)	55 (41–66)	56 (47–70)	0.61
Days from allogeneic hematopoietic stem cell transplantation to ECMO	146 (27–321)	100 (24–226)	485 (270–976)	0.011

Conclusions: Discouraging survival rates in patients treated early after allogeneic hematopoietic stem cell transplantation do not support the use of extracorporeal membrane oxygenation for acute respiratory distress syndrome in this group. On the contrary, long-term allogeneic hematopoietic stem cell transplantation recipients otherwise eligible for full-code ICU management may be potential candidates for extracorporeal membrane oxygenation therapy in case of severe acute respiratory distress syndrome failing conventional measures. (*Crit Care Med* 2017; 45:e500–e507)

- No exciting evidence unfortunately

Case series

- Neutropenic fever
 - Single ECMO centre (Royal Children Hospital)
 - 14 ECMO runs in 20 yrs x malignancy
 - 9 neutropenic fever
 - 44% survive hospital discharge (vs 71% neutropenic ICU patients)
 - 22% long term survival
- Smith et al. Intensive Care Med (2016) 42: 942-943

Table 1 Characteristics of febrile neutropenic patients on ECLS

Diagnosis	N = 9	Demographics	Median	IQR
ALL	4	Age (years)	9	5–11
AML	1	Weight (kg)	28	15–38
B cell lymphoma	2			
Rhabdomyosarcoma	2	Pre-ECLS variables		
Auto-HSCT	1	Duration of mechanical ventilation (h)	6.0	3.1–24
Chemotherapy pre-ECLS	9	pH	7.28	7.18–7.29
Indication for ECLS		PaO ₂ [kPa (mmHg)]	9.4 (71)	7.4–13.6 (56–102)
Respiratory failure	1	PaCO ₂ [kPa (mmHg)]	6.8 (51)	5.2–9.3 (39–70)
Shock	7	Oxygenation index	19	9.5–44.5
Cardiac arrest	1	Mean airway pressure (cmH ₂ O)	17.6	12.6–19
Source of sepsis		Vasoactive inotrope score	75	32.5–190
Gram-negative bacteria	4	PIM 3 score	0.24	0.18–0.43
Viral	2	Neutrophil count at cannulation (×10 ⁹ /L)	0.11	0–0.26
Fungal	1	Duration of neutropenia pre-ECLS (days)	3.0	1.8–5.3
No organism identified	2	Platelet count at cannulation (×10 ⁹ /L)	65	25–125
Cause of death	7			
On ECLS		Duration (h)		
Worsening shock	2	ECLS	120	93–161
Multiorgan failure	1	ICU	277	120–335
Extracranial haemorrhage	1	Hospital	441	121–964
Failure of myocardial recovery	1			
After hospital discharge				
Recurrent malignancy	1			
Sepsis	1			

5/9 mortality
Hospital discharge 4/9 pts

Long-term survival 2 pts (22%)
Mean follow-up 4.2 y (0.7-10y)

Case series

Original Paper



Outcomes of pediatric oncology and hematopoietic cell transplant patients receiving extracorporeal membrane oxygenation

Perfusion
2019, Vol. 34(7) 598–604
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DOI: 10.1177/0267659119842471
journals.sagepub.com/home/prf



Danielle K Maue,¹  Michael J Hobson,¹ Matthew L Friedman,¹
Elizabeth AS Moser² and Courtney M Rowan¹

- Single ECMO centre : Indiana
- Oncology/HSCT patients vs other indication
 - 7/38 cases oncology & HSCT patients
- Similar baseline
 - Other than lower plt for onc/HSCT

Table 3. Comparing ECMO outcomes of the oncology/HCT patients compared to general PICU ECMO patients.

Variable	Oncology/HCT (n = 7)	General PICU (n = 31)	p value
Hospital survival	1 (14)	21 (68)	0.03
Survival to decannulation	2 (29)	24 (77)	0.02
Bleeding complications	1 (14)	4 (13)	1.0
New infection on ECMO	0	4 (13)	1.0
Renal replacement therapy	6 (86)	16 (52)	0.20
Length of ECMO (days)	7 (1, 8)	8 (4, 13)	0.25
Length of mechanical ventilation (days)	14 (2, 16)	14 (9, 26)	0.31
ECMO-free days (at 28 days)	0 (0, 5)	14 (2, 20)	0.009
Length of hospital stay (days)	14 (7, 50)	39 (14, 77)	0.20

HCT: hematopoietic cell transplant; PICU: pediatric intensive care unit; ECMO: extracorporeal membrane oxygenation; IQR: interquartile range. Values are displayed as medians (IQR) or frequency (%); categorical variables were compared with Fisher's exact test; continuous variables were compared with Mann-Whitney U test.

A decade has passed.....

- ECMO x paediatric oncology patients
 - Oncology +/- HSCT patients
 - Data limited to single centre case series
 - Very heterogeneous group
 - Still poor outcome
 - Hospital survival 14-44%
 - HSCT – registry / single centre data
 - Improved but still poor survival ~10%

ECLS Registry Report

International Summary

January, 2020



Extracorporeal Life Support Organization
 2800 Plymouth Road
 Building 300, Room 303
 Ann Arbor, MI 48109

Overall Outcomes

	Total Runs	Survived ECLS	Survived to DC or Transfer
Neonatal			
Pulmonary	32,385	28,417 87%	23,675 73%
Cardiac	8,830	6,097 69%	3,818 43%
ECPR	2,035	1,427 70%	861 42%
Pediatric			
Pulmonary	10,346	7,471 72%	6,199 59%
Cardiac	12,538	9,042 72%	6,667 53%
ECPR	4,945	2,940 59%	2,086 42%
Adult			
Pulmonary	24,395	16,971 69%	14,714 60%
Cardiac	25,488	15,184 59%	11,191 43%
ECPR	8,075	3,363 41%	2,387 29%
Total	129,037	90,912 70%	71,598 55%



Should Extracorporeal Membrane Oxygenation Be Offered? An International Survey

Kevin W. Kuo, MD¹, Ryan P. Barbaro, MD¹, Samir K. Gadepalli, MD², Matthew M. Davis, MD³, Robert H. Bartlett, MD², and Folafoluwa O. Odetola, MD¹

Objectives To assess the current attitudes of extracorporeal membrane oxygenation (ECMO) program directors regarding eligibility for ECMO among children with cardiopulmonary failure.

Study design Electronic cross-sectional survey of ECMO program directors at ECMO centers worldwide within the Extracorporeal Life Support Organization directory (October 2015-December 2015).

Results Of 733 eligible respondents, 226 (31%) completed the survey, 65% of whom routinely cared for pediatric patients. There was wide variability in whether respondents would offer ECMO to any of the 5 scenario patients, ranging from 31% who would offer ECMO to a child with trisomy 18 to 76% who would offer ECMO to a child with prolonged cardiac arrest and indeterminate neurologic status. Even physicians practicing the same specialty sometimes held widely divergent opinions, with 50% of pediatric intensivists stating they would offer ECMO to a child with severe developmental delay and 50% stating they would not. Factors such as quality of life and neurologic status influenced decision making and were used to support decisions for and against offering ECMO.

Conclusions ECMO program directors vary widely in whether they would offer ECMO to various children with cardiopulmonary failure. This heterogeneity in physician decision making underscores the need for more evidence that could eventually inform interinstitutional guidelines regarding patient selection for ECMO. (*J Pediatr* 2017;182:107-13).

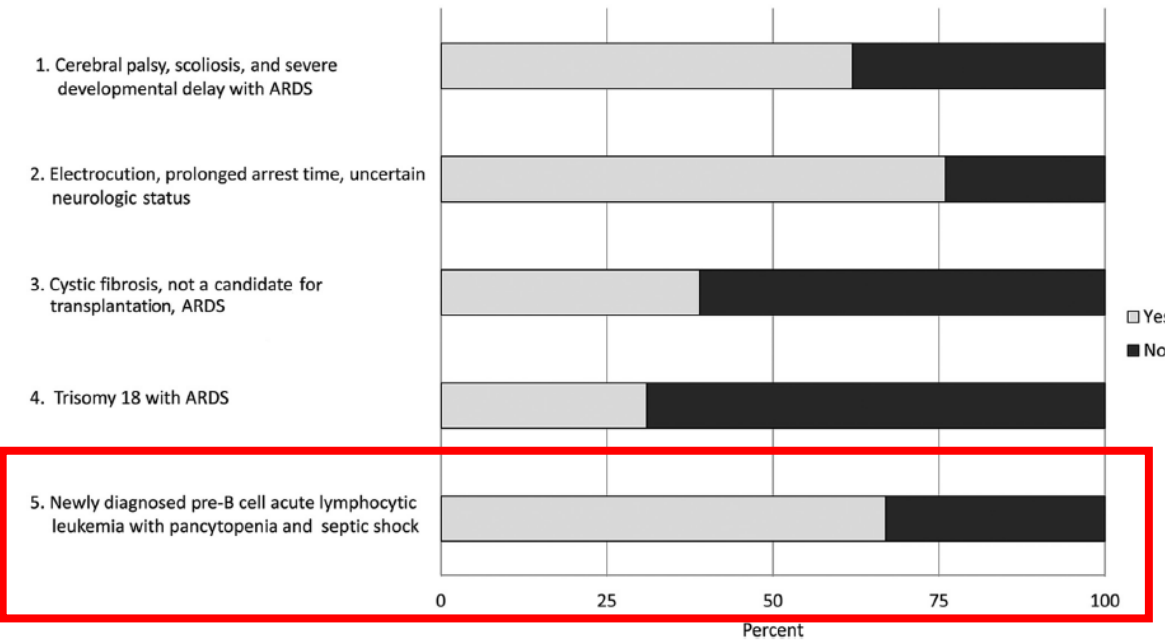


Figure 1. Respondents (%) who would or would not offer ECMO. ARDS, acute respiratory distress syndrome.

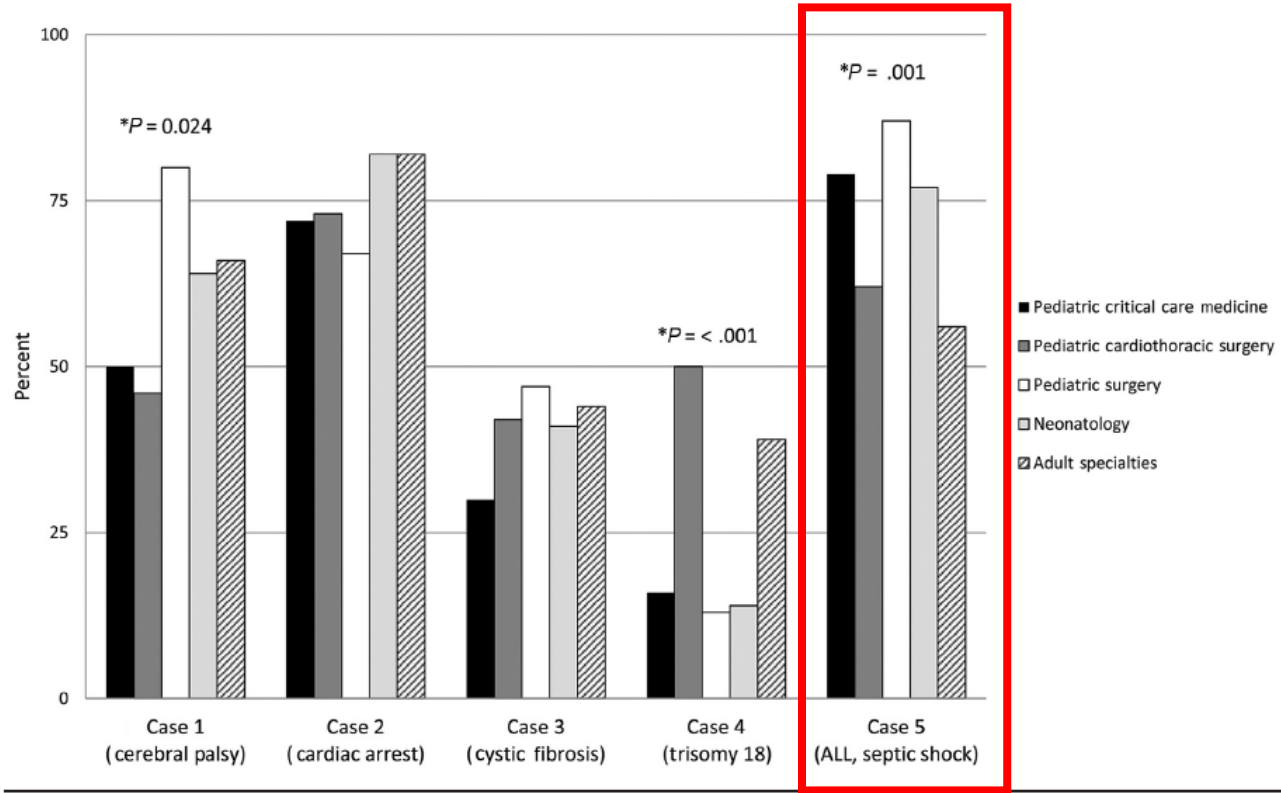


Figure 2. Respondents who would offer ECMO (%) by specialty. ALL, acute lymphoblastic leukemia.

Table II. Selected themes and respondent quotations regarding factors that influenced their decision about ECMO

	Would you offer ECMO?	
	Yes	No
Cerebral palsy		Quality of life (n = 45)
	"Although delayed, Her quality of life is good, she communicates and attends school and enjoys it."	"...her severe developmental delay" "Anticipated quality of life post ECMO run"
Postcardiac arrest		Uncertain neurologic outcome (n = 28)
	"The most important factor in my decision is the uncertain prognosis for the acute injury. So I prefer to buy time with ECMO to properly assess the patient's response."	"Uncertain neurologic status after OHCA at beginning of ECMO is in our institution, a contraindication."
Cystic fibrosis		Transplant status (n = 31)
	"If he is not a transplant candidate, ECMO is his last chance right now for a few more years."	"Most important factor is that he has a progressive and irreversible condition that is not amenable to transplant."
Trisomy 18		Baseline health status (n = 38)
	"He has developmental delay but no other significant organ dysfunction."	"He would not even have had cardiac surgery because of trisomy 18; certainly no ECMO."
Pre-B ALL with septic shock		Prognosis (n = 38)
	"She can recover from her leukemia. I would not let her die from septic shock without trying ECMO."	"Presence of cancer of any type is a poor prognostic indicator for survival with ECMO."

ALL, acute lymphocytic leukemia.

Conclusion

- What we know
 - Paediatric oncology / HSCT / ICC patients
 - Higher mortality vs rest of the ECLS patients
 - Not enough data to identify risk factors for poor outcome
 - HSCT appear to do worst
 - Not an absolute contraindication x ECMO support
 - Different perception amongst ECMO physicians
- Factors to consider
 - ECMO economics.....
 - Case-by-case discussion



Thank You

ECMO – Immunocompromised patients in HK

- No oncology patients
- Immunocompromised / post BMT – 6
 - SCID x 2
 - Hypogammaglobulinaemia x1
 - Beta-thal major s/p BMT x1
 - HLH x 2
- Age: median 8.7yrs (7mth – 16yrs)
- ECMO days: median 17 (3-46)
- ECMO support
 - VA → VV x 2
 - VV x 2
 - VA x 2
- Survive to hospital D/C 1/6 (16.7%)
 - SCID - transplant

Possible better HSCT

- Single organ failure (heart or lung)
- Engrafted HSCT
- Non-neutropenic
- Neurologically intact
- Not at increase risk of bleeding