From Scene to Recovery: How teamwork between Pre-hospital and In-hospital staff improves E-CPR outcomes. Insights from a tertiary center in Madrid, Spain

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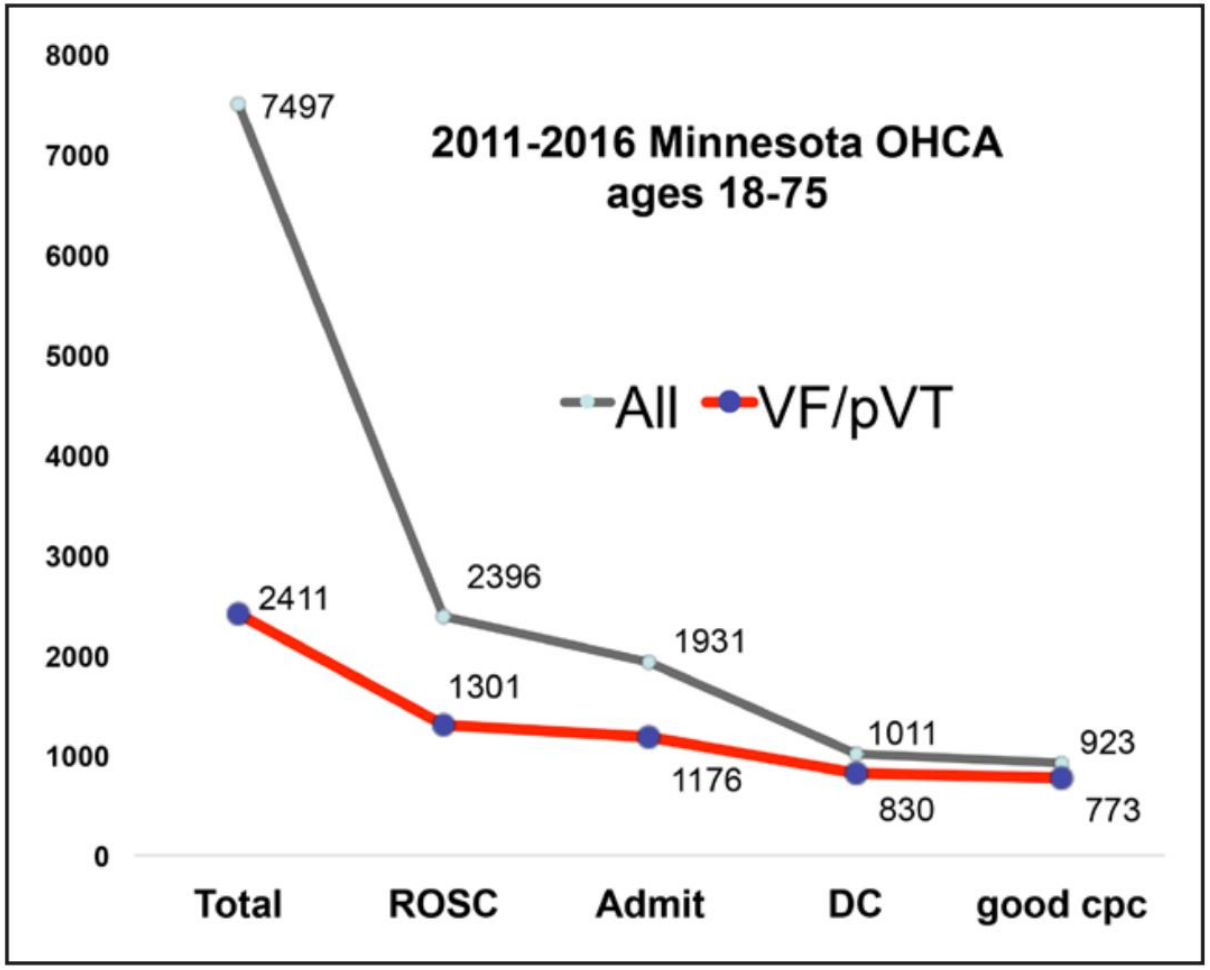
09/05/2024

Background

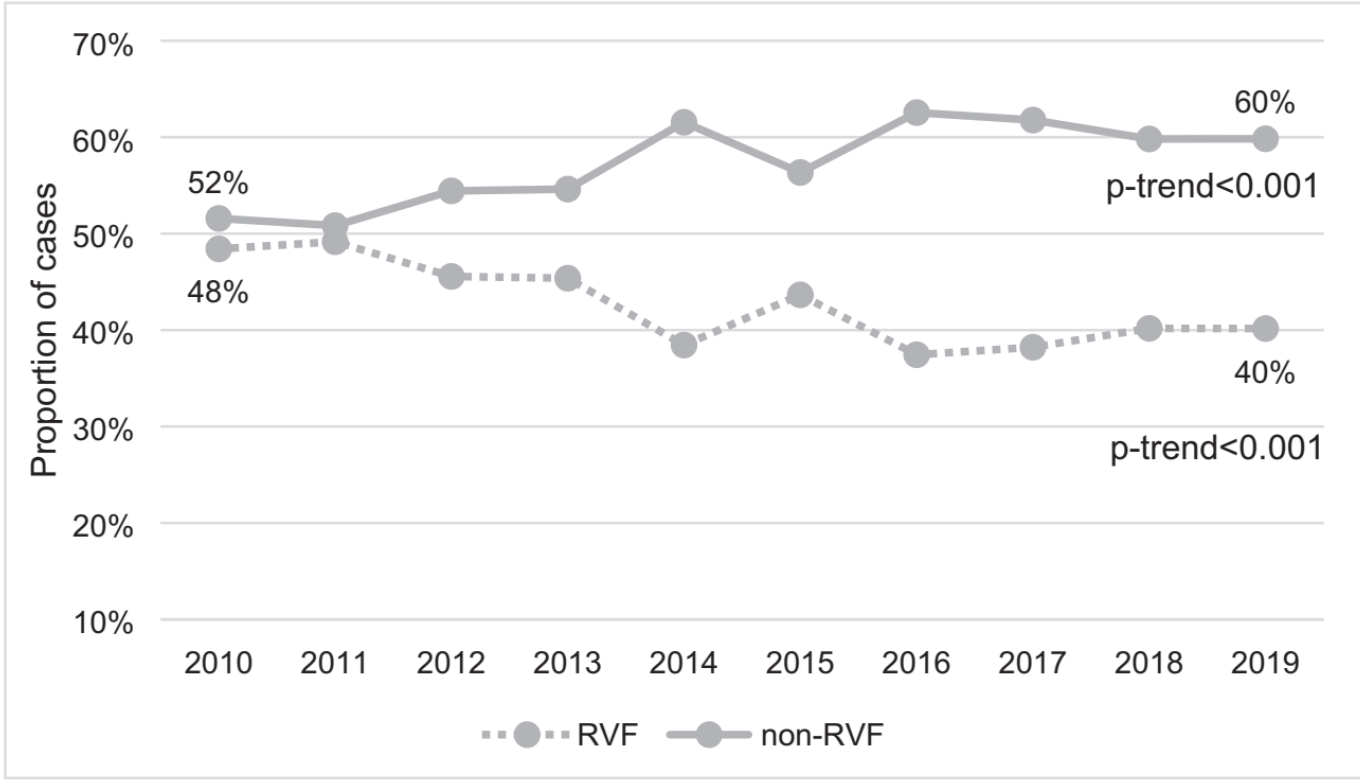


- ≈20-30% of OHCA pts have initial shockable rhythms (VF/VT).
- Initial shockable rhythms (ISR) contribute to 60% of survivors with CPC 1-2.
- ISR is a favorable prognostic marker (survival OR ranging to 5-15).

Yannopoulus, et al. Circulation. 2019;139:e530–e552

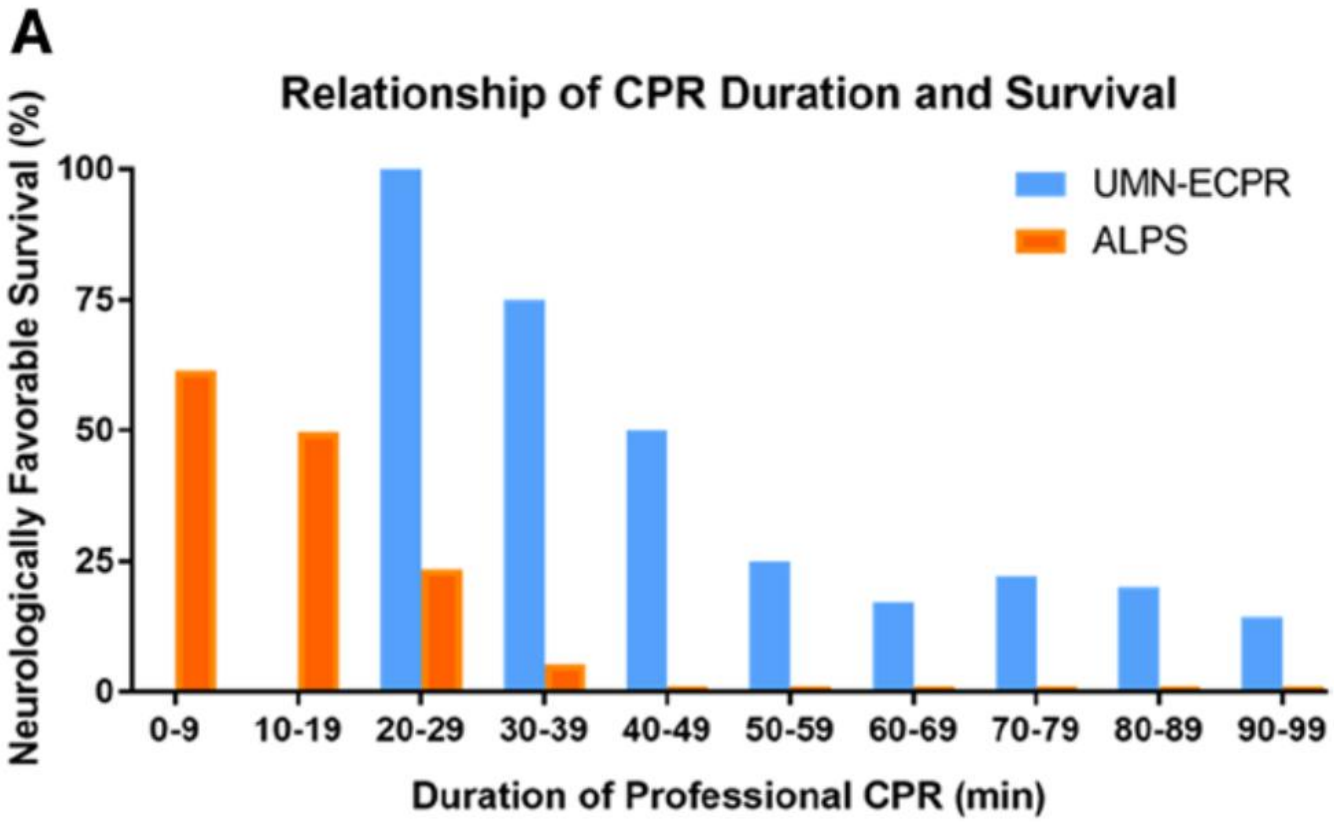
Background

- Yet, 50-60% of patients with VF/VT OHCA are ***refractory*** to advanced CPR and fail to achieve sustained return of spontaneous circulation (ROSC) after ***3 defibrillations + administration of 300 mg amiodarone.***



Alhenaki A, et al. Resusc Plus. 2024 Mar 8;18:100597

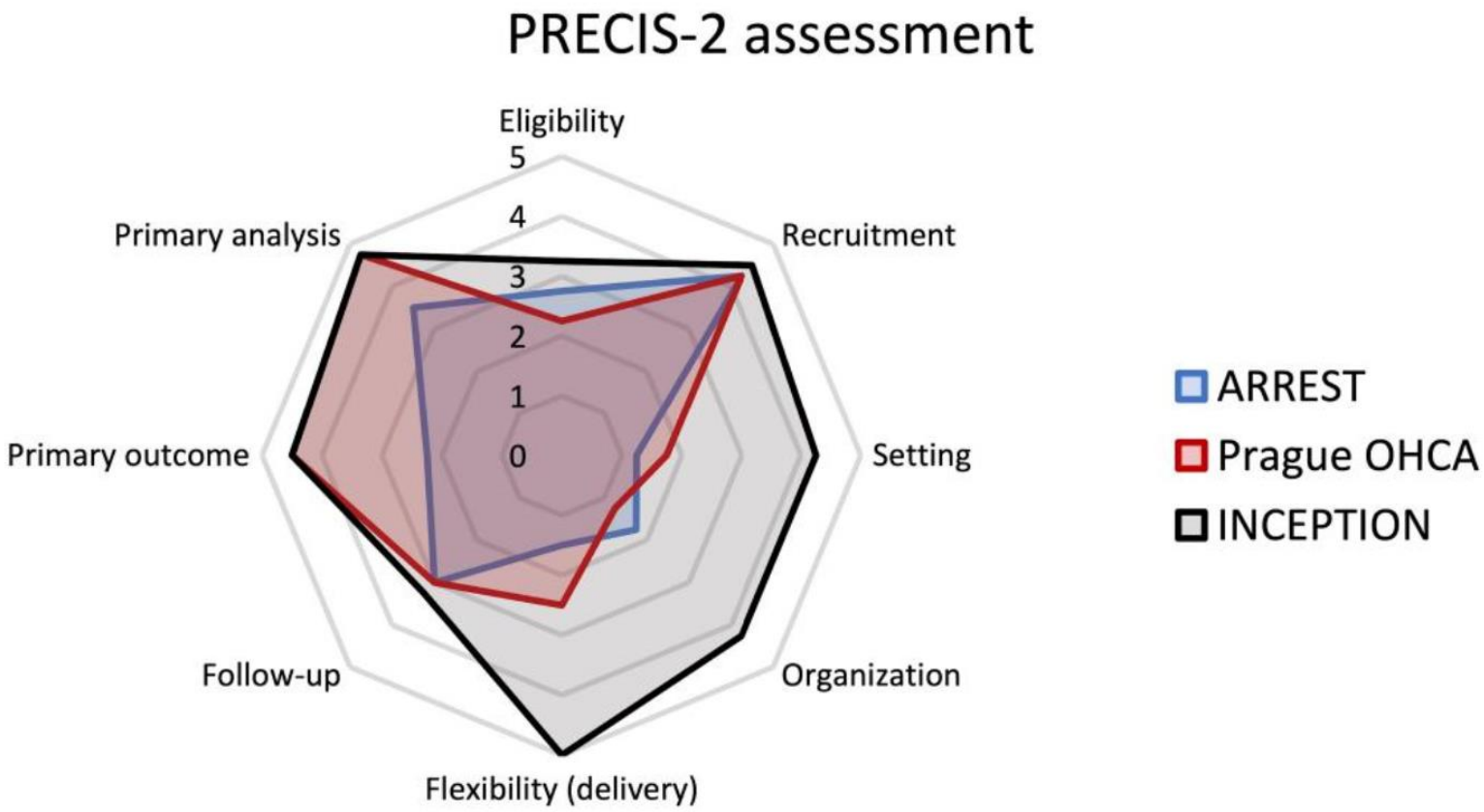
Background



Bartos et al. Circulation. 2020;141:877–886.

- Refractory ISR SV con CPC 1-2 >40 minutos <1%

E-CPR for everyone?



Ubben JFH, et al. Eur Heart J Acute Cardiovasc Care. 2023 Aug 24;12(8):540-547

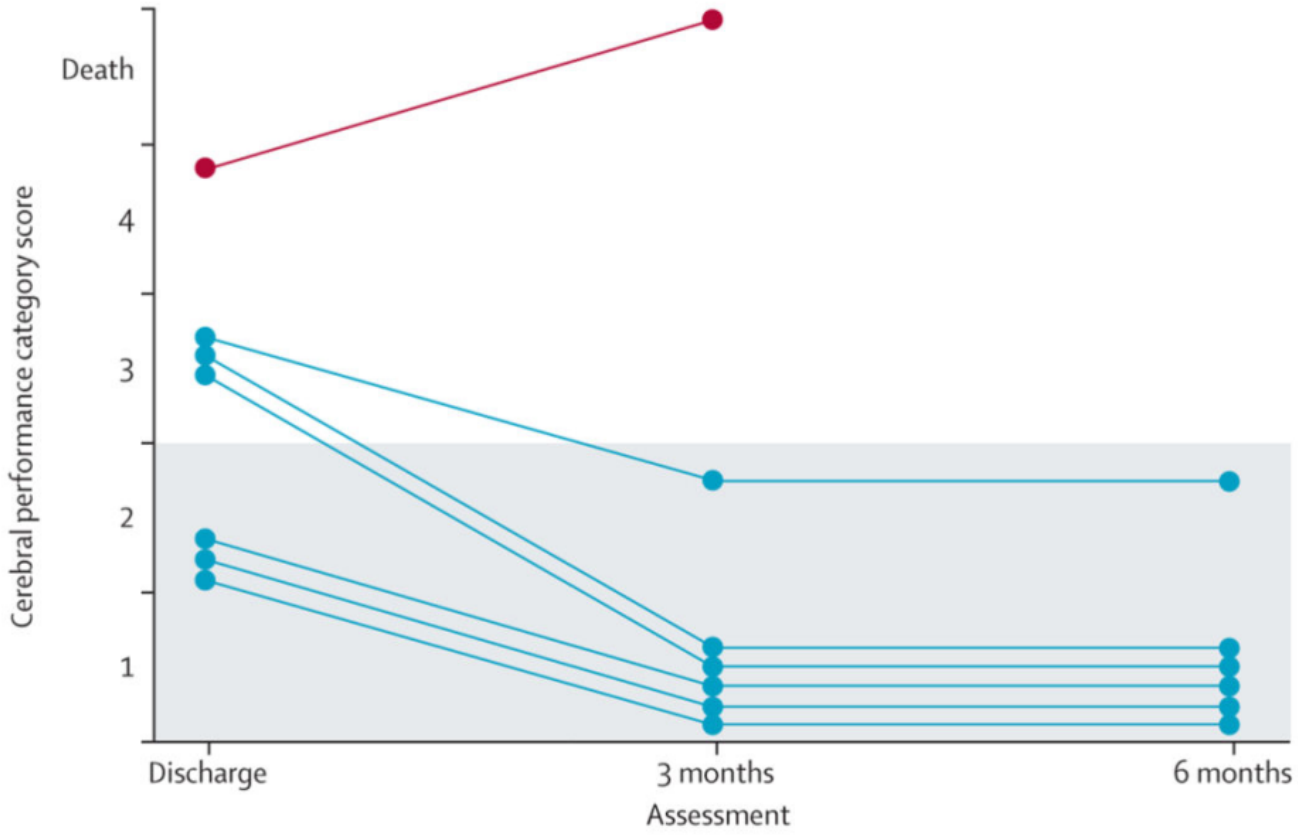
	ARREST[6,12]	Prague OHCA[5,10]	INCEPTION[11,13]
Setting	Single-centre University of Minnesota, USA	Single-centre Charles University, Prague, Czech Republic	Multi-centre the Netherlands
Studied intervention	ECPR and early revascularization	Invasive bundle consisting of intra-arrest transport with mechanical CPR, ECPR, and immediate invasive assessment (coronary angiography)	ECPR
Comparator	CCPR and early revascularization	CCPR with encouraged immediate invasive assessment	CCPR
Number of participating centres	1	1	10
Inclusion Period	August 2019 to June 2020	March 2013 to October 2020	May 2017 to February 2021
Inclusion Criteria			
Age	18–75 years	18–65 years	18–70 years
Only witnessed OHCA	No	Yes	Yes
Rhythm	VF or pulseless VT	Presumed cardiac aetiology, all rhythms	VT/VF or AED-shock admitted
ROSC	No ROSC after 3 shocks	No ROSC after 5 min of ALS	No ROSC within 15 min of ALS
Other	Body habitus able to support mechanical CPR, estimated transport time <30 min	ECPR team available at cardiac centre	Only bystander ALS

Ubben JFH, et al. Eur Heart J Acute Cardiovasc Care. 2023 Aug 24;12(8):540-547

E-CPR for everyone?

Outcomes	CCPR/ standard treatment	ECPR/ invasive strategy	*P*-value
ARREST	***n* = 15**	***n* = 14**	
Survival to hospital discharge	1 (7%)	6 (43%)	0.023
3-month survival	0	6 (43%)	0.006
6-month survival	0	6 (43%)	0.006
Prague OHCA	***n* = 132**	***n* = 124**	
30-day survival (CPC1-2)	24 (18%)	38 (31%)	0.02
6-month survival (CPC1-2)	29 (22%)	39 (32%)	0.09
INCEPTION	***n* = 64**	***n* = 70**	
30-day survival (CPC1-2)	10 (16%)	14 (20%)	0.518*
3-month survival (CPC1-2)	9 (14%)	12 (17%)	0.600*
6-month survival (CPC1-2)	10 (16%)	14 (20%)	0.537*

Ubben JFH, et al. Eur Heart J Acute Cardiovasc Care. 2023 Aug 24;12(8):540-547



Yannopoulos D et al, Lancet. 2020 Dec 5;396(10265):1807-1816

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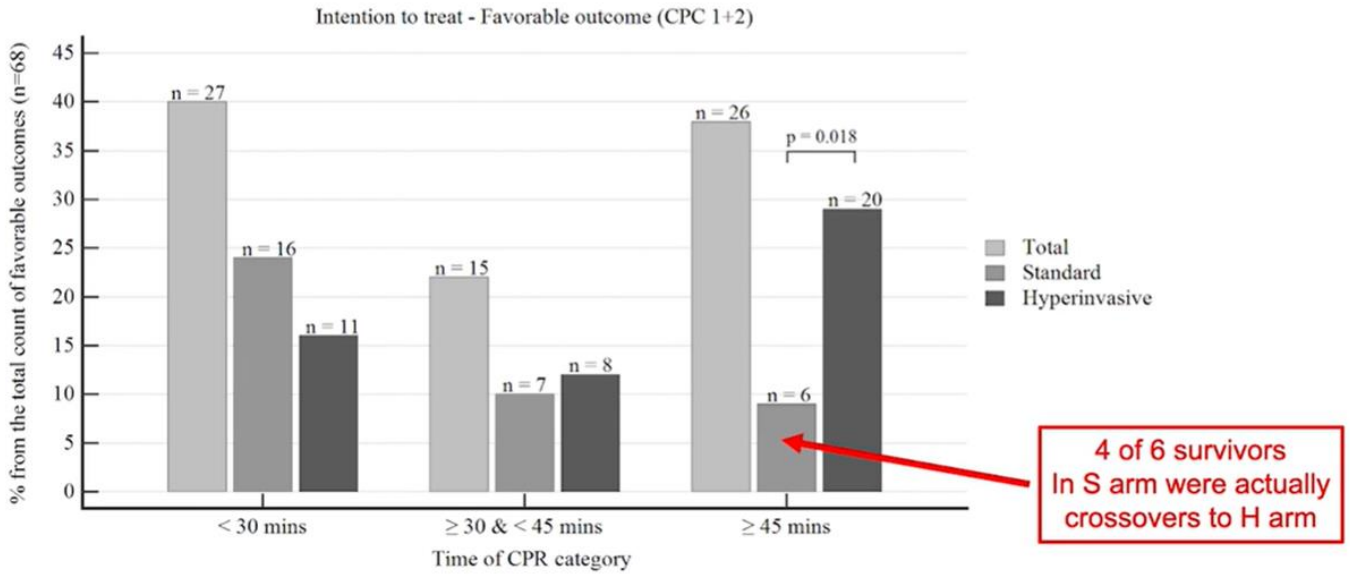
Survival related to time of CPR



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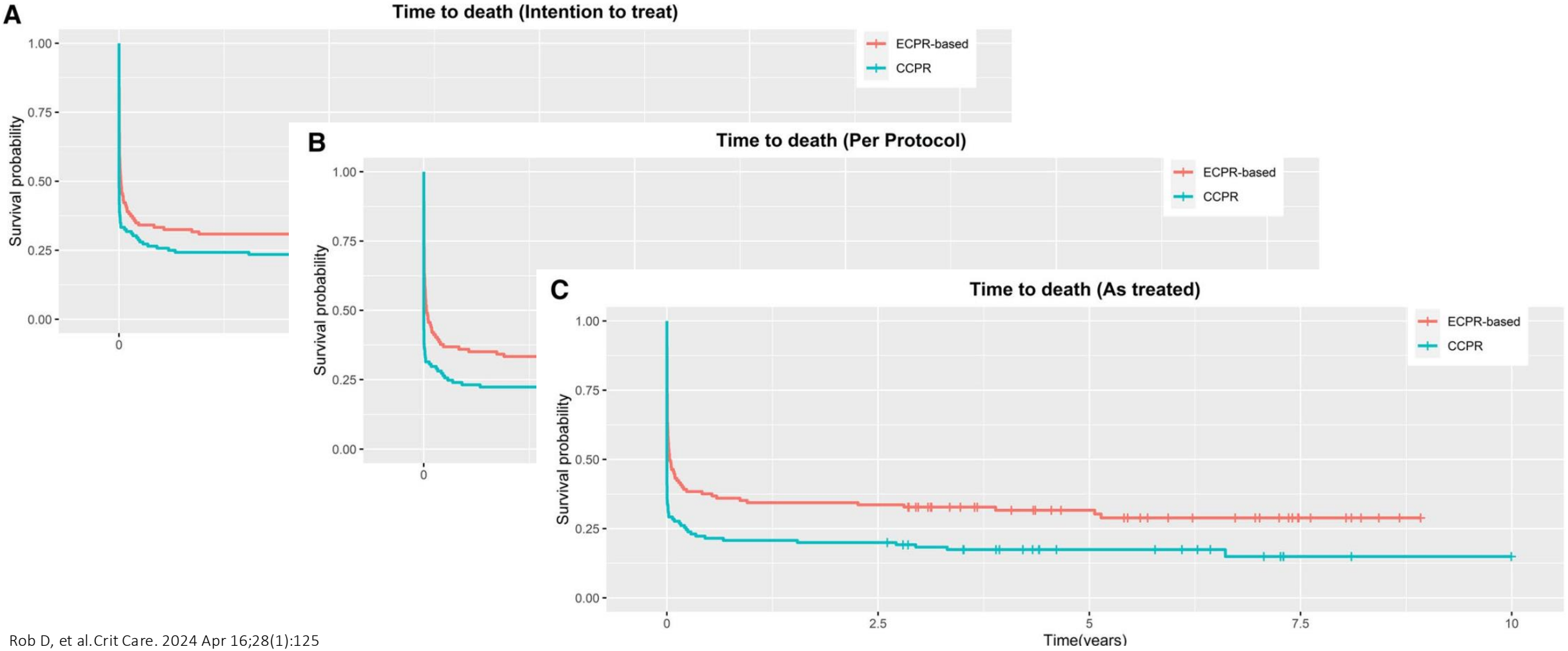
E-CPR for everyone?



Rob D, et al.Crit Care. 2024 Apr 16;28(1):125

Background

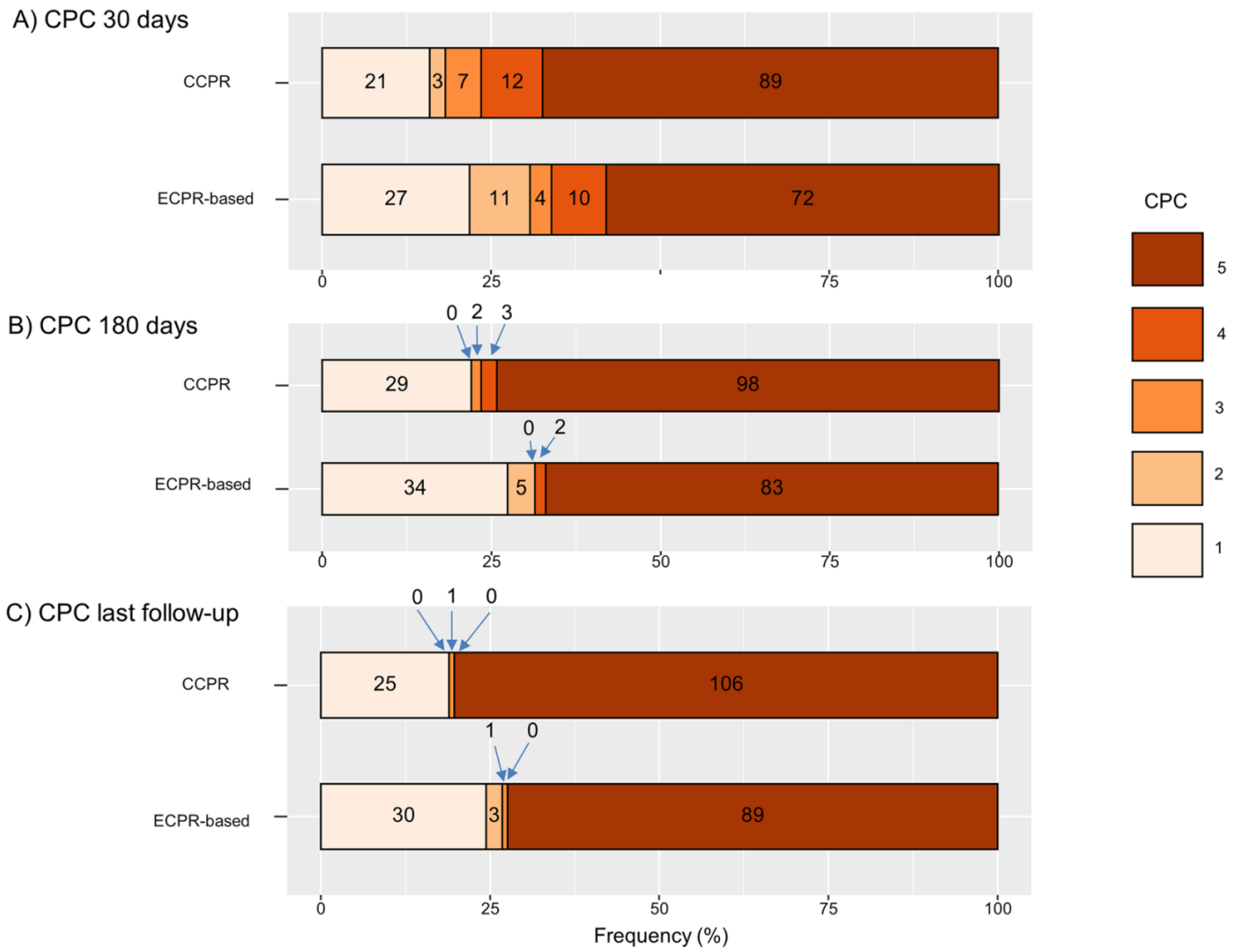


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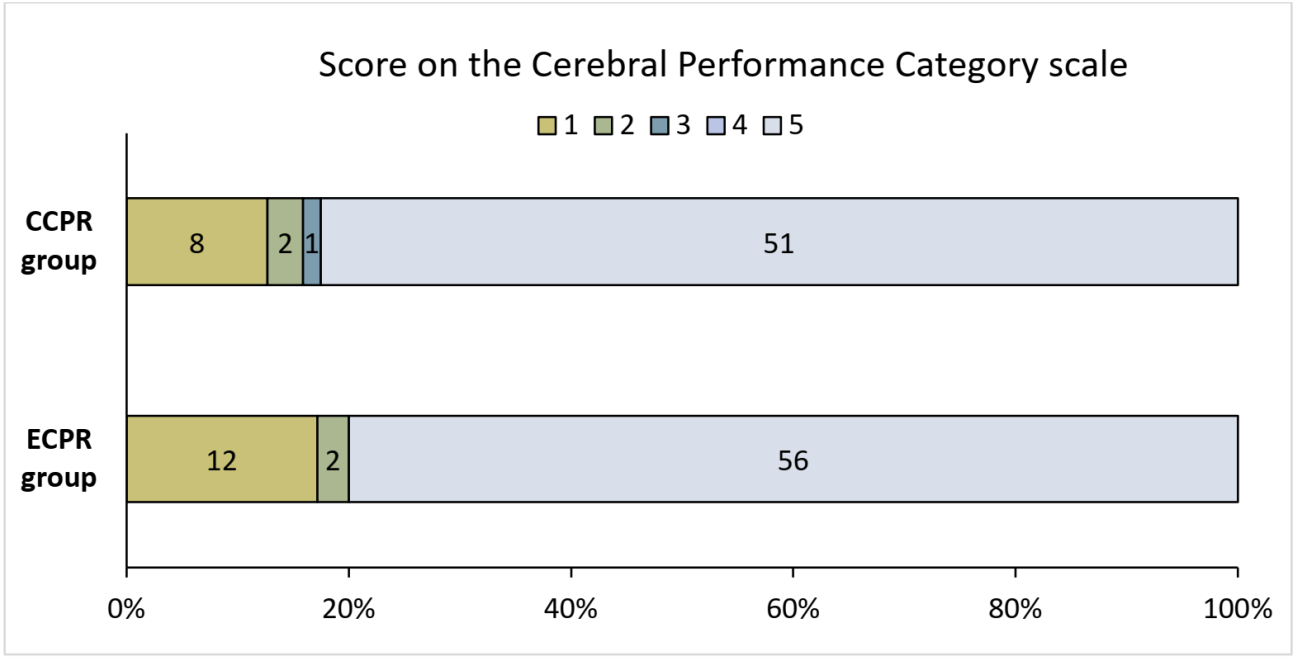
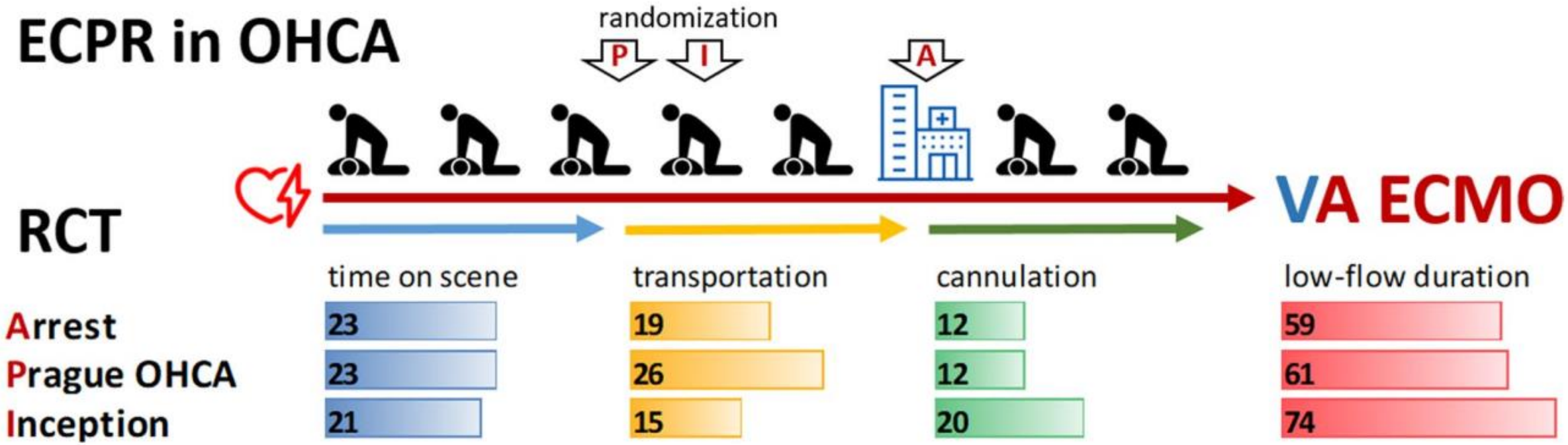
Figure S3. Survival with a favorable neurologic outcome at 30 days



Suverein MM,et al. N Engl J Med. 2023 Jan 26;388(4):299-309

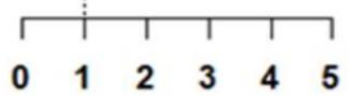
E-CPR for everyone?



Wengenmayer, T., Tigges, E. & Staudacher, D.L. Extracorporeal cardiopulmonary resuscitation in 2023. ICMx 11, 74 (2023)

E-CPR for everyone?

	Number of patients (%)	Odds ratio (95% CI)	*p* value
ECPR time ≤ 38 min	110 (60.1)	2.23 (1.09-4.54)	0.028
Age < 65 years	108 (59.0)	1.47 (0.67-3.22)	0.335
Body mass index > 25 Kg/m2	53 (29.0)	1.18 (0.55-2.50)	0.673
Hypertension	88 (48.1)	0.91 (0.41-2.04)	0.823
Diabetes mellitus	63 (34.4)	0.43 (0.19-0.99)	0.046
Chronic kidney disease	14 (7.7)	0.29 (0.06-1.47)	0.136
Ischemic cardiomyopathy	149 (81.4)	1.17 (0.49-2.83)	0.721
Vasoactive inotropic score ≥ 84	93 (50.8)	0.33 (0.16-0.66)	0.002
Shockable rhythm	67 (36.6)	1.38 (0.69-2.77)	0.359



Park IH, et al.RESCUE Registry. J Clin Med. 2020 Nov 7;9(11):3588.

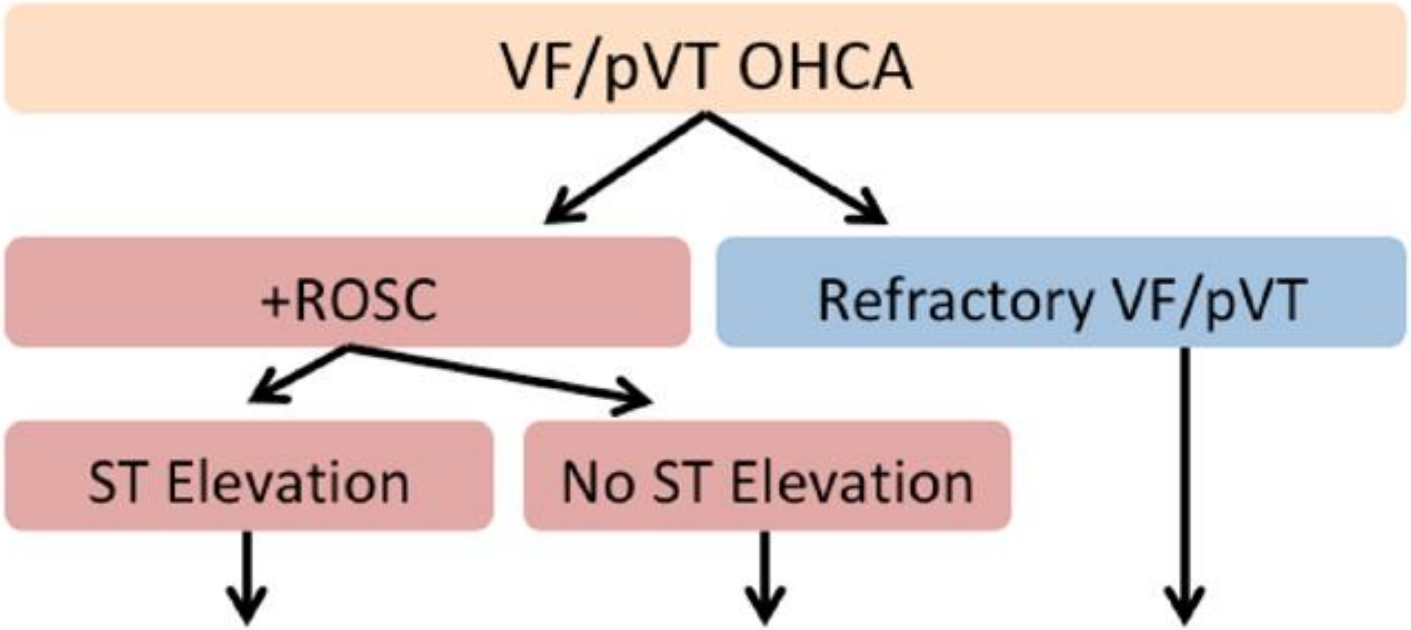
E-CPR for everyone?

Hospital annual ECPR ca			
0–9 cases annually		< 0.001	6,744
Per each additional 10		< 0.001	6,744

Tonna JE, et al. Crit Care Explor. 2022 Jul 25

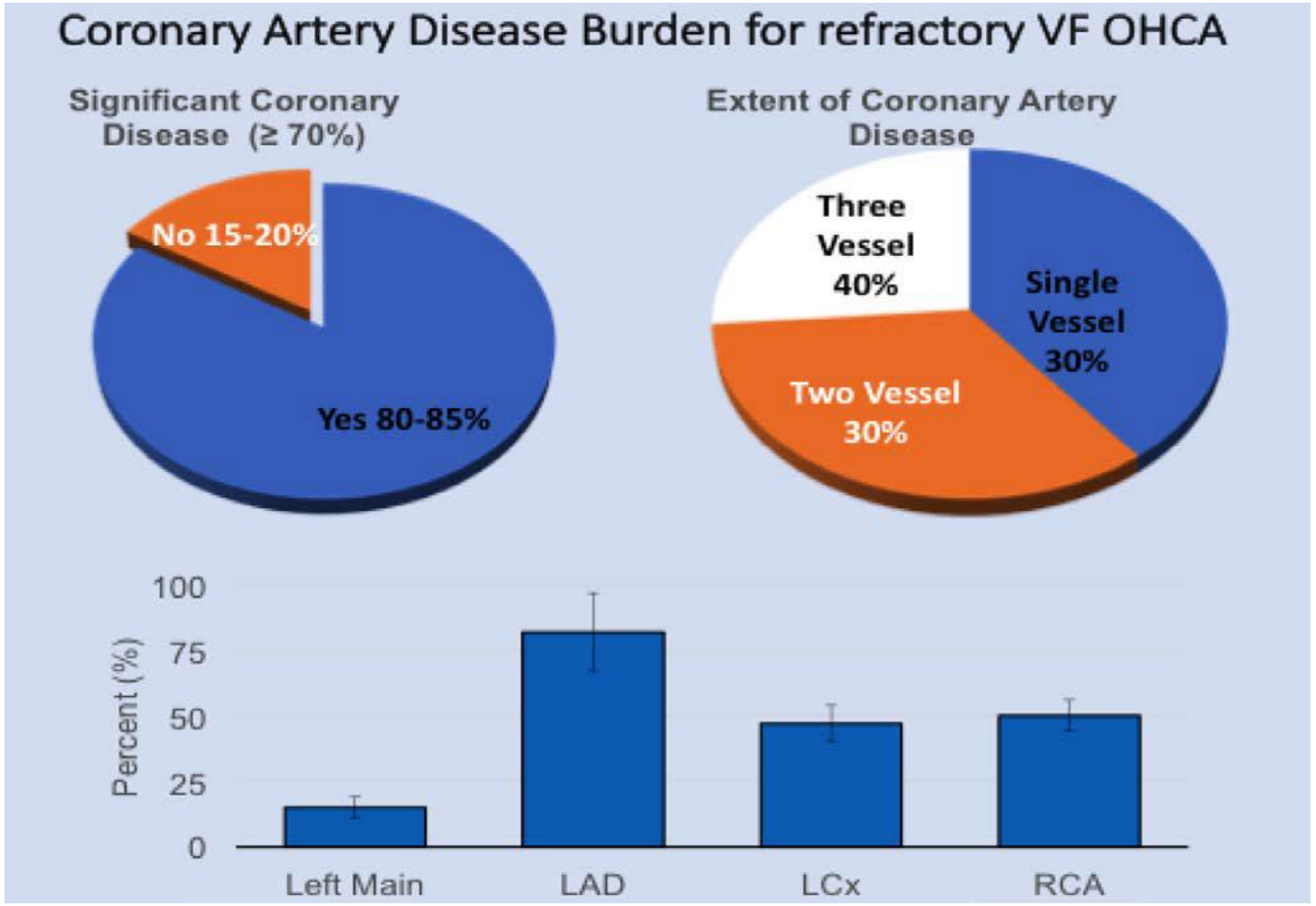
Table S2. Center description

	Number of patients	Median time to ECMO flow (min)	Location of Extracorporeal CPR	Cannulation
Center 1	43	66 (44-75)	Emergency department	Cardiothoracic surgeon
Center 2	10	95 *	Cath lab	Cardiothoracic surgeon, Interventional cardiologist
Center 3	14	63 (37-80)	Cath lab	Interventional cardiologist
Center 4	13	77 (36-89)	Emergency department	Cardiothoracic surgeon
Center 5	6	43 **	Cath lab	Interventional cardiologist
Center 6	3	41 *	Emergency department	Cardiothoracic surgeon, Intensivist
Center 7	8	53 (25-108)	Cath lab	Interventional cardiologist
Center 8	32	69 (54-75)	Emergency department	Intensivist
Center 9	3	69 *	Cath lab	Cardiothoracic surgeon
Center 10	1	NA	Emergency department	Cardiothoracic surgeon, Intensivist



	STE	No STE	Refractory
Significant CAD	70-95%	25-50%	75-85%
Acute Lesions	70-80%	25-35%	60-65%

Yannopoulos D,et al; American Heart Association Emergency Cardiovascular Care Committee. Circulation. 2019 Mar 19;139(12):e530-e552.



Yannopoulos D,et al; American Heart Association Emergency Cardiovascular Care Committee. Circulation. 2019 Mar 19;139(12):e530-e552.

Background

Study or Subgroup	Acute angiography Events	Total	No acute angiography Events	Total	Weight	Odds Ratio M-H, Random, 95% CI
Aurore 2011	31	133	30	312	8.2%	2.86 [1.65, 4.96]
Bro-Jeppesen 2012	129	198	87	162	9.3%	1.61 [1.05, 2.47]
Bulut 1999	4	10	10	27	2.9%	1.13 [0.26, 5.01]
Cronier 2011	54	91	6	20	4.7%	3.41 [1.20, 9.67]
Grasner 2011	80	154	57	430	9.3%	7.07 [4.64, 10.78]
Hollenbeck 2013	80	122	71	147	8.7%	2.04 [1.24, 3.34]
Mooney 2011	63	101	15	39	6.5%	2.65 [1.24, 5.67]
Nanjayya 2012	18	35	12	35	5.2%	2.03 [0.78, 5.31]
Nielsen 2009	303	479	187	507	10.6%	2.95 [2.27, 3.82]
Reynolds 2009	40	63	22	33	5.6%	0.87 [0.36, 2.11]
Strote 2012	44	61	88	179	7.5%	2.68 [1.42, 5.03]
Tomte 2011	76	145	9	29	5.9%	2.45 [1.04, 5.74]
Waldo 2013	57	84	7	26	5.1%	5.73 [2.15, 15.27]
Werling 2007	19	28	10	57	4.7%	9.92 [3.48, 28.25]
Zanuttini 2012	33	48	21	45	5.9%	2.51 [1.08, 5.86]
Total (95% CI)		**1752**		**2048**	**100.0%**	**2.77 [2.06, 3.72]**
Total events	1031		632			

Heterogeneity: $Tau^2 = 0.20$; $Chi^2 = 43.27$, df = 14 ($P < 0.0001$); $I^2 = 68\%$

Test for overall effect: $Z = 6.79$ ($P < 0.00001$)

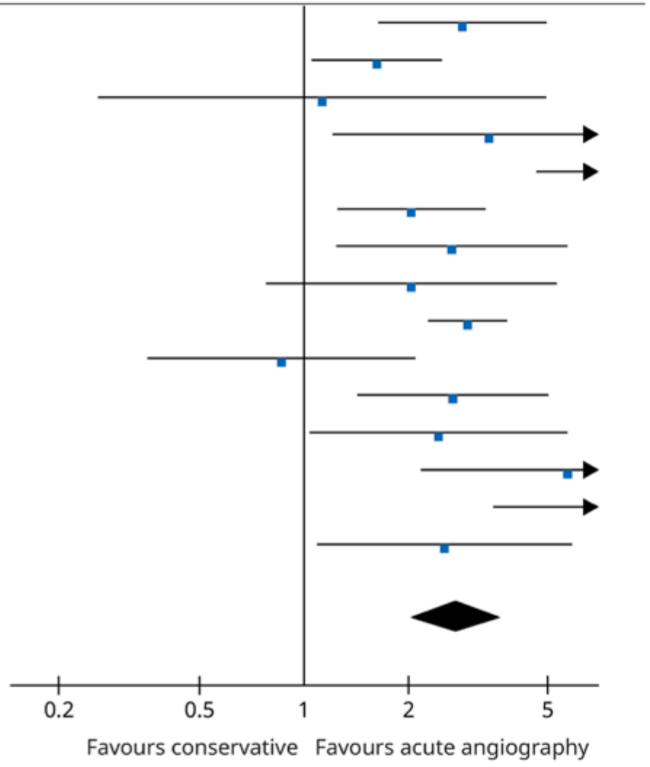
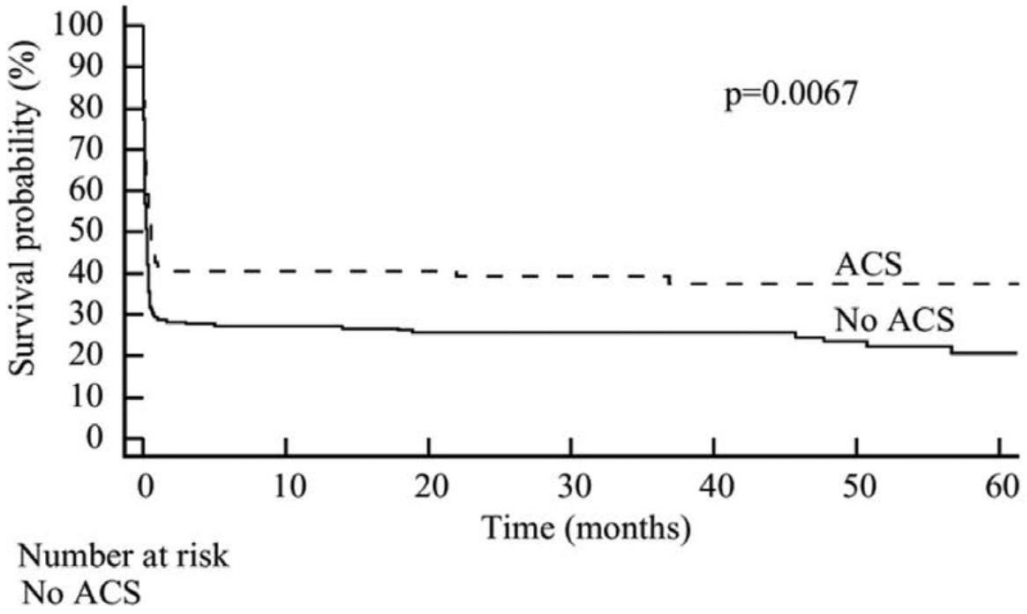
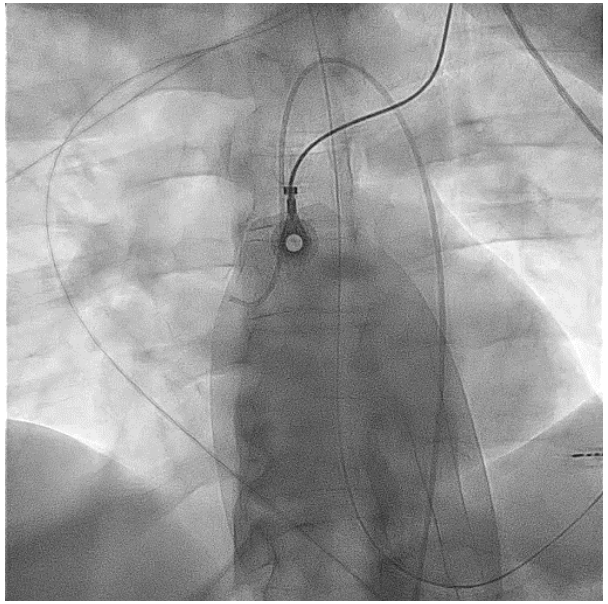
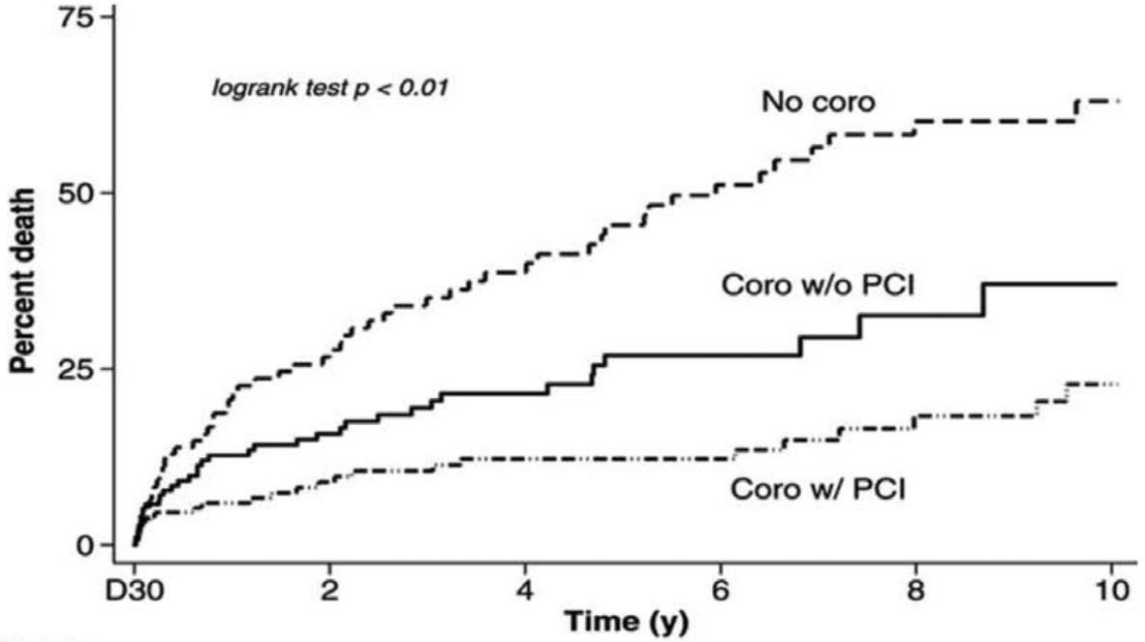


Figure 3. Meta-analysis of the effect of acute angiography after ventricular fibrillation/pulseless ventricular tachycardia cardiac arrest on survival.
df indicates degrees of freedom; and M-H, Mantel-Haenszel test. Reprinted from Camuglia et al[12] with permission from Elsevier. Copyright © 2014, Elsevier.

Yannopoulos D,et al; American Heart Association Emergency Cardiovascular Care Committee. Circulation. 2019 Mar 19;139(12):e530-e552.







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Keys to success

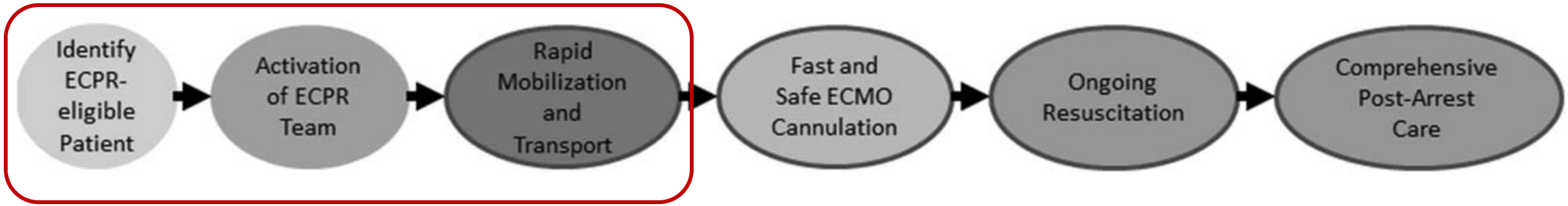
CURRENT OPINION

Refractory cardiac arrest: where extracorporeal cardiopulmonary resuscitation fits

Jason A. Bartos[a,b] *and Demetris Yannopoulos*[a,b]

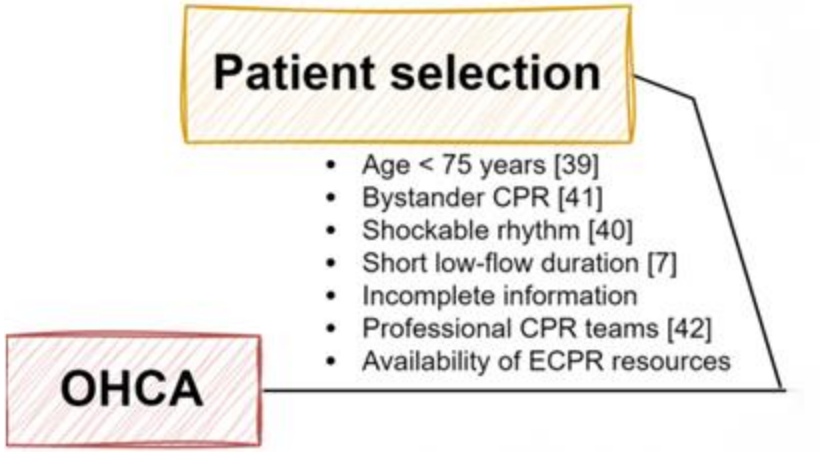
VA-ECMO is a component of an entire ECPR system comprised of EMS, cannulation teams, and the full spectrum of medical specialties and hospital services needed to care for this extremely complex patient population. Successful patient outcomes can only occur if all components of the system are in place.

Keys to success



Keys to success

Refractory CA: fail to achieve sustained ROSC after ***3 defibrillations + administration of 300 mg amiodarone*** (≈first 15 min).



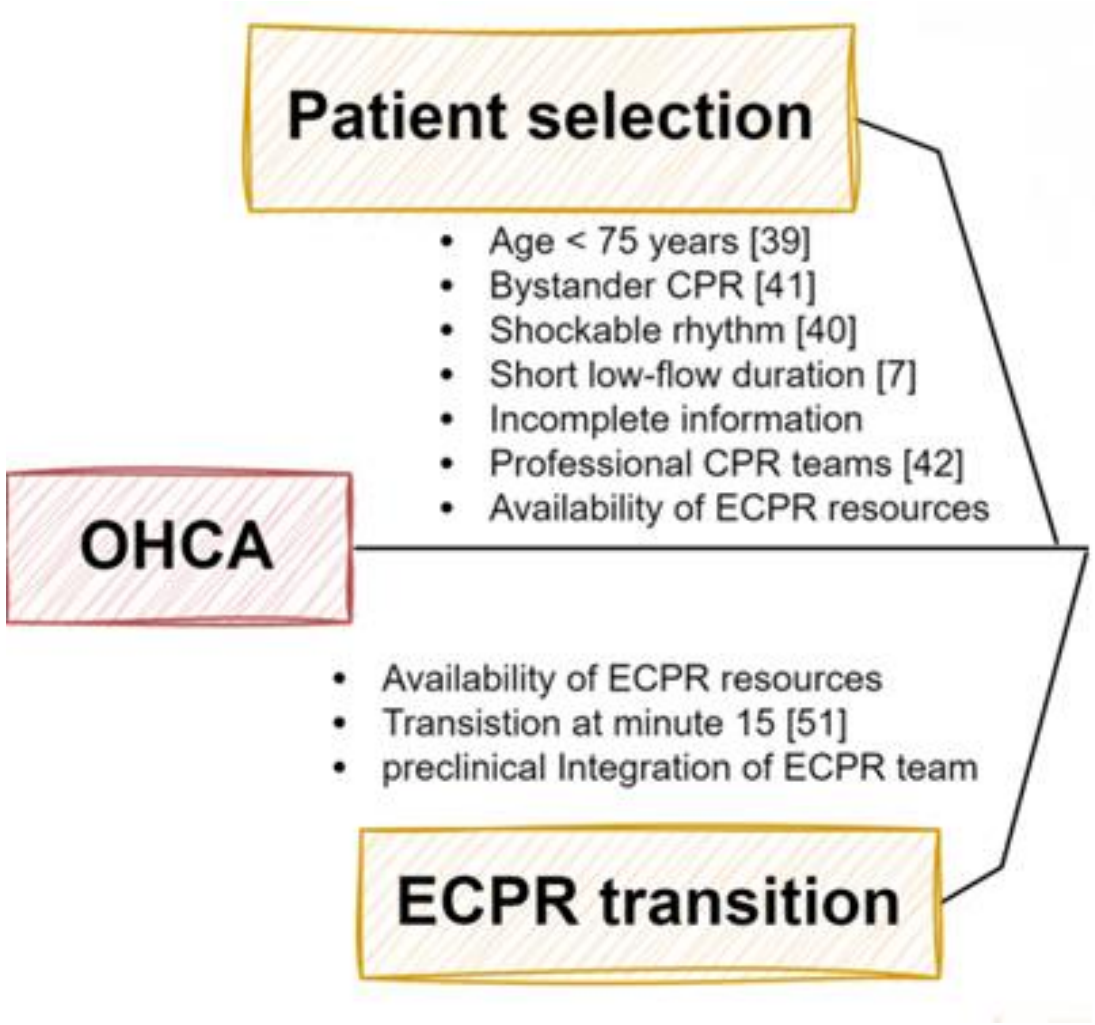
Wengenmayer, T., Tigges, E. & Staudacher, D.L. Extracorporeal cardiopulmonary resuscitation in 2023. ICMx 11, 74 (2023)

Identify eligible E-CPR patient

Table1 Potential ECPR inclusion criteria, as suggested by ELSO [11]

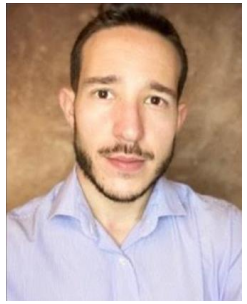
Go criteria for ECPR	
✓ Age < 70 years	≤65 years
✓ Witnessed cardiac arrest	
✓ Time from arrest to CCPR ("no-flow interval") < 5 min (i.e., bystander CPR)	
✓ Initial cardiac rhythm of ventricular fibrillation/pulseless ventricular tachycardia/~~pulseless electrical activity~~	Non traumatic CA
✓ Time from arrest to initiation of ECMO flow ("low-flow interval") < 60 min	Ideally arrival to cath lab <45 min
✓ End-tidal carbon dioxide ($ETCO_2$) > 10 mmHg (1.3 kPa) during CCPR prior to ECMO	
✓ Intermittent ROSC or recurrent ventricular fibrillation	
✓ Presence of "signs of life" during CCPR may predict survival	
✓ Absence of previously known life-limiting comorbidities (e.g., end-stage heart failure, chronic obstructive pulmonary disease, end-stage renal failure, liver failure, terminal illness) and alignment with the patient's care goals	
✓ No known significant aortic valve incompetence (> mild aortic valve incompetence should be ruled out)	

Keys to success



Wengenmayer, T., Tigges, E. & Staudacher, D.L. Extracorporeal cardiopulmonary resuscitation in 2023. ICMx 11, 74 (2023)

ECMO TEAM 24/7



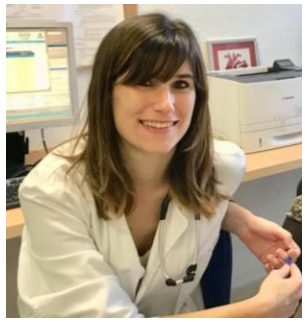
Dr. E. Arbas

Dr. J. Caro

Dr. S. Rosillo

Dr. C. Ugueto

Acute Cardiac Care



Dr. I. Ponz

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Dr. Alfonso Jurado Román

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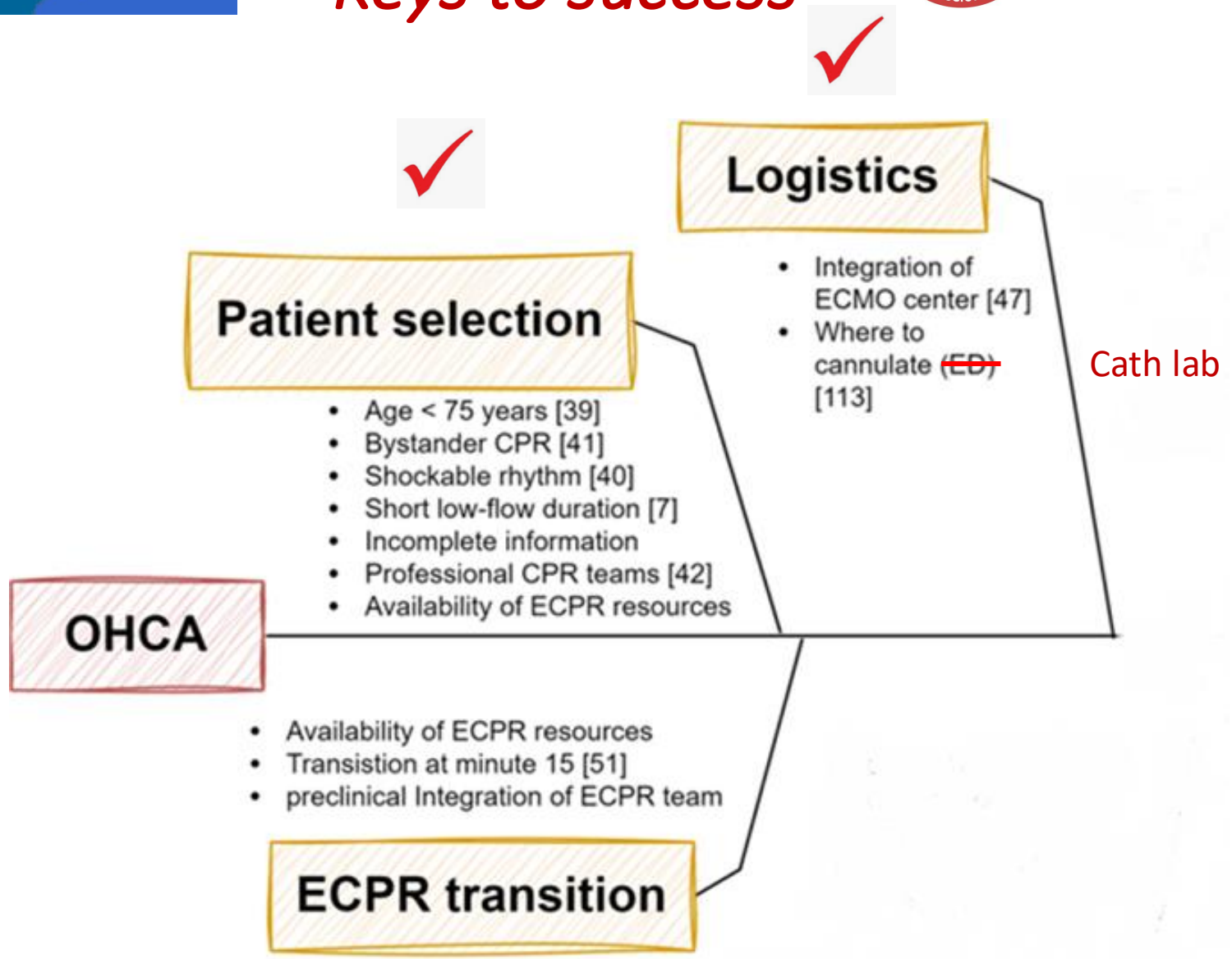
Dr. Daniel Tébar Márquez

Dr. Borja Rivero Santana

Keys to success



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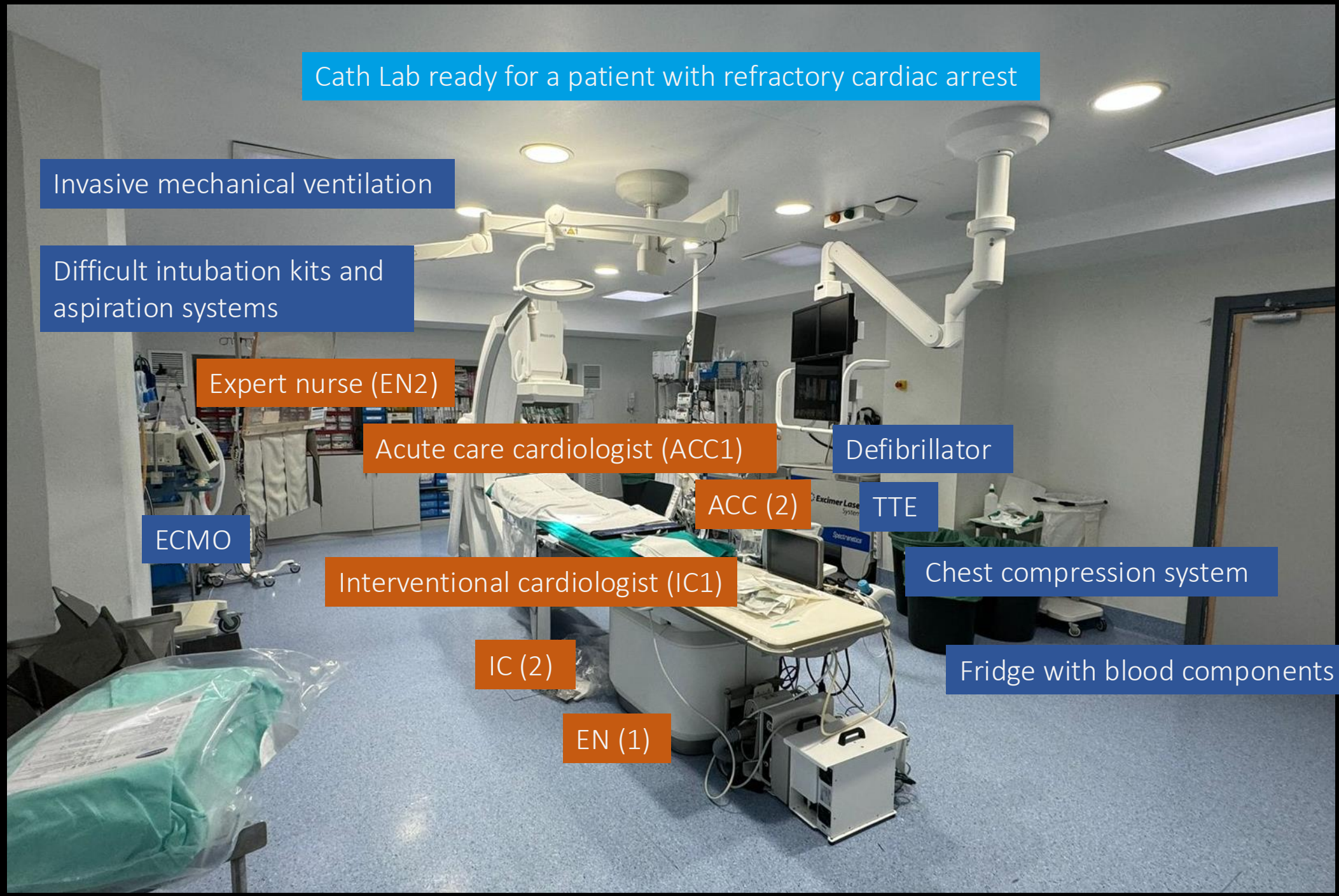

Cath Lab ready for a patient with refractory cardiac arrest
Invasive mechanical ventilation
Difficult intubation kits and aspiration systems
Expert nurse (EN2)
Acute care cardiologist (ACC1)
Defibrillator
ACC (2)
TTE
ECMO
Chest compression system
Interventional cardiologist (IC1)
IC (2)
Fridge with blood components
EN (1)

Reduce time

Logistics

- Integration of ECMO center [47]
- Where to cannulate (ED) [113]

Patient selection

- Age < 75 years [39]
- Bystander CPR [41]
- Shockable rhythm [40]
- Short low-flow duration [7]
- Incomplete information
- Professional CPR teams [42]
- Availability of ECPR resources

OHCA

ECPR transition

- Availability of ECPR resources
- Transistion at minute 15 [51]
- preclinical Integration of ECPR team

60 min

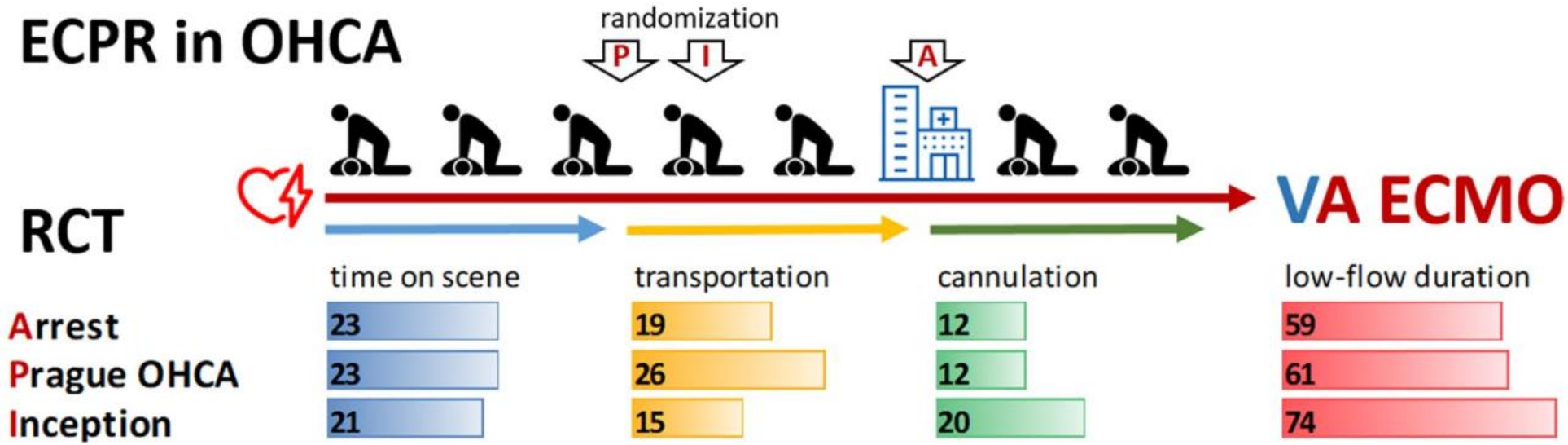
< 15 min

Wengenmayer, et al. Extracorporeal cardiopulmonary resuscitation in 2023. ICMx 11, 74 (2023)

Reduce time

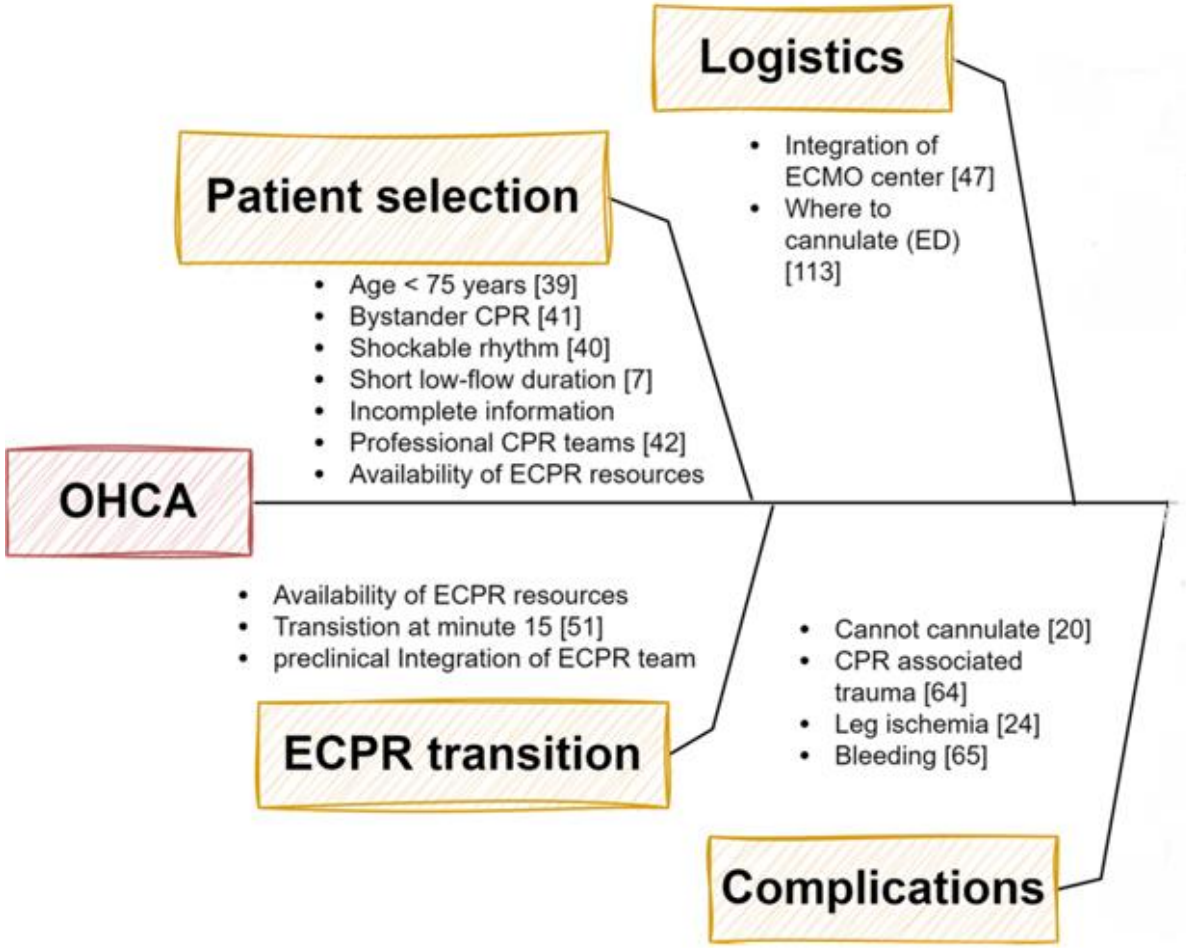
	2022	2023	2024*
Canulation times (min)	18 [12 – 25]	10 [6 – 14]	15 [11 – 17]

*Includes patients until August 1st, 2024
Continuous variables are described as medians and interquartile range



Wengenmayer, T., Tigges, E. & Staudacher, D.L. Extracorporeal cardiopulmonary resuscitation in 2023. ICMx 11, 74 (2023)

Reduce access site complications



- Bilateral femoral cannulation
  Echo/micropuncture guided
  0% failure cannulation

- Small size 15F/21F, Low Flow

- Initially ***without distal perfusion*** cannula
  First 6 hours ACCU (NA, A)
  Echo guided

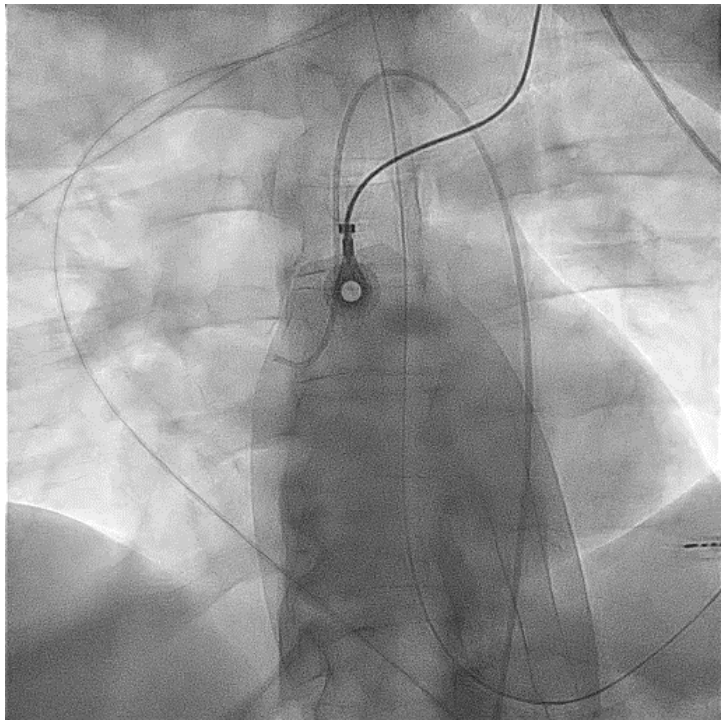
Wengenmayer, et al. Extracorporeal cardiopulmonary resuscitation in 2023. ICMx 11, 74 (2023)

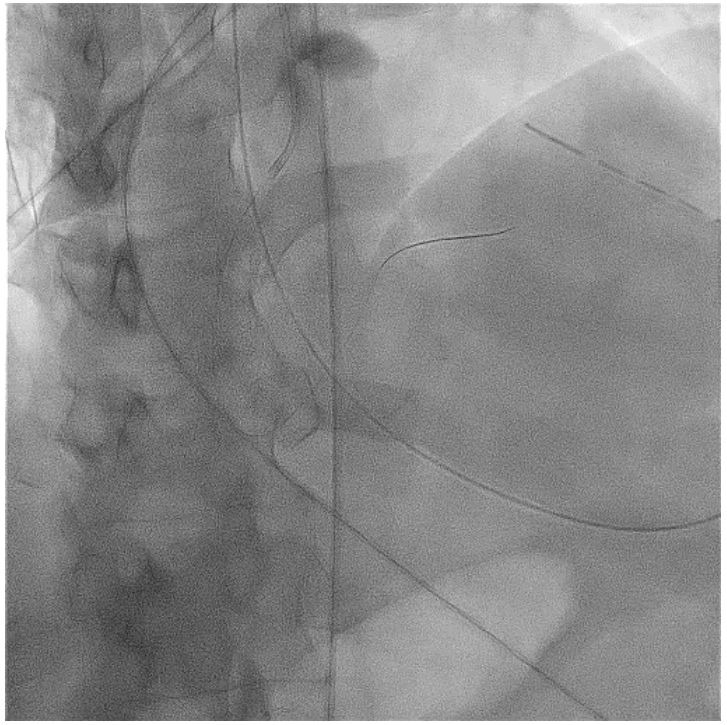
Reduce access site complications

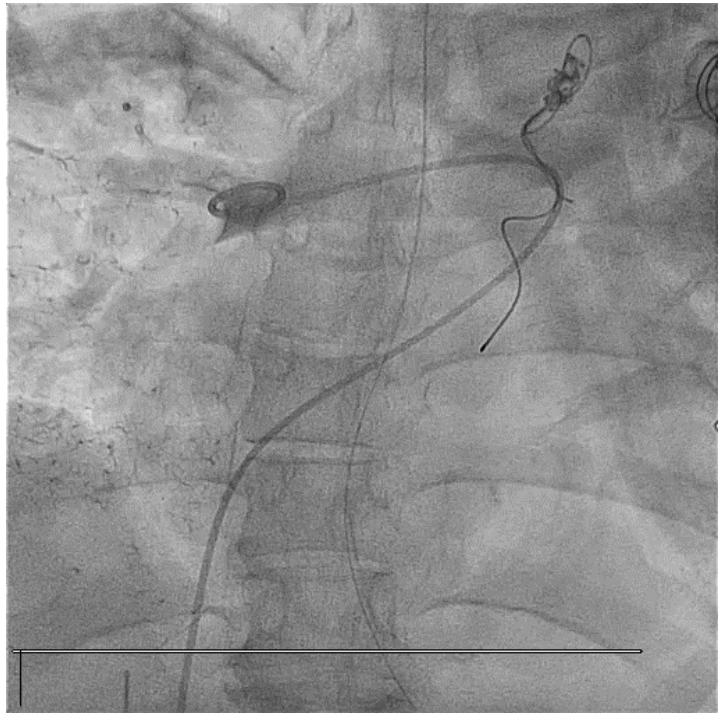
	2022	2023	2024*
Arterial Canula			
15F	4 (100%)	5 (71,4%)	6 (100%)
17F	0	2 (28,6%)	0
Venous canula			
21F	4 (100%)	7 (100%)	6 (100%)
Ischemia	0	1 (14,3%)	1 (16,7%)
Distal perfusion	-	0	1 (16,7%)
Surgery	-	1** (14,3%)	0

*Includes patients until August 1st, 2024
Continuous variables are described as medians and interquartile range

Inmediate invasive approach



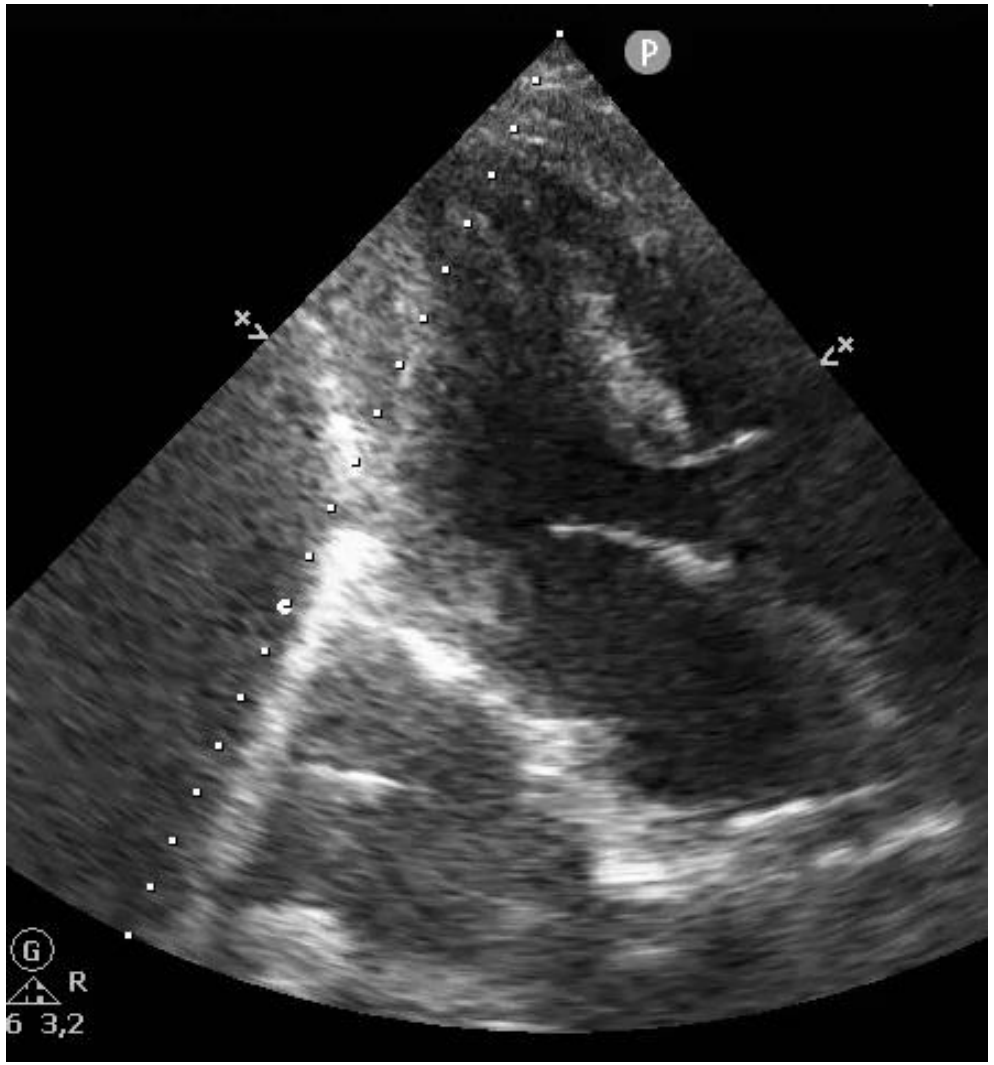




Suspected FM= early EMB

Huang F, et al. Eur Heart J. 2023 Dec 21;44(48):5110-5124

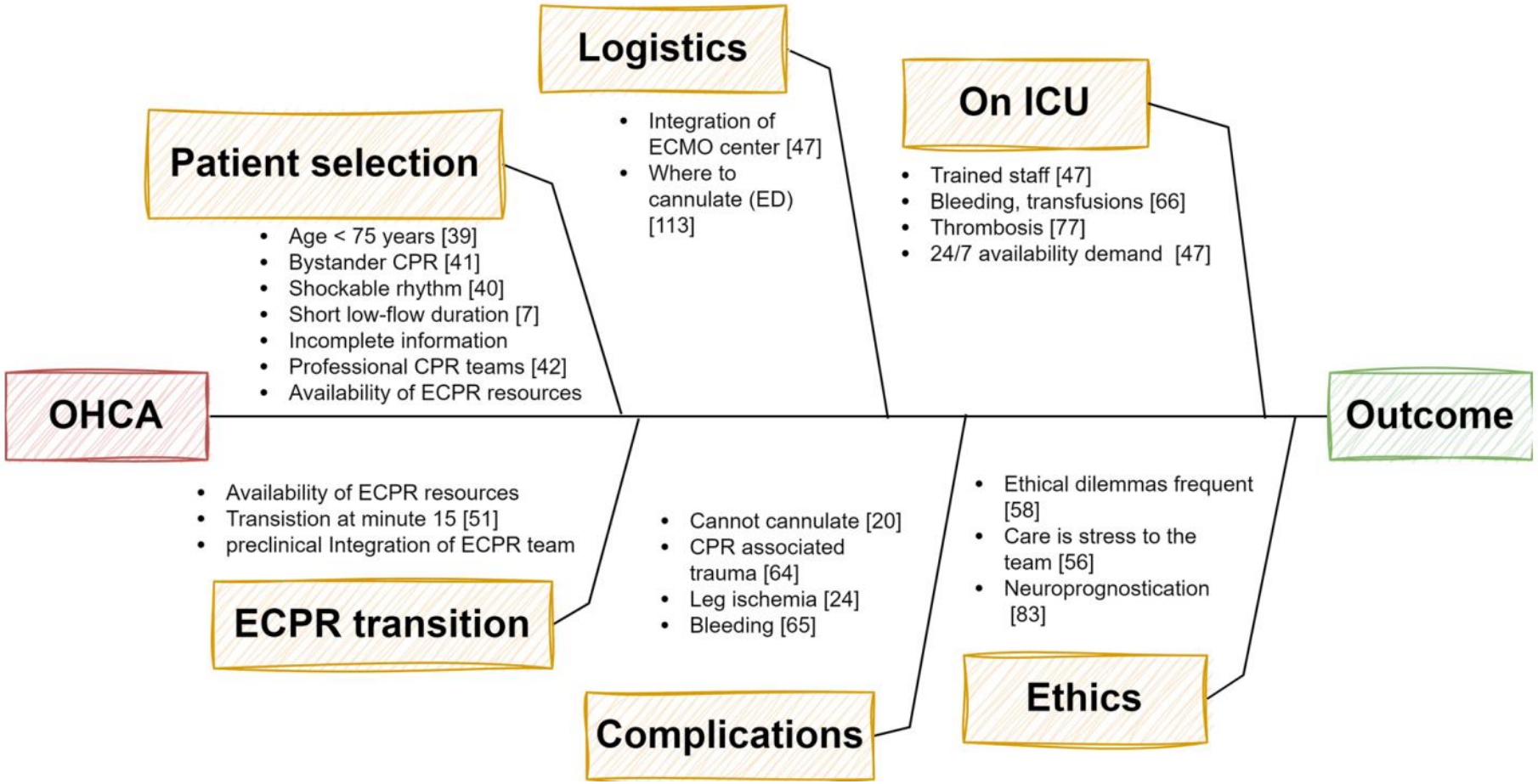
Unloading LV



- Echo before leaving cath lab
- Echo close monitoring first 6-24 hrs ACCU
  - IABP
  - Impella CP® (0%)

	2022	2023	2024
IABP	0	4 (57,1%)	1 (16,7%)

Keys to success



Wengenmayer, T., Tigges, E. & Staudacher, D.L. Extracorporeal cardiopulmonary resuscitation in 2023. ICMx 11, 74 (2023)

Post-resuscitation care

ECMO safety check-list

- Battery, Bubbles, alarms, etc
- O2 and gas supply
- Cannula markers
- Invasive arterial monitoring (right radial)

Post-resuscitation care

Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Clinical paper

ECMO Cardio-Pulmonary Resuscitation (ECPR), trends in survival from an international multicentre cohort study over 12-years☆

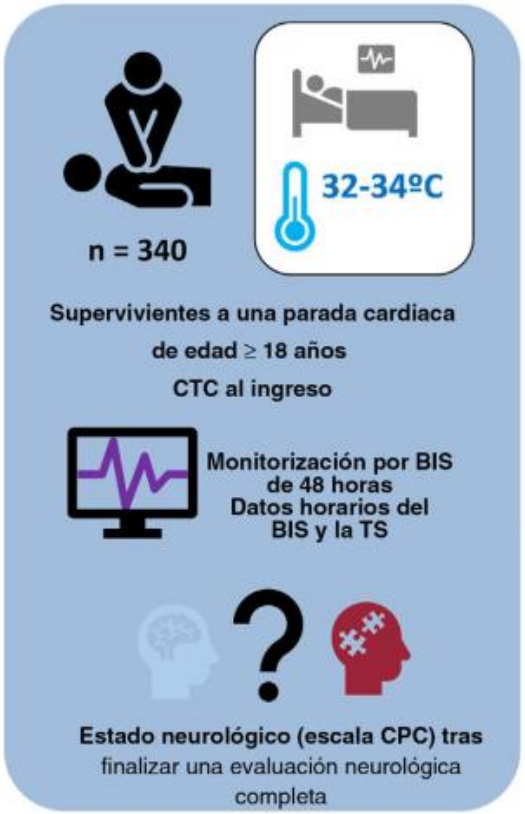
Alexander (Sacha) C. Richardson[a,*], Matthieu Schmidt[b], Michael Bailey[c], Vincent A. Pellegrino[a], Peter T. Rycus[d], David V. Pilcher[a]

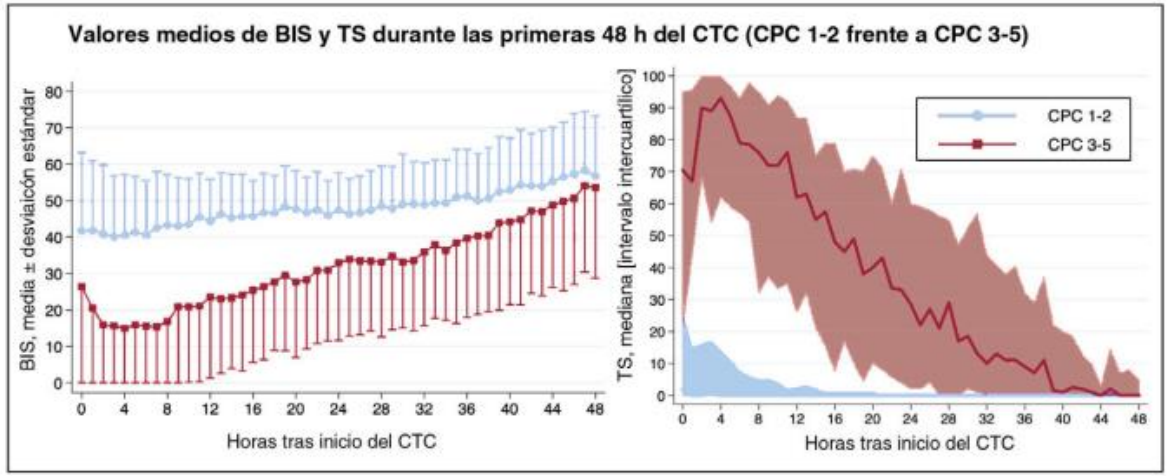
(n)	Cohort 1 2003–2006 166	Cohort 2 2007–2010 392	Cohort 3 2011–2014 1238	p Value
Acute renal failure	35 (21.1%)	83 (21.4%)	121 (10.8%)	<0.0001
Mechanical device problem	16 (10.3%)	25 (7%)	107 (10.7%)	0.12

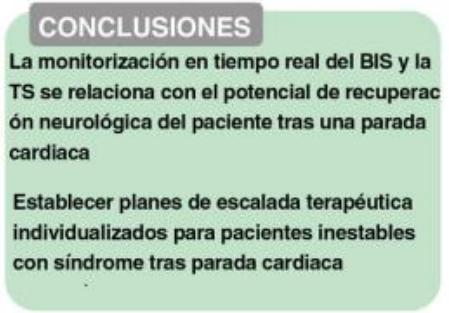
Comparison of ECPR survivors to non-survivors.

n (%)	Survivors 520 (28.9%)	Non-survivors 1276 (71.1%)	p Value
Mechanical device problem	20 (5%)	128 (12%)	<0.0001

Post-resuscitation care







Individual dosing of sedatives

- Hourly registration
- Experienced nurse
- Reduces complications
- Reduces days on MV
- Neurological prognostication

Arbas/Rosillo Rev Esp Cardiol (Engl Ed). 2022 Dec;75(12):992-1000.

Post-resuscitation care

Table 1 Univariate and multivariable comparisons of patients who underwent ECPR with or without TTM groups

Variables	ECPR with TTM ($n=471$)	ECPR without TTM ($n=506$)	Univariate *P* value	Multivariable *P* value	OR (95% CI)
Age (years)	57 (47–67)	62 (49–71)	**<0.001**	**0.001**	0.984 (0.975–0.993)
Male (%)	403 (86%)	425 (84%)	0.533	0.626	0.911 (0.626–1.325)
BCPR (%)	240 (51%)	234 (46%)	0.159	0.853	1.026 (0.786–1.338)
SR (%)	327 (69%)	319 (63%)	**0.036**	0.803	1.038 (0.777–1.386)
ICPS (min)	51 (42–62)	56 (46–69)	**<0.001**	0.685	1.000 (0.999–1.001)
Cardiogenic cause	442 (94%)	422 (83%)	**<0.001**	**<0.001**	2.927 (1.818–4.710)
CPC 1–2 (%)	75 (16%)	50 (10%)	**0.005**	**0.025**	1.570 (1.058–2.330)
TMPS (%)	189 (42%)				
ICTT (min)	249 (105–400)				
TT (°C)					
32	6 (1%)				
33	18 (4%)				
34	302 (65%)				
35	51 (11%)				
36	86 (19%)				
ITM (h)	43 (26–50)				

Sakurai T. J Intensive Care. 2022 Jun 17;10(1):30

Post-resuscitation care

Table 2 Univariate and multivariable comparisons of cases with favorable and unfavorable neurological outcomes

Variables	Favorable outcomes (CPC 1–2; $n = 125$)	Unfavorable outcomes (CPC 3–5; $n = 852$)	Univariate *P* value	Multivariable *P* value	OR (95% CI)
Age (years)	54 (45–65)	60 (49–70)	**< 0.001**	**0.001**	0.978 (0.965–0.991)
Male (%)	102 (82%)	726 (85%)	0.288	0.215	0.723 (0.432–1.208)
BCPR (%)	62 (50%)	412 (48%)	0.848	0.541	0.885 (0.597–1.311)
SR (%)	96 (77%)	550 (65%)	**0.006**	**0.013**	1.828 (1.138–2.937)
ICPS (min)	46 (36–56)	55 (45–66)	**< 0.001**	0.946	1.000 (0.998–1.002)
Cardiogenic cause (%)	113 (90%)	751 (88%)	0.550	0.836	0.928 (0.460–1.873)
TTM (%)	75 (60%)	396 (46%)	**0.005**	**0.021**	1.588 (1.072–2.354)

Sakurai T. J Intensive Care. 2022 Jun 17;10(1):30

Post-resuscitation care

Hypothermia in Acute Coronary Syndrome

Diego Penela MD, Marta Magaldi MD, Jaume Fontanals MD, PhD, Victoria Martin MD, PhD, Ander Regueiro MD, José Tomas Ortiz MD, PhD, Xavier Bosch MD, PhD, Manel Sabaté MD, PhD y Magda Heras MD, PhD

JACC (Journal of the American College of Cardiology), 2013-02-12, Volumen 61, Número 6, Páginas 686-687, Copyright © 2013 American College of Cardiology Foundation

>30%

Is Therapeutic Hypothermia a Risk Factor for Stent Thrombosis?

Sandra O. Rosillo MD, Esteban Lopez-de-Sa MD, Angel M. Iniesta MD, Fernando de Torres MD, Susana del Prado MD, Juan R. Rey MD, PhD, Eduardo Armada MD, PhD, Raúl Moreno MD, PhD y José L. López-Sendón MD, PhD

JACC (Journal of the American College of Cardiology), 2014-03-11, Volumen 63, Número 9, Páginas 939-940, Copyright © 2014 American College of Cardiology Foundation

2,7%

Post-resuscitation care

Immediate Platelet Inhibition Strategy for Comatose Out-of-Hospital Cardiac Arrest Survivors Undergoing Percutaneous Coronary Intervention and Mild Therapeutic Hypothermia

Peter Kordis [1,2], Jernej Berden [1,2], Ursa Mikuz [1,2] and Marko Noc [1,2,*]

Safe
No drug interaction ticagrelor

E-CPR 0%

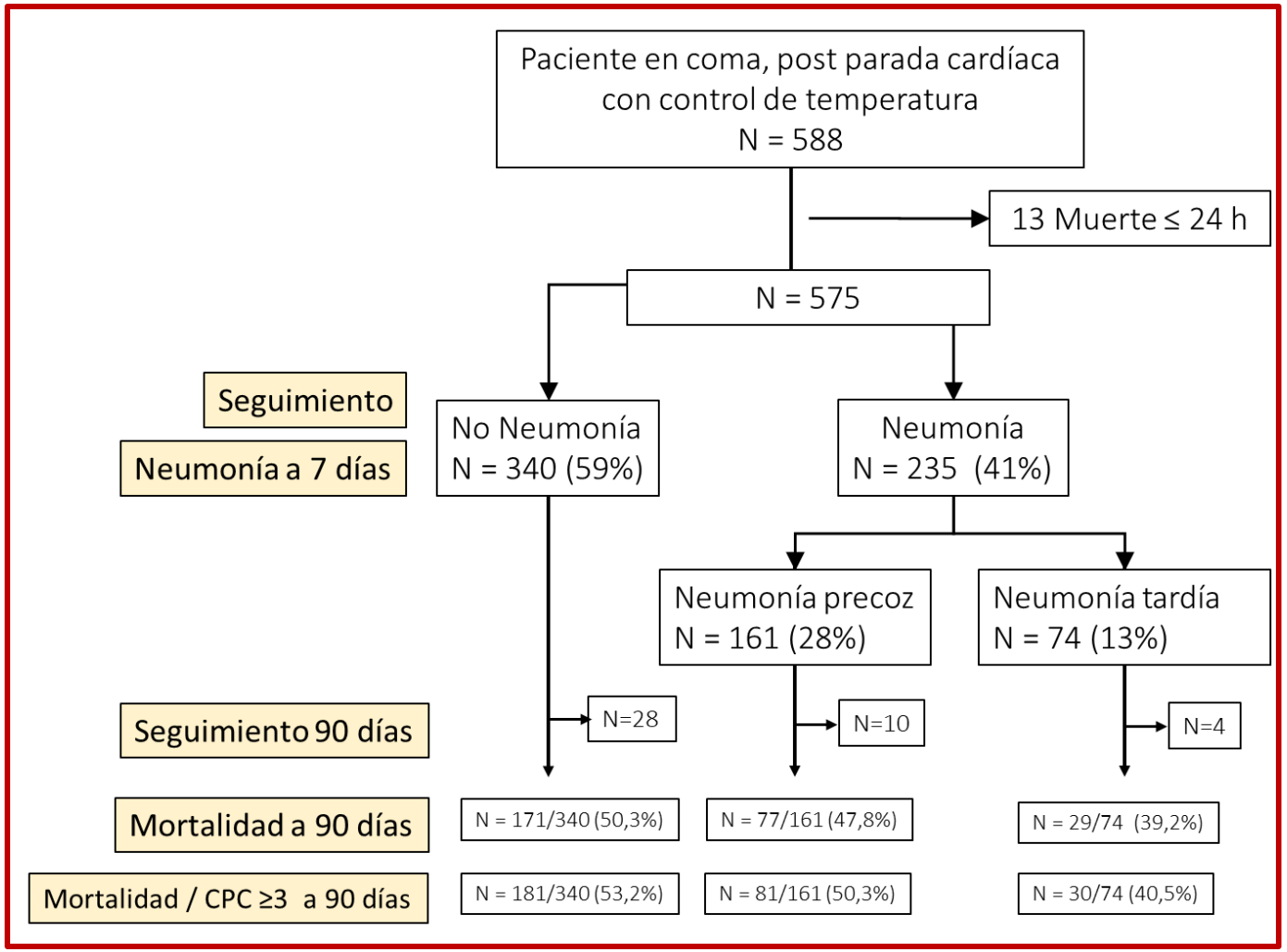
Ticagrelor Crushed Tablets Administration in STEMI Patients

Guido Parodi MD, PhD, Ioanna Xanthopoulou MD, Benedetta Bellandi MD, Vassilios Gkizas MD, Renato Valenti MD, Stavros Karanikas MD, Angela Migliorini MD, Christos Angelidis MD, Rosanna Abbate MD, Sotirios Patsilinakos MD, Giorgio J. Baldereschi MD, Rossella Marcucci MD, PhD, Gian Franco Gensini MD, David Antoniucci MD y Dimitrios Alexopoulos MD

Pre-hospital treatment with crushed versus integral tablets of prasugrel in patients presenting with ST-Segment Elevation Myocardial Infarction-1-year follow-up results of the COMPARE CRUSH trial

Rosanne F Vogel [1], Ronak Delewi [2], Jeroen M Wilschut [3], Miguel E Lemmert [4], Roberto Diletti [3], Ria van Vliet [5], Nancy W P L van der Waarden [6], Rutger-Jan Nuis [3], Valeria Paradies [5], Dimitrios Alexopoulos [7], Felix Zijlstra [3], Gilles Montalescot [8], Dominick J Angiolillo [9], Mitchell W Krucoff [10], Pieter C Smits [5], Nicolas M Van Mieghem [3], Georgios J Vlachojannis [11]

Post-resuscitation care



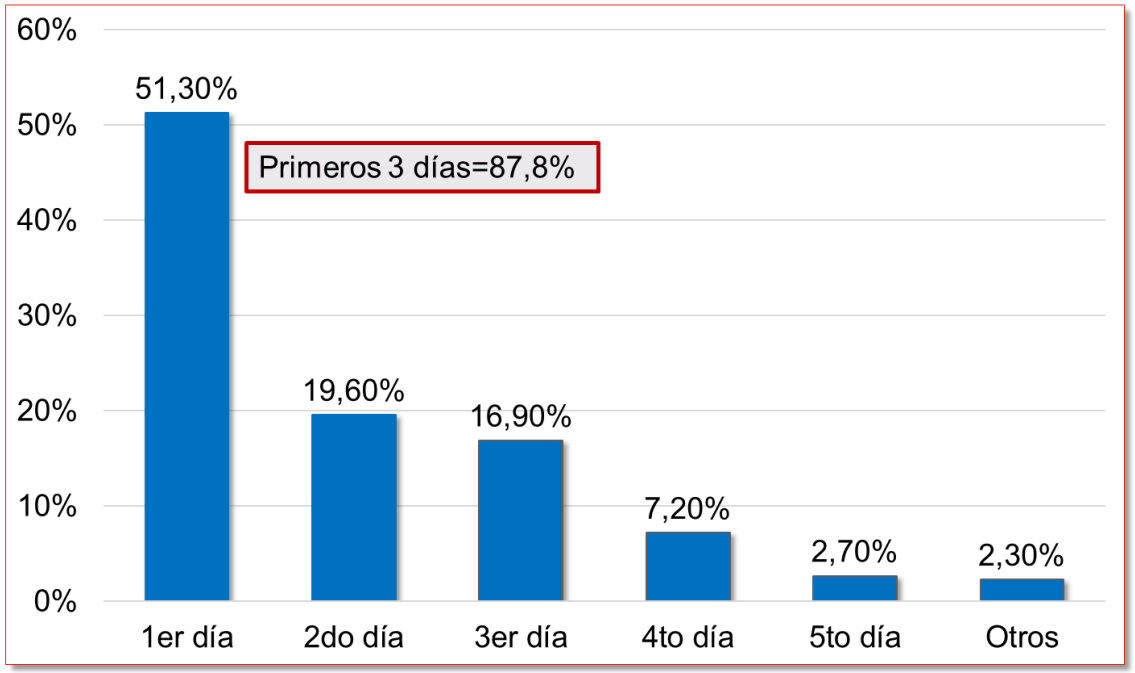
Infectious complications

- *S.aureus* status carriage screening
- Cultures at admission and upon clinical suspicion

Post-resuscitation care

Empleo de antibióticos

Porcentaje de prescripción de antibióticos de acuerdo con el día de ingreso

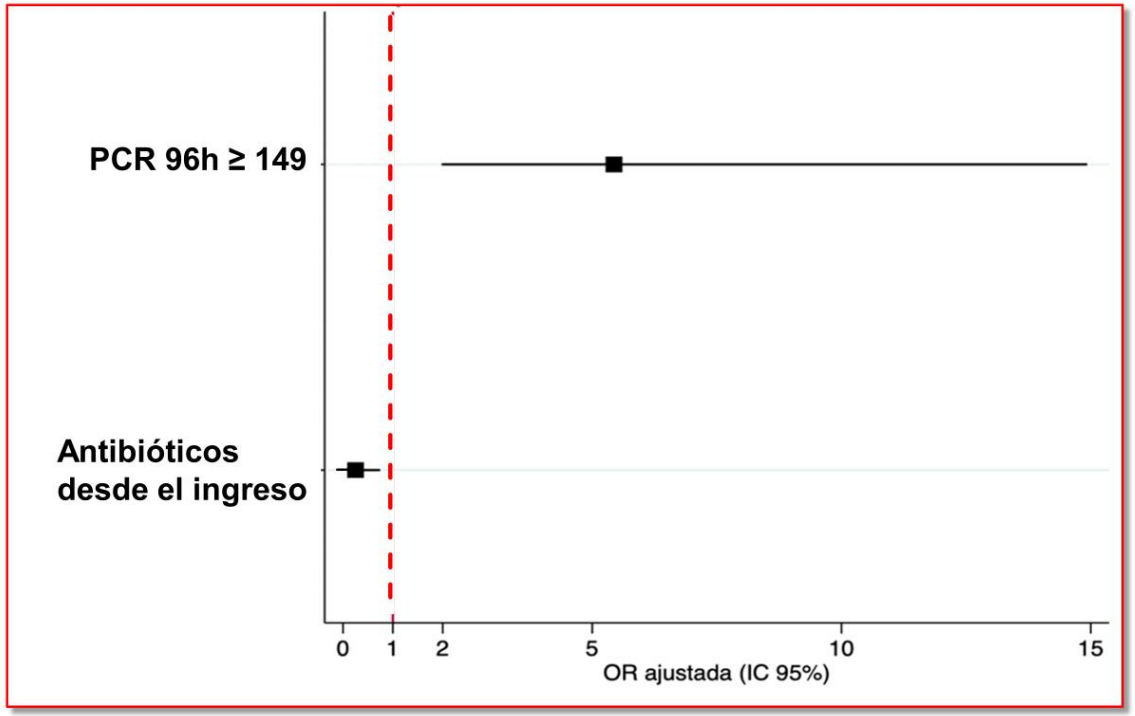


Infectious complications

1° Amoxiciline clavulanate >50%

2° Piperacilin-tazobactam 20%

Factores predictores de neumonía tardía

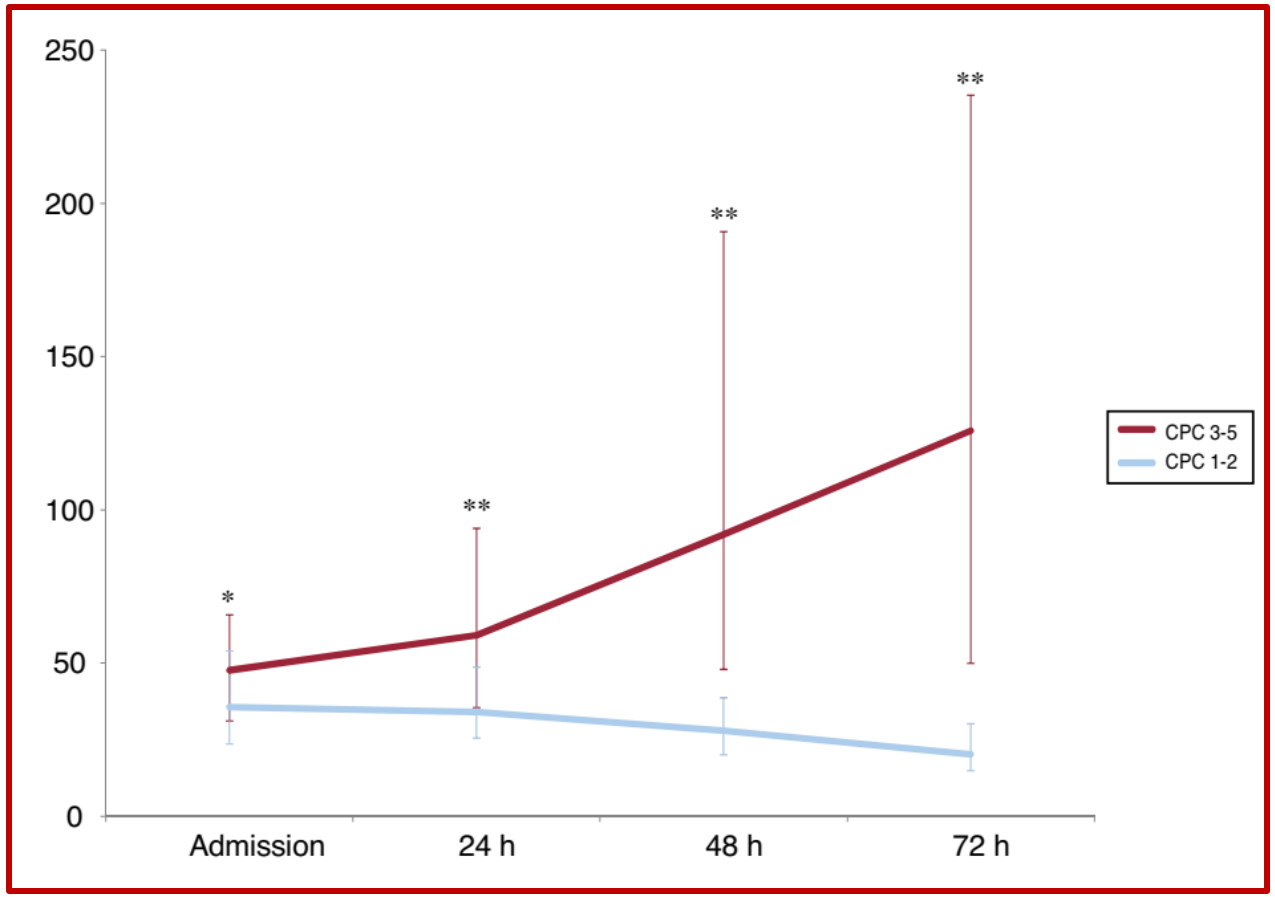


Rosillo. Neumonía de inicio precoz y tardío en pacientes con PCR y TTM. Factores relacionados con el riesgo y el pronóstico. Oct 2023.

Post-resuscitation care

Multimodal neurological prognostication

- Clinical
- Electroencephalogram (x2)
- Biomarkers: serial neuron-specific enolase levels
- Imaging



Martínez-Losas P. Rev Esp Cardiol (Engl Ed). 2020 Feb;73(2):123-130

Post-resuscitation care

Contents lists available at ScienceDirect

Resuscitation

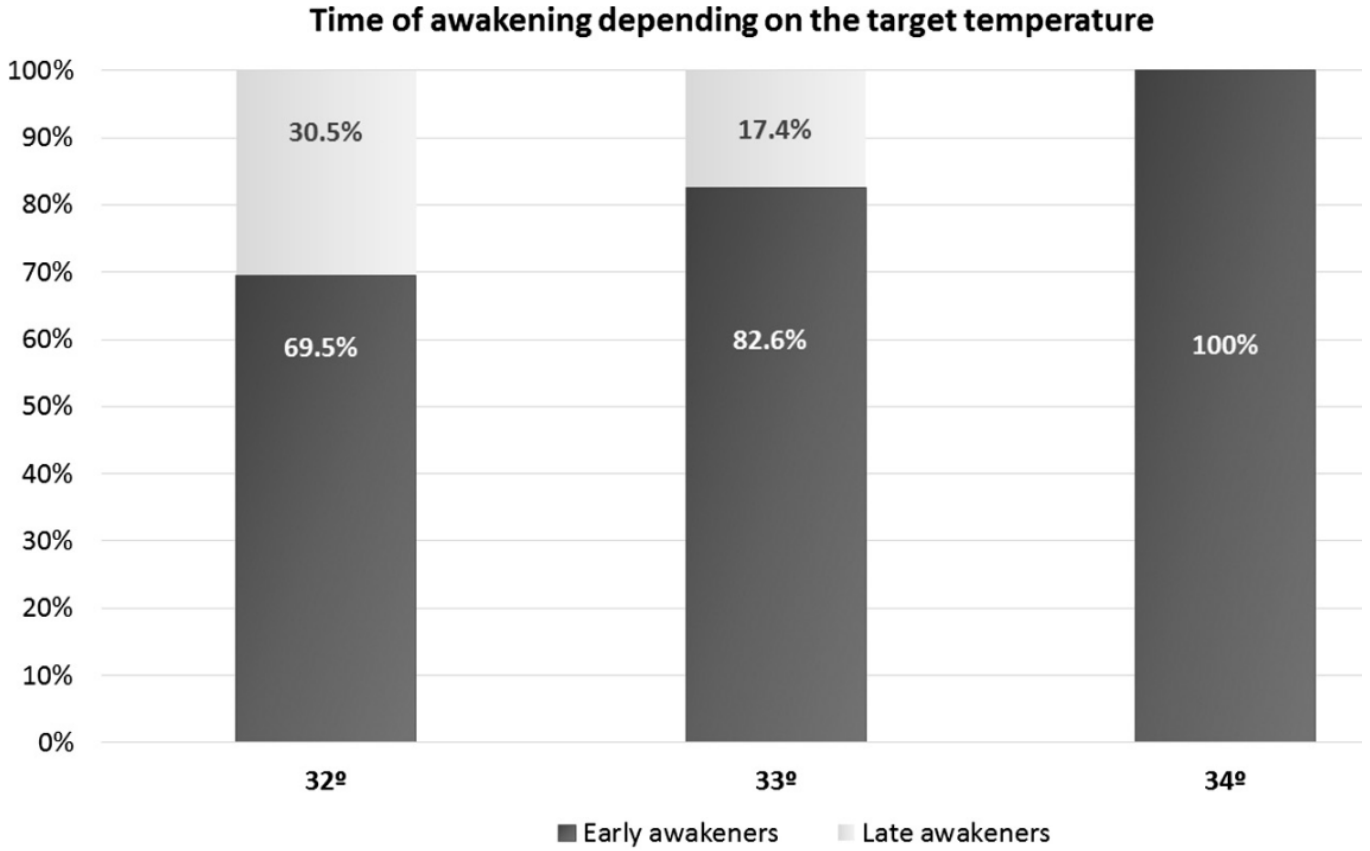
journal homepage: www.elsevier.com/locate/resuscitation

Clinical paper

Influence of the temperature on the moment of awakening in patients treated with therapeutic hypothermia after cardiac arrest☆

Ines Ponz*, Esteban Lopez-de-Sa, Eduardo Armada, Juan Caro, Zorba Blazquez, Sandra Rosillo, Oscar Gonzalez, Juan Ramon Rey, Maria del Carmen Monedero, Jose Luis Lopez-Sendon

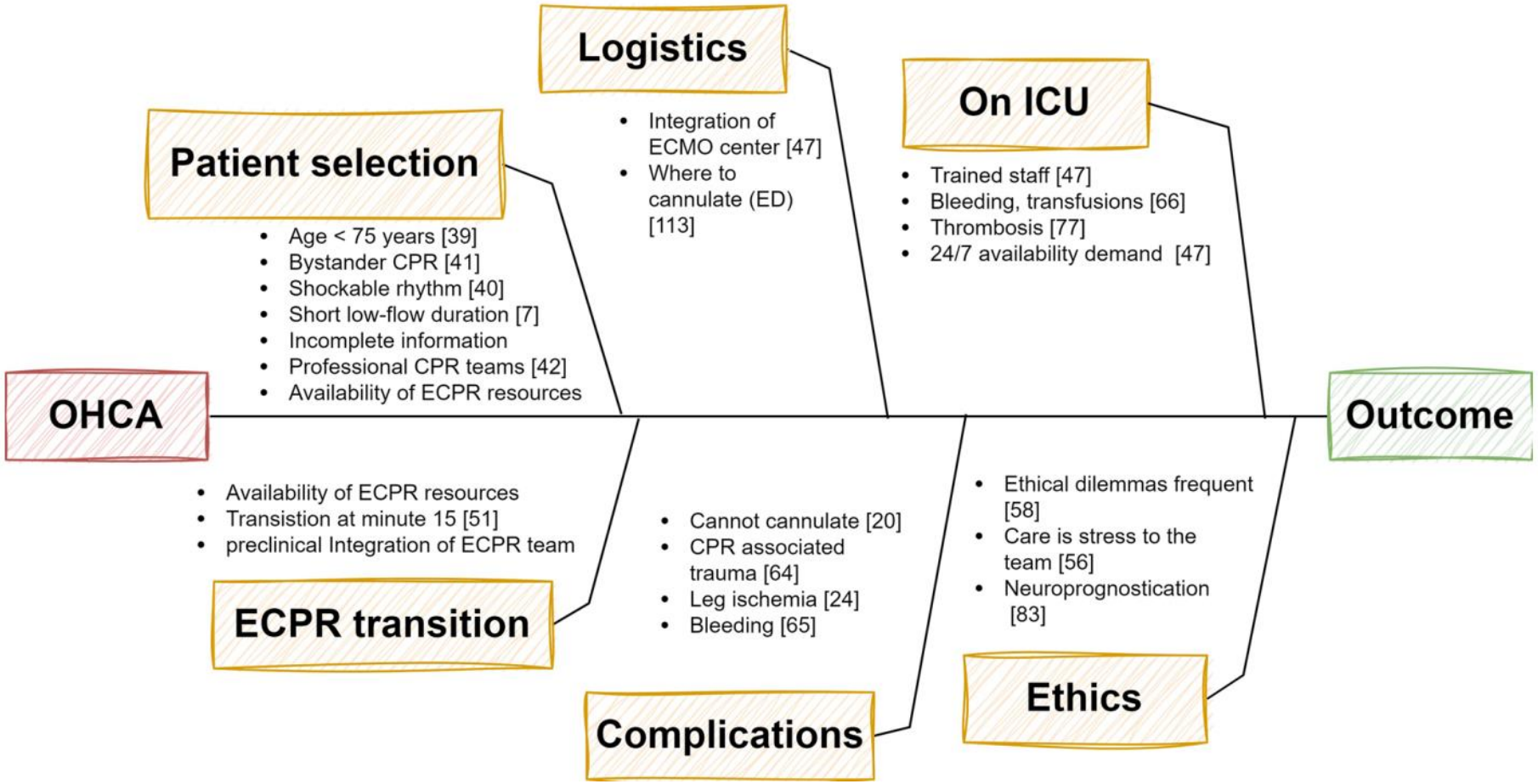
Department of Cardiology, Hospital Universitario La Paz, Madrid, Spain



Multimodal neurological prognostication

- WLST never <72 hours
- Late awakening 5 days

Keys to success



Wengenmayer, T., Tigges, E. & Staudacher, D.L. Extracorporeal cardiopulmonary resuscitation in 2023. ICMx 11, 74 (2023)

Outcomes

	2022	2023	2024*
E-CPR	9	13	11
OHCA	4 (44,4%)	7 (53,9%)	6 (54,6%)
IHCA	5 (55,6%)	6 (46,1%)	5 (45,4%)
Survival CPC 1-2	3 (33,3%)	6 (46.2%)	5 (45,5%)
OHCA	1 (25,0%)	4 (57,1%)	2 (33,3%)
IHCA	2 (40,0%)	2 (33,3%)	3 (60,0%)
Organ donations	1 (11,1%)	1 (7,7%)	4 (36,3%)
OHCA	1 (25,0%)	0	3 (50,0%)
IHCA	0	1 (16,7%)	1 (20,0%)

*Includes patients until August 1st, 2024
Continuous variables are described as medians and interquartile range

First author	Citation	Setting	Cannulation site	Patients in ECPR group	Hospital survival in ECPR	CPC 1–2 (6 months) in ECPR
Yannopoulos et al. 2020	[30]	OHCA	Hospital	15 (vs. 15)	43% (vs. 7%)	40% (vs. 0%)
Hsu et al. 2021	[108]	OHCA	Hospital	12 (vs. 3)	0% (vs. 33%)	0% (vs 0%)
Behlolavek et al. 2022	[29]	OHCA	Hospital	124 (vs. 132)	32% (vs. 23%)	32% (vs. 23%)
Suverein et al. 2023	[12]	OHCA	Hospital	70 (vs. 64)	20% (vs. 20%)	20% (vs. 16%)

Wengenmayer, T., Tigges, E. & Staudacher, D.L. Extracorporeal cardiopulmonary resuscitation in 2023. ICMx 11, 74 (2023)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Thank you