EL TURNO ESTA TRANQUI!!!!

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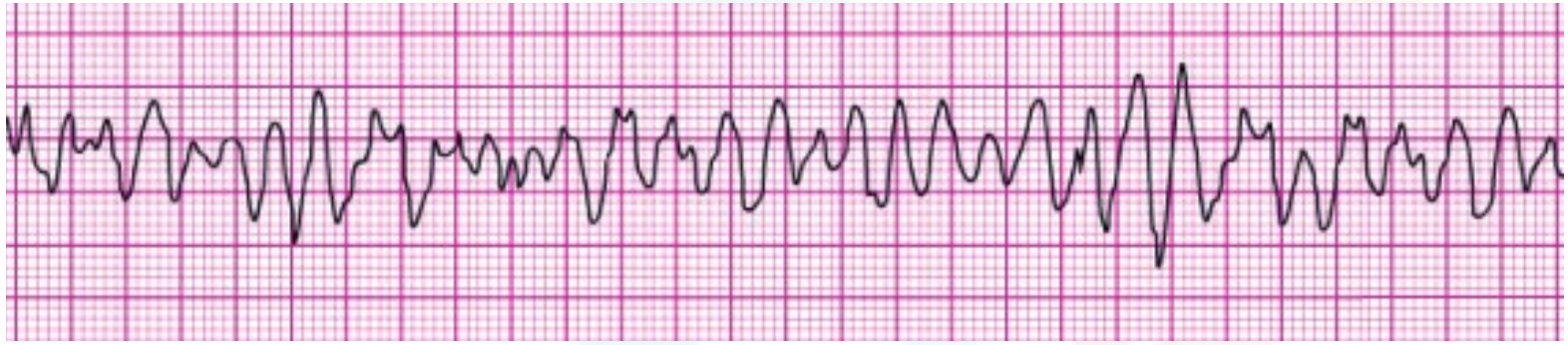
EL TURNO YA NO ESTA TRANQUI!!!

CODIGO AZUL



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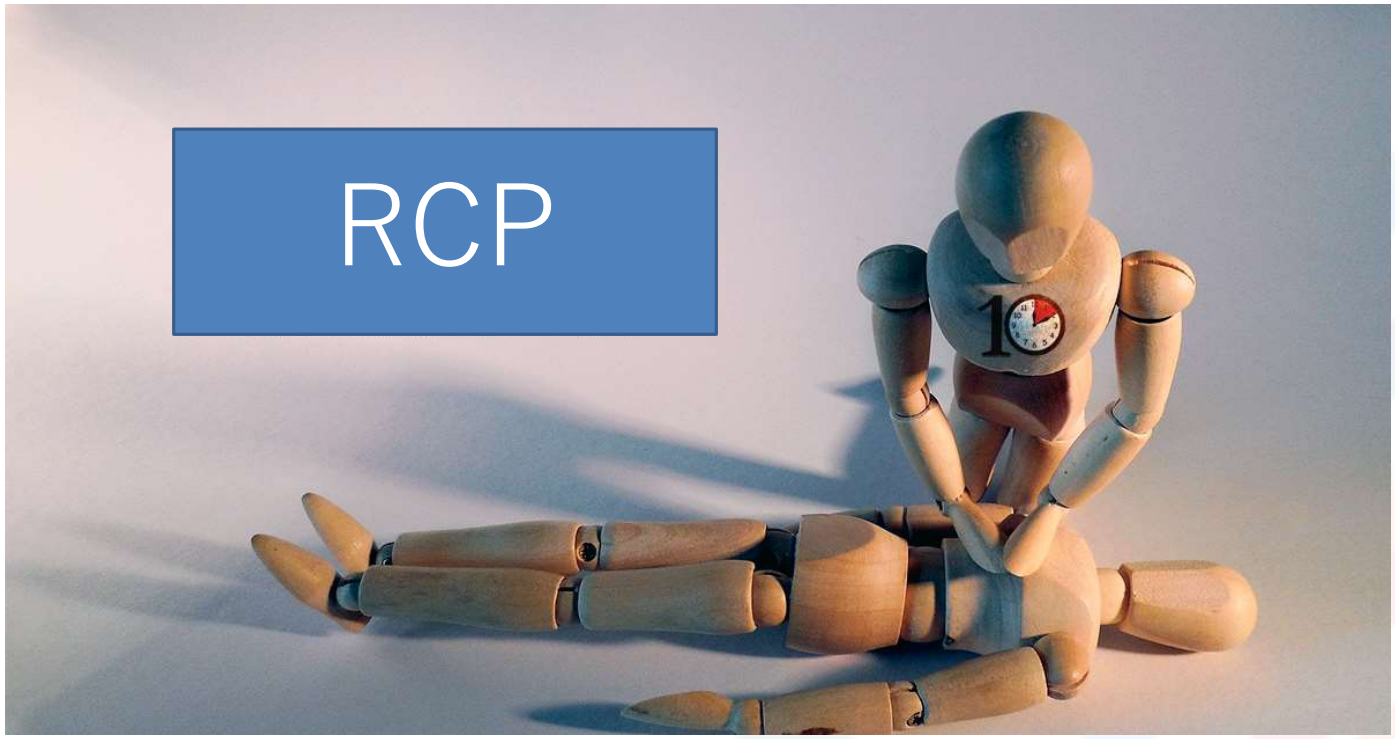

“A Journey of a thousand miles begins with a single step”
-Laozi, Daoist philosopher

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ECPR

DAFNA GARCIA
INTENSIVISTA U LA SABANA
FELLOWSHIP ECMO Y VAD
TTT ELSO

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SIN CONFLICTOS DE INTERES

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PROBLEMA

- 350000/ año OHCA
- **Sobrevida** en condición neurológica óptima **8.4%**
- IHCA Sobrevida Depende

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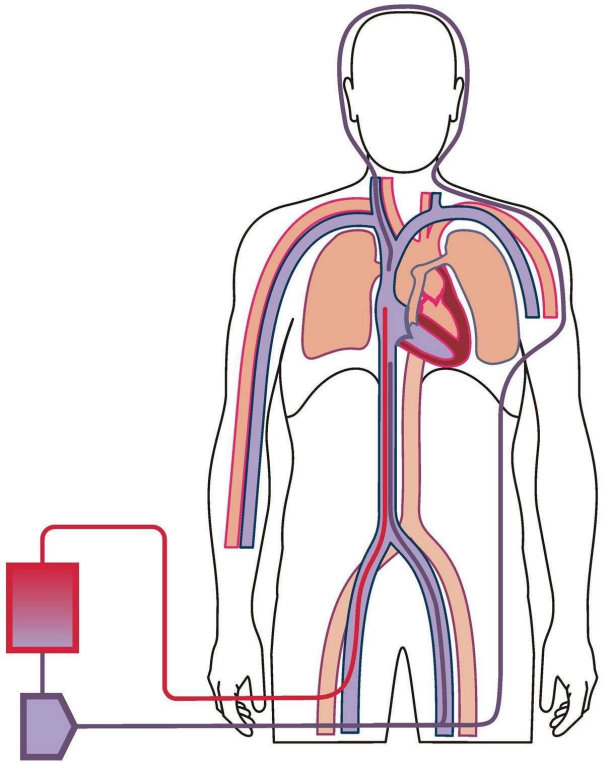

RECMO
ECPR

2019: > 8000 Casos

Sobrevida 29%

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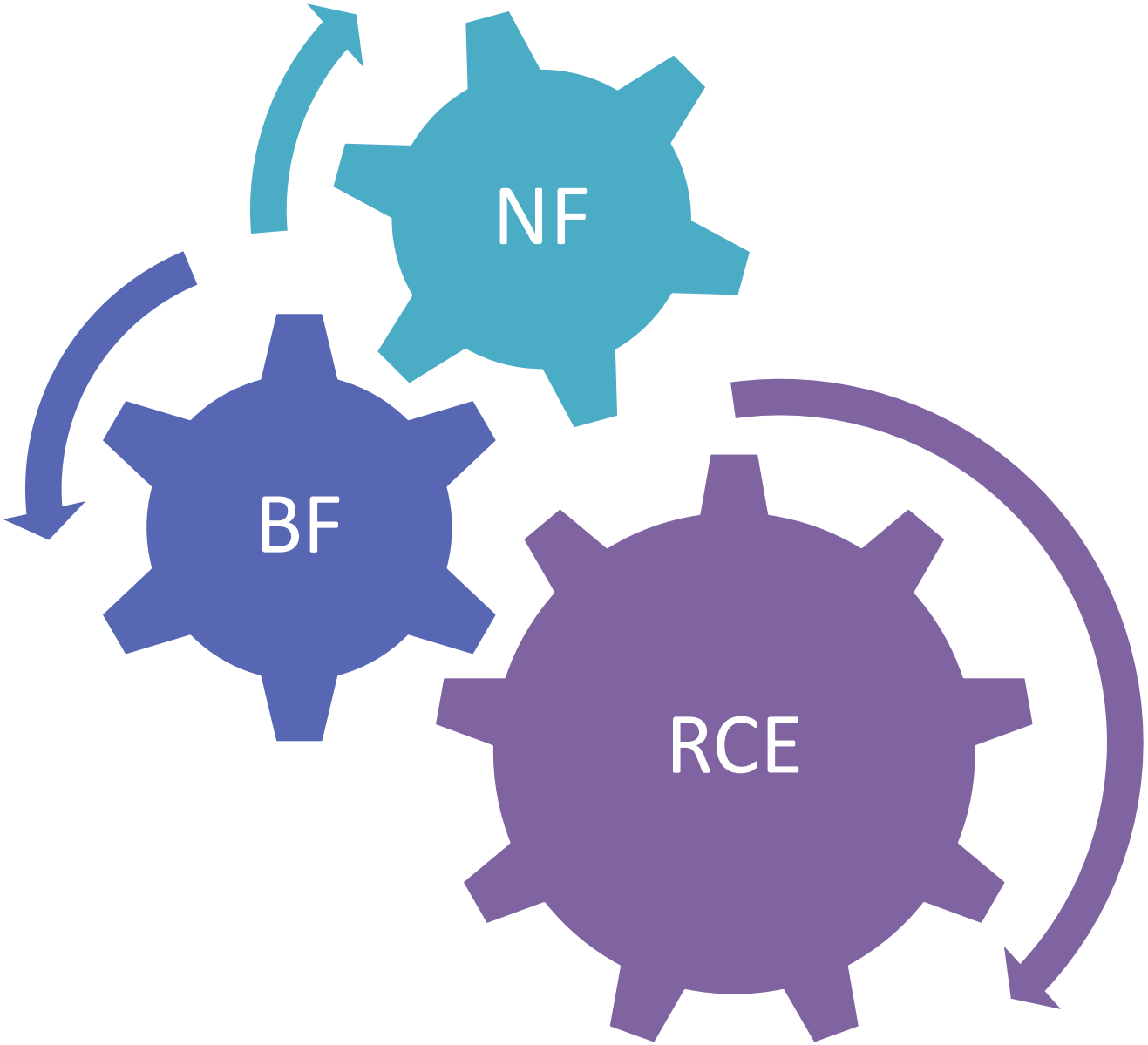
PARO REFRACTARIO

Definición controvertida

Tiempo

Descargas

“ECPR may be considered for **selected patients** as rescue therapy when conventional CPR efforts are failing in settings in which it can be expeditiously implemented and supported by skilled providers” (*Class 2b; Level of Evidence C-LD*).


NF
BF
RCE

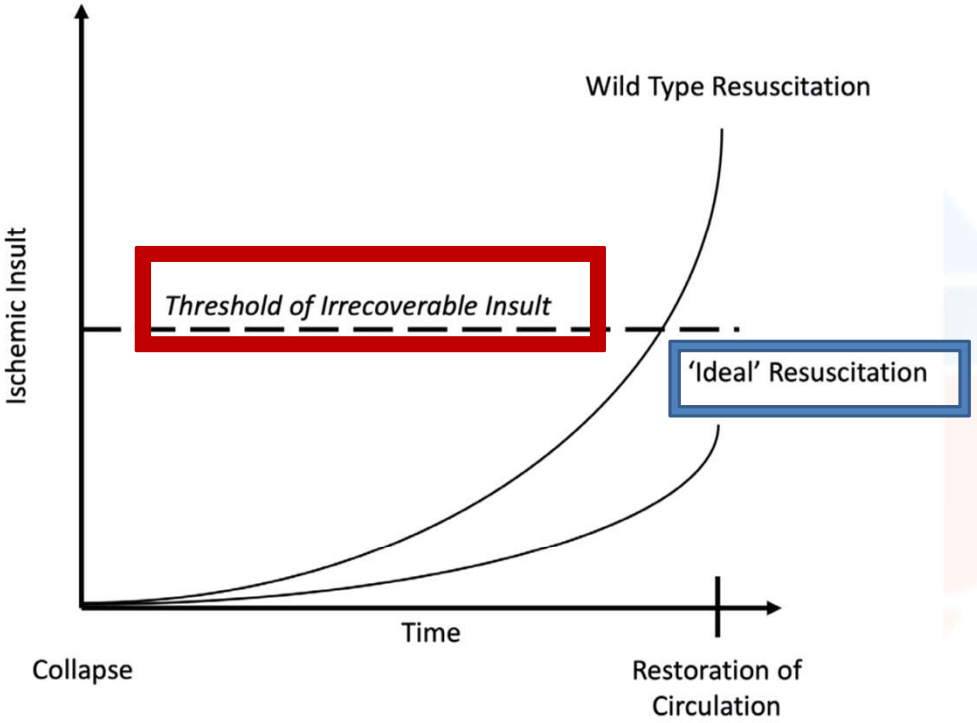
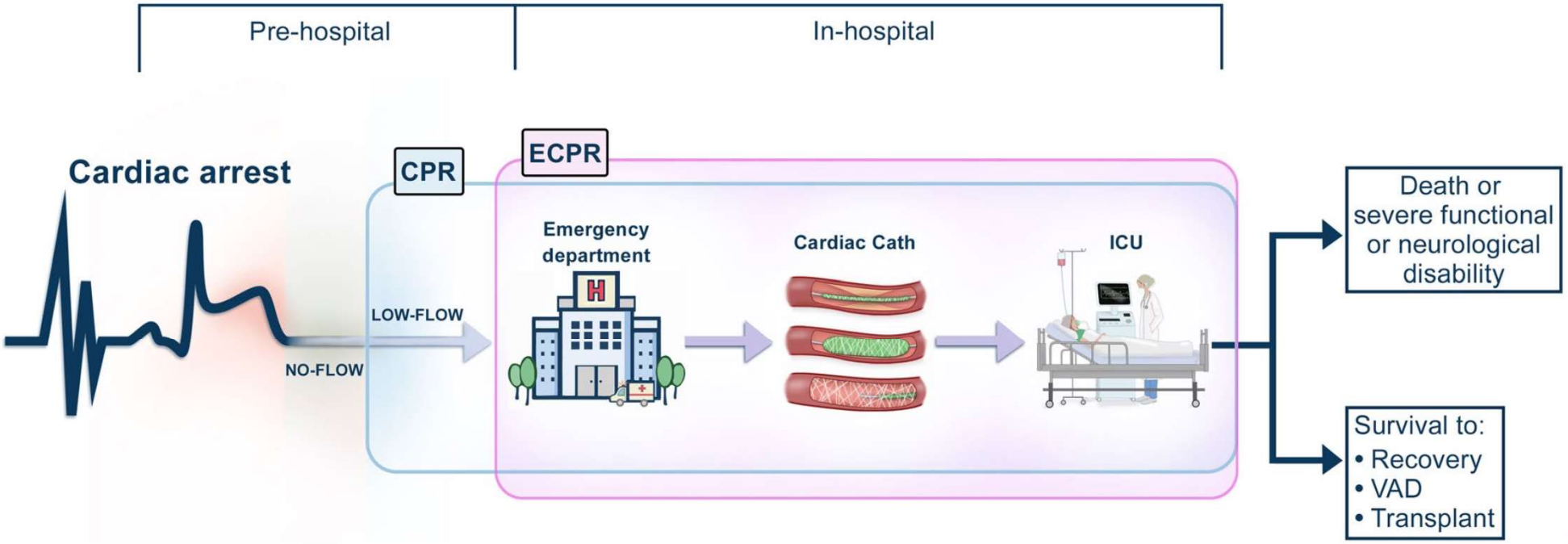


Figure 1: A primary goal of conventional resuscitation prior to ECPR is to mitigate ischemic insult during the 'low-flow' period, the elapsed interval between onset of chest compressions and spontaneous or extracorporeal return of circulation, such that neurologic and systemic recover is possible on ECMO. Brief periods of ischemic insult are typically better tolerated than more prolonged periods of ischemic insult.

ESQUEMA



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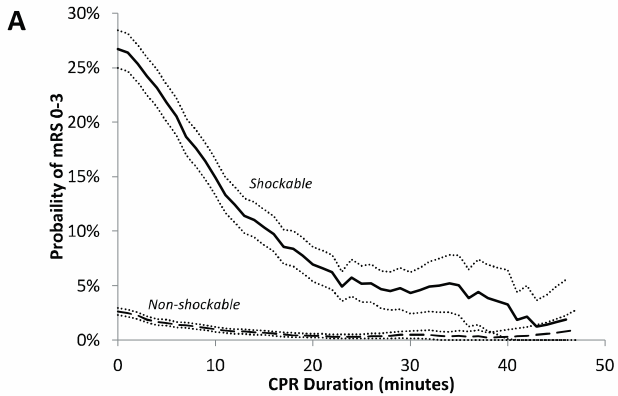
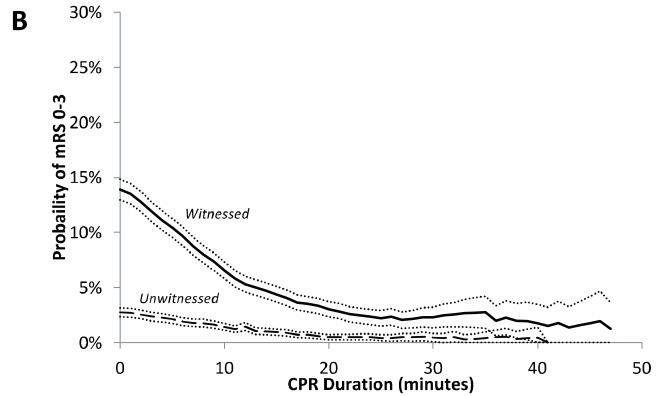
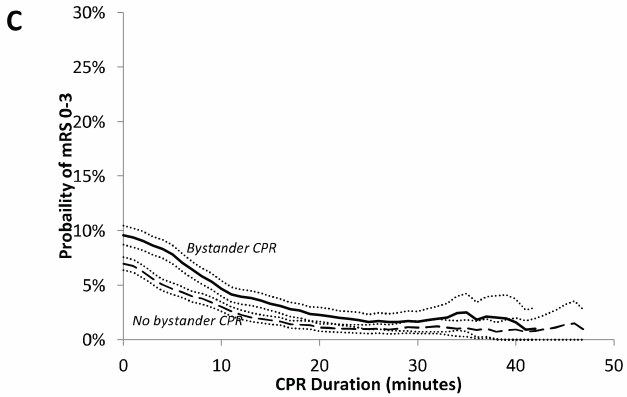


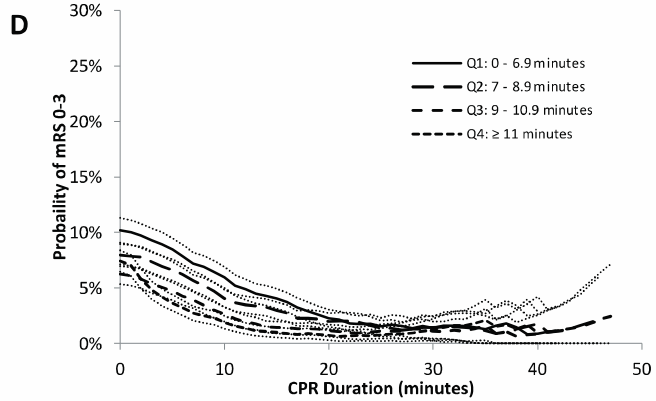
Shockable (n)	2,522	1,772	993	439	122
Non-shockable (n)	8,846	7,423	4,718	1,635	321



Witnessed (n)	5,317	4,007	2,373	967	227
Unwitnessed (n)	6,051	5,118	3,338	1,110	216



Bystander CPR (n)	4,342	3,495	2,046	719	127
No bystander CPR (n)	7,026	5,700	3,665	1,355	316



Q1 (n)	2,844	2,300	1,409	505	111
Q2 (n)	2,862	2,376	1,455	548	113
Q3 (n)	2,820	2,311	1,378	539	117
Q4 (n)	2,842	2,208	1,269	482	102

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Table 2 Factors associated with outcomes after ECPR

Risk factors	Effect on survival with functional recovery	OR for survival	RR or HR for mortality	Modifiable?
Pre-arrest				
Older age	Unfavorable	Age > 60, OR 0.54 [13]	Age ≤ 65, HR 0.46 [15]	No
Shockable rhythm	Favorable	OR 1.39–3.93 [13, 23, 41, 51, 53, 55]	HR 0.58 [14] Asystole, RR 1.36 [56] PEA, RR 1.2 [56]	No
Intra-arrest				
Shorter no-flow or low-flow time	Favorable	CPR < 30 min (vs > 30 min), OR 4.13 [13] CPR < 45 min (vs > 45 min), OR 3.53 [13] CPR < 60 min (vs > 60 min), OR 9.82 [13] For every 10 min shorter CPR, OR 1.95 [51] CPR duration per min increase, OR 0.97 [41] CPR < 45 min vs CPR > 58 min, OR 3.66 [52]	CPR per min increase, HR 1.007 [14] CPR duration ≤ 35 min, HR 0.37 [15]	Yes
High-quality CPR	Favorable	N/A	N/A	Yes
Post-arrest				
Targeted temperature management	Favorable	N/A	N/A	Yes
Percutaneous coronary intervention	Favorable	OR 1.52 [13]	HR 0.36 [15]	Yes

CPR cardiopulmonary resuscitation, *N/A* not available, *PEA* pulseless electrical activity

CRITERIOS ELSO

Edad < 70 años
Paro presenciado
No flujo < 5 min
Ritmo desfibrilable /AESP
Bajo Flujo < 60 min
ETCO2 > 10 mm HG en RCP pre ECPR
RCE intermitente o FV recurrente
Signos de Vida
Ausencia de comorbilidades en estado avanzado
No insuficiencia Ao conocida

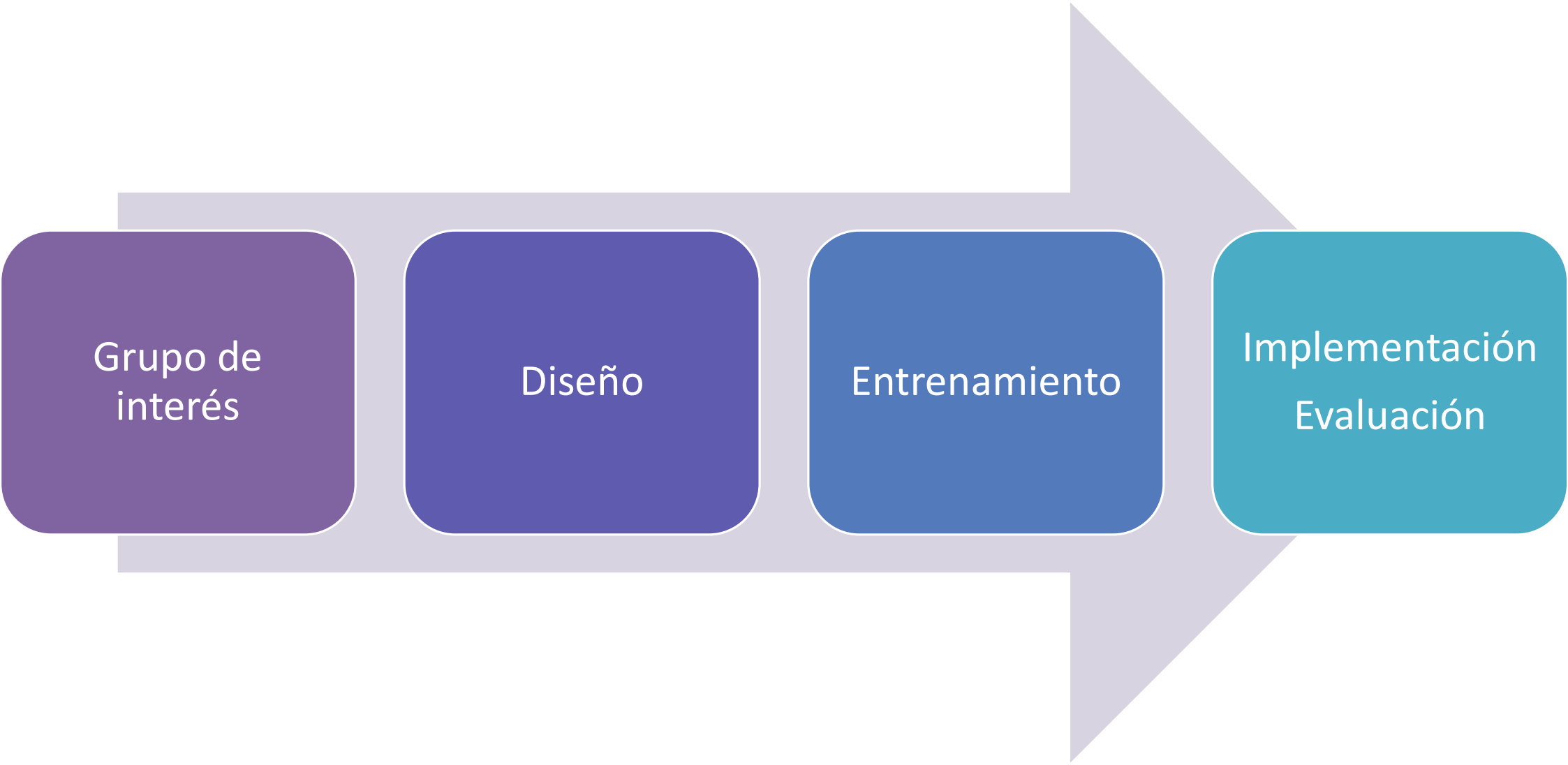
Declaración de consenso de la AHA

Calidad de la reanimación cardiopulmonar: mejora de los resultados de la reanimación cardíaca intra y extrahospitalaria

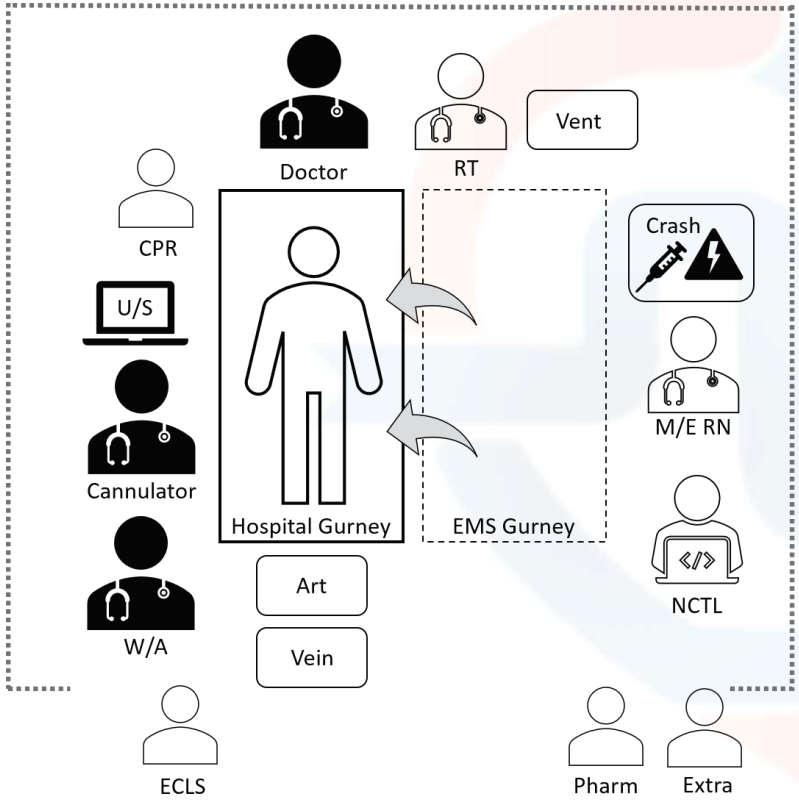
Declaración de consenso de la American Heart Association

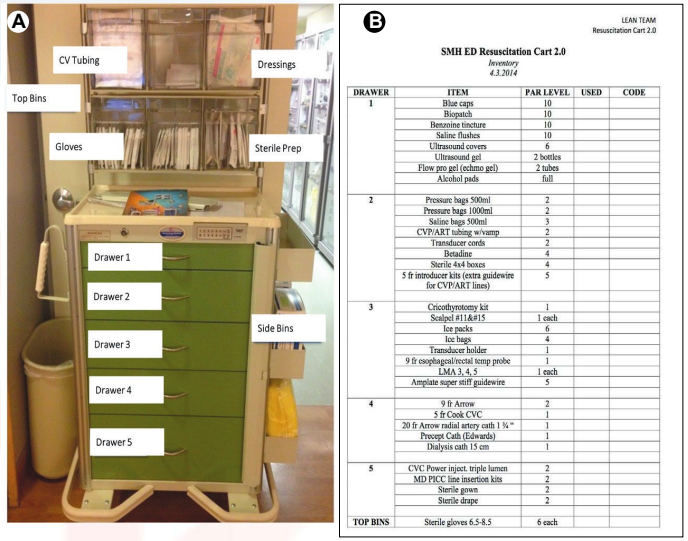
1. La RCP de alta calidad debería considerarse la base sobre la que se sustentan todos los demás esfuerzos de reanimación. Los indicadores de rendimiento de la RCP fijados como objetivo incluyen:
   a. FCT >80 %
   b. Frecuencia de compresión de 100 a 120/min
   c. Profundidad de compresión de ≥50 mm en adultos sin compresión residual del tórax
      i. (Al menos un tercio de la dimensión anteroposterior del tórax en lactantes y niños)
   d. Evite una ventilación excesiva.
      i. (Apenas elevación torácica mínima y una frecuencia inferior a 12 respiraciones por minuto)
2. En todos los paros cardíacos asistidos por reanimadores profesionales
   a. Usar al menos una modalidad de monitorización del rendimiento de la RCP del equipo
   b. En función de los recursos disponibles, usar al menos una modalidad de monitorización de la respuesta fisiológica del paciente a los esfuerzos de reanimación
   c. Ajustar los esfuerzos de reanimación de forma continua según la respuesta fisiológica del paciente
3. Los equipos de reanimación deben coordinar sus esfuerzos para optimizar la RCP durante el paro cardíaco
   a. Iniciando las compresiones con rapidez y optimizando el rendimiento de la RCP desde el principio
   b. Asegurando que un líder de equipo supervise las acciones y delegue de manera eficaz para garantizar una RCP rápida y óptima
   c. Manteniendo la administración óptima de la RCP mediante la integración de cuidados avanzados y traslado

4 PASOS PARA CREAR ECPR TEAM



EQUIPO





DRAWER	ITEM	PAR LEVEL	USED	CODE
1	Blue caps	10		
	Biopatch	10		
	Benzoine tincture	10		
	Saline flushes	10		
	Ultrasound covers	6		
	Ultrasound gel	2 bottles		
	Flow pro gel (echmo gel)	2 tubes		
	Alcohol pads	full		
2	Pressure bags 500ml	2		
	Pressure bags 1000ml	2		
	Saline bags 500ml	3		
	CVP/ART tubing w/vamp	2		
	Transducer cords	2		
	Betadine	4		
	Sterile 4x4 boxes	4		
	5 fr introducer kits (extra guidewire for CVP/ART lines)	5		
3	Cricothyrotomy kit	1		
	Scalpel #11&#15	1 each		
	Ice packs	6		
	Ice bags	4		
	Transducer holder	1		
	9 fr esophageal/rectal temp probe	1		
	LMA 3, 4, 5	1 each		
	Amplate super stiff guidewire	5		
4	9 fr Arrow	2		
	5 fr Cook CVC	1		
	20 fr Arrow radial artery cath 1 ¾ "	1		
	Precept Cath (Edwards)	1		
	Dialysis cath 15 cm	1		
5	CVC Power inject. triple lumen	2		
	MD PICC line insertion kits	2		
	Sterile gown	2		
	Sterile drape	2		
TOP BINS	Sterile gloves 6.5-8.5	6 each		

Figure 3. Image of resuscitation cart (A) and inventory list (B) .

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	Evidence-Based Practice	Advanced Specific Considerations for ECPR Candidates
Chest Compressions	▮ Position hands over the lower sternum ▮ Rate 100-120 per minute ▮ Depth at least 2 inches ▮ Do not lean and allow complete chest recoil ▮ Chest compression fraction at least 80%	▮ Target diastolic blood pressure 30-40 mmHg ▮ Ultrasound may guide hand placement to avoid iatrogenic left ventricular outflow tract obstruction ▮ Continue chest compressions during the initial seconds of ECPR until blood flow exceeds 2.0 L/min ▮ If total blood flow drops below 2.0 L/min after ECMO initiation, resume chest compressions while troubleshooting the circuit
Airway Management and Gas Exchange	▮ Advanced airway strategy does not yield superior clinical outcomes over bag-mask ventilation ▮ Choose most experienced clinician for advanced airway ▮ Use the highest available oxygen concentration during CPR ▮ Titrate supplemental oxygen to normoxia after ROSC or ECPR	▮ Select the advanced airway they can insert most quickly and with the highest probability of success on the first attempt ▮ Mechanical ventilation parameters during chest compressions: • Volume assist-control • Tidal volume: 6 mL/kg • Peak flow: 30 L/min • Maximum peak pressure: 100 mmHg • Respiratory rate: 10 • FiO_2 100% • PEEP: 0

	Evidence-Based Practice	Advanced Specific Considerations for ECPR Candidates
Pharmacotherapy	▌Periodic bolus administration of 1 mg epinephrine increases the likelihood of ROSC, short-term survival, and longer-term survival; the effects on neurologic outcome beyond hospital discharge are uncertain ▌Early epinephrine likely more effective ▌Epinephrine may be more effective in patients with a nonshockable cardiac rhythm ▌Antidysrhythmics increase the likelihood of ROSC but the effects on longer-term outcome are uncertain ▌Use metabolic therapies and antidotes in a targeted fashion when specific etiologies of cardiac arrest are known or strongly suspected	▌Excessive α-adrenergic stimulation risks post-arrest microvascular insufficiency and the 'no-reflow' phenomenon ▌Excessive β-adrenergic stimulation risks post-arrest myocardial dysfunction ▌Titrate epinephrine dosing to diastolic blood pressure 30-40 mmHg
Defibrillation	▌Minimize the total duration of the peri-shock pause ▌'Coarse' appearing ventricular fibrillation typically indicates a greater degree of metabolic substrate within the myocardium and has a higher probability of successful defibrillation than 'fine' appearing ventricular fibrillation	▌Repeated unsuccessful shocks exacerbate myocardial stunning after extracorporeal restoration of circulation ▌If ECPR is imminent, defer additional defibrillation attempts of fine-appearing VF until extracorporeal restoration of circulation ▌Optimize extracorporeal circulatory parameters (e.g. flow, mean arterial pressure, sweep) before re-attempting defibrillation

Stage 1- vascular access

- Place patient on mechanical compression device
- Place board under patient's pelvis
- Place femoral venous and arterial sheaths

STOP: "Does this patient meet ECLS inclusion criteria?"

Stage 2- cannula placement

- Request ECLS specialist to prime the circuit
- Request arterial (17 Fr) and venous (23 Fr) cannulas
- Prior to dilation externally measure venous cannula from percutaneous insertion site to 3rd intercostal space
- Insert =/>145cm 0.035" wires into sheaths
- Consider imaging to verify wire locations in IVC and aorta
- Administer heparin (5,000 U IV)
- Dilate to one size below cannula size
- Insert ECLS cannulas and clamp after removing obturator
    - Venous: after side holes have entered skin, sheath obturator prior to further advancement

STOP: "Does this patient meet ECLS inclusion criteria?"

Stage 3- connection to the circuit & flow initiation

Hand off clamped circuit tubing to sterile field
Perform wet-to-wet connection of tubing to cannulas
Perform "B A STAR" pre-initiation checklist
ECLS specialist initiates ECLS flow by removing arterial tubing clamp

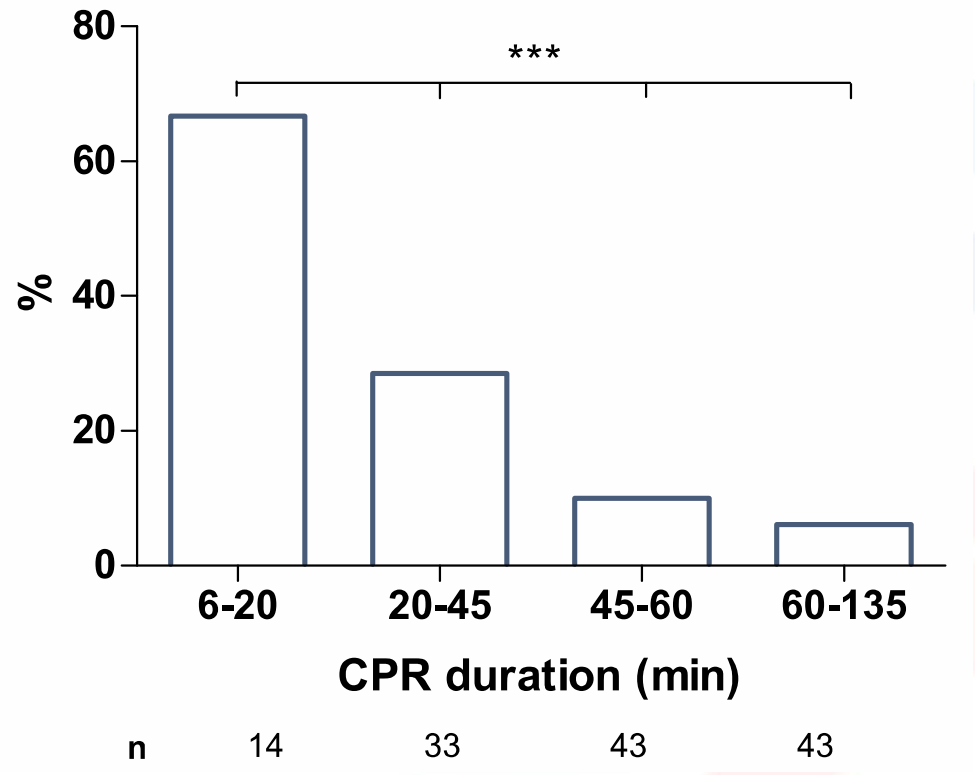

Figure 4. Survival among 133 ECPR-treated in- and out-of-hospital refractory cardiac arrest cases, stratified by the duration of professional CPR (***p=0.001). *Wengenmayer et al. Critical Care (2017) 21:157. Used with permission.*

Location	Advantages	Disadvantages/Risks
Femoral	■ Rapid cannulation ■ Easy site preparation ■ Minimized body motion during CPR due to distance from chest	■ Peripheral arterial disease may impede cannulation ■ Lower extremity ischemia ■ North-South Syndrome
Axillary	■ Reduces risk of North-South syndrome ■ Patient may mobilize on ECMO	■ Increased difficulty due to proximity to CPR ■ Slower cannulation if surgical graft is required ■ Control of cannulation site bleeding is more difficult ■ Upper extremity ischemia or hyperperfusion
Common Carotid	■ Reduces risk of North-South syndrome ■ Patient may mobilize on ECMO	■ Increased stroke risk ■ Increased difficulty due to proximity to CPR
Central Cannulation	■ Rapid cannulation if sternotomy is already performed ■ High flows due to use of large and short cannulas ■ No North-South Syndrome ■ May be performed simultaneous to open chest cardiac massage	■ Requires sternotomy or thoracotomy ■ Bleeding risk increased ■ Cannot be performed during closed chest compressions ■ Decannulation requires surgery

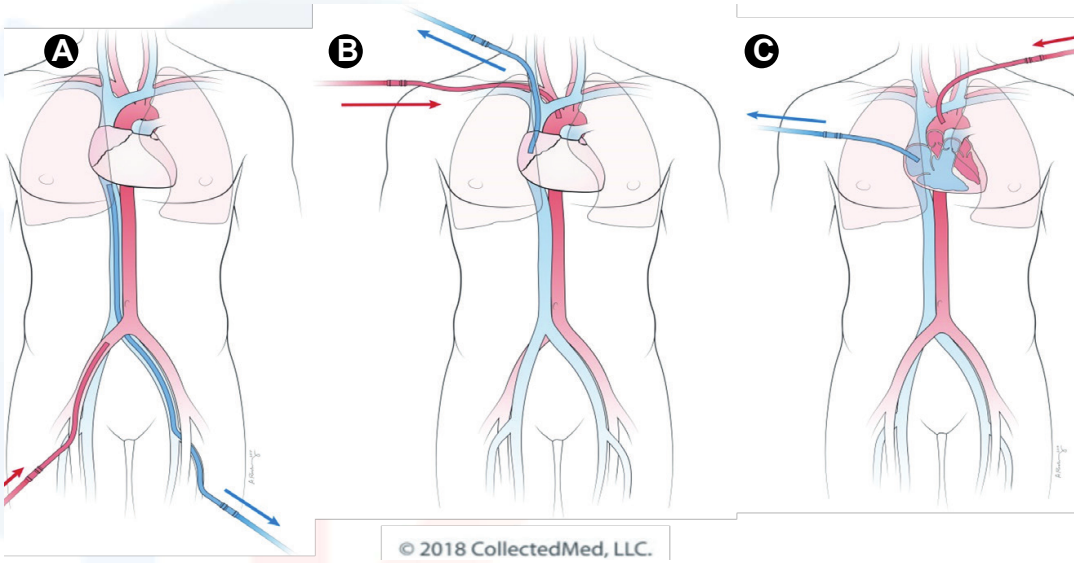

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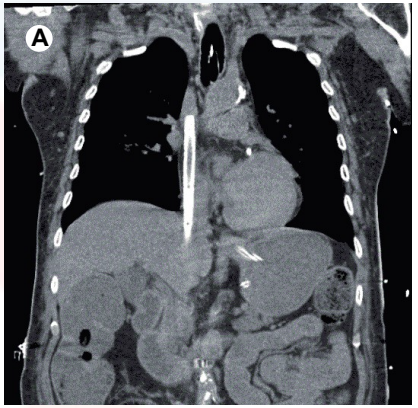
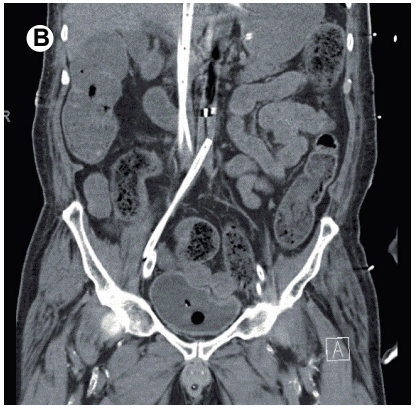
Table 2: Characteristics of Cannulas Used in ECPR

Cannula Type	Diameter	Length	Special Features
Arterial	15-19 Fr	15-30 cm	Wire-reinforced Luer lock side port for the distal perfusion cannula Length tailored to patient
Venous	21-25 Fr	55-60 cm	Wire-reinforced Extended side holes to simultaneously drain the SVC, right atrium, and IVC
Distal Perfusion	6-9 Fr	10-23 cm	Some are wire-reinforced Length tailored to patient Some with large side-arm tubing to reduce resistance





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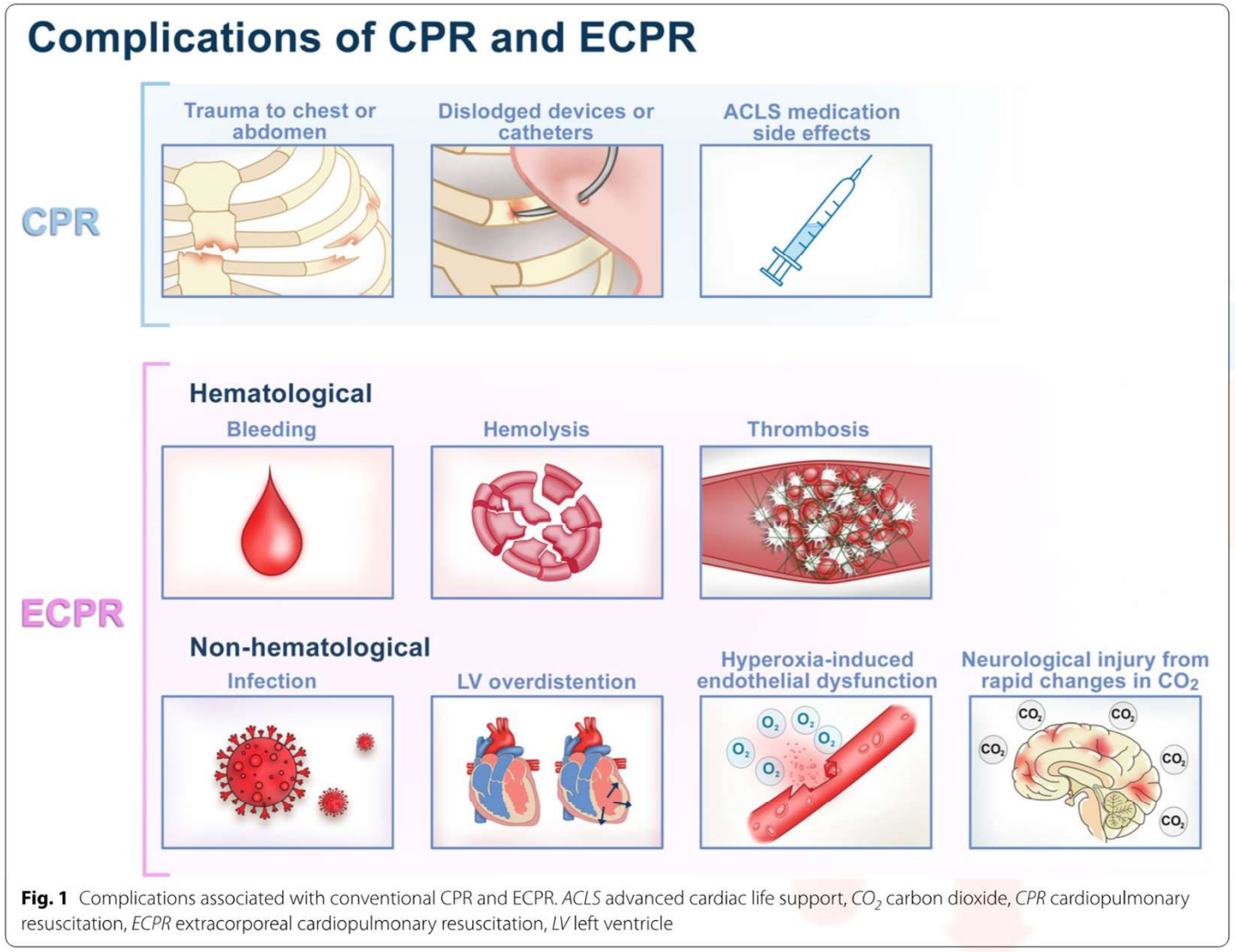

Fig. 1 Complications associated with conventional CPR and ECPR. *ACLS* advanced cardiac life support, CO_2 carbon dioxide, *CPR* cardiopulmonary resuscitation, *ECPR* extracorporeal cardiopulmonary resuscitation, *LV* left ventricle

PRIMERAS 4 HORAS

- Estabilidad hemodinámica
- Identifique y trate la causa del paro
- Descarte complicaciones de RCP
- Evalue posibles complicaciones de ECMO
- Continue manejo pos paro
- Debriefing

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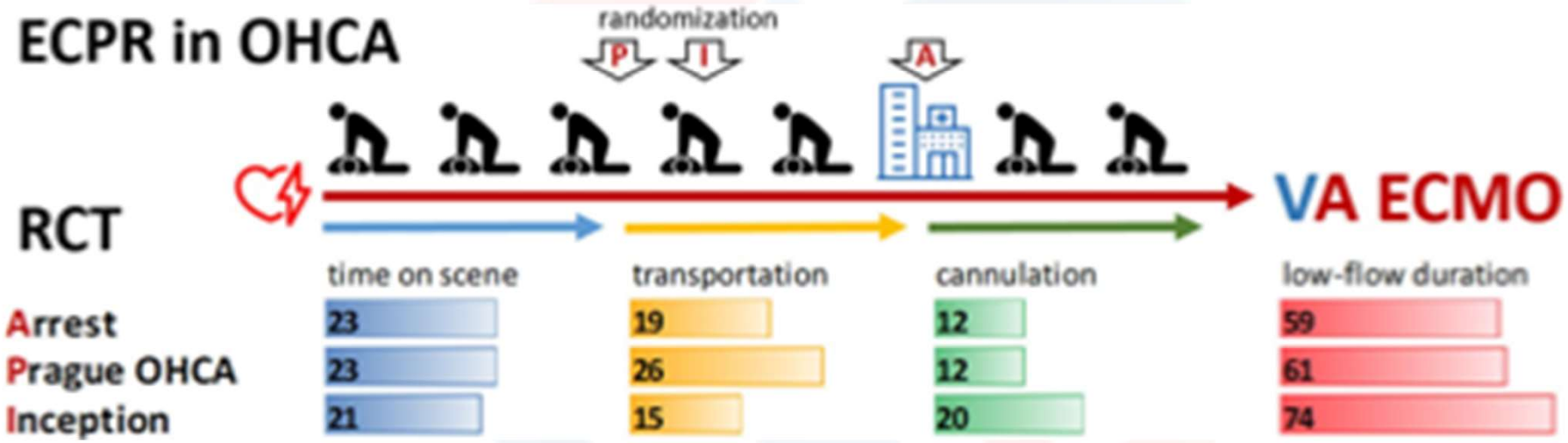
Table 1 Notable published studies of ECPR

	Type of study	No. of subjects	Outcome measurement	Results[a]
IHCA				
Chen [14]	Propensity-score matched analysis	46 matched pairs	Survival to discharge with CPC 1–2	ECPR vs CPR 30.4% vs 15.2%; HR 0.51, [0.35–0.74], $p < 0.0001$[b]
Shin [15]	Propensity-score matched analysis	60 matched pairs	Two-year survival with minimal neurological impairment	ECPR vs CPR 20% vs 5%; HR = 0.53, [0.36–0.80], $p = 0.002$
Ouweneel [37]	Meta-analysis of matched pairs analyses	195 matched pairs	30-day survival with CPC 1–2	ECPR vs CPR 23% vs 9.7%, RR 0.85,[c] ARR 13%, [7–20%], $p = 0.0001$
IHCA and OHCA with in-hospital ECPR				
Lunz [40]	Multicenter retrospective study	IHCA: 165 OHCA: 258	3-month survival with CPC 1–2	IHCA vs OHCA 34.2% vs 9%; RR 0.72,[c] $p < 0.01$



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	ARREST	PRAGUE	INCEPTION
Patient Population	Shockable rhythm with no ROSC after three shocks with estimated transfer time of < 30 minutes	Any rhythm (~60% VF) with ongoing resuscitation (minimum 5 minutes of ACLS) with a presumed cardiac cause	Refractory (> 15 minutes ACLS) arrest with an initial ventricular arrythmia
Intervention	Transported direct to cath lab with initiation of VA ECMO followed by angiography	Transfer direct to cath lab with initiation of VA ECMO followed necessary diagnostic or therapeutic procedures	Bifemoral ECPR either in ED or cath lab by varying specialities (cardiology, cardiothoracics or intensive care)
Control	Continuation of ALS in the ED with transfer to cath lab if ROSC	Standard ACLS treatment with early invasive diagnostic and therapeutic strategies if ROSC achieved	Standard ACLS in either ED or cath lab
Number Enrolled	30	264	160
Age	59 vs 58	59 vs 57	54 vs 57
Witnessed Arrest	73% vs 87%	Not reported	97 vs 98%
Bystander CPR rates	87% vs 80%	99% vs 98%	99 vs 95% had CPR within 5 minutes
Time to ambulance arrival	6 vs 7 minutes	8 vs 9 minutes	8 vs 8 minutes
Low Flow Time*	59 minutes	58 minutes	74 minutes
% those randomised to ECPR group in whom VA ECMO was initiated	100%	66% (34% sustained ROSC on admission)	74% (26% sustained ROSC on admission)
Primary Outcome	Trial stopped early for efficacy with a rate of survival to hospital discharge of 43% in ECPR group vs 7% in C-CPR group	The rate of favourable 180-day survival was not statistically significant (CPC 1 or 2: 32% vs 22%)	No difference in 30-day favourable neurological survival (CPC 1 or 2: 20% vs 16%)
Crossover		Crossover (11 patients to invasive, 9 to standard strategies) was allowed and in all those who received ECPR the overall rate of favourable neurological outcome at 180 days was 22%.	3 patients in control group received ECMO of which all died

**Classically low flow time defined as time from CPR onset to initiation of VA ECMO flow. However in these trials the data reported has subtle differences. In the ARREST trial the time was from 911 call to VA ECMO initiation and in the INCEPTION trial the time reported is from start of arrest until VA ECMO flow.*

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PRE EVENTO

EVALUACION

PREPARACION

CANULACION

ECMO

GERIATRIA

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SIMPOSIOS REGIONALES DE PERFUSION 2025 Bogota, Colombia - 30 y 31 de mayo

CALL ECMO TEAM

CODIGO AZUL
Edad < 65 años
Presenciado
Signos de vida
RCP Efectiva
> 5 min y < 15 min
Causa reversible

RED FLAGS

NO EN ASISTOLIA
NO PRESENCIADO
Condición neurológica previa NO compatible con el esfuerzo

GO GO GO !!!!!

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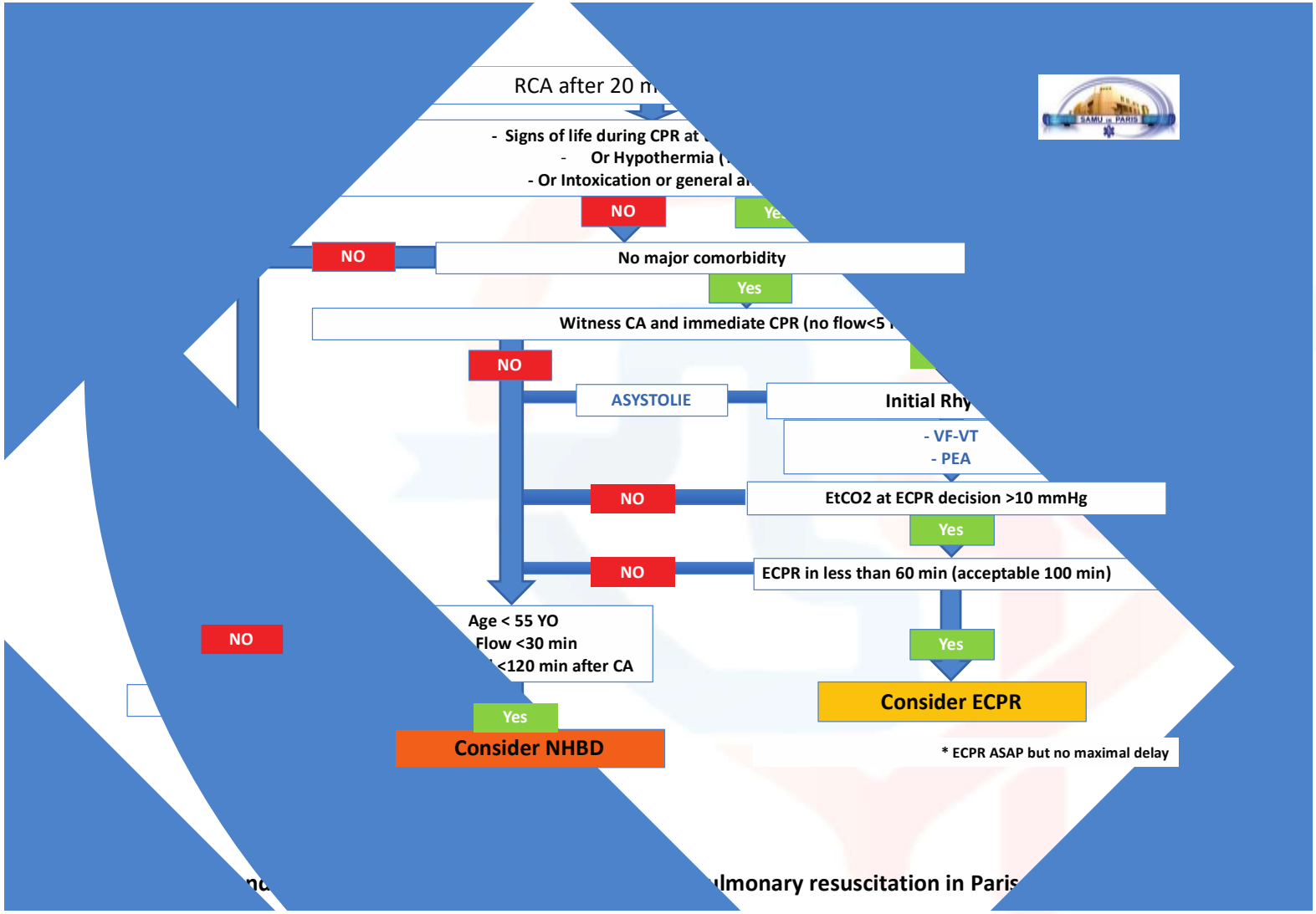

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Signos de vida al inicio de RCP

Edad < 65 años
Paro presenciado
No Comorbilidades significativas
Ritmo Desfibrilable
No ROSC a la 3 descarga o 5 min de RCP
Lactato < 15 Ph 7.0 TAS > 80 PAM > 50

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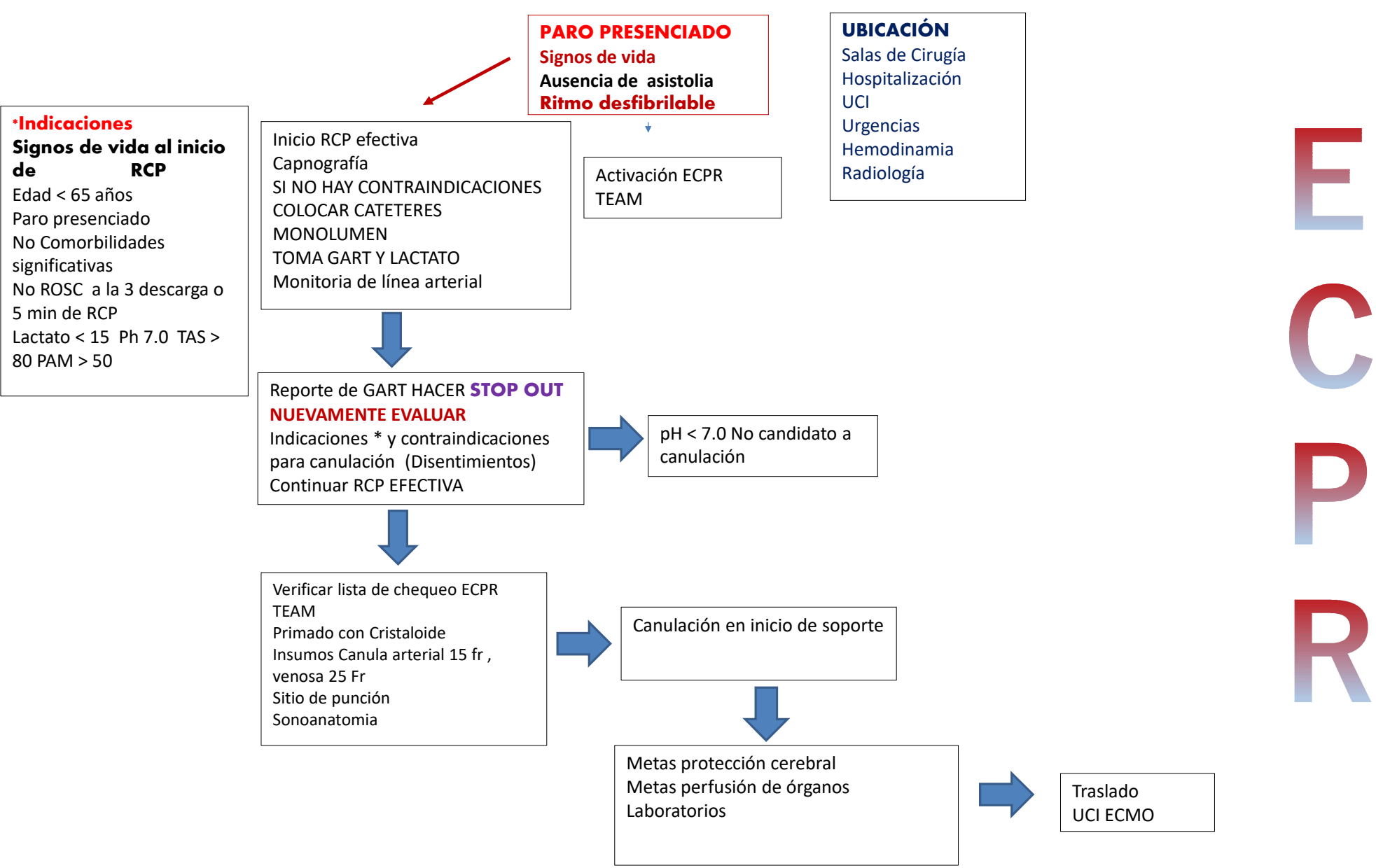
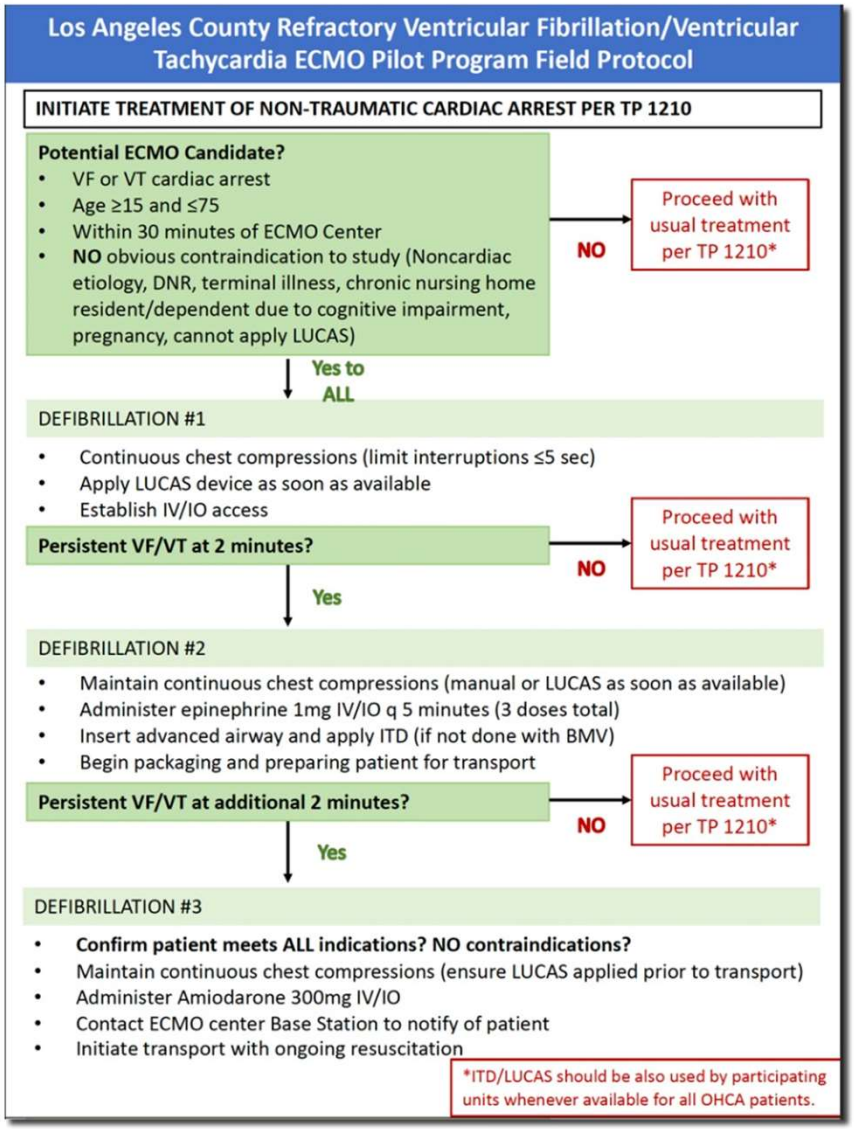
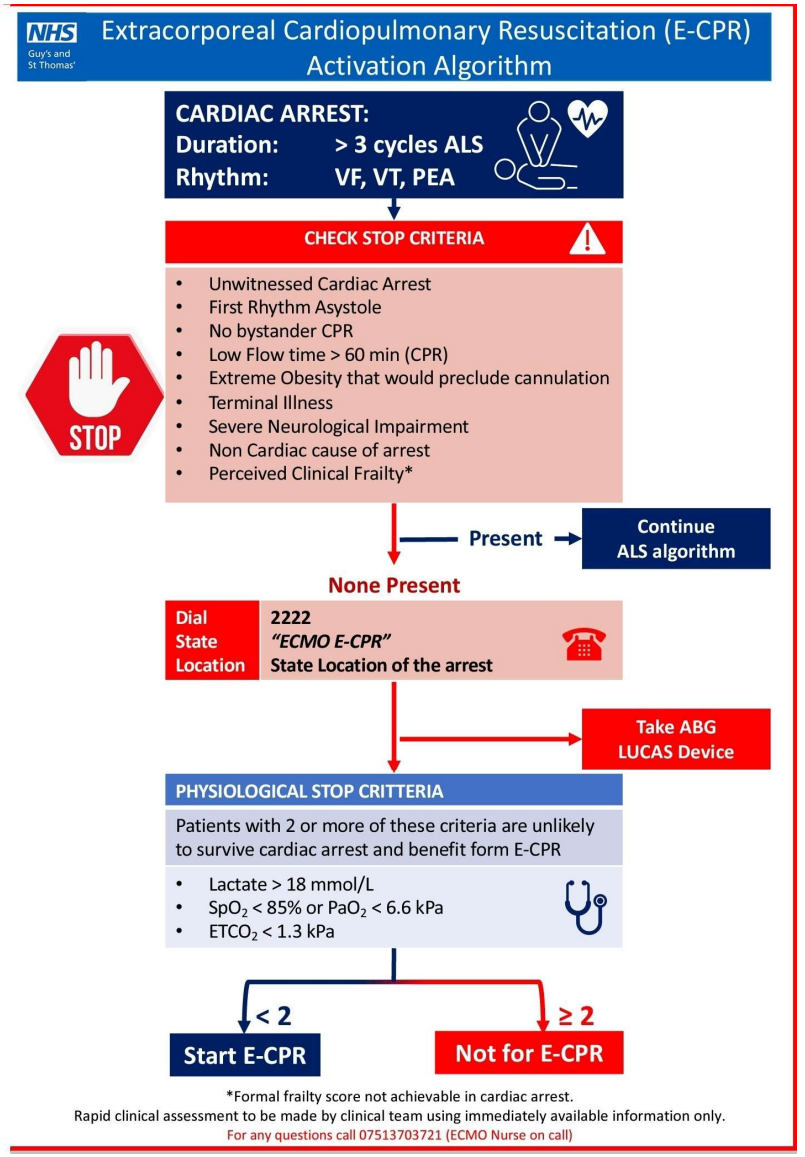
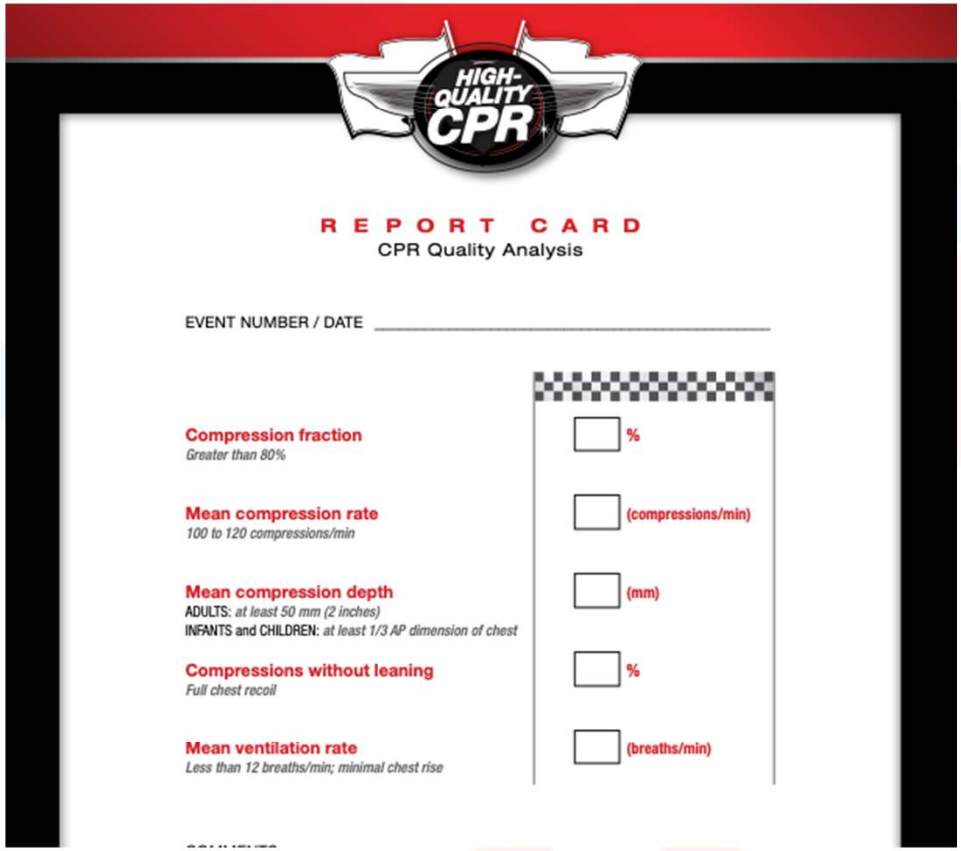

PARO PRESENCIADO
Signos de vida
Ausencia de asistolia
Ritmo desfibrilable
UBICACIÓN
Salas de Cirugía
Hospitalización
UCI
Urgencias
Hemodinamia
Radiología
*Indicaciones
Signos de vida al inicio de RCP
Edad < 65 años
Paro presenciado
No Comorbilidades significativas
No ROSC a la 3 descarga o 5 min de RCP
Lactato < 15 Ph 7.0 TAS > 80 PAM > 50
Inicio RCP efectiva
Capnografía
SI NO HAY CONTRAINDICACIONES
COLOCAR CATETERES
MONOLUMEN
TOMA GART Y LACTATO
Monitoria de línea arterial
Activación ECPR
TEAM
Reporte de GART HACER STOP OUT
NUEVAMENTE EVALUAR
Indicaciones * y contraindicaciones para canulación (Disentimientos)
Continuar RCP EFECTIVA
pH < 7.0 No candidato a canulación
Verificar lista de chequeo ECPR TEAM
Primado con Cristaloide
Insumos Canula arterial 15 fr , venosa 25 Fr
Sitio de punción
Sonoanatomia
Canulación en inicio de soporte
Metas protección cerebral
Metas perfusión de órganos
Laboratorios
Traslado
UCI ECMO
E
C
P
R





ECPR Showcase - EuroELSO Congress 2022, London

DEBRIEFING



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SIMPOSIOS REGIONALES 2025

PARA LLEVAR A CASA

- **CRITERIOS DE SELECCIÓN DE PACIENTES**
- Equipo multidisciplinario – roles
- **COMUNICACIÓN**
- Entrenamiento continuo

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KEEP
CALM
AND
CANNULATE!

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2025

SIMPOSIOS REGIONALES DE PERFUSION 2025 Bogota, Colombia - 30 y 31 de mayo