

II Fórum de Morte Encefálica

DO CONSELHO FEDERAL DE MEDICINA

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Agenda



Padronizando o teste de apneia: instabilidade durante o exame - Dr. Antonio Luis Eiras Falcão

Vantagens da PO₂ >200 mmHg: segurança - Dr. Antonio Luis Eiras Falcão

Paciente DPOC e outras situações - Dr. Antonio Luis Eiras Falcão




RESOLUÇÃO CFM Nº 2.173/2017

Publicado no D.O.U. de 15 de dezembro de 2017, Seção I, p. 274-6

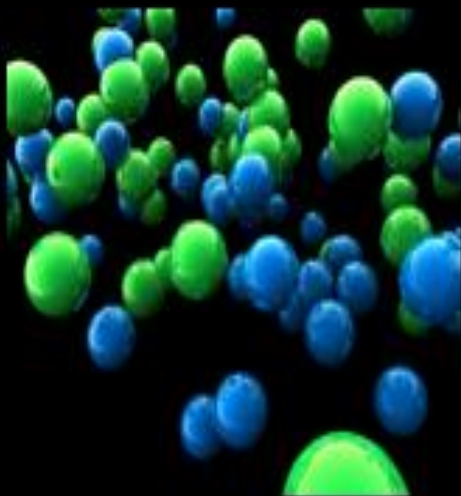
Art. 2º É obrigatória a realização mínima dos seguintes procedimentos para determinação da morte encefálica:

a) dois exames clínicos que confirmem coma não perceptivo e ausência de função do tronco encefálico;

 b) teste de apneia que confirme ausência de movimentos respiratórios após estimulação máxima dos centros respiratórios;

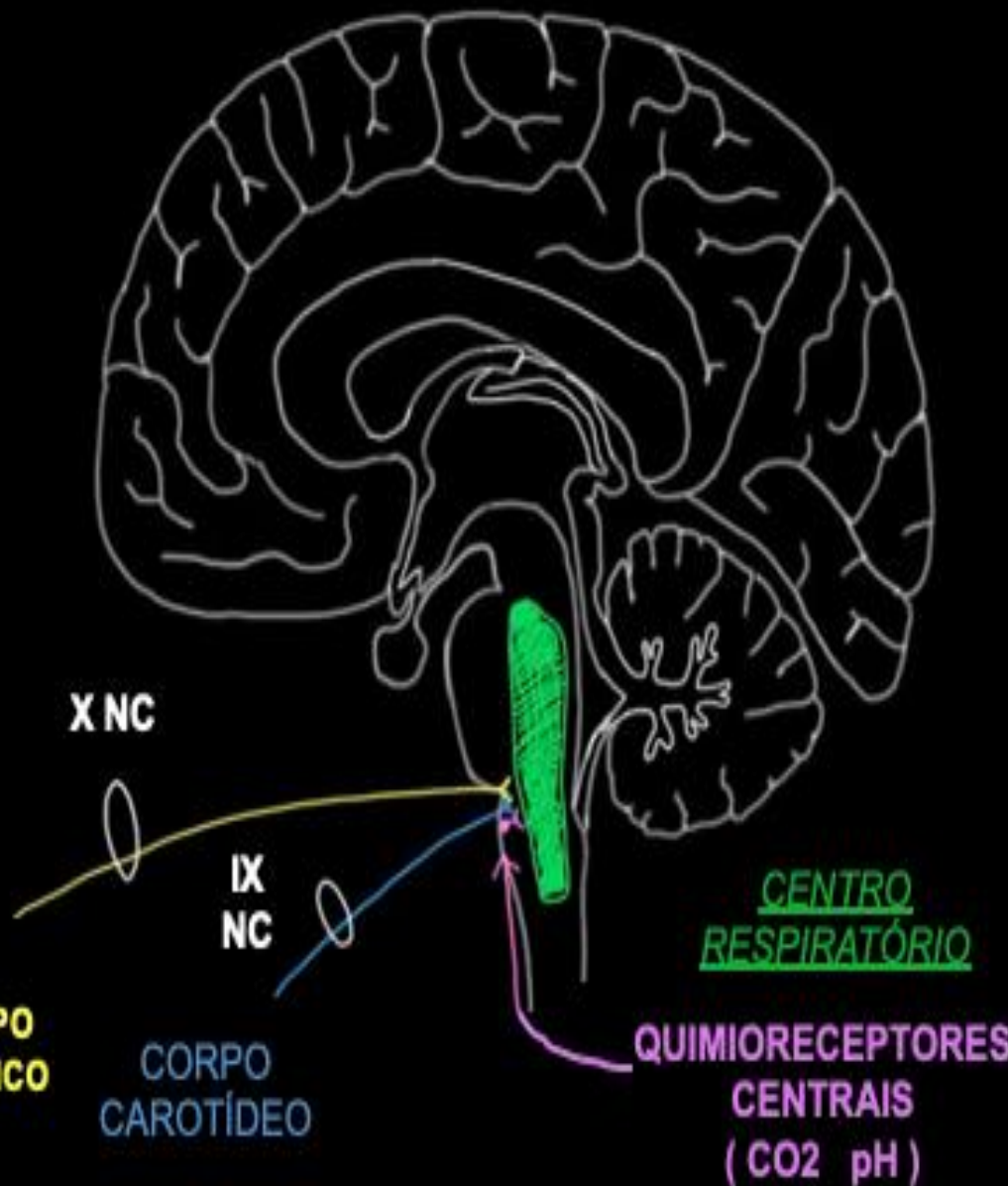
c) exame complementar que comprove ausência de atividade encefálica.

Centros: P/A/QRec/DRG (NTS)/VRG



QUIMIORECEPTORES
PERIFÉRICOS

(O₂ CO₂ pH)



X NC

IX
NC

CORPO
AÓRTICO

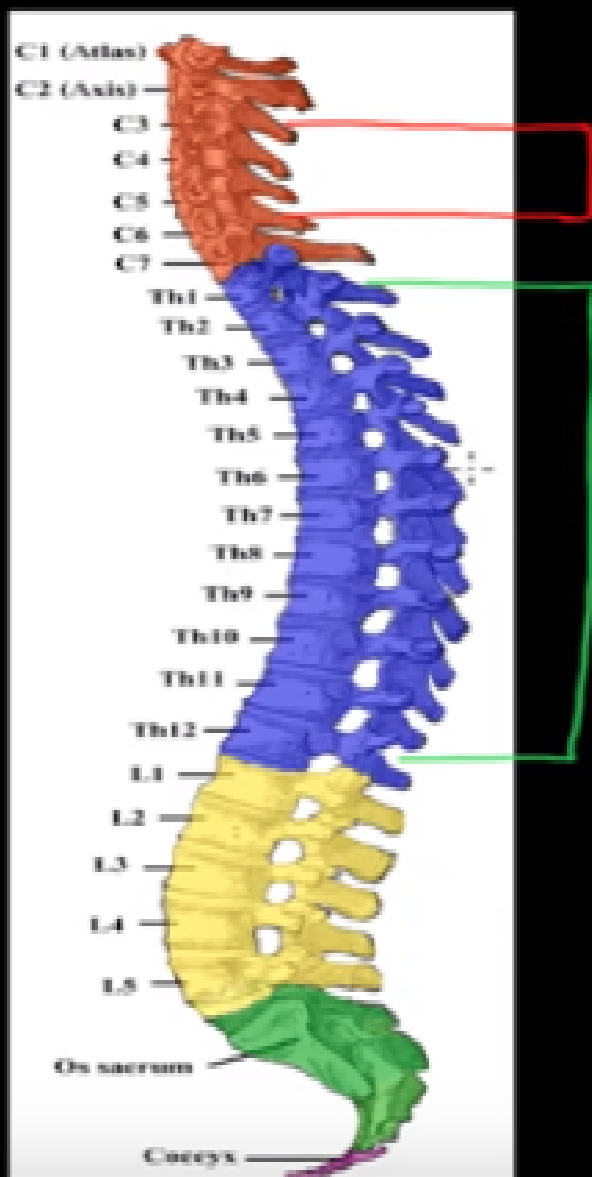
CORPO
CAROTÍDEO

CENTRO
RESPIRATÓRIO

QUIMIORECEPTORES
CENTRAIS
(CO₂ pH)

NERVOS MOTORES

MÚSCULO



C3 - C5



DIAFRAGMA

T1 - T11



**MÚSCULOS
INTERCOSTAIS**

TESTE APNÉIA



ANEXO I DA RESOLUÇÃO CFM Nº 2.173/2017

MANUAL DE PROCEDIMENTOS PARA DETERMINAÇÃO DE MORTE ENCEFÁLICA

- ... monitorização: pO_2 , pCO_2 , pressão
- ... ajustar FiO_2 : ml/kg de FiO_2 % (minutos)
- ... obter gasometria arterial inicial ao final da ré-oxigenação
 - obter pO_2 > %
 - pCO_2 idealmente > mmHg
 - pH entre e mmHg
- : e cristaloide já

TESTE APNÉIA

- ... desconectar o paciente do ventilador mecânico;
- ... estabelecer fluxo de
 - ateter ... ao nível ... (/min)
 - tubo ... (/min) conectado ao tubo
 - outros métodos
- ... observar a presença de qualquer movimento respiratório por ...
- ... obter gasometria final
- ... reconectar na ventilação mecânica



TESTE DE APNEIA (examinador 1 ou 2)

PA (mmHg): _____ TEMP (°C): _____ DATA: _____ HORA: _____

Inicial Final

Inicial Final

PaCO₂ _____

PaO₂ _____

Ausência de movimentos respiratórios com PaCO₂ > 55 mmHg? SIM NÃO

Médico:

CRM:

Assinatura Identificada

TESTE APNÉIA

Interromper o teste :

- Hipotensão (PAS <100 mm Hg / PAM <65 mm Hg)
- Hipoxemia SatO₂ < 85%
- Arritmia cardíaca grave
- Movimentos respiratórios

Colher gasometria arterial e reconectar ao ventilador nos casos de interrupção do teste.

Special Article

The Apnea Test: Rationale, Confounders, and Criticism

**Ari R. Joffe, MD, FRCPC¹, Natalie R. Anton, MD, FRCPC¹, and
Jonathan P. Duff, MD, FRCPC¹**

Journal of Child Neurology

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Potential Problem

Explanation

Cervical spinal cord injury is often present ←

Pituitary/hypothalamic, adrenal, and thyroid insufficiency are often present

The level of pCO₂ required to induce respiration in a damaged brainstem is unknown ←

How to rule out this confounding condition is not known.

These should be diagnosed and treated prior to brain death testing. How these should be tested for is unclear.

There are cases of breathing occurring at a higher pCO₂ than currently recommended for apnea testing. When only medullary function remains, it is expected that a much higher than normal pCO₂ threshold will be present.

The rise in pCO₂ can be expected to increase intracranial pressure, reduce cerebral perfusion, and result in no-reflow phenomenon ←

Hyperoxia can cause fatal apneas when the preBötzinger complex in the medulla is damaged ←

This can convert ischemic penumbra tissue to irreversibly injured brain, which can result in apnea.

Hyperoxia is a routine part of the apnea test necessary to avoid dangerous hypoxia. This can result in apnea.

- AFASTAR LESÃO CERVICAL ALTA
- NÍVEL IDEAL DE CO₂ PARA ESTIMULAR CENTRO RESPIRATÓRIO
- EM CASOS DE LESÃO DE TROCO CEREBRAL E EM DPOC
- NO TA O AUMENTO DE CO₂ PODE AUMENTAR PIC
- TA PODE REDUZIR FSC E DESVIAR ÁREAS DE PENUMBRA EM ÁREAS DE NECROSE

the apnea test prevents gasping. Inducing severe medullary gasping function would be unacceptable. Do not indicate ongoing integration, and apnea can coexist with integration. "Breath of life" is not a biological or scientific concept. It is a philosophical concept. Apnea is not sufficient to indicate loss of life. Apnea is not sufficient to indicate loss of "vital work" continues with apnea during brain death.

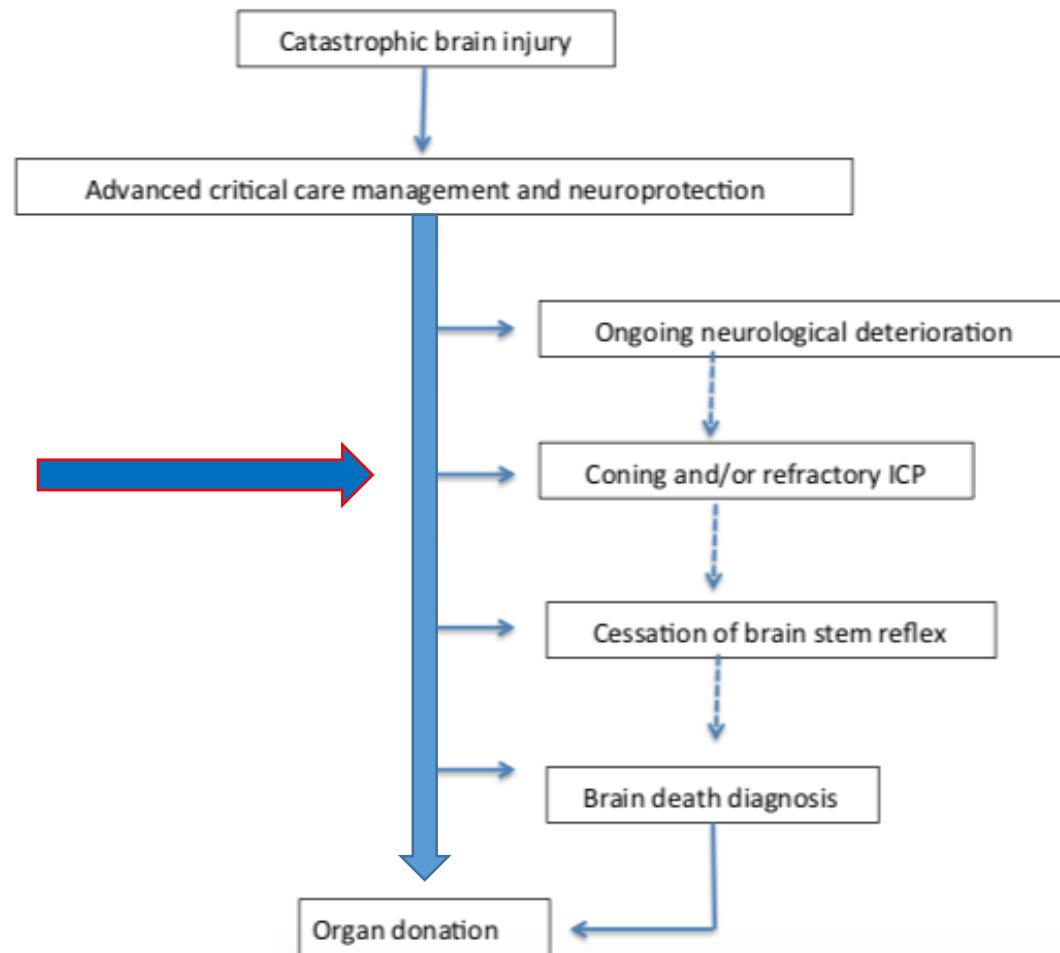
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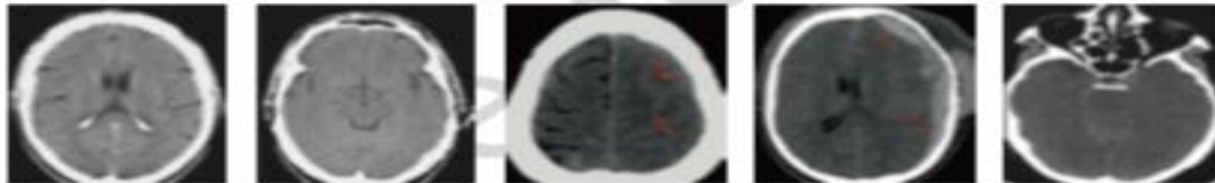
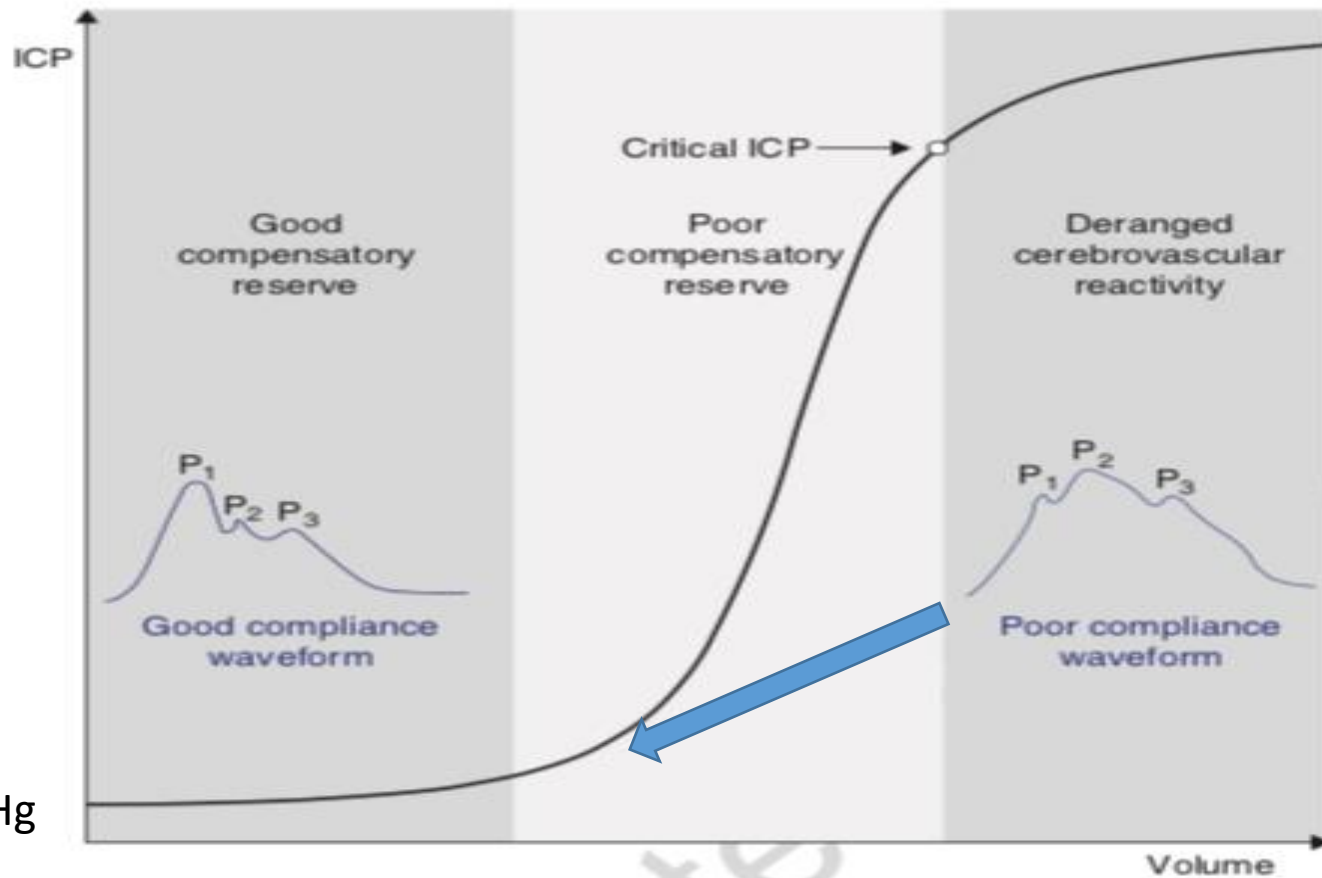
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POSSIBILIDADES APÓS O DIAGNOSTICO DE LESÃO CEREBRAL



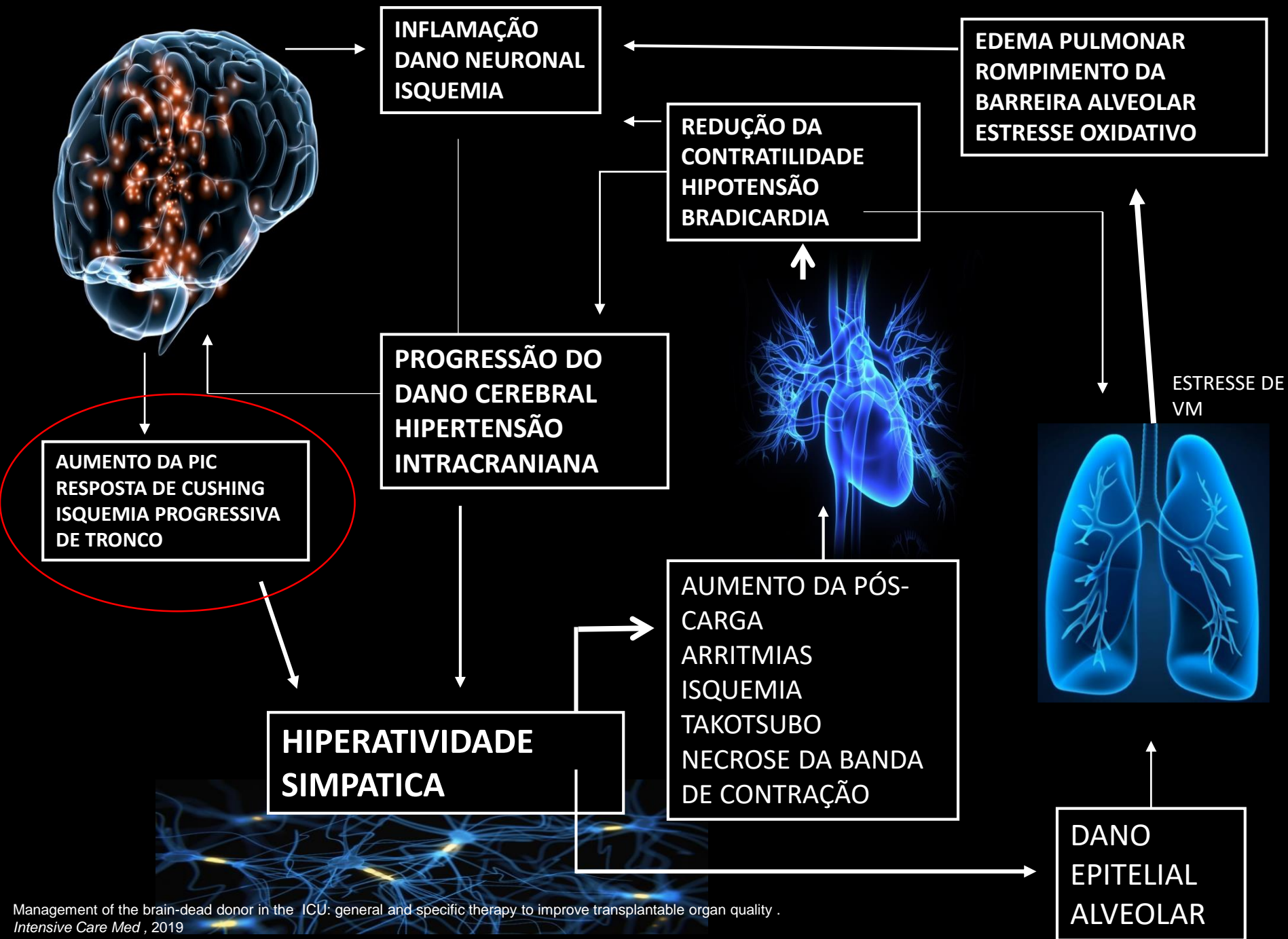
Jawoniyi O, et al, Organ donation and transplantation: awareness and roles of healthcare professionals— a systematic literature review. J Clin Nurs 27:e726–e738 - 2018

10 mmHg

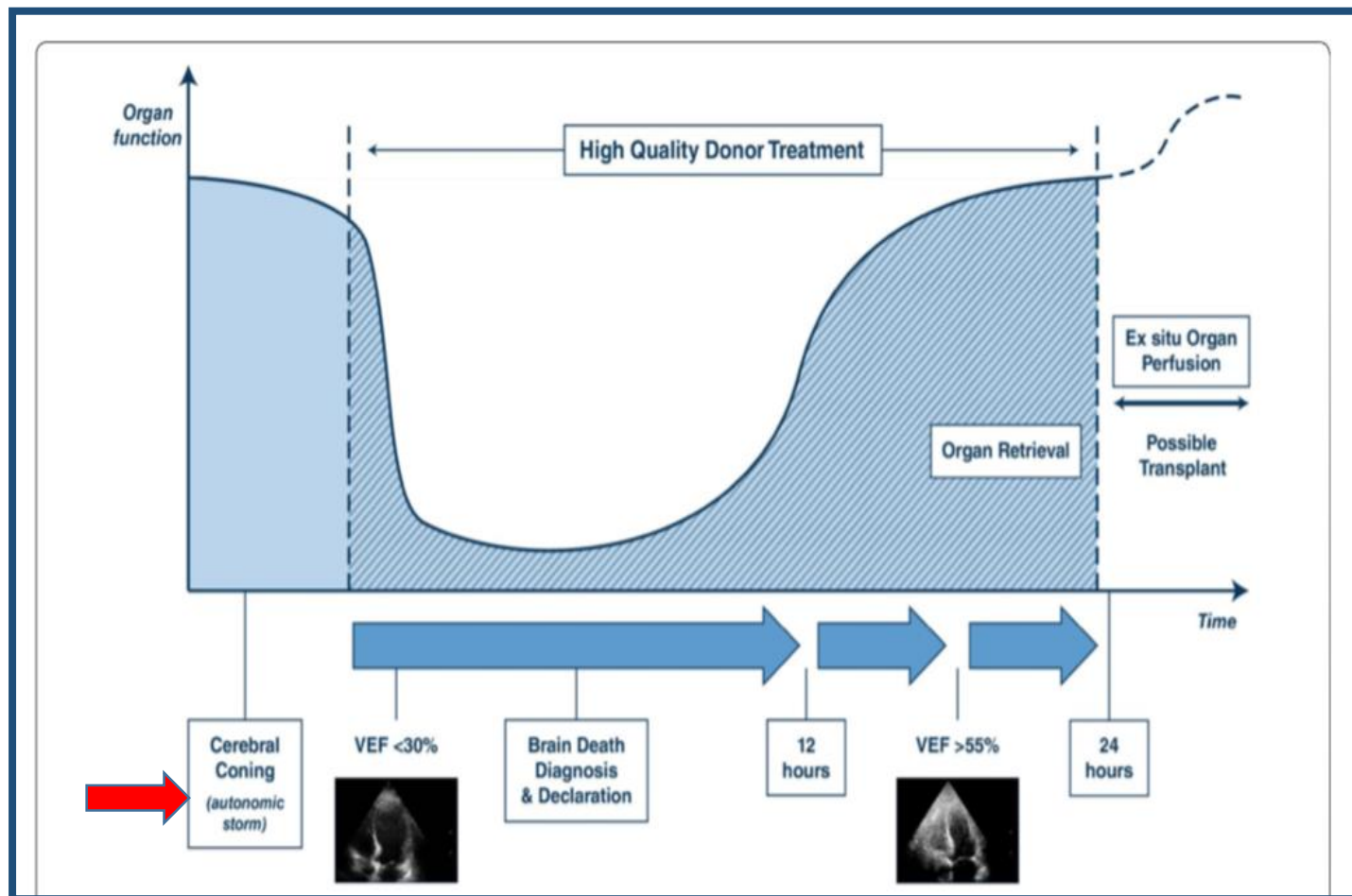


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A. F. Joaquim et al. (eds.), *Fundamentals of Neurosurgery*,
https://doi.org/10.1007/978-3-030-17649-5_4

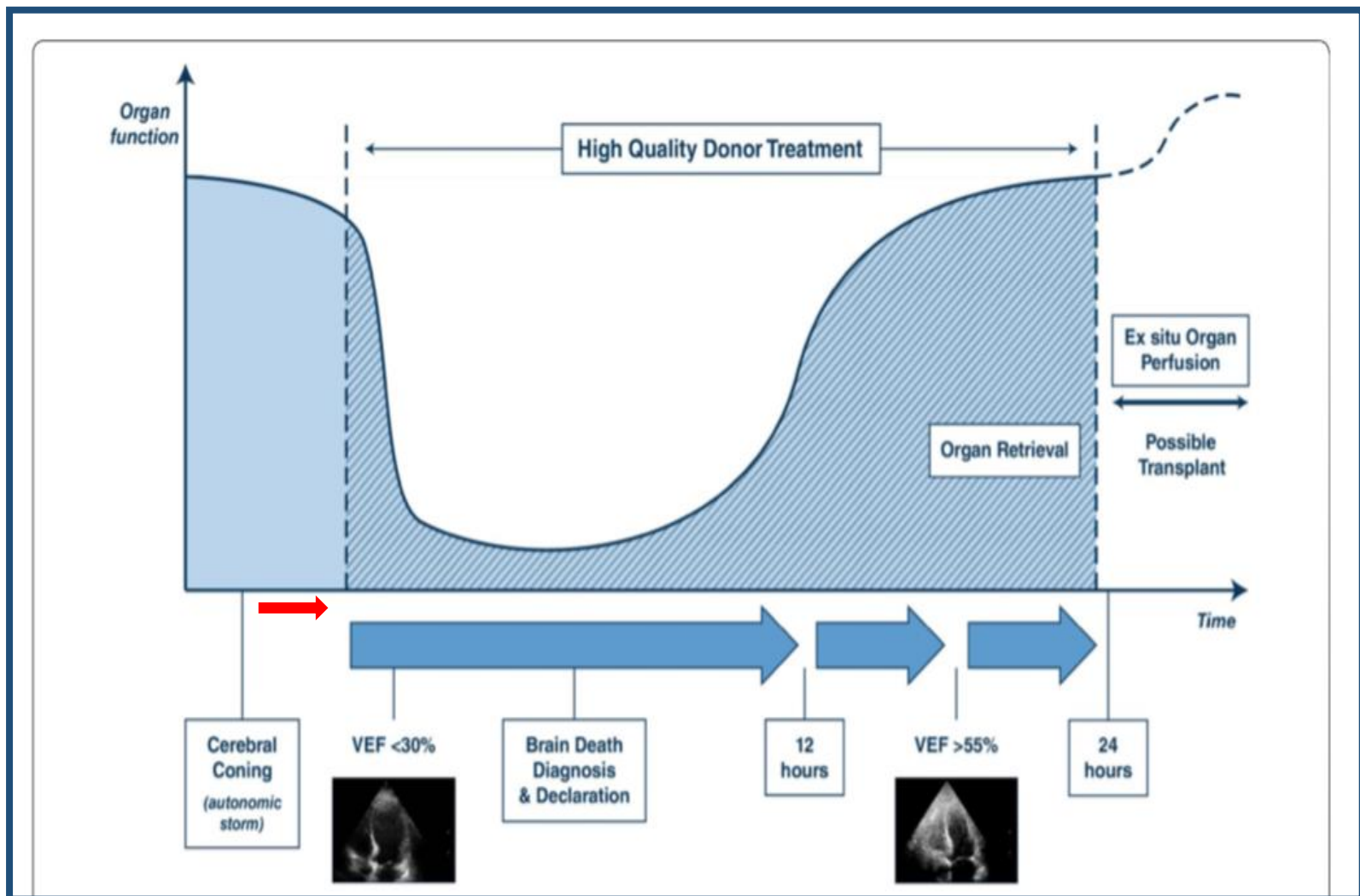


Recuperação da função do órgão relacionada ao tempo após a morte encefálica.

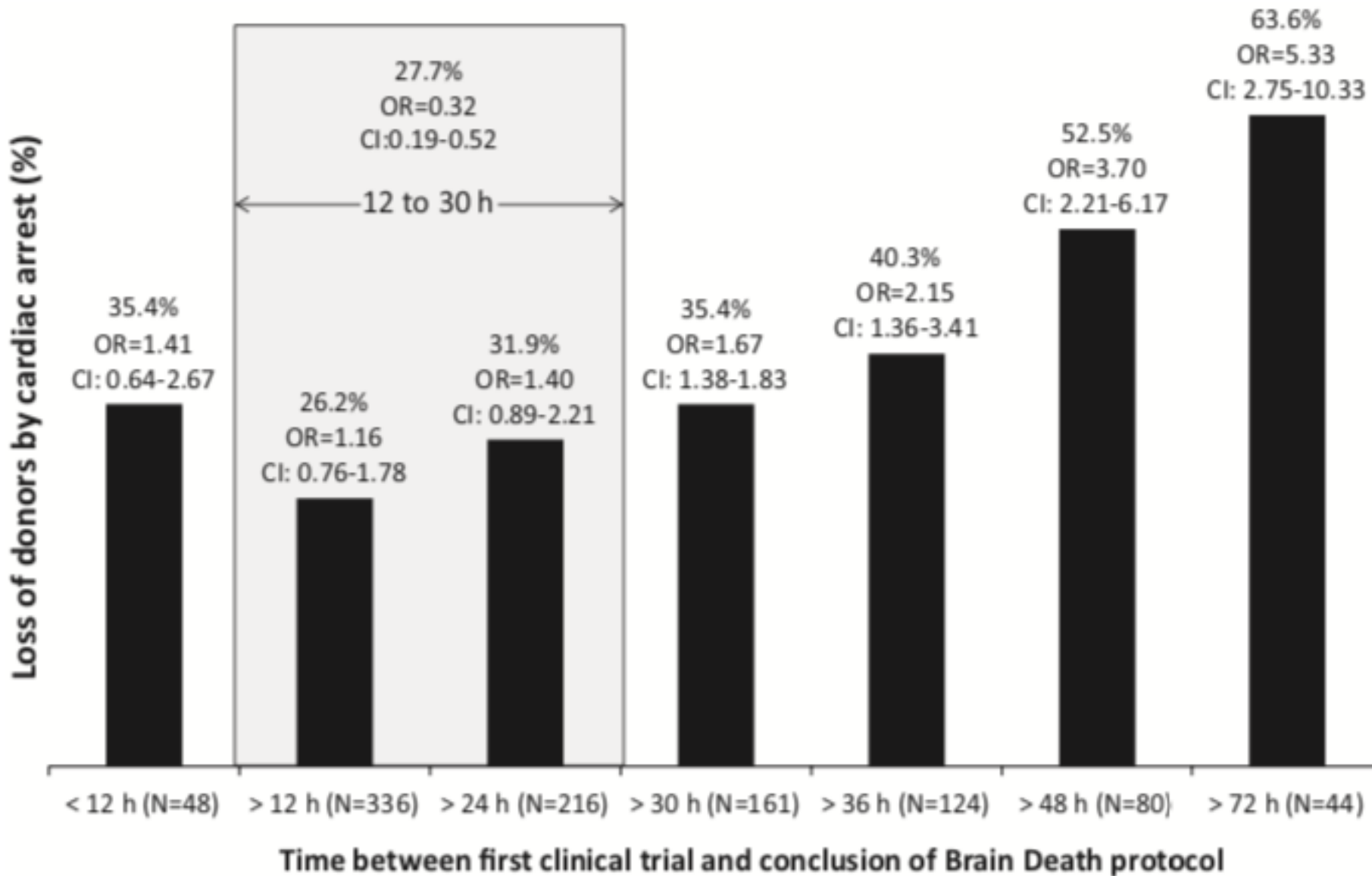


Patel MS, De La Cruz S, Sally MB et al (2017) Active donor management during the hospital phase of care is associated with more organs transplanted per donor. *J Am Coll Surg* 225:525–531.

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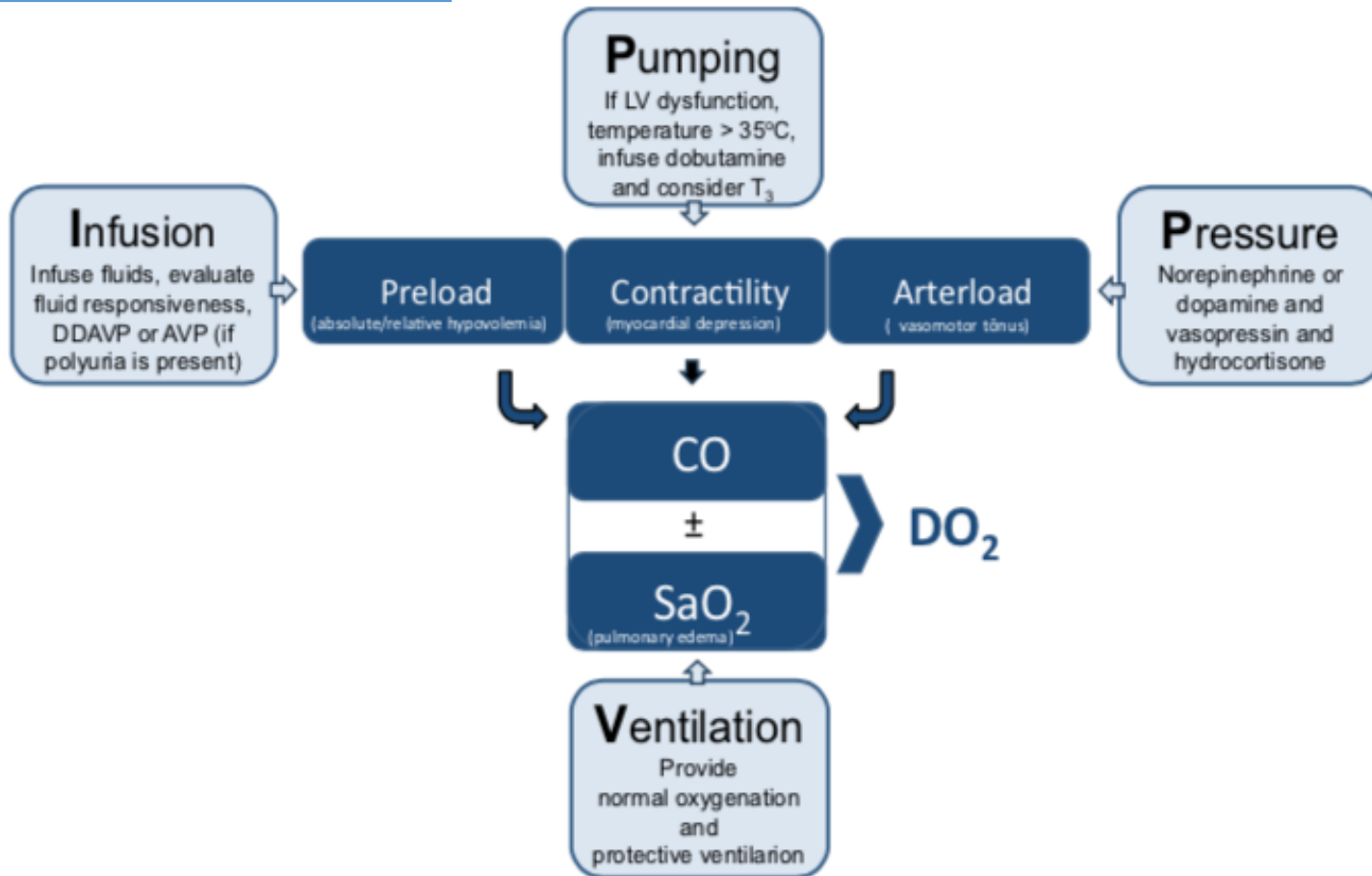
ORIGINAL ARTICLE

WILEY | **Clinical TRANSPLANTATION**

The effect of brain death protocol duration on potential donor losses due to cardiac arrest

Glauco Adriano Westphal^{1,2} | Tiago Amaral Slaviero² | Artur Montemezzo² | Gabriel Torres Lingardi² | Fernanda Carolina Cani de Souza² | Tiago Costa Carnin¹ | Diego Roberto Soares¹ | Alisson Hideto Hachiya² | Leticia Lopes Ferraz² | Joel de Andrade¹

VIP - Protocol



Westphal GA (2016) A simple bedside approach to therapeutic goals achievement during the management of deceased organ donors—an adapted version of the “VIP” approach. Clin Transpl 30:138–144.



Morte encefálica: tempos de execução, teste de apneia e características do potencial doador

Hospital das Clínicas – Unicamp

Talita M Sansoni , Maria Valeria de Omena Athayde , Luciana Aparecida dos Santos , Rafaela Batista dos Santos Pedrosa
Helder José leads Zambelli , Luis Antonio C. Sardinha , Venâncio P. Dantas Filho, António Eiras Falcão

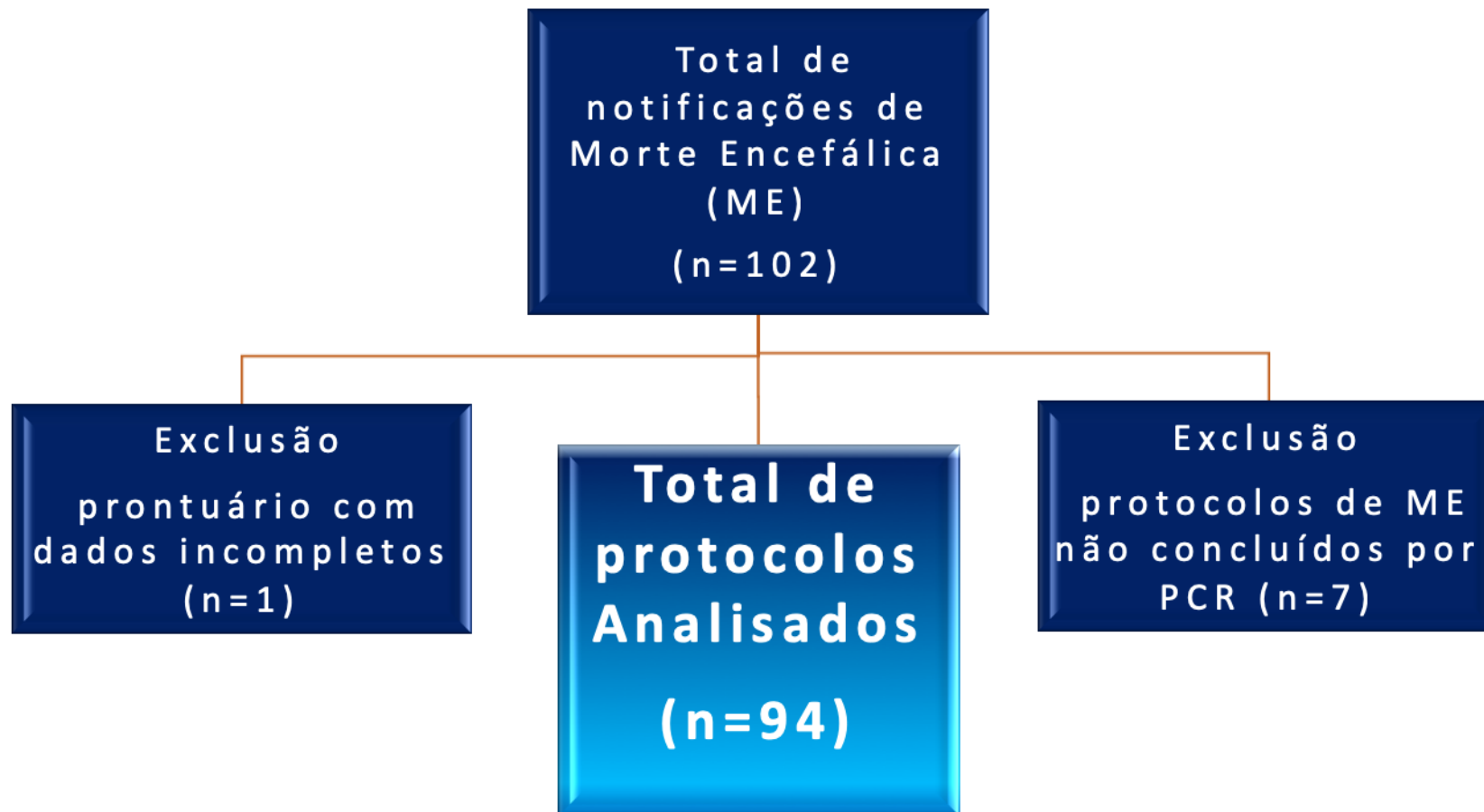


MÉTODOS

- Coorte de pacientes admitidos na UTI-HC-UNICAMP
- Banco de dados eletrônico de registro contínuo da UTI/HC- Unicamp e prontuários do setor de Organização e Procura de Órgãos (OPO) do HC_UNICAMP
- Protocolos de ME realizados na UTI no período de **2010 a 2017**



RESULTADOS



RESULTADOS

- Feminino (n=34) 36%
- Masculino (n=60) 64%
- SOFA 7 ± 3
- APACHE 19 ± 6



RESULTADOS

Drogas vasoativas (n=86)

Noradrenalina N=82 (95%) TPME 15±9h	Vasopressina N=24 (28%) TPME 15±9h	Dopamina N=2 (2%) TPME 13±5h	SOFA 8±3 APACHE 18±4
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UNICAMP

		O2 Pré 1º	CO2 Pré 1º	Sat O2 Pré 1º	pH Pré 1º	O2 Pós 1º	CO2 Pós 1º	Sat O2 Pós 1º	pH Pós 1º
N	Válido	93	Diferença de PaO2 = 52 mmHg em 10 minutos Diferença de PaCO2 = 40 mmHg em 10 minutos pH foi de 7,34 para 7,11						
	Ausente	7							
Média		242,705							
Mediana		243,000							
Desvio Padrão		116,2287	11,1293	3,3758	,100678	113,41208	16,5117	9,2079	,081492
Percentis	25	139,000	35,700	98,800	7,28000	100,2500	70,700	93,375	7,06000
	50	243,000	41,500	99,600	7,34000	191,0000	81,800	98,700	7,11000
	75	346,500	49,100	99,900	7,41500	282,5000	93,300	99,275	7,17000



UNICAMP

Statistics

		O2 Pré 2°	CO2 Pré 2°	Sat O2 Pré 2°	pH Pré 2°	O2 Pós 2°	CO2 Pós 2°	Sat O2 Pós 2°	pH Pós 2°
N	Valid	85	85	85	85	84	87	84	84
	Missing	Diferença de PaO2 = 77 mmHg em 10 minutos							14
Mean		Diferença de PaCO2 = 41 mmHg em 10 minutos							7,1033
Median		pH foi de 7,34 para 7,09							7,0950
Std. Deviation		107,014	11,1382	1,5655	,0918	119,424	19,987	15,1896	,10189
Percentiles	25	157,00	37,000	98,950	7,270	82,40	70,00	89,775	7,0400
	50	248,00	42,800	99,500	7,340	171,50	83,60	98,650	7,0950
	75	332,00	49,450	99,850	7,400	286,00	94,90	99,300	7,1775

The apnea test in brain death determination using oxygen diffusion method remains safe

Ali Daneshmand, MD, Alejandro A. Rabinstein, MD, and Eelco F.M. Wijdicks, MD, PhD

Neurology® 2019;92:1-2. doi:10.1212/WNL.0000000000006963

Correspondence

Dr. Wijdicks

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Methods

We studied records of 147 patients (age >16 years) referred to our organ donation agency from 2008 to 2018. Apnea testing followed the American Academy of Neurology (AAN) guideline.⁵ Patients were preoxygenated with 100% oxygen and advanced oxygen insufflation cannula at 6 L/min. Apnea testing was only commenced after a $P_aO_2 > 200$ mm Hg and a P_aCO_2 between 35 and 45 mm Hg. Hypotension was defined as a systolic blood pressure of <90 mm Hg and hypoxia was defined as $P_aO_2 < 60$ mm Hg. A paired *t* test compared blood pressure, pH, P_aCO_2 , and P_aO_2 before and after apnea testing. The Mayo Clinic institutional review board reviewed this study.

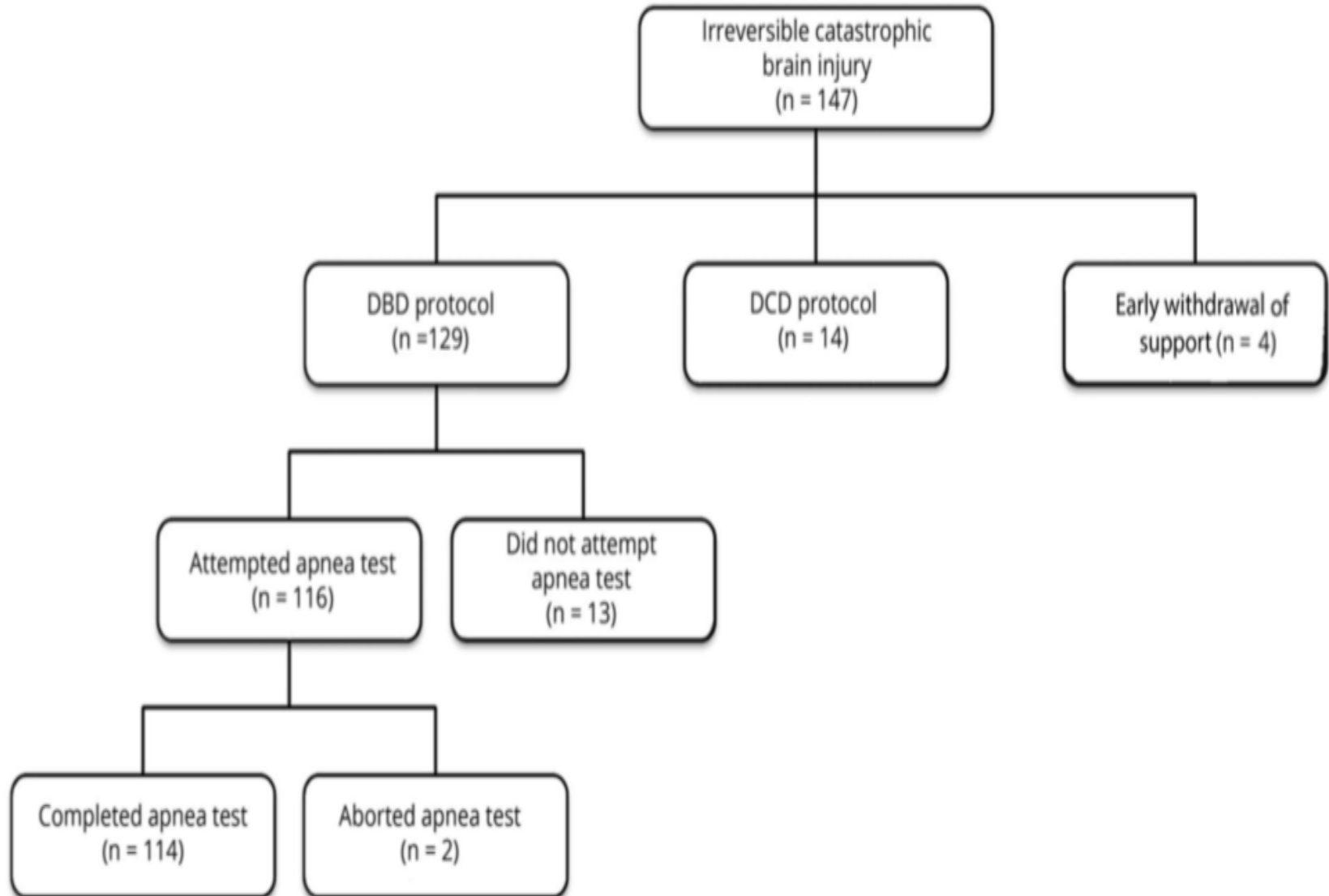
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Results

The apnea test was successfully completed in 114 patients. Prior to apnea testing, median and interquartile range (IQR) for arterial pH, PaCO₂, and PaO₂ were 7.38 (IQR 0.10), 41 (IQR 10) mm Hg, and 299 (IQR 197) mm Hg, and, following the test, changed to arterial pH of 7.18

Diferença de PaCO₂ = 31 mmHg

pH foi de 7,38 para 7,18

Todos com DVA sendo 16% iniciaram DVA no Teste de apneia e 30% aumento de DVA durante o teste

patients (16%) were not on pressors prior to apnea testing. In 39 patients (30%), an increase in

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Conclusões



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OBRIGADO