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NEMOCNICE TOMÁŠE BATI VE ZLÍNĚ

ZDRAVOTNICKÁ ZÁCHRANNÁ SLUŽBA ZLÍNSKÉHO KRAJE

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ARIM KNTB Zlín

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No conflict of interest

Osnova

- Perkins GD et al. The effects of adrenaline in out of hospital cardiac arrest with shockable and non-shockable rhytms: Findings from the PACA and PARAMEDIC-2 randomised control trials. Resuscitation 2019.
- Vargas M et al. Epinephrine for out of hospital cardiac arrest: A systematic review and meta-analysis of randomized controlled trials. Resuscitation 2019.
- Holmberg MJ et al. Vasopressors during adult cardiac arrest: A systematic review and meta-analysis.
- Lundin A et al. Adrenaline, ROSC and survival in patients resuscitated from in-hospital cardiac arrest. Resuscitation 2019.
- Fothergill RT et al. Repeated adrenaline doses and survival from an out-of-hospital cardiac arrest. Resuscitation 2019.
- Chen Z et al. Clinical Efficacy of Extracorporeal Cardiopulmonary Resuscitation for Adults with Arrest: Meta-Analysis with Trial Sequential Analysis. Biomed Res Ing. 2019.
- Chang MP et al. Association of ventilation with outcomes from out-of-hospital cardiac arrest. Resuscitation 2019.
- Soar J et al. European Resuscitation Council Guidelines for Resuscitation: 2018 Update – Antiarrhythmic drugs for cardiac arrest. Resuscitation 2019.
- Hope Kilgannon J et al. Partial pressure of arterial carbon dioxide after resuscitation from cardiac arrest and neurological outcome: A prospective multi-center protocol-directed cohort study. Resuscitation 2019.
- Evald L. Prolonged targeted temperature management reduces memory retrieval deficits six months post-cardiac arrest: A randomised controlled trial. Resuscitation 2019.

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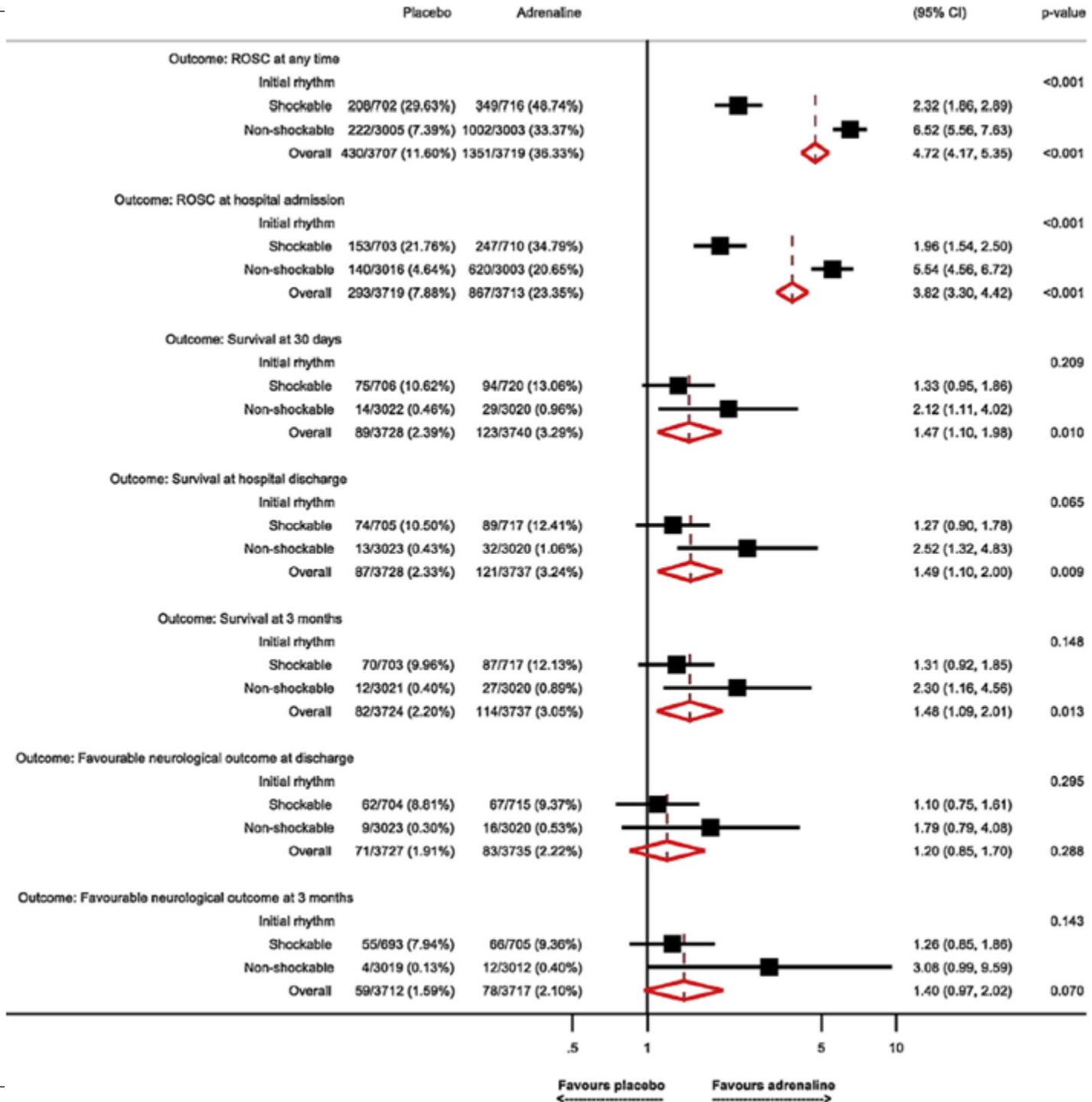
The effects of adrenaline in out of hospital cardiac arrest with shockable and non-shockable rhythms: Findings from the PACA and PARAMEDIC-2 randomised controlled trials

Gavin D. Perkins[a,b,], Claire Kenna[a], Chen Ji[a], Charles D. Deakin[c,d], Jerry P. Nolan[a,e], Tom Quinn[f], Rachael Fothergill[g], Imogen Gunson[h], Helen Pocock[c], Nigel Rees[i], Karl Charlton[j], Judith Finn[k], Simon Gates[l], Ranjit Lall[a]*

Resuscitation. 2019 Jul; 140: 55-63.

7 848 pacientů


Placebo
Adrenaline
(95% CI)
p-value
Outcome: ROSC at any time
Initial rhythm
<0.001
Shockable 208/702 (29.63%) 349/716 (48.74%) 2.32 (1.86, 2.89)
Non-shockable 222/3005 (7.39%) 1002/3003 (33.37%) 6.52 (5.56, 7.63)
Overall 430/3707 (11.60%) 1351/3719 (36.33%) 4.72 (4.17, 5.35) <0.001
Outcome: ROSC at hospital admission
Initial rhythm
<0.001
Shockable 153/703 (21.76%) 247/710 (34.79%) 1.96 (1.54, 2.50)
Non-shockable 140/3016 (4.64%) 620/3003 (20.65%) 5.54 (4.56, 6.72)
Overall 293/3719 (7.88%) 867/3713 (23.35%) 3.82 (3.30, 4.42) <0.001
Outcome: Survival at 30 days
Initial rhythm
0.209
Shockable 75/706 (10.62%) 94/720 (13.06%) 1.33 (0.95, 1.86)
Non-shockable 14/3022 (0.46%) 29/3020 (0.96%) 2.12 (1.11, 4.02)
Overall 89/3728 (2.39%) 123/3740 (3.29%) 1.47 (1.10, 1.98) 0.010
Outcome: Survival at hospital discharge
Initial rhythm
0.065
Shockable 74/705 (10.50%) 89/717 (12.41%) 1.27 (0.90, 1.78)
Non-shockable 13/3023 (0.43%) 32/3020 (1.06%) 2.52 (1.32, 4.83)
Overall 87/3728 (2.33%) 121/3737 (3.24%) 1.49 (1.10, 2.00) 0.009
Outcome: Survival at 3 months
Initial rhythm
0.148
Shockable 70/703 (9.96%) 87/717 (12.13%) 1.31 (0.92, 1.85)
Non-shockable 12/3021 (0.40%) 27/3020 (0.89%) 2.30 (1.16, 4.56)
Overall 82/3724 (2.20%) 114/3737 (3.05%) 1.48 (1.09, 2.01) 0.013
Outcome: Favourable neurological outcome at discharge
Initial rhythm
0.295
Shockable 62/704 (8.81%) 67/715 (9.37%) 1.10 (0.75, 1.61)
Non-shockable 9/3023 (0.30%) 16/3020 (0.53%) 1.79 (0.79, 4.08)
Overall 71/3727 (1.91%) 83/3735 (2.22%) 1.20 (0.85, 1.70) 0.288
Outcome: Favourable neurological outcome at 3 months
Initial rhythm
0.143
Shockable 55/693 (7.94%) 66/705 (9.36%) 1.26 (0.85, 1.86)
Non-shockable 4/3019 (0.13%) 12/3012 (0.40%) 3.08 (0.99, 9.59)
Overall 59/3712 (1.59%) 78/3717 (2.10%) 1.40 (0.97, 2.02) 0.070
.5
1
5
10
Favours placebo
Favours adrenaline

Epinephrine for out of hospital cardiac arrest: A systematic review and meta-analysis of randomized controlled trials.

Maria Vargas, Pasquale Buonanno, Carmine Iacovazzo, Giuseppe Servillo.

Resuscitation. 2019 Mar; 136: 54-60.

Vasopressor during adult cardiac arrest: A systematic review and meta-analysis.

Mathias J. Holmberg, Mahmoud S. Issa, Ari Moskowitz, Peter Morlex, Michelle Welsford, Robert W. Neumar, Edison F. Paiva, Amin Coker, Christopher K. Hansen, Lars W. Andersen, Michael W. Donnino, Katherine M. Berg, on behalf of the International Liaison Committee on Resuscitation Advanced Life Support Task Force Collaborators.

Resuscitation. 2019 Jun; 139: 106-121.

20 716 pacientů

Adrenaline, ROSC and survival in patients resuscitated from in-hospital cardiac arrest.

Andreas Lundin, Christian Rylander, Thomas Karlsson, Johan Herlitz, Peter Lungren.

Resuscitation. 2019 Jul; 140: 64-71.

6 033 pacientů

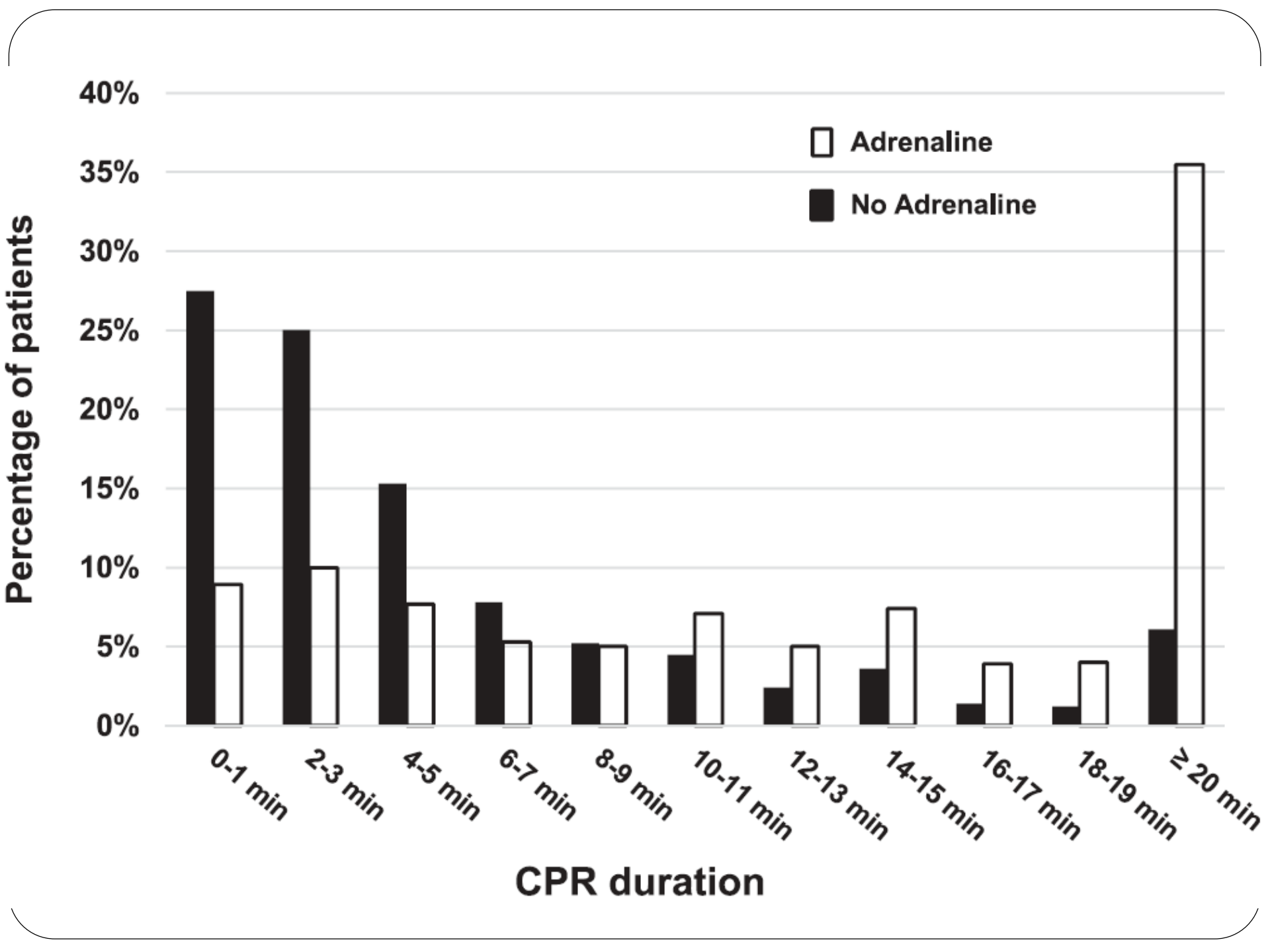
	Adrenalin	Bez adrenalinu	p
ROSC defibrilovatelné	72 %	98 %	< 0,0001
ROSC nedefibrilovatelné	50 %	65 %	< 0,0001
30-d přežití def.	30 %	85 %	< 0,0001
30-d přežití nedef.	12 %	48 %	< 0,0001
Neurologický out. def.	22 %	80 %	< 0,0001
Neurologický out. nedef.	8 %	41 %	< 0,001

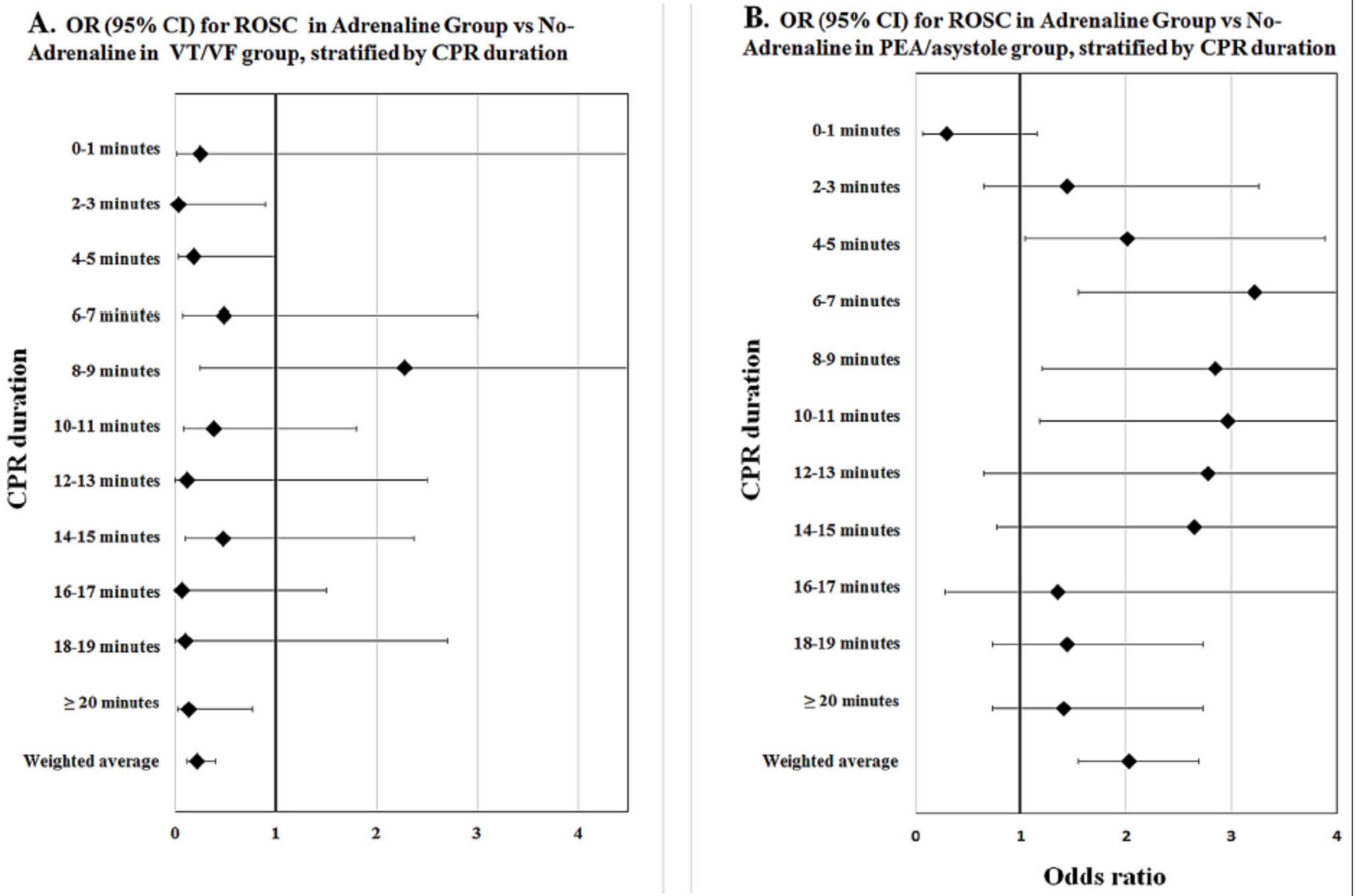
	Adrenaline			
	All patients (n = 6033)	Yes (n = 4055)	No (n = 1978)	Standardized difference
Emergency department	717 (11.9)	492 (12.1)	225 (11.4)	0.02
General wards	2927 (48.5)	2105 (51.9)	822 (41.6)	0.21
Intermediary wards	26 (0.4)	14 (0.3)	12 (0.6)	0.04
Lab, X-ray, polyclinic,	256 (4.2)	174 (4.3)	82 (4.1)	0.01
Other	113 (1.9)	65 (1.6)	48 (2.4)	0.06
Witnessed (1.5)	4779 (80.5)	3113 (78.0)	1666 (85.5)	0.20
ECG monitored (1.5)	3127 (52.6)	1920 (48.2)	1207 (61.6)	0.27
Initial rhythm				
VF/VT	1356 (22.5)	541 (13.3)	815 (41.2)	0.66
PEA/Asystole	3410 (56.5)	2792 (68.9)	618 (31.2)	0.81
Unknown	1267 (21.0)	722 (17.8)	545 (27.6)	0.23
CPR duration (minutes) (17.7)	14 (2, 37)	19 (6, 44)	3 (1, 15)	1.69
Delay (minutes)				
Collapse to start of CPR (9.5)	0 (0,1)	0 (0,2)	0 (0,1)	0.06
Collapse to ECG recording (42.4)	0 (0,5)	0 (0,5)	0 (0,3)	0.33
Collapse to first defibrillation[b] (10.1)	1 (0,5)	2 (0,6)	1 (0,3)	1.19
No. of defibrillations[b] (2.8)	1 (1,5)	3 (1,7)	1 (1,3)	0.71
Treatment				
Intubation (1.5)	3049 (51.3)	2821 (71.1)	228 (11.6)	1.52
Antiarrhythmics (4.2)	804 (13.9)	584 (15.2)	220 (11.3)	0.11
Acidosis (4.5)	750 (13.0)	728 (19.1)	22 (1.1)	0.62
Defibrillation				
Of all patients (1.5)	1833 (30.8)	1041 (26.2)	792 (40.3)	0.30
Of VF/VT patients (0.3)	1272 (94.2)	521 (96.8)	751 (92.4)	0.20
Of PEA/Asystole patients (0.8)	403 (12.0)	393 (14.3)	10 (1.3)	0.48
Of patients with unknown rhythm (2.6)	158 (12.8)	127 (18.3)	31 (5.7)	0.39

Results presented as number (percentage) or median (10th, 90th percentile).

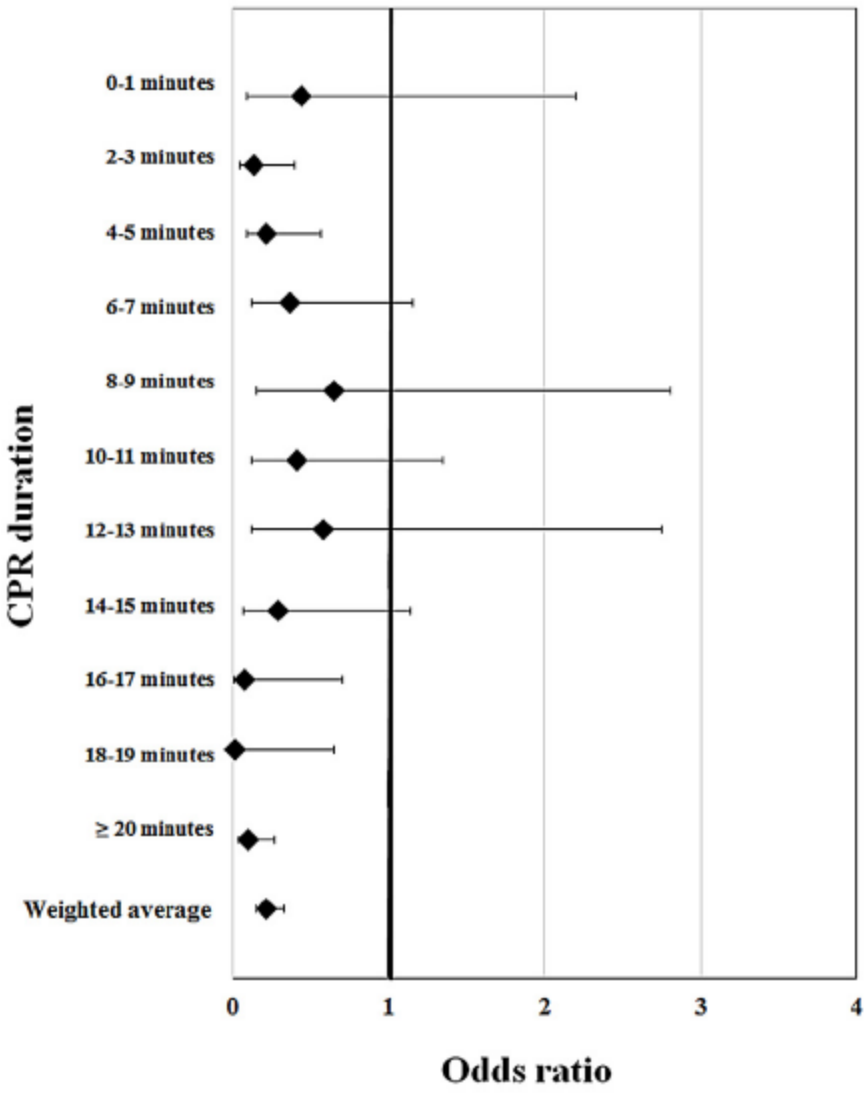
[a] Percentage of patients where information was missing.

[b] Of defibrillated patients with VF/VT as initial rhythm.

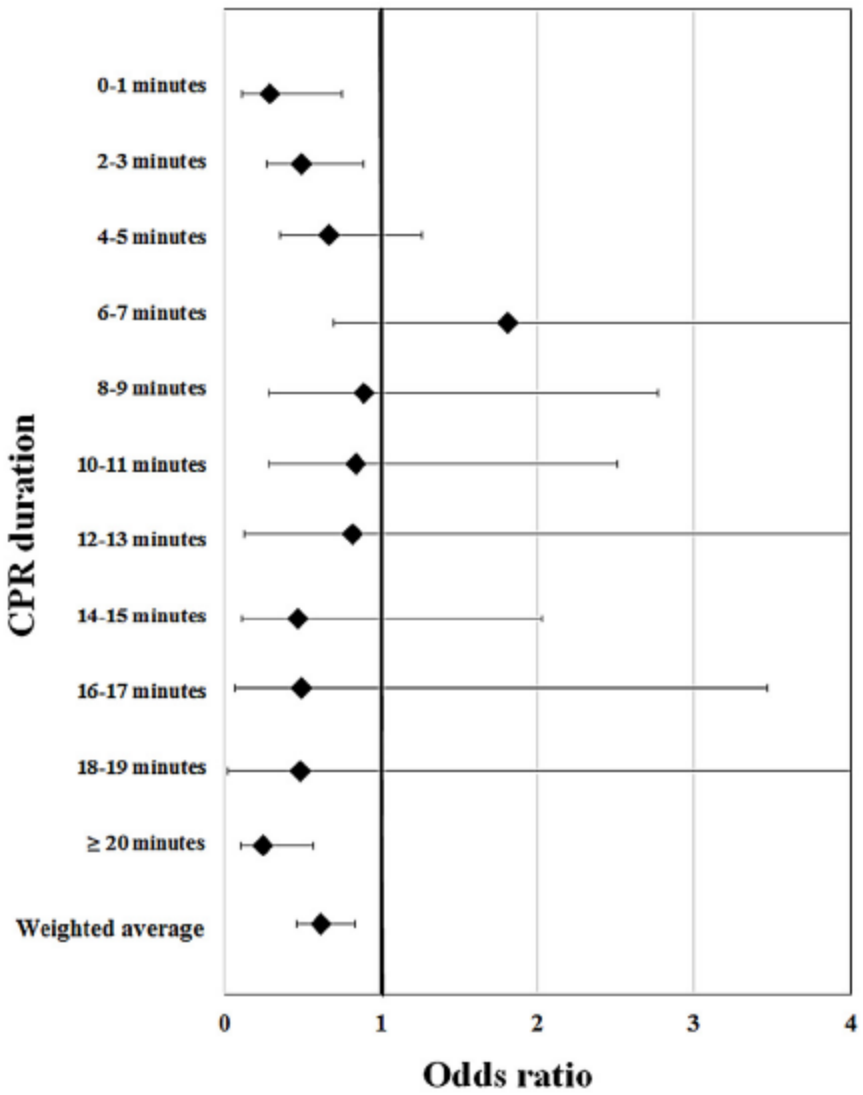

40%
35%
30%
25%
20%
15%
10%
5%
0%
Percentage of patients
Adrenaline
No Adrenaline
0-1 min
2-3 min
4-5 min
6-7 min
8-9 min
10-11 min
12-13 min
14-15 min
16-17 min
18-19 min
≥ 20 min
CPR duration


A. OR (95% CI) for ROSC in Adrenaline Group vs No-Adrenaline in VT/VF group, stratified by CPR duration
CPR duration
0-1 minutes
2-3 minutes
4-5 minutes
6-7 minutes
8-9 minutes
10-11 minutes
12-13 minutes
14-15 minutes
16-17 minutes
18-19 minutes
≥ 20 minutes
Weighted average
0
1
2
3
4
B. OR (95% CI) for ROSC in Adrenaline Group vs No-Adrenaline in PEA/asystole group, stratified by CPR duration
CPR duration
0-1 minutes
2-3 minutes
4-5 minutes
6-7 minutes
8-9 minutes
10-11 minutes
12-13 minutes
14-15 minutes
16-17 minutes
18-19 minutes
≥ 20 minutes
Weighted average
0
1
2
3
4
Odds ratio

C. OR (95% CI) for 30-day survival in Adrenaline Group vs No-Adrenaline in VT/VF group, stratified by CPR duration



D. OR (95% CI) for 30-day survival in Adrenaline Group vs No-Adrenaline in PEA/asystole group, stratified by CPR duration



Repeated adrenaline doses and survival from an out-of-hospital cardiac arrest

Rachael T. Fothergill[a,g,], Amber C. Emmerson[a], Rajeshwari Iyer[a], Johanna Lazarus[a], Mark Whitbread[b], Jerry P. Nolan[c,d,g], Charles D. Deakin[e,f], Gavin D. Perkins[g,h]*

Resuscitation. 2019 May; 138: 316-321.

3151 pacientů

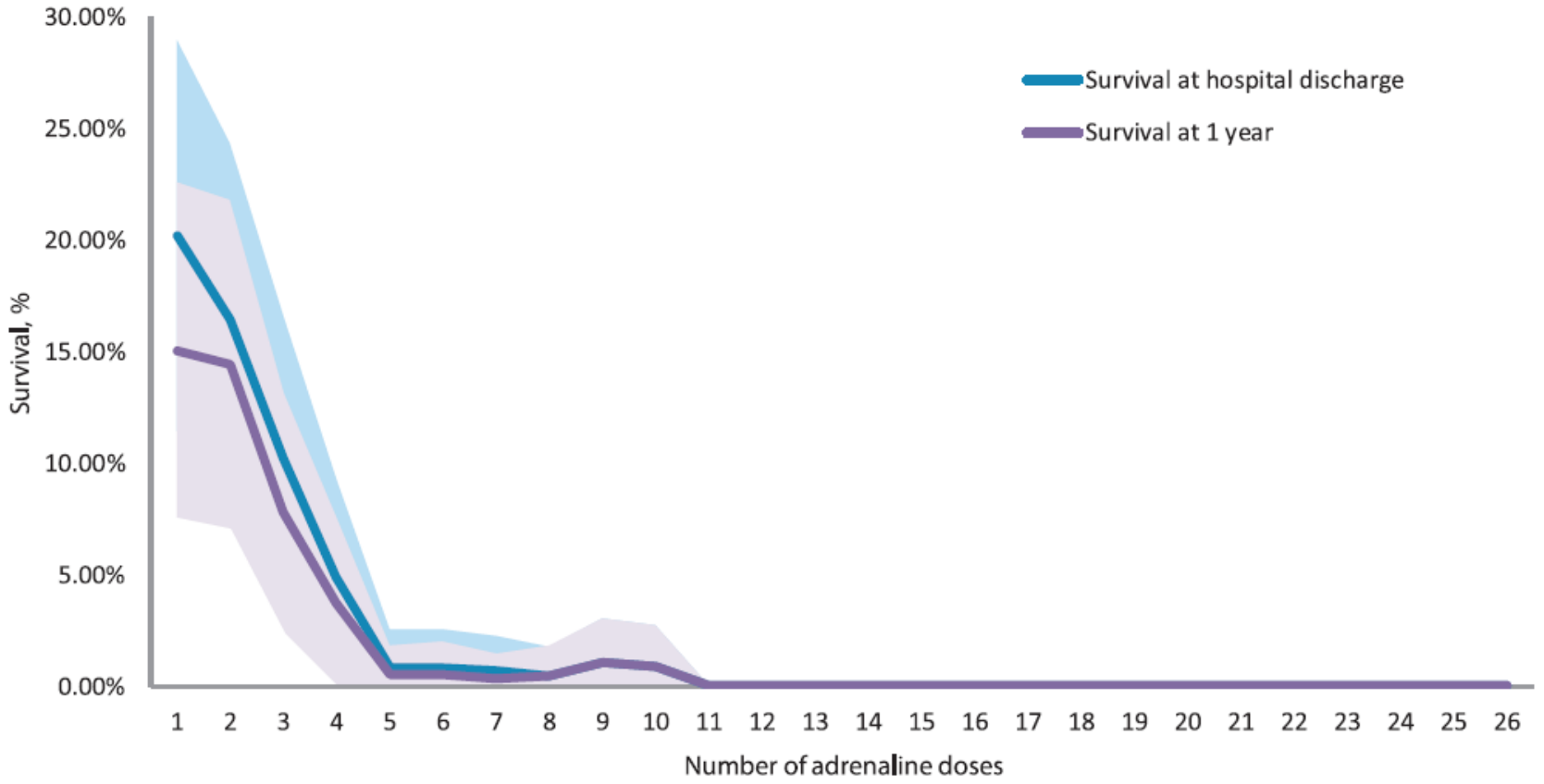


Fig. 2 – Relationship between the number of adrenaline doses and percentage survival to hospital discharge and survival to 1-year post-arrest. Shaded regions represent 95% confidence interval. 33 unknown outcomes were excluded from analysis.

4 pacienti dostali více než 8 dávek adrenalinu

- První dávka adrenalinu u všech do 13 minut od zahájení KPR
- U všech ETCO2 nad 20 mmHg
- 3 pacienti měli intermitentní ROSC během KPR
- 3 pacienti měli AIM a byli trasportování přímo na PCI

Table 2 – Adjusted odds ratios (AOR) for survival to hospital discharge and 1 year post-arrest. Multivariate analysis was used to control for potential confounders listed on Table 1.

	AOR (95% CI)[a]	*p*-value
Outcome at hospital discharge		
1 dose of adrenaline	Reference	(–)
2 doses of adrenaline	0.7 (0.39, 1.28)	0.67
≥3 doses of adrenaline	0.15 (0.09, 0.26)	<0.0001
Initial shockable rhythm (not present)	Reference	(–)
Initial shockable rhythm (present)	9.83 (6.1, 15.86)	<0.0001
Age	0.96 (0.95, 0.97)	<0.0001
Sex (Male)	Reference	(–)
Sex (Female)	2.98 (1.66, 5.33)	0.0002
Outcome at 1 year		
1 dose of adrenaline	Reference	(–)
2 doses of adrenaline	0.85 (0.46, 1.62)	0.62
≥3 doses of adrenaline	0.18 (0.1, 0.33)	<0.0001
Initial shockable rhythm (not present)	Reference	(–)
Initial shockable rhythm (present)	14.27 (8.26, 24.6)	<0.0001
Age	0.96 (0.95, 0.98)	<0.0001
Sex (Male)	Reference	(–)
Sex (Female)	2.49 (1.36, 4.58)	0.003

SD, standard deviation; CI, confidence interval.

[a] An adjusted odds ratio above 1.0 favors survival.

Sigal AP. Impact of adrenaline dose and timing on out-of-hospital cardiac arrest survival and neurological outcomes. Resuscitation 2019.

Review Article

Clinical Efficacy of Extracorporeal Cardiopulmonary Resuscitation for Adults with Cardiac Arrest: Meta-Analysis with Trial Sequential Analysis

Zhen Chen,[1] **Changzhi Liu**,[1] **Jiequn Huang**,[1] **Peiling Zeng**,[1] **Jingcheng Lin**,[1] **Ruiqiu Zhu**,[1] **Jianhai Lu**,[1] **Zhujiang Zhou**,[1] **Liuer Zuo**,[1] **and Genglong Liu**[2]

Biomed Res Int. 2019 Jul 9; 2019:6414673

Study(year)	Nation	Study design	OHCA/IHCA	Patients (N.)	Male (%)	Mean age ECPR/CCPR (years)
Blumenstein (2015)	Germany	CS and PSM	IHCA	104	56.7	72/73
Chen (2008)	Taiwan	CS and PSM	IHCA	92	85.9	57/55
Choi (2016)	Korea	CS and PSM	OHCA	640	81	56/58
Chou (2014)	Taiwan	CS	IHCA	66	86.4	60.5/69.6
Kim (2014)	Korea	CS and PSM	OHCA	104	76.5	54/54
Lee (2015)	Korea	CS	IHCA and OHCA	955	64.9	59.0/63.5
Lin (2010)	Taiwan	CS and PSM	IHCA	54	81.5	59/60
Maekawa (2013)	Japan	CS and PSM	OHCA	48	79.2	57/57
Sakatomo (2014)	Japan	CS	OHCA	454	89.6	56.3/58.1
Schober (2017)	Austria	CS	OHCA	239	74	46/60
Shin (2011)	Korea	CS and PSM	IHCA	90	64.7	63.5/61.5
Shin (2013)	Korea	CS and PSM	IHCA	120	64.2	60.8/60.5
Siao (2015)	Taiwan	CS	IHCA and OHCA	60	76.7	54.6/60.3

	RR	95 % CI	TSA*	GRADE
30-denní přežití	1,6	1,25-2,06	+	Low
30-denní neurologický outcome	2,69	1,63-4,46	+	Low
3-6 měsíců přežití	2,59	1,71-3,93	+	Moderate
3-6 měsíců dobrý neurologický outcome	4,21	2,47-7,16	+	Moderate
1 roční přežití	1,86	1,29-2,68	+	Low
1 roční dobrý neurologický outcome	2,43	1,48-3,99	+	Moderate

*Trial Sequentila Analysis

	RR	95 % CI	TSA	GRADE
OHCA: 30-denní přežití	1,18	0,71-1,97	+	Very low
IHCA: 30-denní přežití	1,9	1,43-2,52	+	Low
OHCA: 30-denní dobrý neurologický outcome	3,93	1,00-15,5	-	Very low
IHCA: 30-denní dobrý neurologický outcome	2,02	1,21-3,39	+	Moderate

*Trial Sequentila Analysis

NEMOCNICE TOMÁŠE BATI VE ZLÍNĚ

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Association of ventilation with outcomes from out-of-hospital cardiac arrest

Mary P. Chang[a], Yuanzheng Lu[b], Brian Leroux[c], Elisabete Aramendi Ecenarro[d], Pamela Owens[a], Henry E. Wang[e], Ahamed H. Idris[a,]*

Resuscitation. 2019 Aug; 174-181: .

560 pacientů

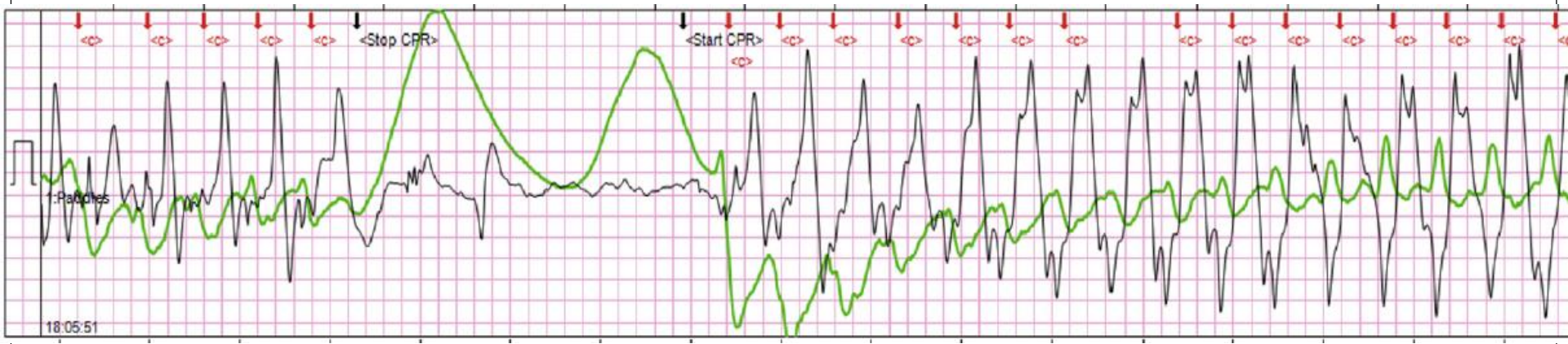

Table 1 – Demographics of study participants, chest compression and ventilation quality factors, initial cardiac rhythm, and outcomes by ventilation group: ventilation in less than 50% of pauses vs. ventilation in ≥ 50% of pauses.

	<50% of pauses with ventilation (N = 424)	≥50% of pauses with ventilation (N = 136)	p=
Outcomes			
Prehospital ROSC (%)	37 (8.7)	27 (19.8)	0.0009
ED ROSC (%)	89 (21.0)	45 (33.1)	0.0054
Any ROSC (%)	96 (22.6)	48 (35.3)	0.0047
Survival (%)	17 (4.0)	14 (10.3)	0.008
mRs ≤3 (%)	9 (2.1)	7 (5.1)	0.078

Interquartile range (IQR); Ventricular tachycardia (VT); Ventricular fibrillation (VF); Pulseless electrical activity (PEA); Return of spontaneous circulation (ROSC); Emergency department (ED), modified Rankin score (mRs).

Table 2 – Multiple logistic regression analysis of the association between patients who received ≥ one ventilation in at least 50% of pauses and out-of-hospital cardiac arrest outcomes. The multivariable model was adjusted for age, sex, initial cardiac rhythm, witnessed status, bystander CPR, location, and 911 call to emergency medical services arrival time interval.

Outcome	Unadjusted analysis Odds ratio (95% confidence interval)	Adjusted analysis Odds ratio (95% confidence interval)
ROSC at ED	2.68 (1.56–4.62)	2.84 (1.47–5.48)
Survival to hospital Admission	1.90 (1.24–2.92)	1.92 (1.15–3.22)
Survival to discharge	2.93 (1.39–6.18)	2.13 (0.83–5.47)
Favorable neurological Outcome (mRs ≤ 3)	2.92 (1.04–8.20)	4.14 (1.14–15.05)

Return of spontaneous circulation (ROSC); Emergency department (ED); Modified Rankin Score (mRs).

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ZDRAVOTNICKÁ ZÁCHRANNÁ SLUŽBA ZLÍNSKÉHO KRAJE

European Resuscitation Council Guidelines for Resuscitation: 2018 Update– Antiarrhythmic drugs for cardiac arrest

Jasmeet Soar *, *Gavin D. Perkins*, *Ian Maconochie*, *Bernd W. Böttiger*, *Charles D. Deakin*, *Claudio Sandroni*, *Theresa M. Olasveengen*, *Jonathan Wyllie*, *Robert Greif*, *Andrew Lockey*, *Federico Semeraro*, *Patrick Van de Voorde*, *Carsten Lott*, *Leo Bossaert*, *Koenraad G. Monsieurs*, *Jerry P. Nolan*, *on behalf of the European Resuscitation Council*

Resuscitation. 2019; 134: 99-103

Table 1 – Summary of ILCOR CoSTR and ERC Guidelines 2018– the role of antiarrhythmic drugs during advanced life support. The Table indicates changes to ERC Guidelines.

Topic	ILCOR CoSTR 2018	ERC Guideline 2015	ERC 2018 Guideline change
Antiarrhythmic drugs for cardiac arrest in adults	We suggest the use of amiodarone or lidocaine in adults with shock-refractory VF/pVT (weak recommendation, low-certainty evidence). We suggest against the routine use of magnesium in adults with shock-refractory VF/pVT (weak recommendation, very low-certainty evidence). The confidence in effect estimates is currently too low to support an ALS Task Force recommendation about the use of bretylium, nifekalant, or sotalol in the treatment of adults in cardiac arrest with shock-refractory VF/pVT.	We recommend that amiodarone should be given after three defibrillation attempts irrespective of whether they are consecutive shocks, or interrupted by CPR, or for recurrent VF/pVT during cardiac arrest. Give amiodarone 300 mg intravenously; a further dose of 150 mg may be given after five defibrillation attempts. Lidocaine (100 mg) may be used as an alternative if amiodarone is not available or a local decision has been made to use lidocaine instead of amiodarone. An additional bolus of lidocaine 50 mg can also be given after five defibrillation attempts. We recommend that magnesium is not used routinely for the treatment of cardiac arrest.	Minor changes that show that any beneficial effects of amiodarone and lidocaine are similar.
Post-resuscitation antiarrhythmic drugs in adults	The confidence in effect estimates is currently too low to support an ALS Task Force recommendation about the use of prophylactic antiarrhythmic drugs immediately after ROSC in adults with VF/pVT cardiac arrest.	No specific guidance given	No change
Antiarrhythmic drugs for cardiac arrest in infants and children	We suggest that amiodarone or lidocaine be used in the treatment of paediatric shock-refractory VF/pVT (weak recommendation, very low-certainty evidence).	[For VF/pVT give] amiodarone 5 mg kg^{-1} after the third shock once CPR has been resumed. Give a second dose of amiodarone 5 mg kg^{-1} if still in VF/pVT after the fifth shock. Lidocaine may be used as an alternative to amiodarone. It can be used with a loading dose of 1 mg kg^{-1} (maximum dose 100 mg/dose) followed by continuous infusion at 20–50 micrograms kg^{-1} min^{-1}. There is no evidence for giving magnesium routinely during cardiopulmonary arrest.	No change

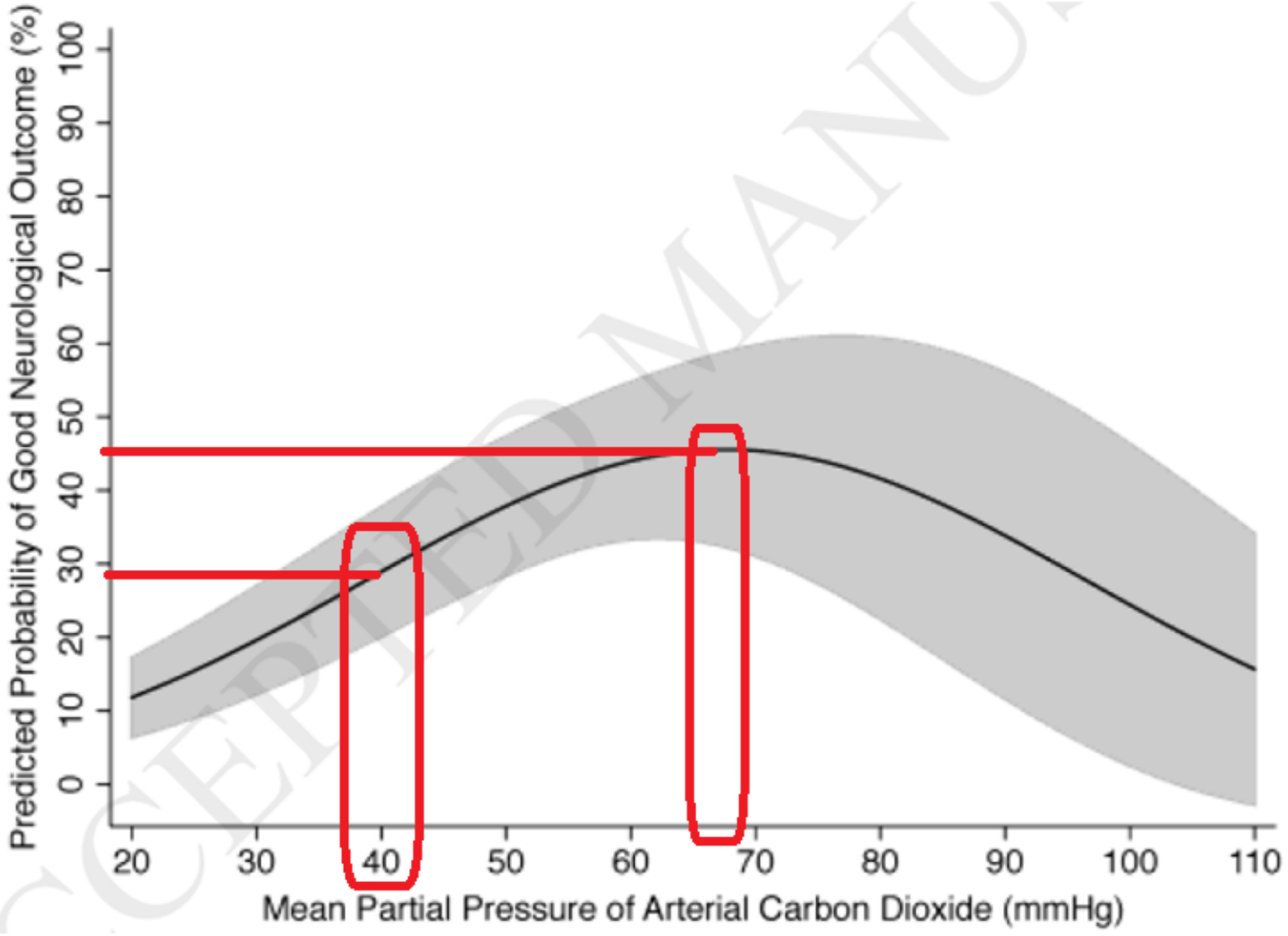
Abbreviations: ALS Advanced Life Support, CoSTR Consensus on Science and Treatment Recommendation, ERC European Resuscitation Council, ILCOR International Liaison Committee on Resuscitation, ROSC return of spontaneous circulation, VF/pVT ventricular fibrillation/pulseless ventricular tachycardia.

Partial pressure of arterial carbon dioxide after resuscitation from cardiac arrest and neurological outcome: A prospective multi-center protocol-directed cohort study.

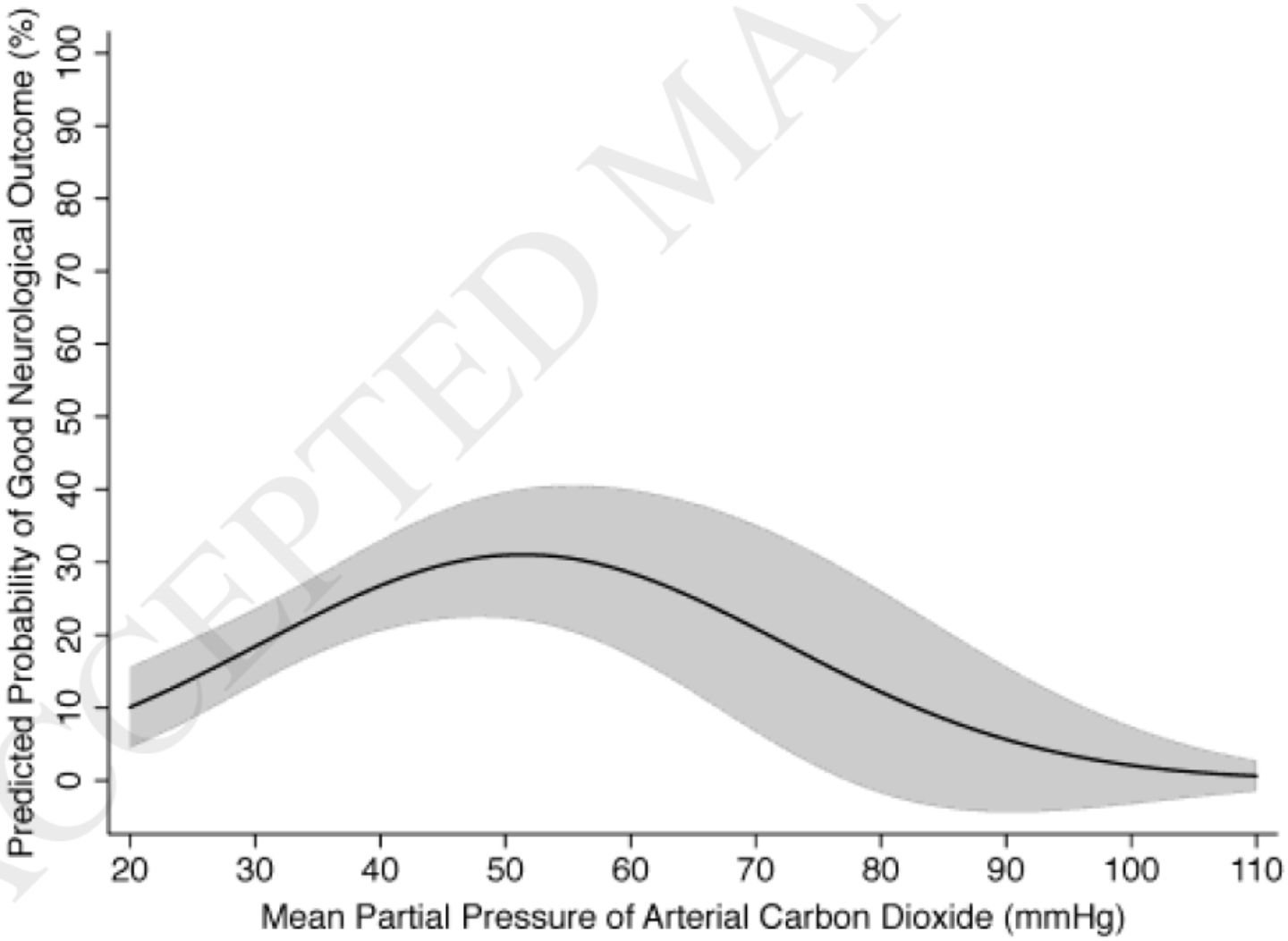
J. Hope Kilgannon, Benton R. Hunter, Michale A. Puskarich, Lisa Shea, Brian M. Fuller, Christopher Jones, Michael Donnino, Jeffrey A. Kline, Alan E. Jones, Nathan I. Shapiro, Benjamin S. Abella, Stephen Trzeciak, Brian W. Roberts.

Resuscitation. 2019 Feb; 135: 212-220.

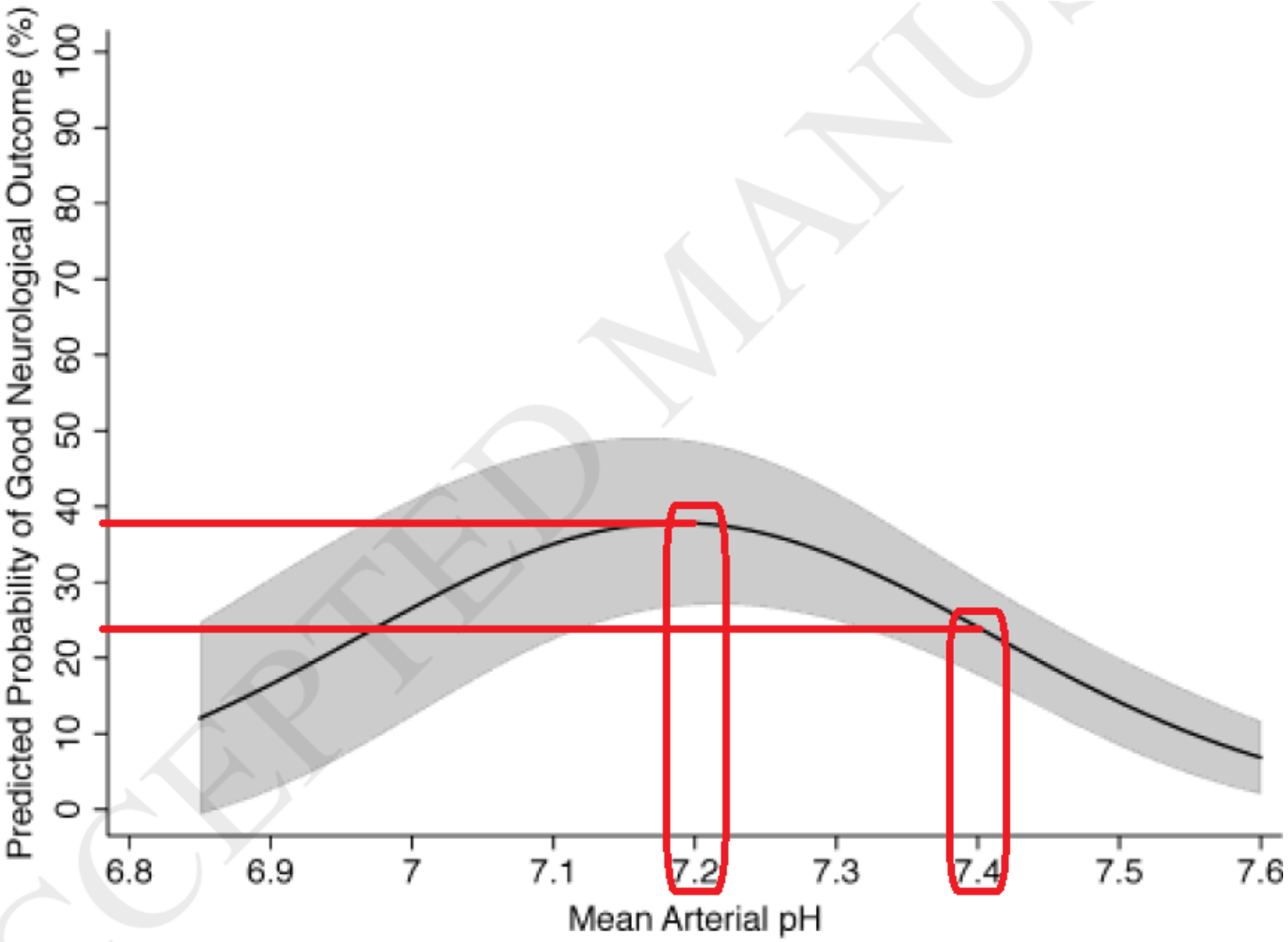
280 pacientů



68 mmHg



51 mmHg



Prolonged targeted temperature management reduces memory retrieval deficits six months post-cardiac arrest: A randomised controlled trial

Lars Evald[a,*], *Kolbjørn Brønnick*[b], *Christophe Henri Valdemar Duez*[c], *Anders Morten Grejs*[c], *Anni Nørgaard Jeppesen*[c], *Eldar Søreide*[d,e], *Hans Kirkegaard*[c], *Jørgen Feldbæk Nielsen*[a]

Resuscitation. 2019 Jan; 134: 1-9.

79 pacientů

NEMOCNICE TOMÁŠE BATI VE ZLÍNĚ

LÉKAŘSKÁ FAKULTA Masarykova univerzita

ZDRAVOTNICKÁ ZÁCHRANNÁ SLUŽBA ZLÍNSKÉHO KRAJE

Treatment effect of TTM48 on cognitive impairment six months post-OHCA

Neuropsychological raw scores were converted to standardised z-scores that were adjusted for age, and patients were categorised as being impaired or non-impaired based on the number of deviant performances on twelve cognitive tests. There were significantly fewer cognitively impaired patients in the TTM48 group compared to the TTM24 group ($p = 0.02$), and it corresponded to a moderate effect size (Cohen's $d = 0.61$). Specifically, 5 of the 43 patients (12%) in the TTM48 group were classified as being impaired compared to 12 of the 36 patients (33%) in the TTM24 group (Fig. 3). This difference corresponded to a relative risk ratio (RR) of 2.9 (95% CI 1.1–7.4) or a number needed to treat of approximately five patients (NNT = 4.6).

Take home message

- Adrenalin u OHCA zvyšuje šanci na ROSC, přežití a (u nedefibrilovatelných rytmů) i neurologický outcome
- U IHCA má adrenalin daleko menší efekt (byť u nedefibrilovatelných rytmů zvyšuje šanci na ROSC) a zhoršuje neurologický outcome
- Prakticky více než 5 dávek adrenalinu nezlepší šanci na přežití, více než 3 dávky adrenalinu jsou spojeny se špatným neurologickým outcome
- ELS zvyšuje šanci na přežití a dobrý neurologický outcome (více u IHCA)
- Kvalitní BVM ventilace v režimu 30:2 zvyšuje šanci na ROSC, přežití a dobrý neurologický outcome
- Lidocaine má stejný efekt jako Amiodarone u refrakterní VF/VT
- Po ROSC udržovat paCO2 kolem 68 mmHg (resp. 51 mmHg u MAc)
- TTM 48 hodin zlepšuje kognitivní deficit

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Děkuji za pozornost