Má resuscitace před sebou zářnou budoucnost? Nebo jen za sebou zářnou minulost?

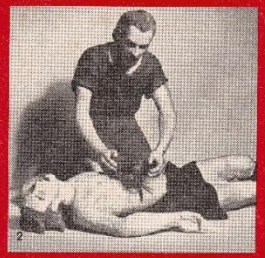
MUDr. Tomáš Drábek, Ph.D., FASA
Safar Center for Resuscitation Research
Department of Anesthesiology and Perioperative Medicine
University of Pittsburgh & UPMC


3434
Safar Center for
Resuscitation Research
Second Floor

SUPPLEMENT TO
JAMA
THE JOURNAL of the American Medical Association

Standards for Cardiopulmonary Resuscitation (CPR) and Emergency Cardiac Care (ECC)

1. Early Ages - Flagellation Method
2. Early Ages - Heat Method

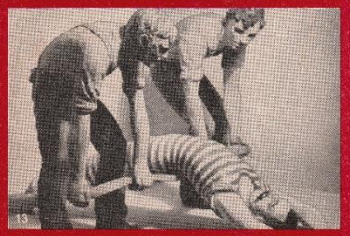


3. 1530 - Bellows Method
4. 1711 - Fumigation Method

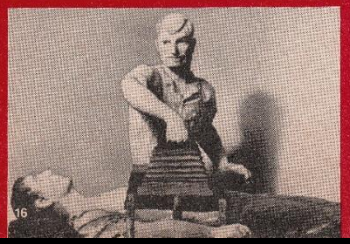
5. 1770 - Inversion Method
6. 1773 - Barrel Method

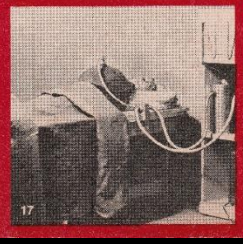
7. 1803 - Russian Method
8. 1812 - Trotting Horse Method

February 18, 1974
Volume 227, No. 7

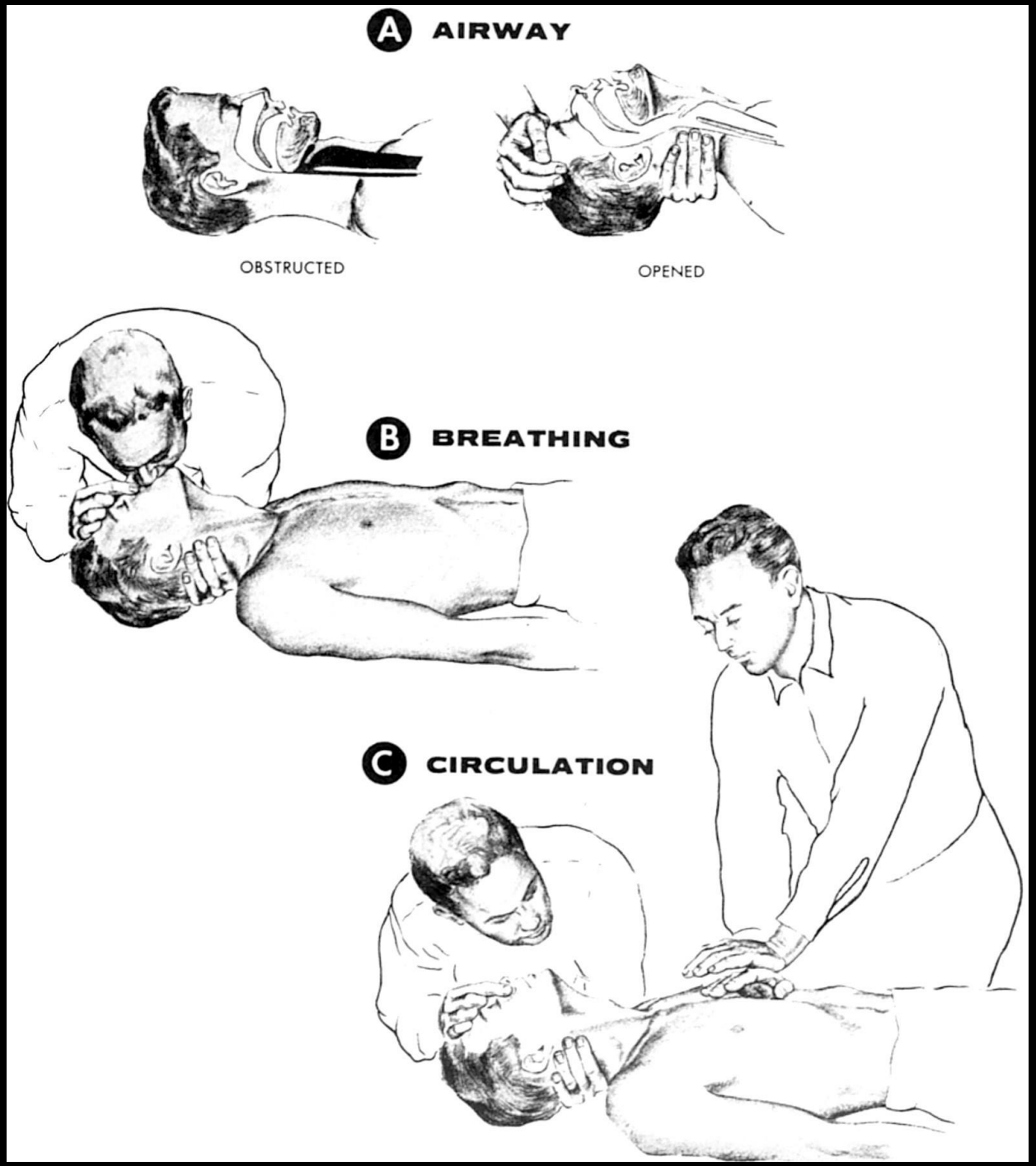


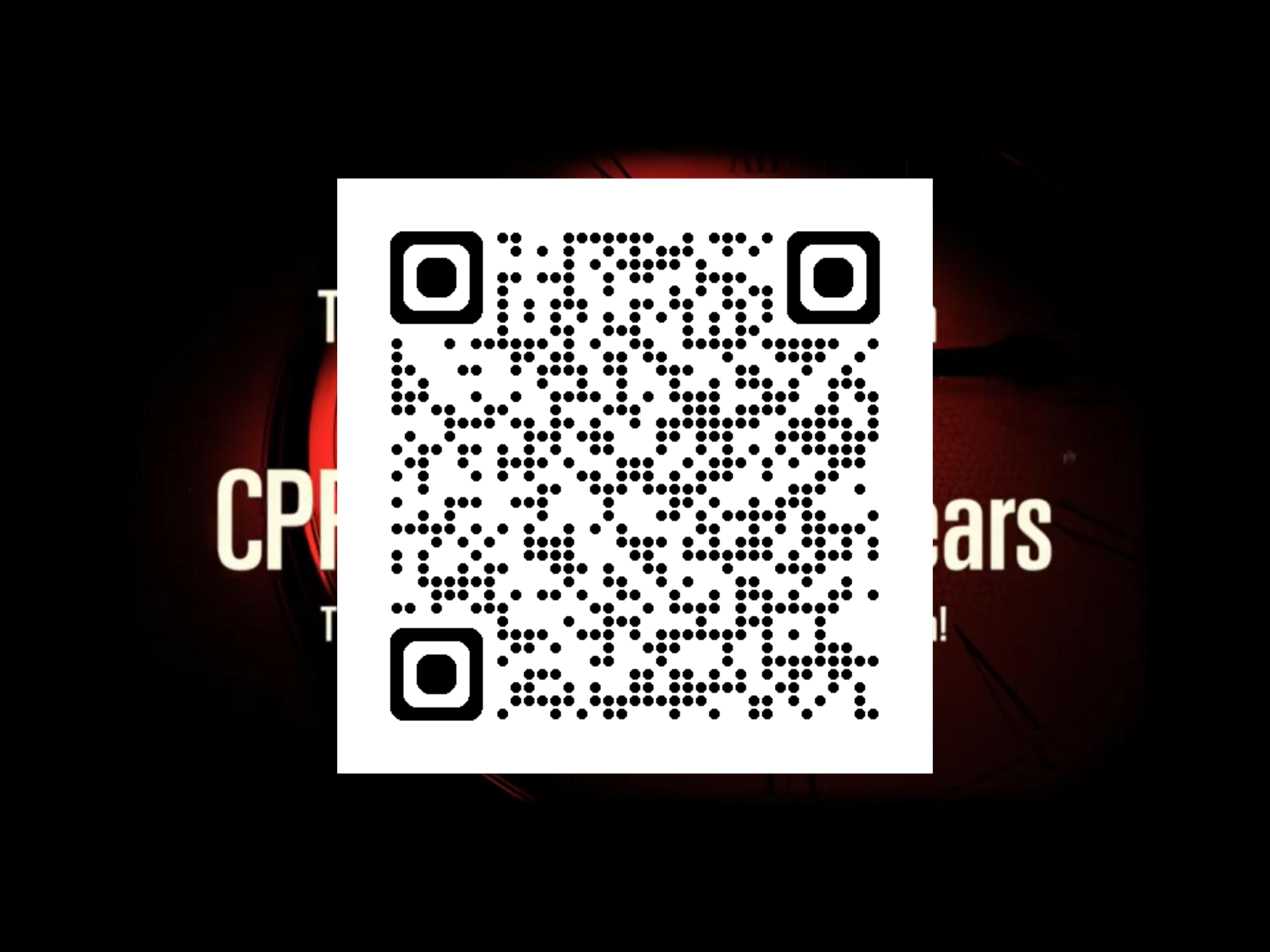
9. 1831 - Dalrymple Method
10. 1856 - Marshall Hall Method
11. 1861 - Sylvester Method
12. 1871 - Howard Method
13. 1886 - J.B. Francis Method
14. 1903 - Schafer Prone Pressure Method
15. 1894 - Prochownick Method
16. 1916 - Acklen Method
17. 1926 - Eisenmenger Method
18. One-Rescuer Cardiopulmonary Resuscitation

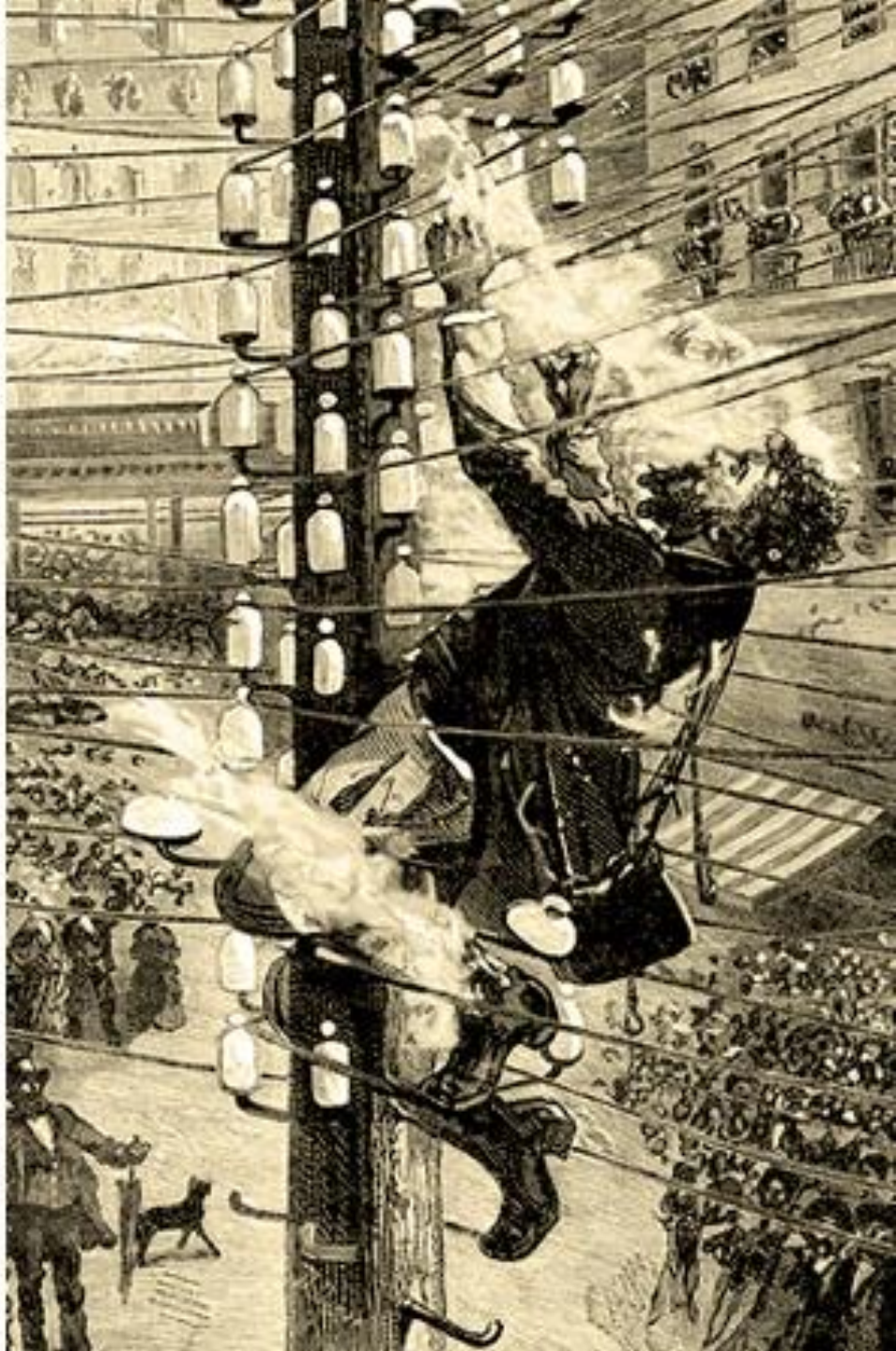




70-020-A
74-800M
6-75-500M


A AIRWAY
OBSTRUCTED
OPENED
B BREATHING
C CIRCULATION





Tony Ruffolo
@WPXITonyRuffolo

Wires on fire in the 3700 block of Mt. Troy Road, Reserve Twp. Road closed at Hoffman Blvd. #WPXI #PGH #Pittsburgh

Resuscitation 64 (2005)
139–143

Resuscitation Great

Kouwenhoven, Jude and Knickerbocker
The introduction of defibrillation and external chest compressions into modern resuscitation

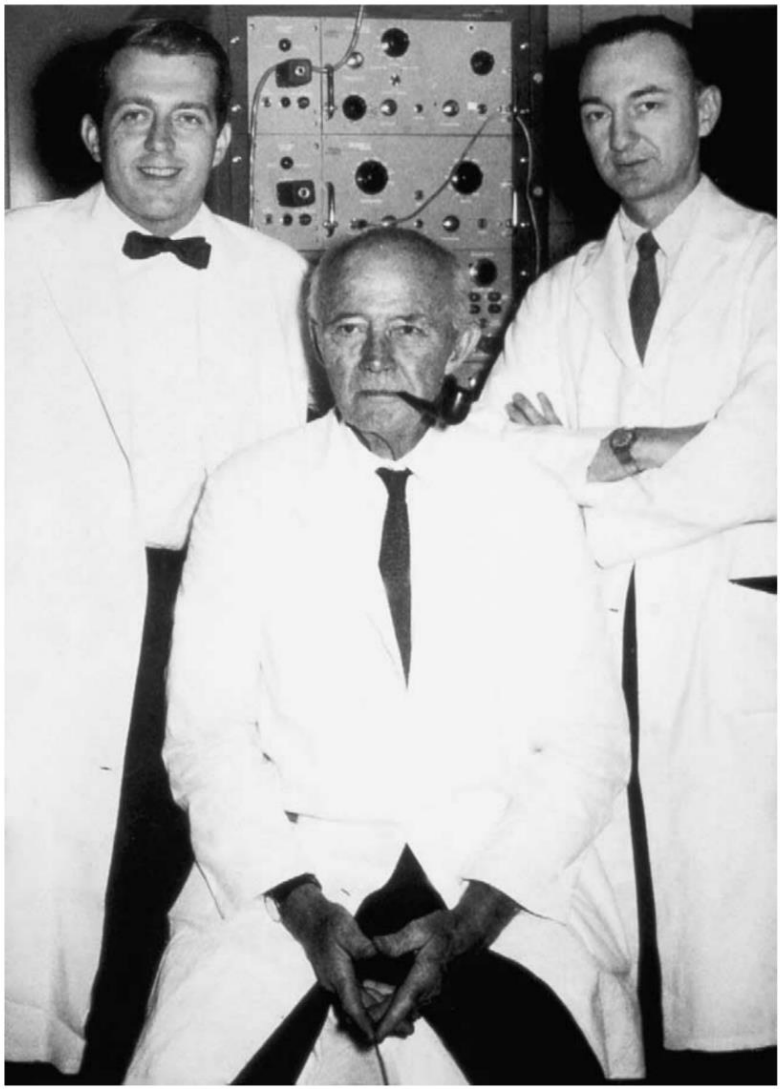


Fig. 1. Knickerbocker, Kouwenhoven and Jude.

The New England
Journal of Medicine

Volume 254 APRIL 19, 1956 Number 16

TERMINATION OF VENTRICULAR FIBRILLATION IN MAN BY EXTERNALLY APPLIED ELECTRIC COUNTERSHOCK*

PAUL M. ZOLL, M.D.,† ARTHUR J. LINENTHAL, M.D.,‡ WILLIAM GIBSON, M.D.,§
MILTON H. PAUL, M.D.,¶ AND LEONA R. NORMAN, M.D.‖

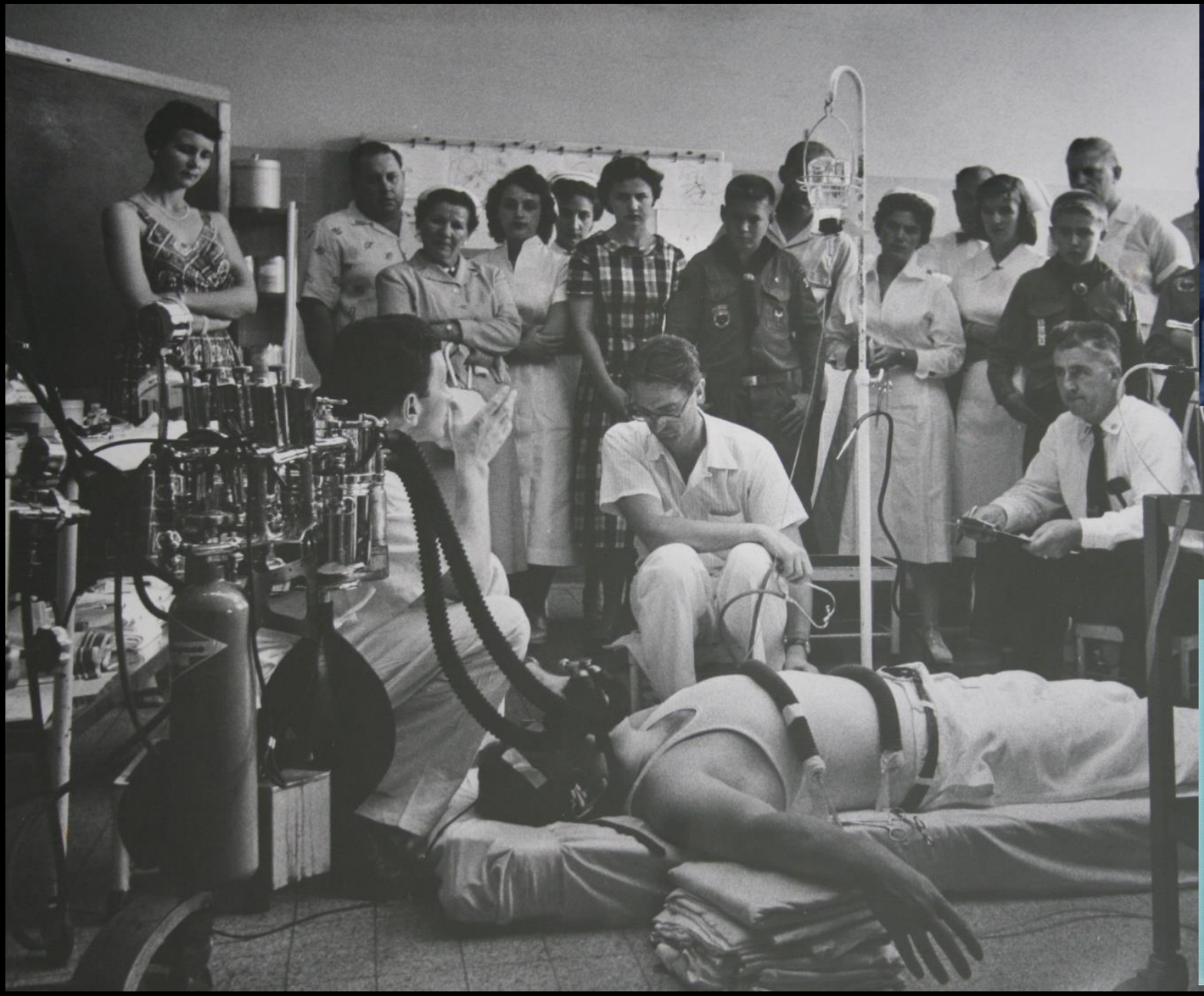
Recent Advances in Surgery 1958

CONDUCTED BY ALFRED BLALOCK, M.D.

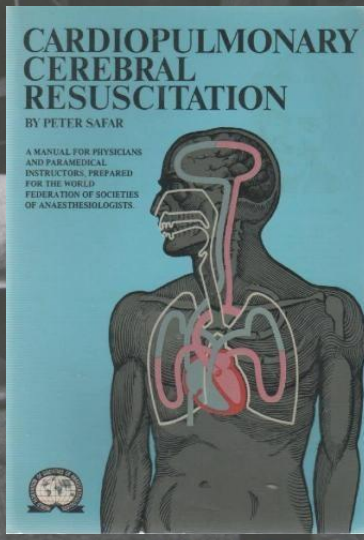
CLOSED CHEST DEFIBRILLATION OF THE HEART

W. B. KOUWENHOVEN, DR.ING.,* W. R. MILNOR, M.D.,** G. G. KNICKERBOCKER, B.S.,*** AND WILLIAM R. CHESNUT, M.D.,**** BALTIMORE, MD.

(From the Schools of Engineering and Medicine of The Johns Hopkins University)



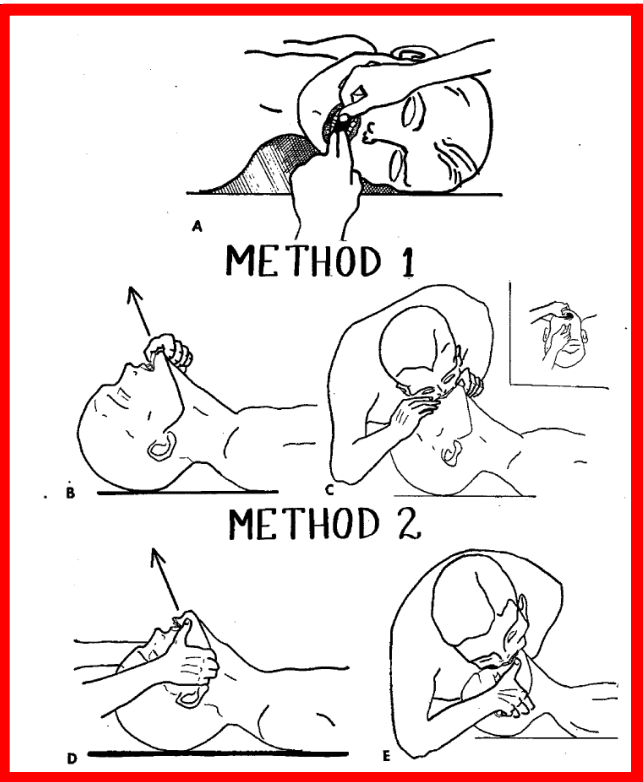

Dr. Peter Safar


CARDIOPULMONARY
CEREBRAL
RESUSCITATION
BY PETER SAFAR
A MANUAL FOR PHYSICIANS
AND PARAMEDICAL
INSTRUCTORS, PREPARED
FOR THE WORLD
FEDERATION OF SOCIETIES
OF ANAESTHESIOLOGISTS.

VENTILATORY EFFICACY OF MOUTH-TO-MOUTH ARTIFICIAL RESPIRATION

AIRWAY OBSTRUCTION DURING MANUAL AND MOUTH-TO-MOUTH ARTIFICIAL RESPIRATION

Peter Safar, M.D., Baltimore



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Mouth-to-mouth artificial respiration has been used for centuries for infants but has been used rarely for adults, probably because of the hesitancy

Performance of 167 Rescuers

	Method	Rescuers Studied, No.	Rescuers Successful in Producing Tidal Volumes Above 500 Ml. Each Within 60 Sec., No.
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* The tidal exchange was measured in all instances except during the performance of 31 rescuers, with the mouth-to-mouth procedure, method 1, when it was only estimated.

† With artificial oropharyngeal airway.

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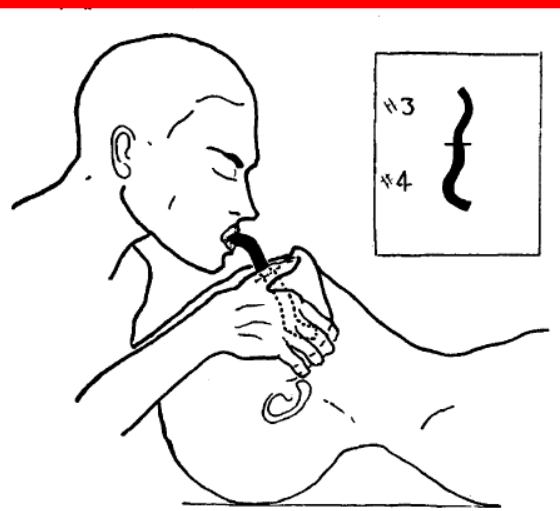


Fig. 5.—Mouth-to-airway artificial respiration. Insert airway along curve of tongue, without pushing tongue back. Extend head. Prevent air leakage through corners of mouth and nostrils.

CLOSED-CHEST CARDIAC MASSAGE

W. B. Kouwenhoven, Dr. Ing., James R. Jude, M.D.
and
G. Guy Knickerbocker, M.S.E., Baltimore

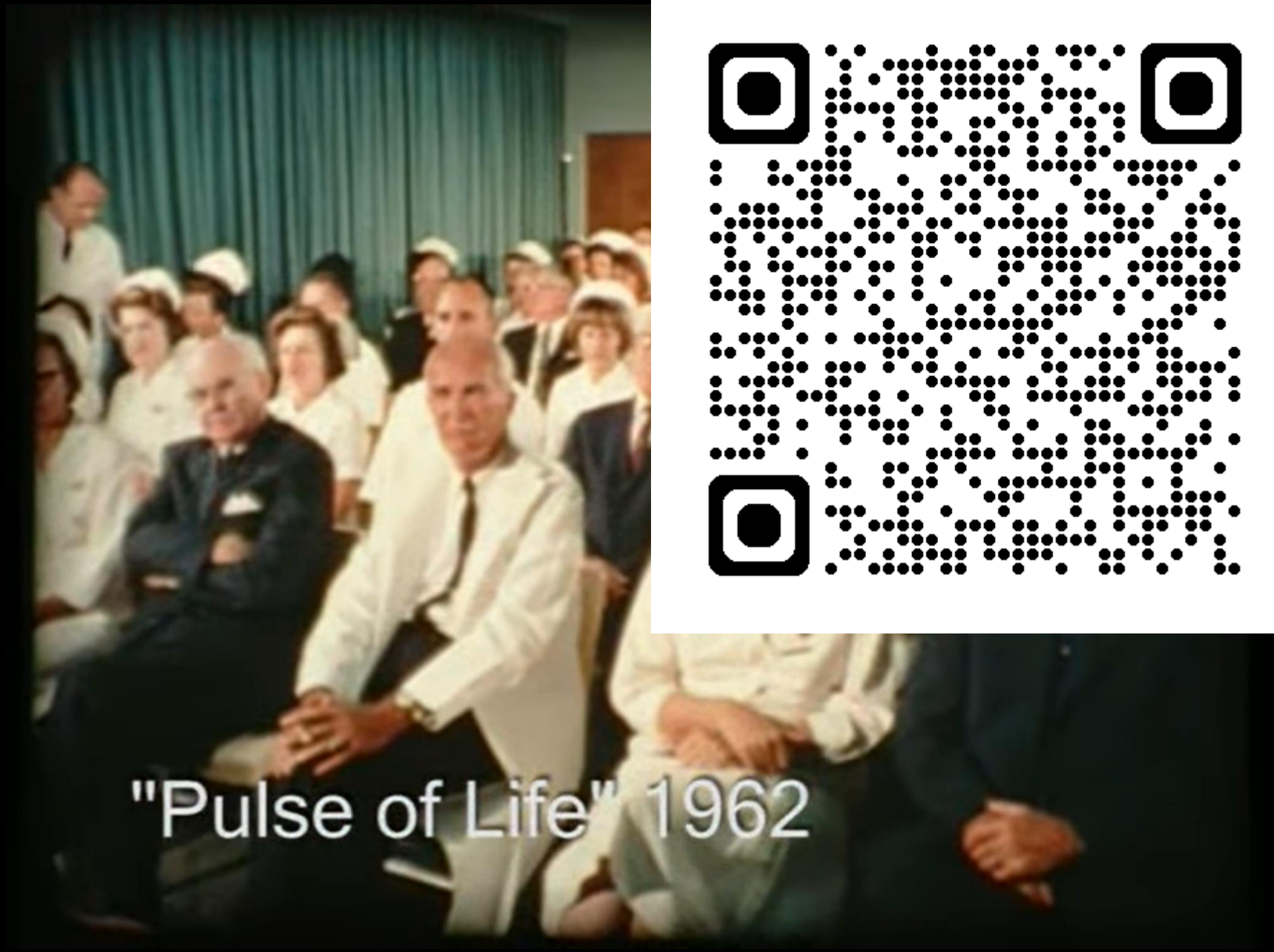
Ventricular Defibrillation

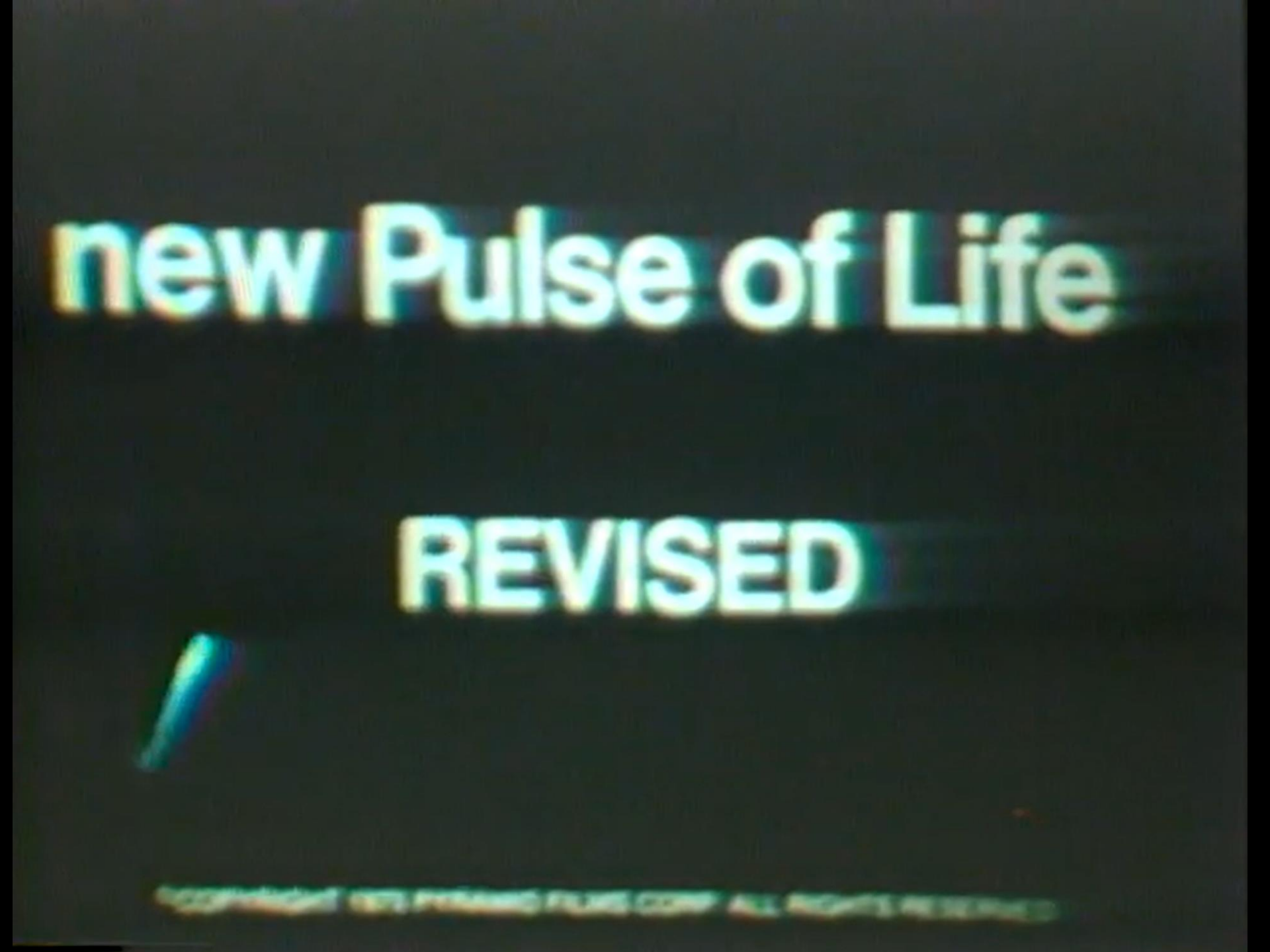
An Experimental Investigation of Voltage Requirements and Effect of Electrode Size

Lloyd D. MacLean, M.D., and Robert A. van Tyn, M.D., St. Paul, Minn.

Ventilation and Circulation with Closed-Chest Cardiac Massage in Man

Peter Safar, M.D., Torrey C. Brown, Warren J. Holtey, M.D., and Robert J. Wilder, M.D., Baltimore


"Pulse of Life" 1962


new Pulse of Life
REVISED

Cardiac Arrest

1961

Report of Application of External Cardiac Massage on 118 Patients

James R. Jude, M.D., William B. Kouwenhoven, Dr. Ing., and G. Guy Knickerbocker, M.S.E., Baltimore

fibrillation. Cardiac action was restored in 107 (78%) of the 138 cardiac arrests. In 84 (60%) of the 138, the prearrest status of the central nervous system and heart was regained. Twenty-eight (24%) of the 118 patients survived the arrest and inciting disease to leave the hospital.

RESUSCITATION 186 (2023) 109757

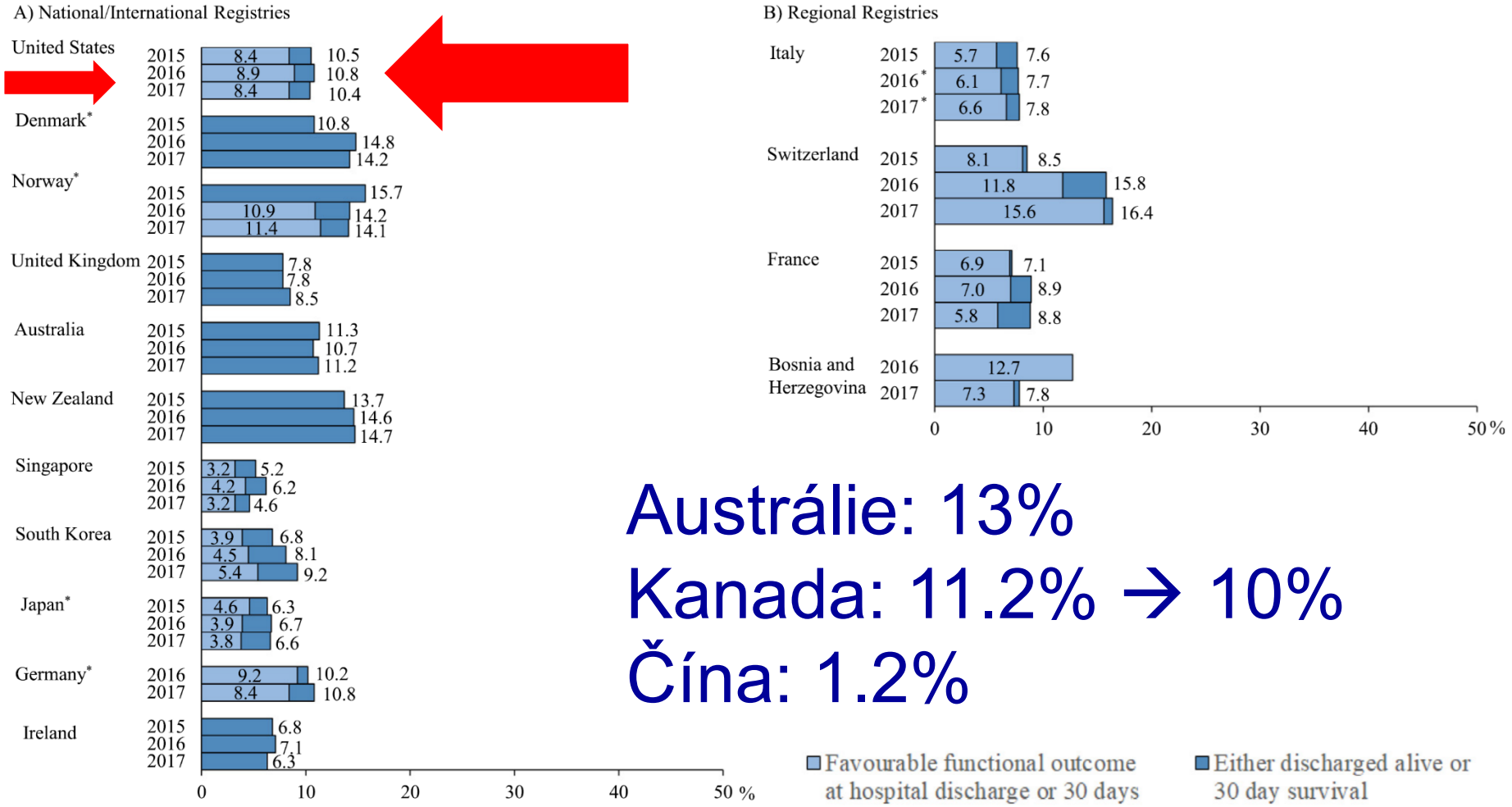
Available online at ScienceDirect

Resuscitation

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

Clinical paper

Three-year trends in out-of-hospital cardiac arrest across the world: Second report from the International Liaison Committee on Resuscitation (ILCOR)



Austrálie: 13%

Kanada: 11.2% → 10%

Čína: 1.2%

Fig. 3.1 – Temporal trend of survival and favourable functional outcome among all EMS treated OHCA including EMS witnessed.

A) National/International Registries, B) Regional Registries *Reported 30-day survival.

EMS denoted emergency medical services; OHCA; out-of-hospital cardiac arrest.

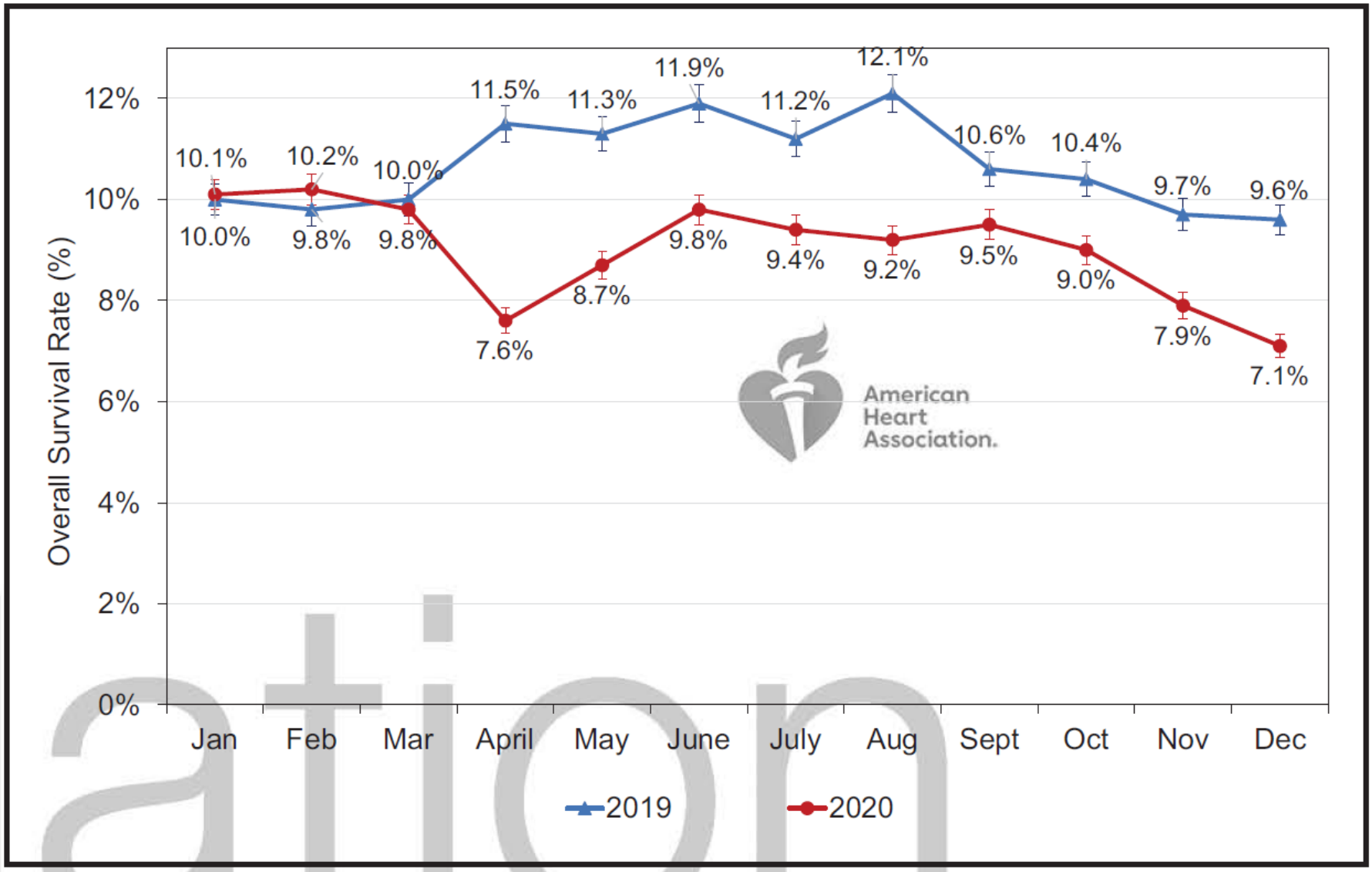


Chart 19-2. Overall OHCA survival, by month, 2019 to 2020, CARES, United States.

2025 Heart Disease and Stroke Statistics: A Report of US and Global Data From the American Heart Association

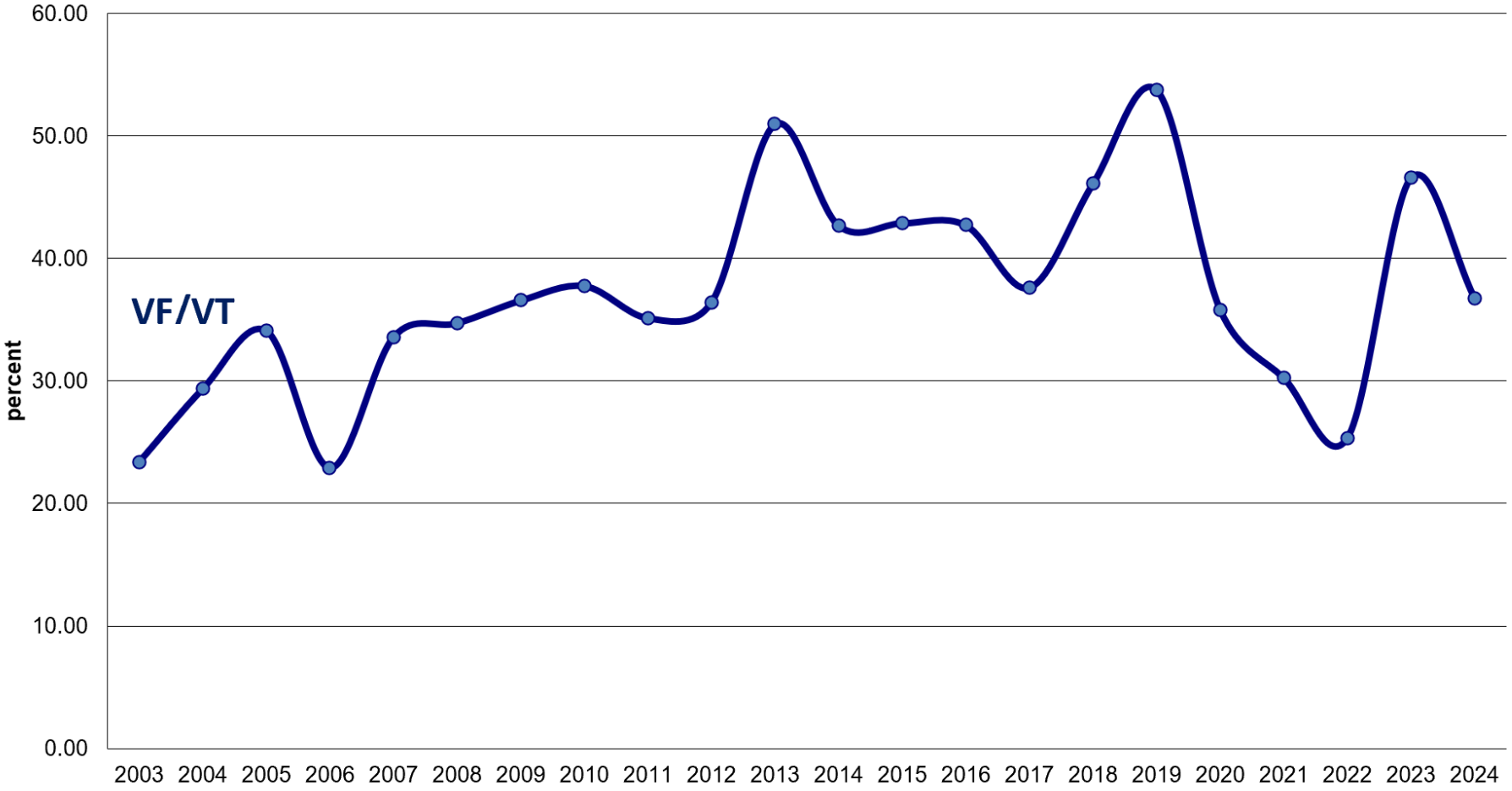
- Přežití do propuštění z nemocnice = 10,2%
- Přežití s dobrým neurologickým výsledkem = 8,1%

ZZS hl.m. Prahy

OHCA 30-denní přežití (CPC 1-2)

ZZS hl.m. Prahy

OHCA 30-denní přežití (CPC 1-2)



Cardiac Arrest

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HEART–LUNG RESUSCITATION

I FIRST AID: OXYGENATE THE BRAIN IMMEDIATELY

IF UNCONSCIOUS

Airway – *TILT HEAD BACK*

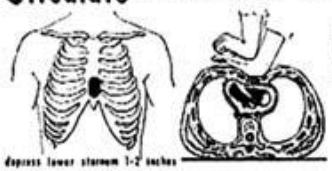
IF NOT BREATHING

Breathe – *INFLATE LUNGS 3-5 TIMES, MAINTAIN HEAD TILT*

MOUTH-TO-MOUTH, MOUTH-TO-NOSE, mouth-to-adjunct, bag-mask

• FEEL PULSE
• IF PRESENT – CONTINUE LUNG INFLATIONS
• IF ABSENT –

Circulate – *COMPRESS HEART ONCE A SECOND. ALTERNATE 2-3 LUNG INFLATIONS WITH 15 STERNAL COMPRESSIONS UNTIL SPONTANEOUS PULSE RETURNS.*



for physicians only

II START SPONTANEOUS CIRCULATION

Drugs – *EPINEPHRINE:* 1.0 mg (1.0 CC OF 1:1000) I.V. OR 0.5 mg INTRACARDIAC. REPEAT LARGER DOSE IF NECESSARY

SODIUM BICARBONATE: APPROXIMATELY 3.75 G/50 CC (1/2 DOSE IN CHILDREN) I.V. REPEAT EVERY 5 MINUTES IF NECESSARY

E. K. G. – • *FIBRILLATION:* EXTERNAL ELECTRIC DEFIBRILLATION. REPEAT SHOCK EVERY 1-3 MINUTES UNTIL FIBRILLATION REVERSED

• *IF ASYSTOLE OR WEAK BEATS:* EPINEPHRINE OR CALCIUM I.V.

A.C.: 440 – 1000 V 0.25 sec
or D.C.: 150 W/sec 0.0025 sec

Fluids – *I.V. PLASMA, DEXTRAN, SALINE*
Do not interrupt cardiac compressions and ventilation. Tracheal intubation only when necessary.

AFTER RETURN OF SPONTANEOUS CIRCULATION USE VASOPRESSORS AS NEEDED,
e.g. NOREPINEPHRINE (Levophed) I.V. DRIP

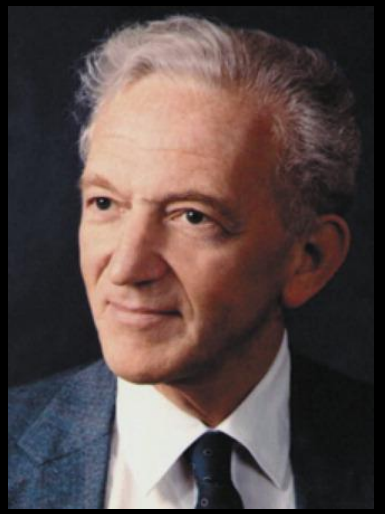
III SUPPORT RECOVERY (physician-specialist)

Gauge *EVALUATE AND TREAT CAUSE OF ARREST*

Hypothermia *START WITHIN 30 MINUTES IF NO SIGN OF CNS RECOVERY*

Intensive Care *SUPPORT VENTILATION:* TRACHEOTOMY, PROLONGED CONTROLLED VENTILATION, GASTRIC TUBE AS NECESSARY
SUPPORT CIRCULATION
CONTROL CONVULSIONS
MONITOR

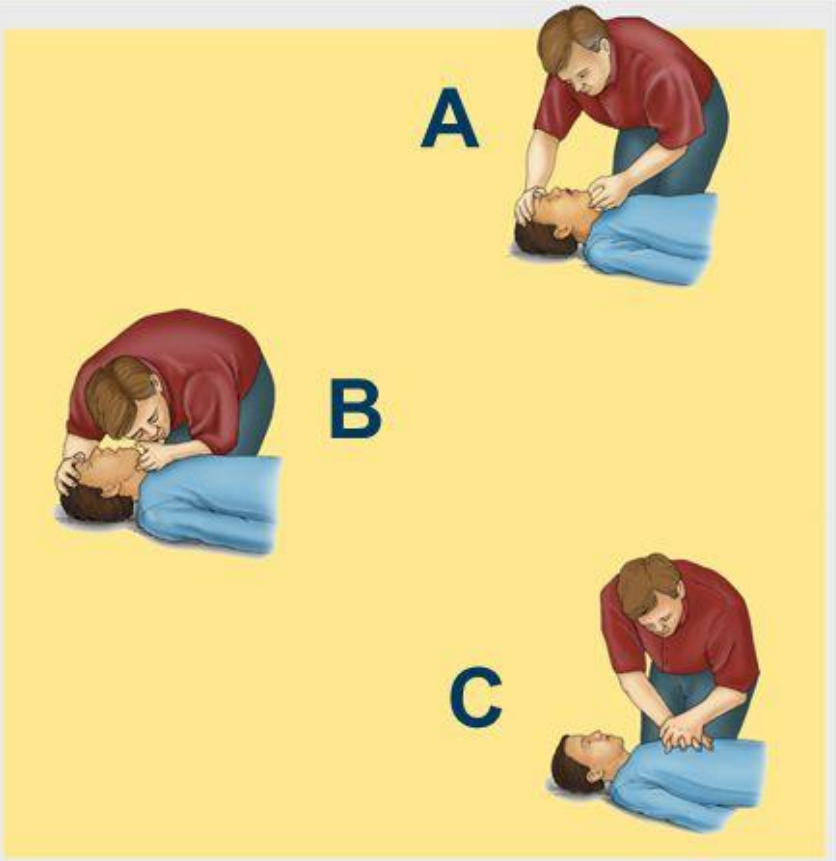
Figure 1. The A, B, C of emergency resuscitation. These instructions have been arranged for the front and back of a billfold card or for a poster which may be obtained from the Pennsylvania Heart Association or the Pennsylvania Department of Health, Harrisburg.



CPR

The ABCs of CPR

- **A** Airway
- **B** Breathing
- **C** Circulation



Breathing

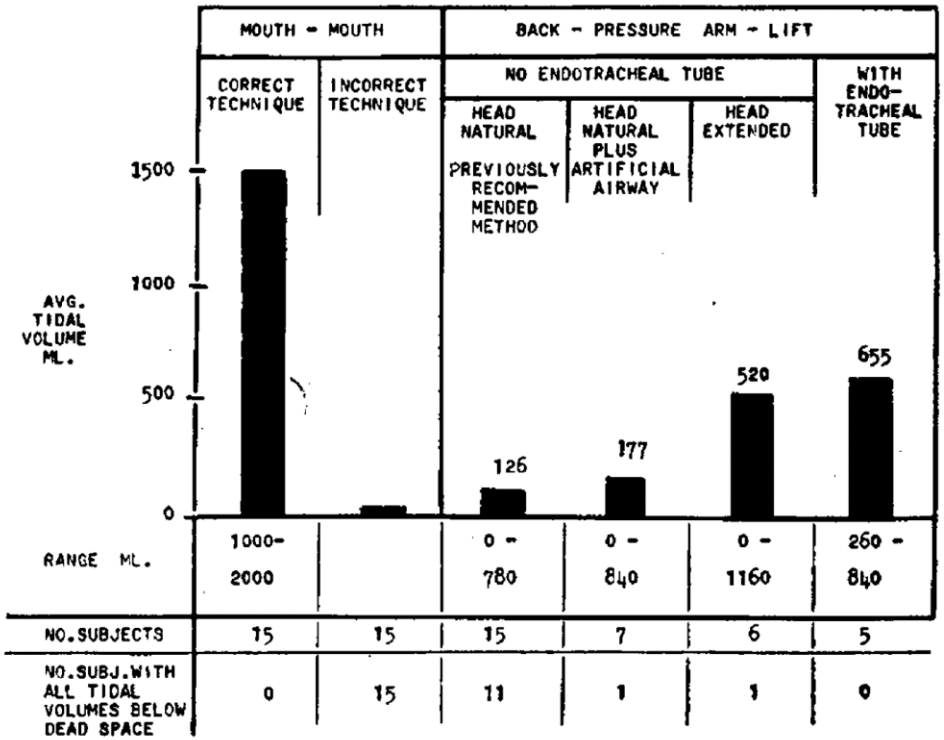


Fig. 2.—Tidal volumes as influenced by upper airway obstruction.

cates that sometimes the jaw can be supported with one hand, I prefer the use of both hands at the child's head.

Mouth-to-mouth artificial respiration has been used for centuries for infants but has been used rarely for adults, probably because of the hesitancy

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	Method	Rescuers Studied, No.	Rescuers Successful in Producing Tidal Volumes Above 500 Ml. Each Within 60 Sec., No.
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* The tidal exchange was measured in all instances except during the performance of 31 rescuers, with the mouth-to-mouth procedure, method 1, when it was only estimated.

† With artificial oropharyngeal airway.

of many people to "kiss" a moribund stranger. The

mouth-to-mouth ventilation. Survival to hospital discharge was better among patients assigned to chest compression alone than among those assigned to chest compression plus mouth-to-mouth ventilation (14.6 percent vs. 10.4 percent), but the difference was not statistically significant (P=0.18).

Conclusions The outcome after CPR with chest compression alone is similar to that after chest compression with mouth-to-mouth ventilation, and chest compression alone may be the preferred approach for bystanders inexperienced in CPR. (N Engl J Med 2000;342:1546-53.)

VOLUME 342 NUMBER 21

CARDIOPULMONARY RESUSCITATION BY CHEST COMPRESSION ALONE OR WITH MOUTH-TO-MOUTH VENTILATION

ALFRED HALLSTROM, PH.D., LEONARD COBB, M.D., ELISE JOHNSON, B.A., AND MICHAEL COPASS, M.D.

Cardiopulmonary resuscitation by bystanders with chest compression only (SOS-KANTO): an observational study

SOS-KANTO study group

Lancet 2007; 369: 920–26

See Comment page 882

*Members listed at end of paper

Correspondence to:
Dr Ken Nagao, The SOS-KANTO Committee, Department of Emergency and Critical Care Medicine, Surugadai Nihon University Hospital, 1-8-13 Kanda Surugadai, Chiyoda-Ku, Tokyo, 101-8309, Japan
Kennagao@med.nihon-u.ac.jp

Summary

Background Mouth-to-mouth ventilation is a barrier to bystanders doing cardiopulmonary resuscitation (CPR), but few clinical studies have investigated the efficacy of bystander resuscitation by chest compressions without mouth-to-mouth ventilation (cardiac-only resuscitation).

Methods We did a prospective, multicentre, observational study of patients who had out-of-hospital cardiac arrest. On arrival at the scene, paramedics assessed the technique of bystander resuscitation. The primary endpoint was favourable neurological outcome 30 days after cardiac arrest.

Findings 4068 adult patients who had out-of-hospital cardiac arrest witnessed by bystanders were included; 439 (11%) received cardiac-only resuscitation from bystanders, 712 (18%) conventional CPR, and 2917 (72%) received no bystander CPR. Any resuscitation attempt was associated with a higher proportion having favourable neurological outcomes than no resuscitation (5·0% *vs* 2·2%, p<0·0001). Cardiac-only resuscitation resulted in a higher proportion of patients with favourable neurological outcomes than conventional CPR in patients with apnoea (6·2% *vs* 3·1%; p=0·0195), with shockable rhythm (19·4% *vs* 11·2%, p=0·041), and with resuscitation that started within 4 min of arrest (10·1% *vs* 5·1%, p=0·0221). However, there was no evidence for any benefit from the addition of mouth-to-mouth ventilation in any subgroup. The adjusted odds ratio for a favourable neurological outcome after cardiac-only resuscitation was 2·2 (95% CI 1·2–4·2) in patients who received any resuscitation from bystanders.

Interpretation Cardiac-only resuscitation by bystanders is the preferable approach to resuscitation for adult patients with witnessed out-of-hospital cardiac arrest, especially those with apnoea, shockable rhythm, or short periods of untreated arrest.

CPR with Chest Compression Alone or with Rescue Breathing

N Engl J Med 2010; 363:423-33.

Thomas D. Rea, M.D., Carol Fahrenbruch, M.S.P.H., Linda Culley, B.A., Rachael T. Donohoe, Ph.D., Cindy Hambly, E.M.T., Jennifer Innes, B.A., Megan Bloomingdale, E.M.T., Cleo Subido, Steven Romines, M.S.P.H., and Mickey S. Eisenberg, M.D., Ph.D.

Přežití do propuštění z nemocnice

12.5% pouze nepřímá srdeční masáž

11.0% nepřímá srdeční masáž s umělým dýcháním

P = 0.31

Přežití s dobrým neurologickým výsledkem

14.4% vs. 11.5%

P = 0.13

Airway

Contents lists available at ScienceDirect

American Journal of Emergency Medicine

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

Volume 57, July 2022, Pages 60-69

Outcome of cardiopulmonary resuscitation with different ventilation modes in adults: A meta-analysis

Yangyang Tang [a], Mengxue Sun [a], Aiqun Zhu [b,c,*]

[a] Xiangya Nursing School of Central South University, Changsha, Hunan, China
[b] Clinical Nursing Teaching and Research Section, The Second Xiangya Hospital of Central South University, Changsha, Hunan, China
[c] Department of Emergency Medicine, The Second Xiangya Hospital of Central South University, Changsha, Hunan, China

BMV vs SGA vs ETI

Dvacet pět studií (n = 196,486)
ROSC: ETI > SGA > BMV
Propuštění: ETI > SGA > BMV
Neurologický výsledek: ETI = SGA = BMV

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Health Technology Assessment

Volume 26 • Issue 21 • April 2022

ISSN 1366-5278

~ 10,000 pacientů

Příznivý výsledek:

SGA 6.4%

ETI 6.8%

Supraglottic airway device versus tracheal intubation in the initial airway management of out-of-hospital cardiac arrest: the AIRWAYS-2 cluster RCT

Jonathan R Benger, Kim Kirby, Sarah Black, Stephen J Brett, Madeleine Clout, Michelle J Lazaroo, Jerry P Nolan, Barnaby C Reeves, Maria Robinson, Lauren J Scott, Helena Smartt, Adrian South, Elizabeth A Stokes, Jodi Taylor, Matthew Thomas, Sarah Voss, Sarah Wordsworth and Chris A Rogers

CPR is as easy as

C-A-B

Compressions

Push hard and fast on the center of the victim's chest.

Airway

Tilt the victim's head back, and lift the chin to open the airway.

Breathing

Give mouth-to-mouth rescue breaths.

American Heart Association

Learn and Live

Drugs

HEART–LUNG RESUSCITATION

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IF UNCONSCIOUS

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IF NOT BREATHING

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MOUTH-TO-MOUTH, MOUTH-TO-NOSE, mouth-to-adjunct, bag-mask

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- IF ABSENT –

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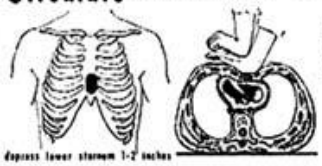

for physicians only

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E. K. G. –

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Fluids – *I.V. PLASMA, DEXTRAN, SALINE*

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Hypothermia *START WITHIN 30 MINUTES IF NO SIGN OF CNS RECOVERY*

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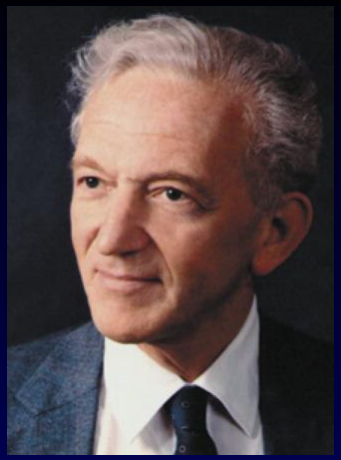
SUPPORT CIRCULATION
CONTROL CONVULSIONS
MONITOR

Figure 1. The A, B, C of emergency resuscitation. These instructions have been arranged for the front and back of a billfold card or for a poster which may be obtained from the Pennsylvania Heart Association or the Pennsylvania Department of Health, Harrisburg.



Resuscitation 82 (2011) 1138–1143

Contents lists available at ScienceDirect

Resuscitation

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

Clinical paper

Effect of adrenaline on survival in out-of-hospital cardiac arrest: A randomised double-blind placebo-controlled trial☆

Ian G. Jacobs[a,c,*], Judith C. Finn[a,c], George A. Jelinek[b], Harry F. Oxer[c], Peter L. Thompson[d,e]

[a] Discipline of Emergency Medicine (M516), University of Western Australia, 35 Stirling Highway, Crawley, 6009 Western Australia, Australia
[b] Department of Medicine, University of Melbourne (St Vincents Hospital), Victoria Parade, Fitzroy, 3065 Melbourne, Australia
[c] St John Ambulance (Western Australia), PO Box 183, Belmont 6984, Western Australia, Australia
[d] School of Medicine and Population Health, University of Western Australia, Western Australia, Australia
[e] Sir Charles Gairdner Hospital, Hospital Avenue, Nedlands, 6009 Western Australia, Australia

Přežití do propuštění:
Placebo 5 (1.9%) pacientů
Adrenalin 11 (4.0%) pacientů
(OR = 2.2; 95% CI 0.7–6.3)

Intravenous Drug Administration During Out-of-Hospital Cardiac Arrest

A Randomized Trial

JAMA. 2009;302(20):2222-2229

Theresa M. Olasveengen, MD
Kjetil Sunde, MD, Ph
Cathrine Brunborg, MSc
Jon Thowsen
Petter A. Steen, MD, PhD
Lars Wik, MD, PhD

Table 2. In-Hospital Treatment and Outcome

	No Intravenous (n = 433)	Intravenous (n = 418)	*P* Value[a]
Any ROSC during resuscitation	107 (25)	165 (40)	<.001
Admitted to hospital	126 (29)	178 (43)	<.001
ROSC	89 (21)	133 (32)	<.001
Ongoing CPR	37 (9)	45 (11)	.33
Admitted to ICU[b]	88 (20)	125 (30)	.002
Awake at ICU admission	8 (9)	7 (6)	.48
Therapeutic hypothermia	62 (70)	90 (72)	.93
Angiography or PCI	43 (49)	50 (40)	.33
Time in ICU, median (range), d[c]	6 (1-31)	4 (1-44)	.05
Cause of death in ICU[d]			
Brain	29 (69)	52 (70)	>.99
Cardiac	8 (19)	12 (16)	.90
Multiorgan failure	5 (12)	10 (14)	>.99
Discharged alive	40 (9.2)	44 (10.5)	.61
Cerebral performance score at discharge			
1 (good cerebral performance)	30 (7.0)	37 (8.9)	.31
1-2 (good cerebral performance to moderate cerebral disability)	35 (8.1)	41 (9.8)	.45
2 (moderate cerebral disability)	5 (1.2)	4 (1.0)	>.99
3 (severe cerebral disability)	3 (1.0)	3 (1.0)	>.99
4 (coma or vegetative state)	2 (<1.0)	0	.50
Discharged from hospital if admitted to ICU	40 (45)	44 (35)	.17
Alive 1 y after cardiac arrest[e]	36 (8)	41 (10)	.53

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istration.
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f-hospital

The Journal of Emergency Medicine, Vol. 52, No. 6, pp. 809–814, 2017
Published by Elsevier Inc.
0736-4679/$ - see front matter

ELSEVIER

Clinical Review

CrossMark

Epinephrine may improve outcomes in the circulatory phase prior to 10 min post arrest, though further study is needed. Basic Life Support measures including adequate chest compressions and early defibrillation provide the greatest benefit. Conclusions: Epinephrine may improve return of spontaneous circulation, but it does not improve survival to discharge or neurologic outcome. Timing of epinephrine may affect patient outcome, but Basic Life Support measures are the most important aspect of resuscitation and patient survival. Published by Elsevier Inc.

EMERGENCY MEDICINE MYTHS: EPINEPHRINE IN CARDIAC ARREST

Brit Long, MD* and Alex Koyfman, MD†

*Department of Emergency Medicine, San Antonio Military Medical Center, Fort Sam Houston, Texas and †Department of Emergency Medicine, The University of Texas Southwestern Medical Center, Dallas, Texas

Reprint Address: Brit Long, MD, Department of Emergency Medicine, San Antonio Military Medical Center, 3841 Roger Brooke Dr., Fort Sam Houston, TX 78234

A Randomized Trial of Epinephrine in Out-of-Hospital Cardiac Arrest

2018

G.D. Pe . Regan,
J. Long, N. Rees,
L. O' etrou,
N. ors*

RESULTS

At 30 days, 130 patients (3.2%) in the epinephrine group and 94 (2.4%) in the placebo group were alive (unadjusted odds ratio for survival, 1.39; 95% confidence interval [CI], 1.06 to 1.82; P=0.02). There was no evidence of a significant difference in the proportion of patients who survived until hospital discharge with a favorable neurologic outcome (87 of 4007 patients [2.2%] vs. 74 of 3994 patients [1.9%]; unadjusted odds ratio, 1.18; 95% CI, 0.86 to 1.61). At the time of hospital discharge, severe neurologic impairment (a score of 4 or 5 on the modified Rankin scale) had occurred in more of the survivors in the epinephrine group than in the placebo group (39 of 126 patients [31.0%] vs. 16 of 90 patients [17.8%]).

CONCLUSIONS

In adults with out-of-hospital cardiac arrest, the use of epinephrine resulted in a significantly higher rate of 30-day survival than the use of placebo, but there was no significant between-group difference in the rate of a favorable neurologic outcome because more survivors had severe neurologic impairment in the epinephrine group. (Funded by the U.K. National Institute for Health Research and others; Current Controlled Trials number, ISRCTN73485024.)

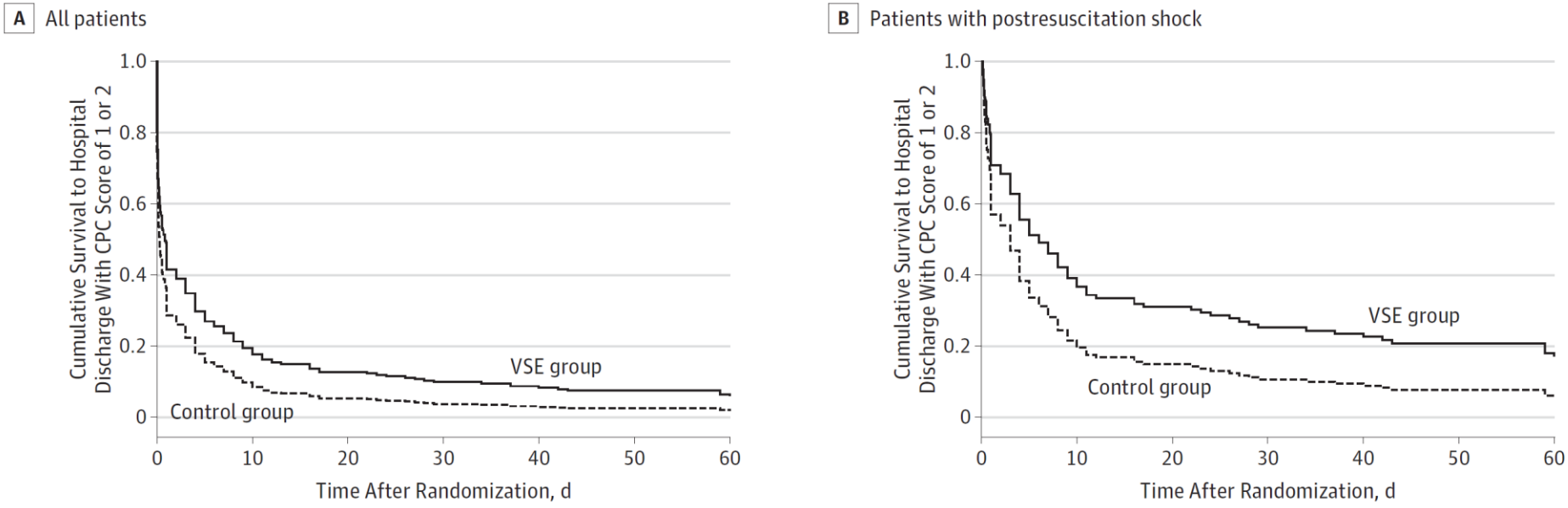
Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Vasopressin, Steroids, and Epinephrine and Neurologically Favorable Survival After In-Hospital Cardiac Arrest

A Randomized Clinical Trial

JAMA. 2013;310(3):270-279.

Figure 2. Results on Survival Analysis



Improved resuscitation outcome in emergency medical systems with increased usage of sodium bicarbonate during cardiopulmonary resuscitation

Conclusions: Earlier and more frequent use of SB was associated with higher early resuscitability rates and with better long-term outcome. Sodium bicarbonate may be beneficial during CPR, and it should be subjected to a randomized clinical trial.

Initial rhythm vs. short- and long-term cardiopulmonary resuscitation outcome according to the sites' sodium bicarbonate usage profile.

	ROSC ROSC+/total, n (%)			Good neurological outcome CPC1 or 2/total, n (%)		
	Low SB users	High SB users	*P**	Low SB users	High SB users	*P**
VF or VT	151/578 (26.1)	91/281 (32.4)	0.056	16/577 (2.8)	23/279 (8.2)	0.0005
AS or PEA	115/448 (25.7)	141/413 (34.1)	0.007	6/448 (1.3)	14/443 (3.4)	0.005

JOURNAL OF IOWA MEDICAL SOCIETY

HEART–LUNG RESUSCITATION

I FIRST AID: OXYGENATE THE BRAIN IMMEDIATELY

IF UNCONSCIOUS

Airway – *TILT HEAD BACK*

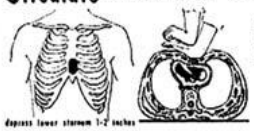
IF NOT BREATHING

Breathe – *INFLATE LUNGS 3-5 TIMES, MAINTAIN HEAD TILT*

MOUTH-TO-MOUTH, MOUTH-TO-NOSE, mouth-to-adjunct, bag-mask

- FEEL PULSE
- IF PRESENT – CONTINUE LUNG INFLATIONS
- IF ABSENT –

Circulate – *COMPRESS HEART ONCE A SECOND. ALTERNATE 2-3 LUNG INFLATIONS WITH 15 STERNAL COMPRESSIONS UNTIL SPONTANEOUS PULSE RETURNS.*



for physicians only

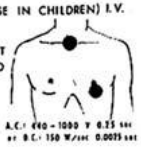
II START SPONTANEOUS CIRCULATION

Drugs – *EPINEPHRINE:* 1.0 mg (1.0 CC OF 1:1000) I.V. OR 0.5 mg INTRACARDIAC. REPEAT LARGER DOSE IF NECESSARY

SODIUM BICARBONATE: APPROXIMATELY 3.75 G/50 CC (1/2 DOSE IN CHILDREN) I.V. REPEAT EVERY 5 MINUTES IF NECESSARY

E. K. G. – • *FIBRILLATION:* EXTERNAL ELECTRIC DEFIBRILLATION. REPEAT SHOCK EVERY 1-3 MINUTES UNTIL FIBRILLATION REVERSED

• *IF ASYSTOLE OR WEAK BEATS:* EPINEPHRINE OR CALCIUM I.V.



Fluids – *I.V. PLASMA, DEXTRAN, SALINE*

Do not interrupt cardiac compressions and ventilation. Tracheal intubation only when necessary.

AFTER RETURN OF SPONTANEOUS CIRCULATION USE VASOPRESSORS AS NEEDED,

e.g. NOREPINEPHRINE (Levophed) I.V. DRIP

III SUPPORT RECOVERY (physician-specialist)

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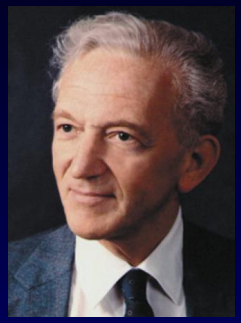

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 MAY 5, 2016 VOL. 374 NO. 18

Amiodarone, Lidocaine, or Placebo in Out-of-Hospital Cardiac Arrest

P.J. Kudenchuk, S.P. Brown, M. Daya, T. Rea, G. Nichol, L.J. Morrison, B. Leroux, C. Vaillancourt, L. Wittwer, C.W. Callaway, J. Christenson, D. Egan, J.P. Ornato, M.L. Weisfeldt, I.G. Stiell, A.H. Idris, T.P. Aufderheide, J.V. Dunford, M.R. Colella, G.M. Vilke, A.M. Brienza, P. Desvigne-Nickens, P.C. Gray, R. Gray, N. Seals, R. Straight, and P. Dorian, for the Resuscitation Outcomes Consortium Investigators*

RESULTS

In the per-protocol population, 3026 patients were randomly assigned to amiodarone (974), lidocaine (993), or placebo (1059); of those, 24.4%, 23.7%, and 21.0%, respectively, survived

CONCLUSIONS

Overall, neither amiodarone nor lidocaine resulted in a significantly higher rate of survival or favorable neurologic outcome than the rate with placebo among patients with out-of-hospital cardiac arrest due to initial shock-refractory ventricular fibrillation or pulseless ventricular tachycardia. (Funded by the National Heart, Lung, and Blood Institute and others; ClinicalTrials.gov number, NCT01401647.)

ORIGINAL RESEARCH ARTICLE

Antiarrhythmic Drugs for Nonshockable-Turned-Shockable Out-of-Hospital Cardiac Arrest

The ALPS Study (Amiodarone, Lidocaine, or Placebo)

In all, 16 (4.1%) amiodarone, 11 (3.1%) lidocaine, and 6 (1.9%) placebo-treated patients survived to hospital discharge (*P*=0.24).

BACKGROUND: Out-of-hospital cardiac arrest (OHCA) commonly presents with nonshockable rhythms (asystole and pulseless electric activity). It is unknown whether antiarrhythmic drugs are safe and effective when nonshockable rhythms evolve to shockable rhythms (ventricular fibrillation/pulseless ventricular tachycardia [VF/VT])

Peter J. Kudenchuk, MD et al

ORIGINAL RESEARCH ARTICLE

EKG

JOURNAL OF IOWA MEDICAL SOCIETY

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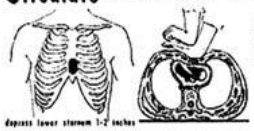

for physicians only

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• *IF ASYSTOLE OR WEAK BEATS:* EPINEPHRINE OR CALCIUM I.V.

A.C.: 440 – 1000 V 0.25 sec
or D.C.: 150 W-sec 0.0025 sec

Fluids – *I.V. PLASMA, DEXTRAN, SALINE*

Do not interrupt cardiac compressions and ventilation.
Tracheal intubation only when necessary.

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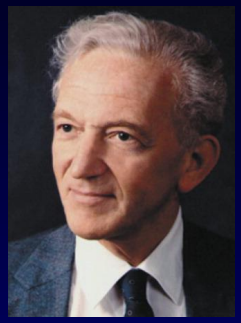


The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Defibrillation Strategies for Refractory Ventricular Fibrillation

Table 3. Primary and Secondary Outcomes.

Outcome	Standard Defibrillation (N=136)	VC Defibrillation (N=144)	DSED (N=125)	Adjusted Relative Risk (95% CI)*	
				DSED vs. Standard	VC vs. Standard
	number of patients/total number (percent)				
Survival to hospital discharge†	18/135 (13.3)	31/143 (21.7)	38/125 (30.4)	2.21 (1.33–3.67)	1.71 (1.01–2.88)

CONCLUSIONS

Among patients with refractory ventricular fibrillation, survival to hospital discharge occurred more frequently among those who received DSED or VC defibrillation than among those who received standard defibrillation. (Funded by the Heart and Stroke Foundation of Canada; DOSE VF ClinicalTrials.gov number, NCT04080986.)

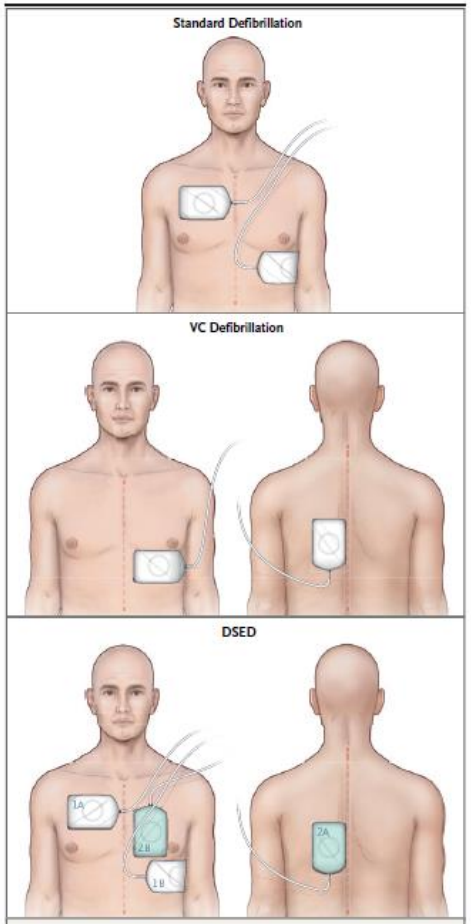


Figure 1. Pad Placement in the Three Defibrillation Strategies.
Pad placement for standard defibrillation, vector-change (VC) defibrillation, and double sequential external defibrillation (DSED) is shown. In the bottom panel, defibrillation pads 2A and 2B are those of the second defibrillator, with the pads placed in the posterior and anterior positions. For all strategies, the first three shocks occurred with pads placed in the configuration used for standard defibrillation.

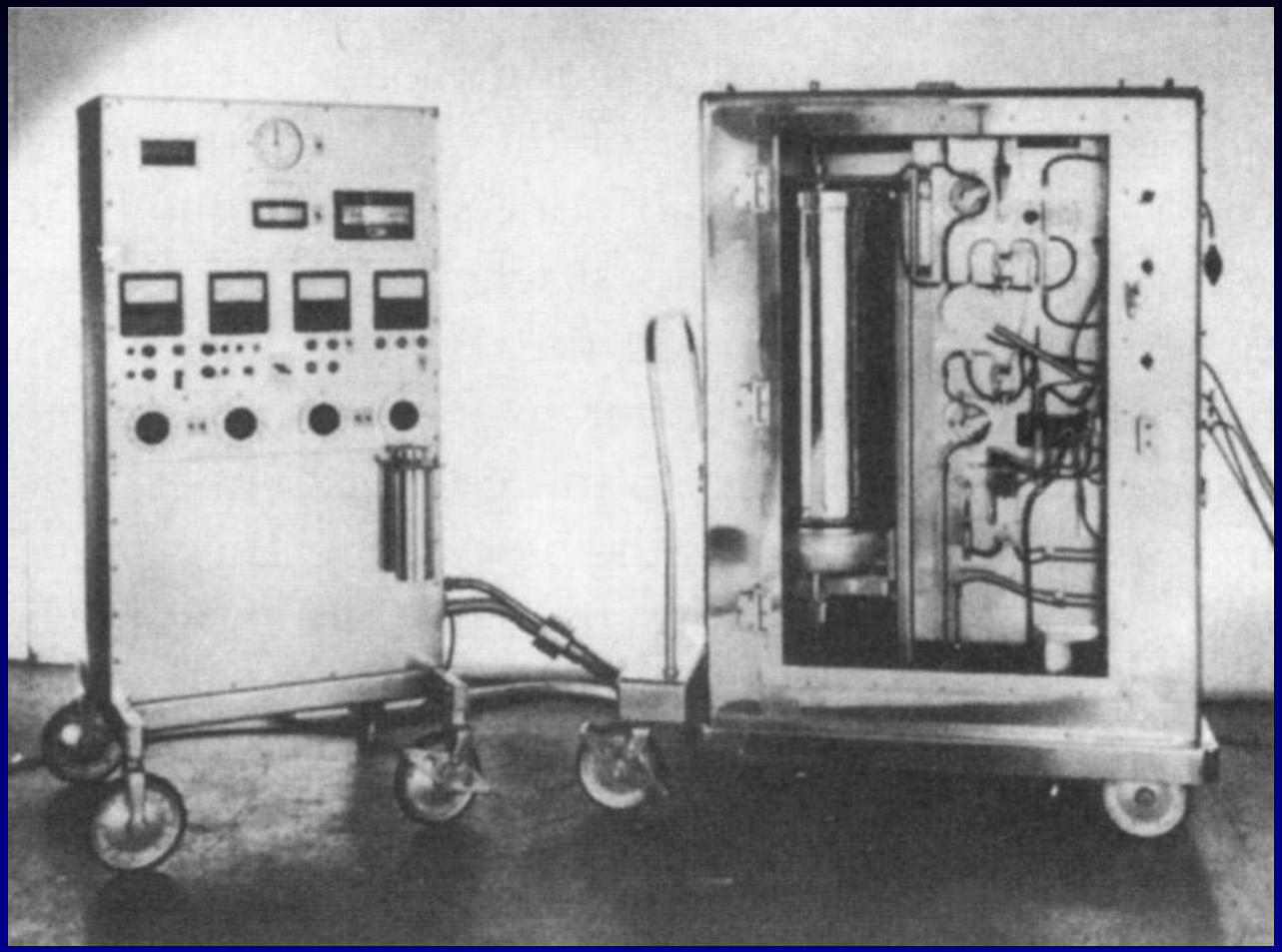
ECPR

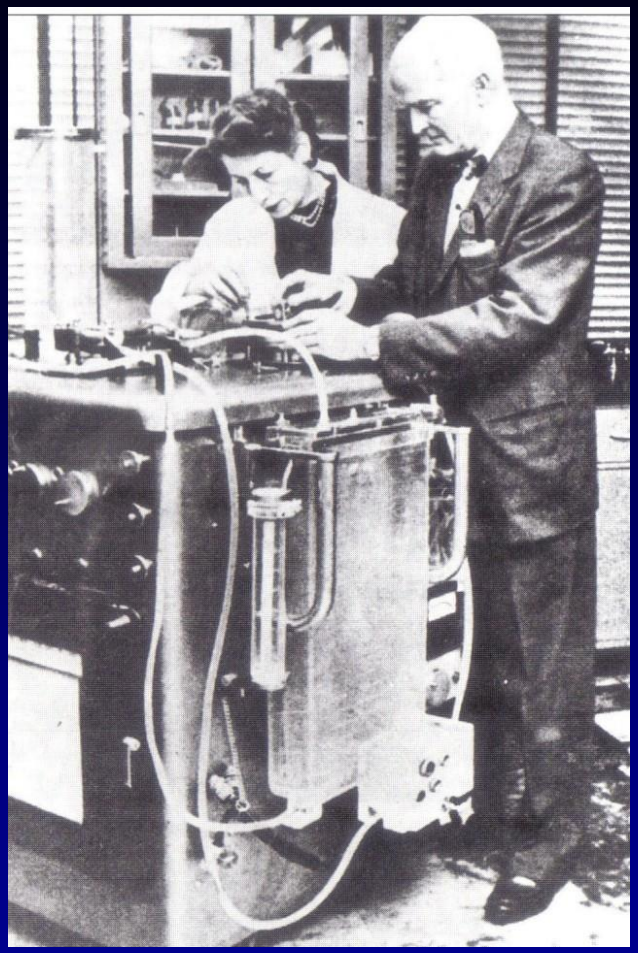
extracorporeal CPR

SCIENTIFIC AMERICAN

NOVEMBER 27, 2023 | 5 MIN READ

ECPR Could Prevent Many More Cardiac Arrest Deaths





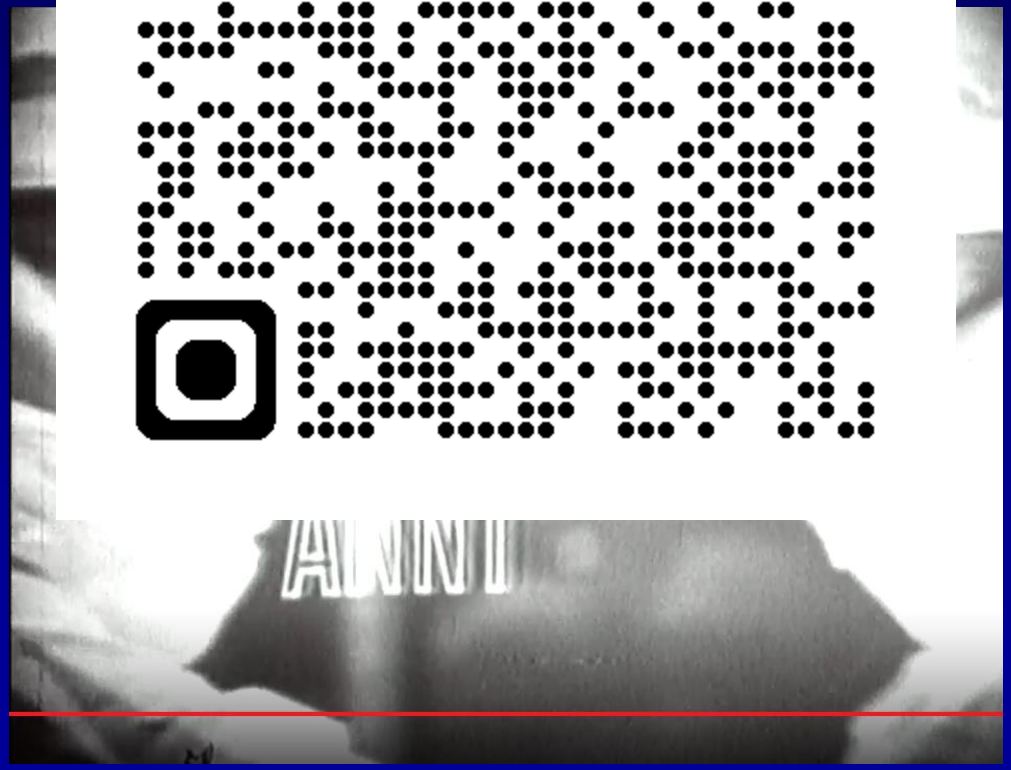
1953: Chirurg John H. Gibbon Jr. provedl první úspěšnou operaci na srdci s využitím mimotělního oběhu.

CKTCH | Centrum kardiovaskulární a transplantační chirurgie

Česká prve… …rgii v Brně

25/4/1956	Operace
23/5/1956	Operace
5/2/1958	Operace

…OSS)



The Role of Assisted Circulation in Cardiac Resuscitation

7/8

John H. Kennedy, MD

Assisted Circulation in Cardiac Resuscitation, Cleveland Metropolitan General Hospital

Patient	Duration of Preliminary Cardiac Massage	Liters/Sq M/Minute			Comment
		Mode	Flow	Duration Minutes	
1*	Not mentioned	PCPB†	2.1	60	Myocardial infarction, regained consciousness during perfusion; died later
2*	30 minutes	PCPB	2.0	60	Air embolism during pelvic surgery; resuscitated; died 4 days later; brain damage
3	35 minutes	PCPB	1.7	45	Intraoperative hypoxia; recovered completely
4	10 minutes	PCPB	1.25	120	Myocardial infarction; resuscitated; died of third cardiac arrest
5	5 minutes	PCPB	1.0	58	Resuscitated; pulmonary embolectomy; died postoperatively
6	0	LHBP‡	2.6	45	Intraoperative ventricular fibrillation; resuscitated; normally cerebral function; died postoperatively of ventricular fibrillation
7	0	LHBP	2.6	60	Intraoperative ventricular fibrillation; unsuccessful resuscitation
8	30 minutes	PCPB	2.6	25	Intraoperative ventricular fibrillation; resuscitated; died postoperatively following aortic valve replacement

JAMA, Aug 22, 1966 • Vol 197, No 8

Cardiopulmonary Bypass After Prolonged Cardiac Arrest in Dogs

Ann Emerg Med June 1987;16:611-619.

o Pretto, MD*†‡
Safar, MD*†‡
e Saito, MD‡‖
n Stezoski*†‡
Kelsey, PhD§
urgh, Pennsylvania

he Resuscitation Research Center*

Ventricular fibrillation (VF)
survived by cerebral neuro
(ROSC) by external CPR is
mits control of pressure, flow
blood. After 12½ minutes of
as a research tool for reperf
ten dogs without thoracoton
preceding CPR (a deliberate

BEST OUTCOME
(time of death after cardiac arrest)

	Overall Performance Category	Cardiac Arrest of 12	
		Control CPR-ALS	Cardiopulmonary Bypass
	No ROSC in 30 min	●●	
Brain Death	5		
Coma, Vegetative State	4	● (6h)C ● (18h) C ● (16h)C ● (72h) ● (16h)C ● (72h)	★ (6h) C ★ (72h) ★ (16h) C ★ (72h) ★ (20h) P
Severe Deficit Conscious	3		★ (72h) ★ (72h)
Moderate Deficit Conscious	2		★ (72h) ★ (72h)
Normal	1		★ (72h)
Conscious Survivors	n	0 of 10 (6) *$P < .05$	5 of 10 *$P < .05$

with CPB increases cardiovascular resuscitability and thereby survival compared to standard CPR and advanced life support. Cerebral recovery, however, requires more than CPB. CPB should be explored in a CPR animal model with a clinically realistic scenario. [Pretto E, Safar P, Saito R, Stezoski

Contents lists available at ScienceDirect

Resuscitation

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

Review

Extracorporeal cardiopulmonary resuscitation for cardiac arrest: A systematic review

Mathias J. Holmberg[a,b], Guillaume Geri[c,d], Sebastian Wiberg[b,e], Anne-Marie Guerguerian[f], Michael W. Donnino[b,g], Jerry P. Nolan[h], Charles D. Deakin[i], Lars W. Andersen[a,b,*], for the International Liaison Committee on Resuscitation's (ILCOR) Advanced Life Support and Pediatric Task Forces

- 25 observačních studií: 15 u dospělých se zástavou mimo nemocnici, 7 u dospělých se zástavou u hospitalizovaných pacientů, 3 u dětských hospitalizovaných pacientů
- **Nejednoznačné výsledky** neumožňují doporučit nebo zamítnout ECPR pro dospělé či dětské pacienty. Kvalita dat v hodnocených studiích byla nízká.

Resuscitation 131 (2018) 91–100

Advanced reperfusion strategies for patients with out-of-hospital cardiac arrest and refractory ventricular fibrillation (ARREST): a phase 2, single centre, open-label, randomised controlled trial

Demetris Yannopoulos, Jason Bartos, Ganesh Raveendran, Emily Walser, John Connett, Thomas A Murray, Gary Collins, Lin Zhang, Rajat Kalra, Marinos Kosmopoulos, Ranjit John, Andrew Shaffer, RJ Frascone, Keith Wesley, Marc Conterato, Michelle Biros, Jakub Tolar, Tom P Aufderheide

	ECMO-facilitated resuscitation (n=15)		Standard ACLS treatment (n=15)		Risk difference or p value
	Number of patients with data	Patients	Number of patients with data	Patients	
Primary outcome (95% CrI)					
Survival to hospital discharge	14	6 (43%, 21·3–67·7)	15	1 (7%, 1·6–30·2)	36% (3·7–59·2; posterior probability=0·9861)
Secondary outcomes (95% CI)					
Survival to 3 months	14	6 (43%, 21·3–67·7)	15	0 (0·0–20·4)	0·0063
Survival to 6 months	14	6 (43%, 21·3–67·7)	15	0 (0·0–20·4)	0·0063

Lancet 2020 Dec 5;396(10265):1807-1816

JAMA | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Effect of Intra-arrest Transport, Extracorporeal Cardiopulmonary Resuscitation, and Immediate Invasive Assessment and Treatment on Functional Neurologic Outcome in Refractory Out-of-Hospital Cardiac Arrest
A Randomized Clinical Trial

Jan Belohlavek, MD, PhD; Jana Smalcova, MD; Daniel Rob, MD; Ondrej Franek, MD; Ondrej Smid, MD; Milana Pokorna, MD, PhD; Jan Horák, MD; Vratislav Mrazek, MD; Tomas Kovarnik, MD, PhD; David Zemanek, MD, PhD; Ales Kral, MD, PhD; Stepan Havranek, MD, PhD; Petra Kavalkova, PhD; Lucie Kompelentova, MD; Helena Tomková, MD; Alan Mejstrik, MSc; Jaroslav Valasek, MD; David Peran, MSc; Jaroslav Pekara, MSc; Jan Rulisek, MD, PhD; Martin Balik, MD, PhD; Michal Huptych, PhD; Jiri Jarkovsky, PhD; Jan Malik, MD, PhD; Anna Valerianova, MD, PhD; Frantisek Mejnsky, MSc, PhD; Petr Kolouch, MD; Petra Havrankova, MD, PhD; Dan Romportl, MD; Arnost Komarek, PhD; Ales Linhart, MD, PhD; for the Prague OHCA Study Group

INTERVENTIONS In the invasive strategy group (n = 124), mechanical compression was initiated, followed by intra-arrest transport to a cardiac center for ECPR and immediate invasive assessment and treatment. Regular advanced cardiac life support was continued on-site in the standard strategy group (n = 132).

JAMA. 2022;327(8):737-747.

Table 2. Primary and Secondary Outcomes in a Study of Intra-arrest Transport, Extracorporeal Cardiopulmonary Resuscitation, and Immediate Invasive Assessment and Treatment in Refractory Out-of-Hospital Cardiac Arrest

	No. (%)			
	Invasive strategy (n = 124)	Standard strategy (n = 132)	Absolute difference, % (95% CI)	*P* value
Primary outcome				
Survival with minimal or no neurologic impairment at 180 d[a]	39 (31.5)	29 (22.0)	9.5 (−1.3 to 20.1)	.09
Secondary outcomes				
Survival with minimal or no neurologic impairment at 30 d[a]	38 (30.6)	24 (18.2)	12.4 (1.9 to 22.7)	.02
Cardiac recovery at 30 d	54 (43.5)	45 (34.1)	9.4 (−2.5 to 21)	.12

CONCLUSIONS AND RELEVANCE Among patients with refractory out-of-hospital cardiac arrest, the bundle of early intra-arrest transport, ECPR, and invasive assessment and treatment did not significantly improve survival with neurologically favorable outcome at 180 days compared with standard resuscitation. However, the trial was possibly underpowered to detect a clinically relevant difference.

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 JANUARY 26, 2023 VOL. 388 NO. 4

Early Extracorporeal CPR for Refractory Out-of-Hospital Cardiac Arrest

M.M. Suverein, T.S.R. Delnoij, R. Lorusso, G.J. Brandon Bravo Bruinsma, L. Otterspoor, C.V. Elzo Kraemer, A.P.J. Vlaar, J.J. van der Heijden, E. Scholten, C. den Uil, T. Jansen, B. van den Bogaard, M. Kuijpers, K.Y. Lam, J.M. Montero Cabezas, A.H.G. Driessen, S.Z.H. Rittersma, B.G. Heijnen, D. Dos Reis Miranda, G. Bleeker, J. de Metz, R.S. Hermanides, J. Lopez Matta, S. Eberl, D.W. Donker, R.J. van Thiel, S. Akin, O. van Meer, J. Henriques, K.C. Bokhoven, L. Mandigers, J.J.H. Bunge, M.E. Bol, B. Winkens, B. Essers, P.W. Weerwind, J.G. Maessen, and M.C.G. van de Poll

Start of arrest to start of ECLS flow	
No. of patients	44
Median interval (IQR) — min	74 (63 to 87)

Table 4. Survival with Favorable Neurologic Outcome.*

Outcome	Extracorporeal CPR (N=70)	Conventional CPR (N=63)†	Odds Ratio (95% CI)	P Value	Risk Ratio (95% CI)
Primary outcome: 30-day survival with favorable neurologic outcome — no./total no. (%)	14/70 (20)	10/63 (16)	1.4 (0.5–3.5)	0.52	1.05 (0.97–1.13)

CONCLUSIONS

In patients with refractory out-of-hospital cardiac arrest, extracorporeal CPR and conventional CPR had similar effects on survival with a favorable neurologic outcome. (Funded by the Netherlands Organization for Health Research and Development and Maquet Cardiopulmonary [Getinge]; INCEPTION ClinicalTrials.gov number, NCT03101787.)

Low et al. Critical Care (2024) 28:57
https://doi.org/10.1186/s13054-024-04830-5

Critical Care

BRIEF REPORT Open Access

Extracorporeal cardiopulmonary resuscitation versus conventional CPR in cardiac arrest: an updated meta-analysis and trial sequential analysis

Christopher Jer Wei Low[1†], Ryan Ruiyang Ling[1†], Kollengode Ramanathan[1,2], Ying Chen[3], Bram Rochwerg[4,5], Tetsuhisa Kitamura[6], Taku Iwami[7], Marcus Eng Hock Ong[8,9] and Yohei Okada[7,8*]

Zhong et al. BMC Emergency Medicine (2024) 24:128
https://doi.org/10.1186/s12873-024-01058-y

BMC Emergency Medicine

SYSTEMATIC REVIEW Open Access

Comparison of prognosis between extracorporeal CPR and conventional CPR for patients in cardiac arrest: a systematic review and meta-analysis

Hong Zhong[1,4†], Zhaohui Yin[2†], Yanze Wang[3†], Pei Shen[3†], Guoli He[3†], Shiming Huang[4], Jianhong Wang[3], Shan Huang[3], Li Ding[3], Zunwei Luo[3] and Manhong Zhou[1,3*]

Journal of Intensive Care Medicine
2025, Vol. 40(2) 207-217

DOI: 10.1177/08850666241303851
journals.sagepub.com/home/jic
Sage

Extracorporeal-CPR Versus Conventional-CPR for Adult Patients in Out of Hospital Cardiac Arrest– Systematic Review and Meta-Analysis

Swetha Reddy, MD[1,2], Samuel Garcia, MD[3], Logan J. Hostetter, MD[3], Alexander S. Finch, MD[4], Fernanda Bellolio, MD[4], Pramod Guru, MD[1,2], Danielle J. Gerberi, MLIS, AHIP[5], and Nathan J. Smischney, MD, MSc, FASA[6]


Blu-ray Disc
CAMERON DIAZ
MATT DILLON
BEN STILER
něco na té
ECPR
je
něco na tě mary ji

RESUSCITATION 180 (2022) 111–120

Available online at ScienceDirect

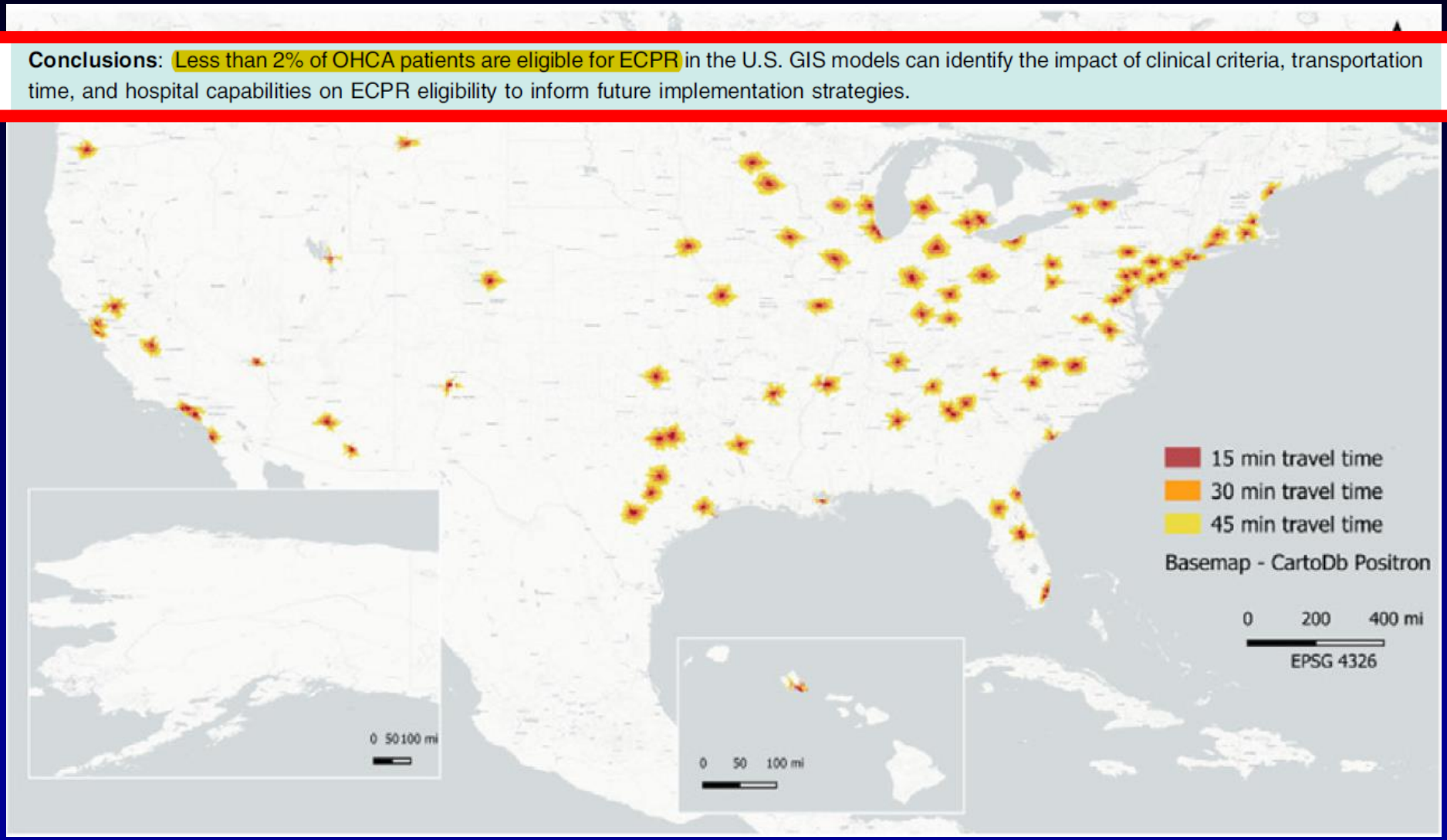
Resuscitation

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

Clinical paper

Eligibility of out-of-hospital cardiac arrest patients for extracorporeal cardiopulmonary resuscitation in the United States: A geographic information system model

Conclusions: Less than 2% of OHCA patients are eligible for ECPR in the U.S. GIS models can identify the impact of clinical criteria, transportation time, and hospital capabilities on ECPR eligibility to inform future implementation strategies.



Švédsko

- Restriktivní kritéria: 18-65 let, defibrilovatelný rytmus
- Liberální kritéria: 18-70 let, jakýkoli rytmus
- Ze všech pacientů se zástavou srdce, pouze 1.4% se vešlo do restriktivních kritérií, a 7.8 % do liberálních kritérií pro ECPR.

Resuscitation 84 (2013) 1525–1529

Contents lists available at ScienceDirect

Resuscitation

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

Clinical paper

Safety and feasibility of prehospital extra corporeal life support implementation by non-surgeons for out-of-hospital refractory cardiac arrest☆

Lionel Lamhaut[a,b,*], Romain Jouffroy[a], Michaela Soldan[a], Pascal Phillipe[a], Thibaut Deluze[a], Murielle Jaffry[a], Christelle Dagron[a], Benoit Vivien[a], Christian Spaulding[b,c], Kim An[a], Pierre Carli[a,b]

[a] D.A.R. and SAMU de Paris, Hôpital Necker, Assistance Publique Hôpitaux de Paris, Paris Descartes University, Paris, France

Resuscitation 117 (2017) 109–117

Contents lists available at ScienceDirect

Resuscitation

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

Clinical paper

A Pre-Hospital Extracorporeal Cardio Pulmonary Resuscitation (ECPR) strategy for treatment of refractory out hospital cardiac arrest: An observational study and propensity analysis

Lionel Lamhaut[a,b,*], Alice Hutin[a,c], Etienne Puymirat[d,e], Jérome Jouan[f], Jean-H… …n An[a], Floren… …[i], Frédér… Pierre …

[a] SAMU de Paris and intensive care unit, Necker Hospital, Assistance Publique-Hopitaux de Paris (APHP), 149 rue de de Sevres 75015 Paris, France
[b] Paris Sudden Death Expertise Center, Paris Cardiovascular Research Center (PARCC), INSERM Unit 970, Paris, France

Průměrná doba do plné reperfúze byla zkrácena o 20 min

Statistical simulation

Optimizing extracorporeal cardiopulmonary resuscitation delivery for out-of-hospital cardiac arrest: a Monte Carlo simulation study ☆

Lawrence Leroux[a,b,c], Brian Grunau[d,e,f,g], Pierre Lecuyer[h], Nathaniel B. Dennis-Benford[i], Lionel Lamhaut[j,k,l], Sheldon Cheskes[m,n,o,p], Alexis Cournoyer[a,q,r,s], Yiorgos Alexandros Cavayas[a,t,u,v,]*

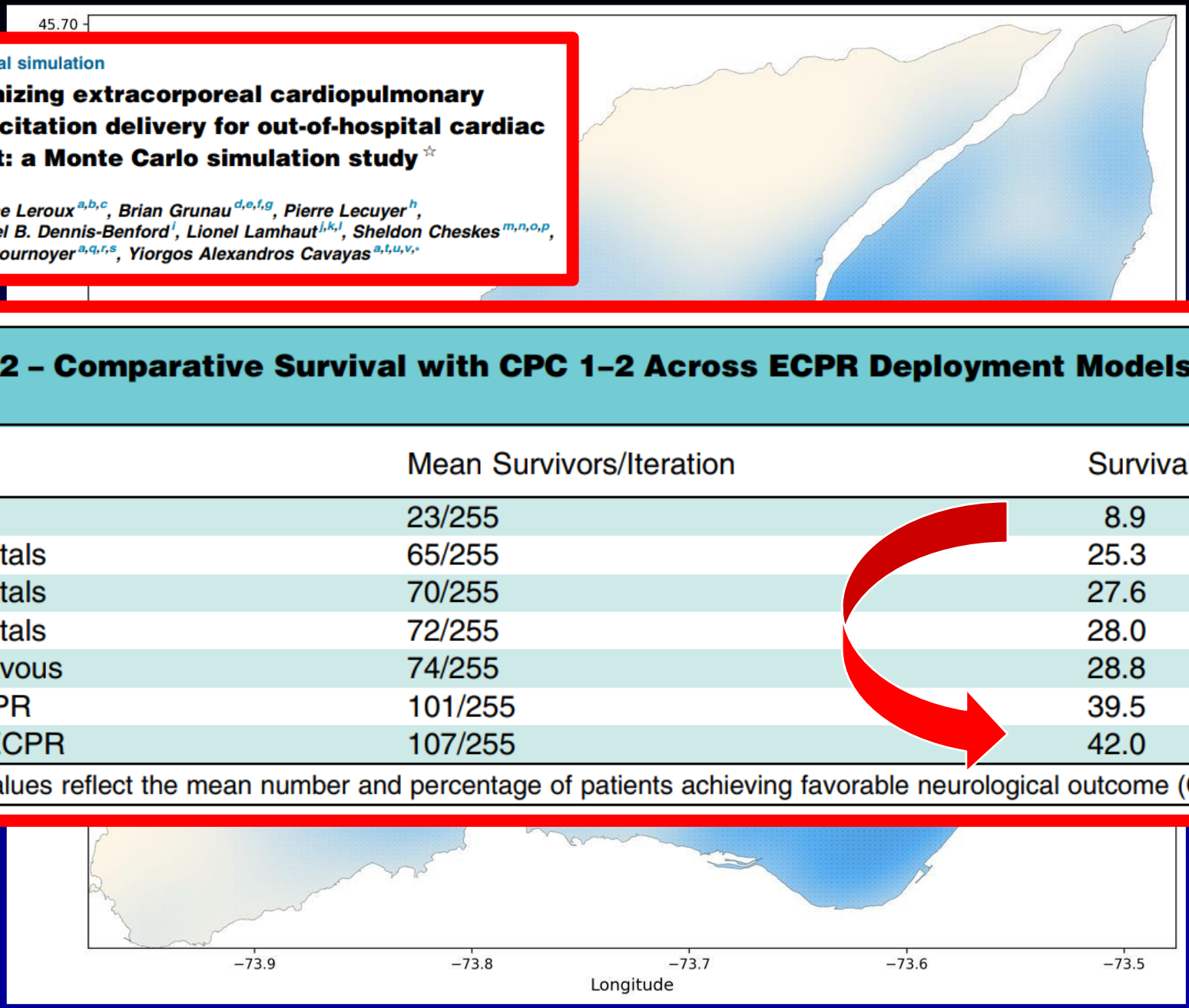


Table 2 – Comparative Survival with CPC 1–2 Across ECPR Deployment Models.

Model	Mean Survivors/Iteration	Survival (%)
ACLS	23/255	8.9
2 Hospitals	65/255	25.3
3 Hospitals	70/255	27.6
4 Hospitals	72/255	28.0
Rendezvous	74/255	28.8
PH ECPR	101/255	39.5
O-PH ECPR	107/255	42.0

Survival values reflect the mean number and percentage of patients achieving favorable neurological outcome (CPC 1–2)

Resuscitation 2025 Oct:215:110743

Editorial

RESUSCITATION 215 (2025) 110790

How to plan for prehospital ECPR, and move mountains

Tomas Drabek [a,*]

Garrett A. Cavaliere [b]

[a] *Safar Center for Resuscitation Research, Department of Anesthesiology and Perioperative Medicine, University of Pittsburgh School of Medicine, UPMC Presbyterian Hospital, 200 Lothrop St., Suite C-200, Pittsburgh, PA 15213, United States*

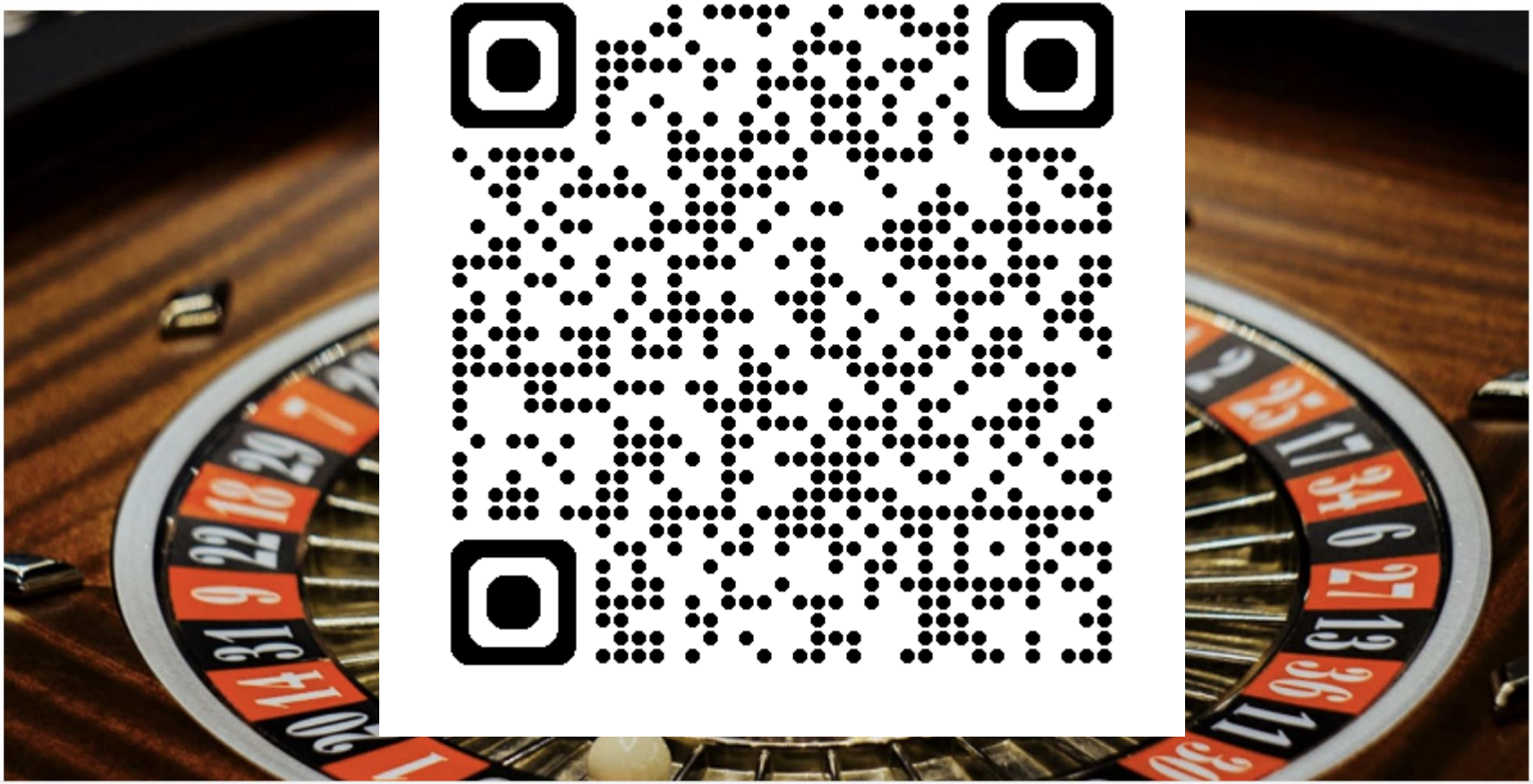
[b] *Department of Emergency Medicine and Division of EMS, Life Lion Critical Care Transport, Penn State College of Medicine, Penn State Health Hershey Medical Center, 500 University Dr., Hershey, PA 17933, United States*

long been looming on the horizons of resuscitation landscape.

Jak to s ECPR vidí Monte Carlo aneb chcete-li být IN, musíte jít OUT

10. 11. 2025

No Comments




Assistance
géolocalisée
24h/24
7j/7


incase
Andy Warhol
©®/™ The Andy Warhol Foundation for Visual Arts, Inc.

Clinical paper

RESUSCITATION 208 (2025) 110488

Pre-hospital ECPR cost analysis and cost effectiveness modelling study

Fredrick Zmudzki[a,b,c], Brian Burns[d,e], Natalie Kruit[d,e,f], Changle Song[g], Emily Moylan[g], Hemal Vachharajani[f], Hergen Buscher[h,i], Timothy J. Southwood[d,j], Paul Forrest[d,j], Mark Dennis[d,j,]*

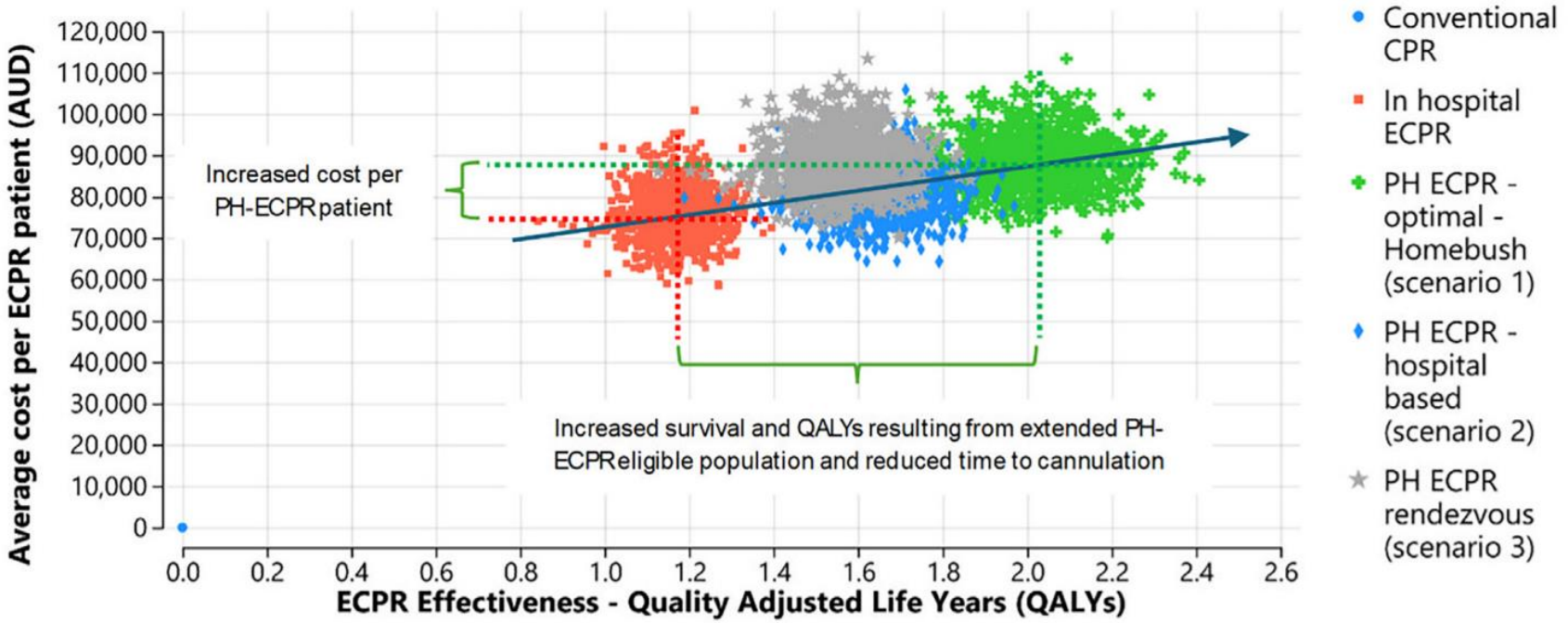


Fig. 3 – PH-ECPR estimated costs and effectiveness per patient by strategy. Estimated cost and effectiveness (QALYS) by ECPR delivery strategy. The individual-colored dots represent modelled point estimates of the average cost per patient under bootstrapped scenarios. A slight increase in cost per patient (y-axis) is seen with PH-ECPR. However, the increase patient catchment enabled by PH-ECPR is reflected in increased QALYs (x-axis).

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Resuscitation

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

Editorial

Extra corporeal cardiopulmonary resuscitation: A cost of living crisis?

Table 3 – Comparison of cost of other accepted medical interventions.

Intervention	Cost per patient (USD)	ICER (USD)/Cost per QALY
Hospital based ECPR	$48,750	$16,388
PH ECPR Team (Base Case)	$65,000	$29,250
CAR – T Therapy[58]	$500,000	$125,000
Lumacaftor/ivacaftor[58]	$379,780	$3,655,352
Novel Cancer Drugs[59]	$196,000	NR[@]
Nivolumab (NSCLC)[60]	$180,557	$138,457
Pelvic exenteration[61]	$89,315	$147,765
Kidney transplantation[29,45]	$66,000	Cost saving

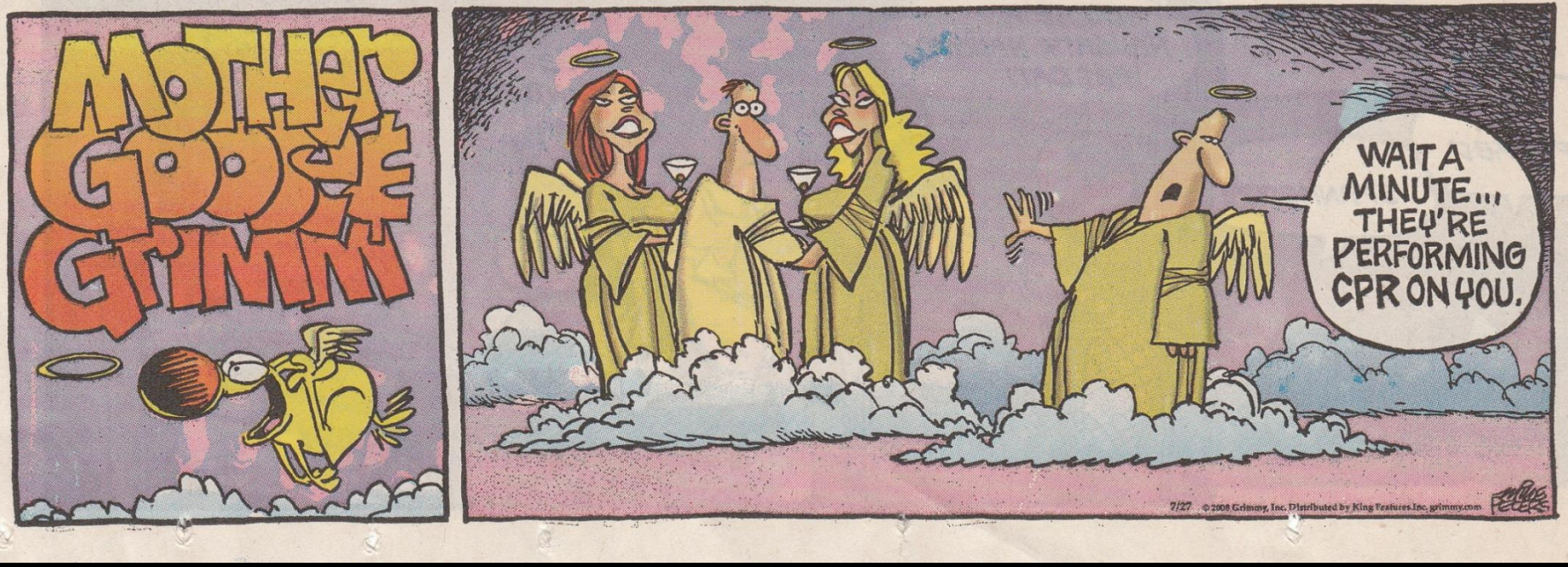
[@] NR – not reported.

Souhrn:

- **A**irway: všechny pomůcky jsou přijatelné
- **B**reathing: není nezbytné, ale vhodné
- **C**irculation: zevní srdeční masáž bez přerušení pro vdechy
- **D**rugs: nejsou žádný zázrak
- **E**KG: dvojitá defibrilace nebo změna vektoru

ECPR

ale jen někde a pro někoho


MOTHER GOOSE GRIMM
WAIT A MINUTE... THEY'RE PERFORMING CPR ON YOU.
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