ACLS 2015

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American Heart Association®

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EUROPEAN SOCIETY OF CARDIOLOGY®

Why ... rm CPR ?

Thai Resuscitation Council : TRC

Resuscitation Council of Asia

International Liaison Committee on Resuscitation

ILCOR

OHCA


Lay rescuers
EMS
ED
Cath lab
ICU

IHCA


Primary providers
Code team
Cath lab
ICU

Strategies to improve CPR outcome

High bystander CPR and AED use rate

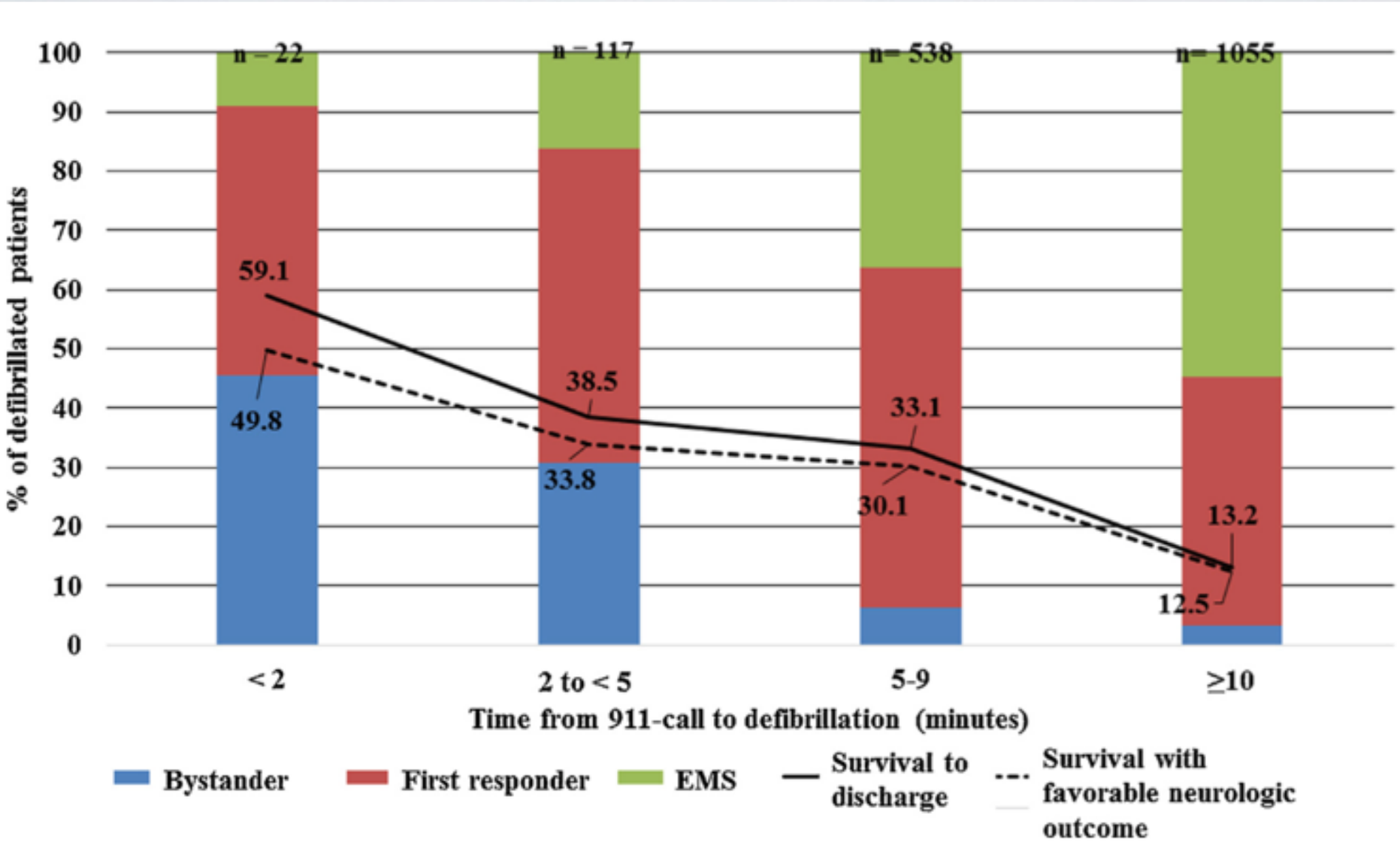
High quality ACLS

Post cardiac arrest care

Debriefing and Registration

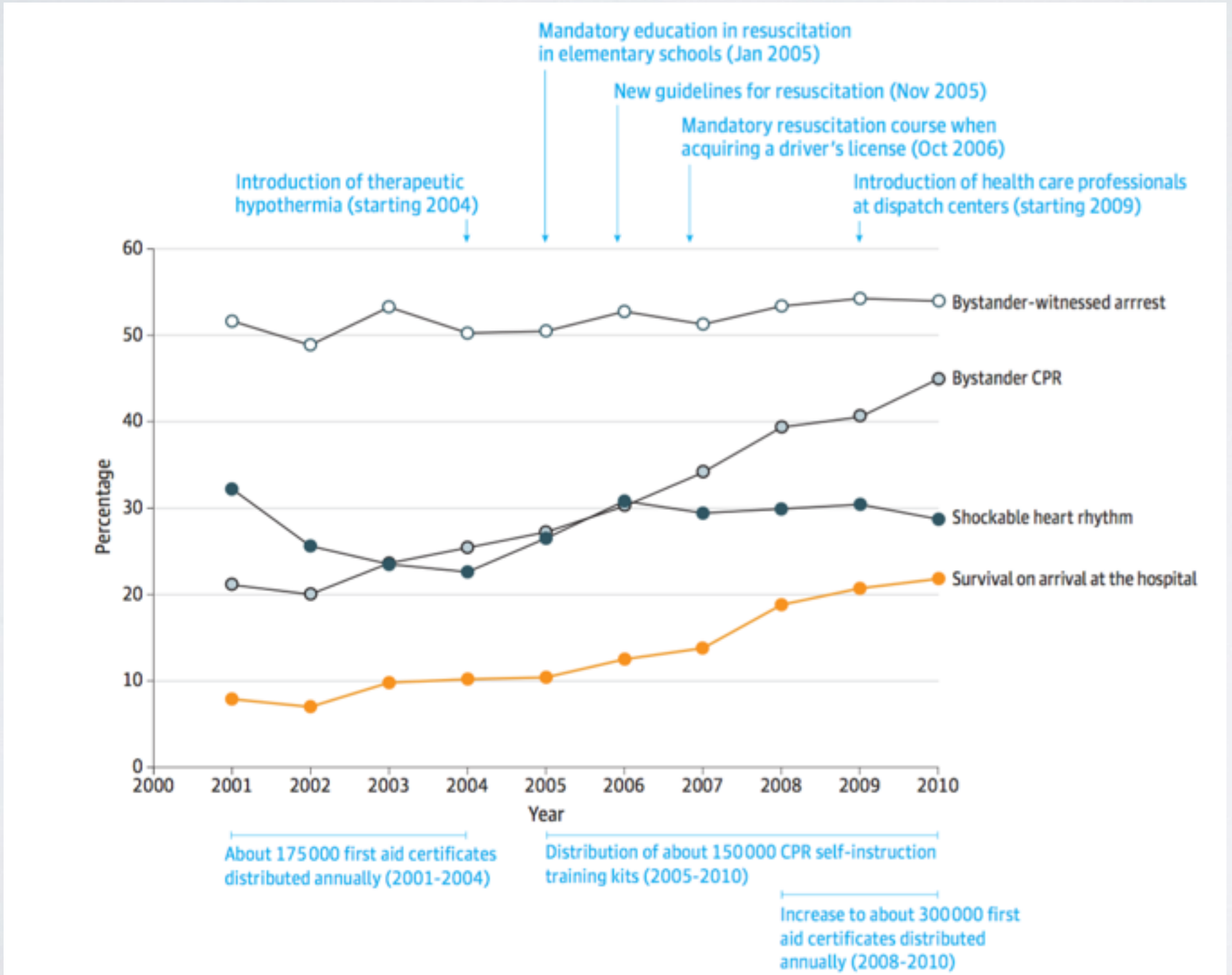
Bystander CPR

The role of bystanders, first responders, and emergency medical service providers in timely defibrillation and related outcomes after out-of-hospital cardiac arrest

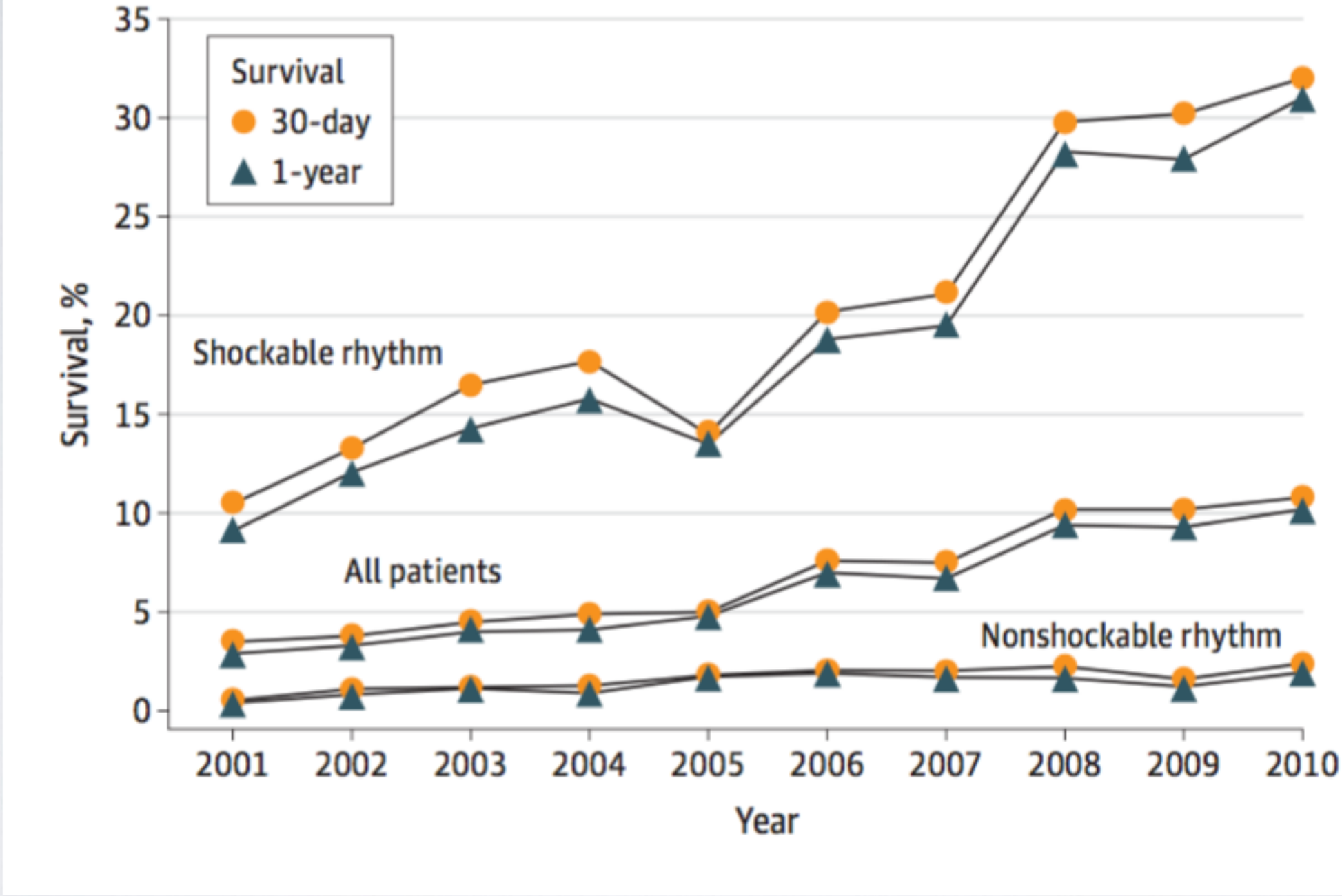


Hansen M. Resuscitation 2015;96:303-309

Association of National Initiatives to Improve Cardiac Arrest Management With Rates of Bystander Intervention and Patient Survival After Out-of-Hospital Cardiac Arrest



Wissenberg M.
JAMA. 2013;310(13):1377-1384



Wissenberg M.
JAMA. 2013;310(13):1377-1384

Dispatchers should be educated to identify unresponsiveness with abnormal breathing

The role of dispatcher-guided CPR provide

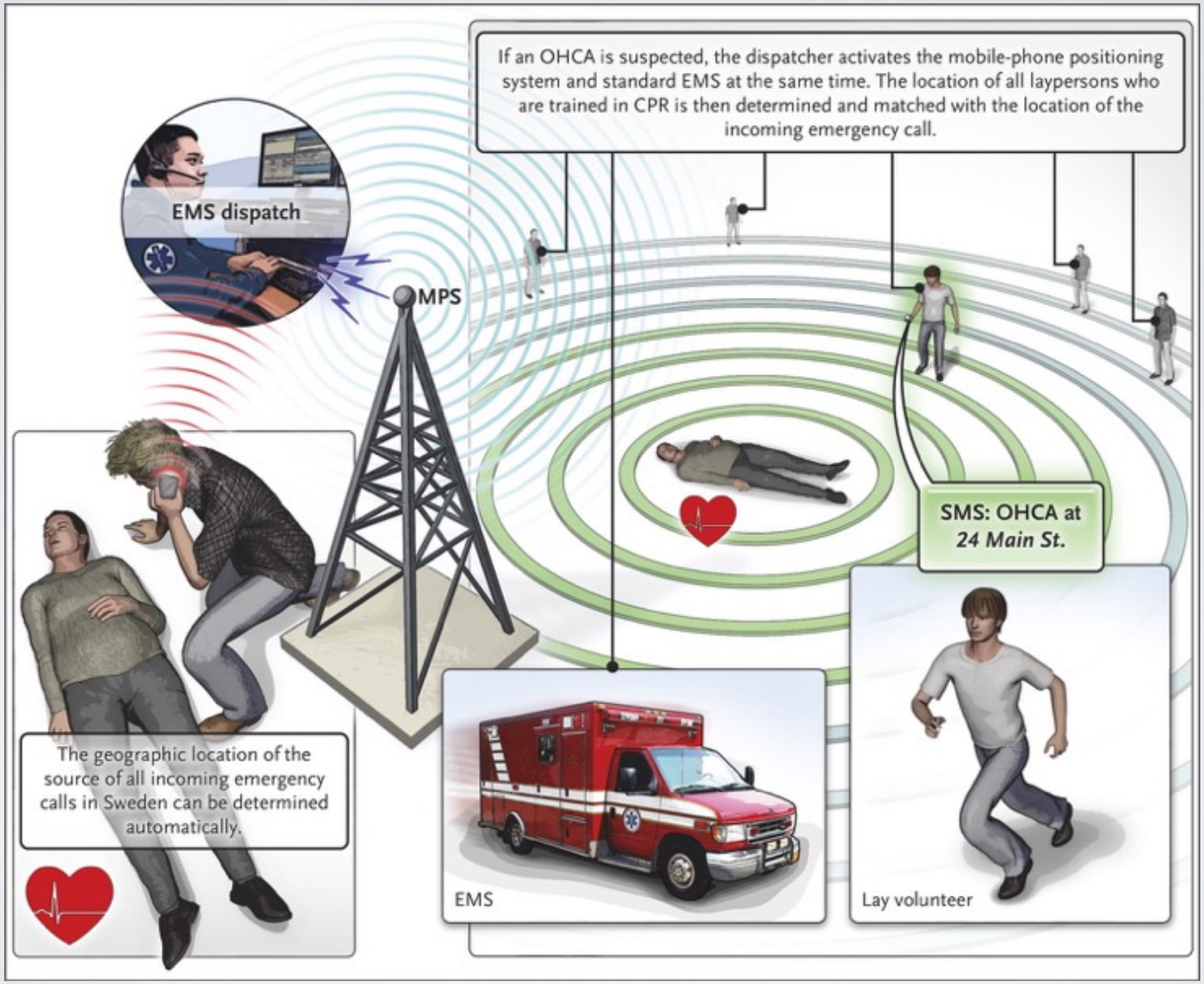
Chest compression only CPR instructions

Dispatcher instruction of chest compression-only CPR increases actual provision of bystander CPR

	Dispatcher instruction		
	CCCPR (n=5,743)	Conventional CPR (n=13,926)	*p*
CCCPR and conventional CPR	4,022(70)	8,655(62.1)	<0.001
Conventional CPR	3,880(67.6)	3,899(28.0)	<0.001
Call receipt to CPR by bystanders, mead(SD)	1.4(1.6)	1.3(1.7)	<0.001

Shimamoto T. Resuscitation 2015;96;9-15

Mobile-Phone Dispatch of Laypersons for CPR in OHCA



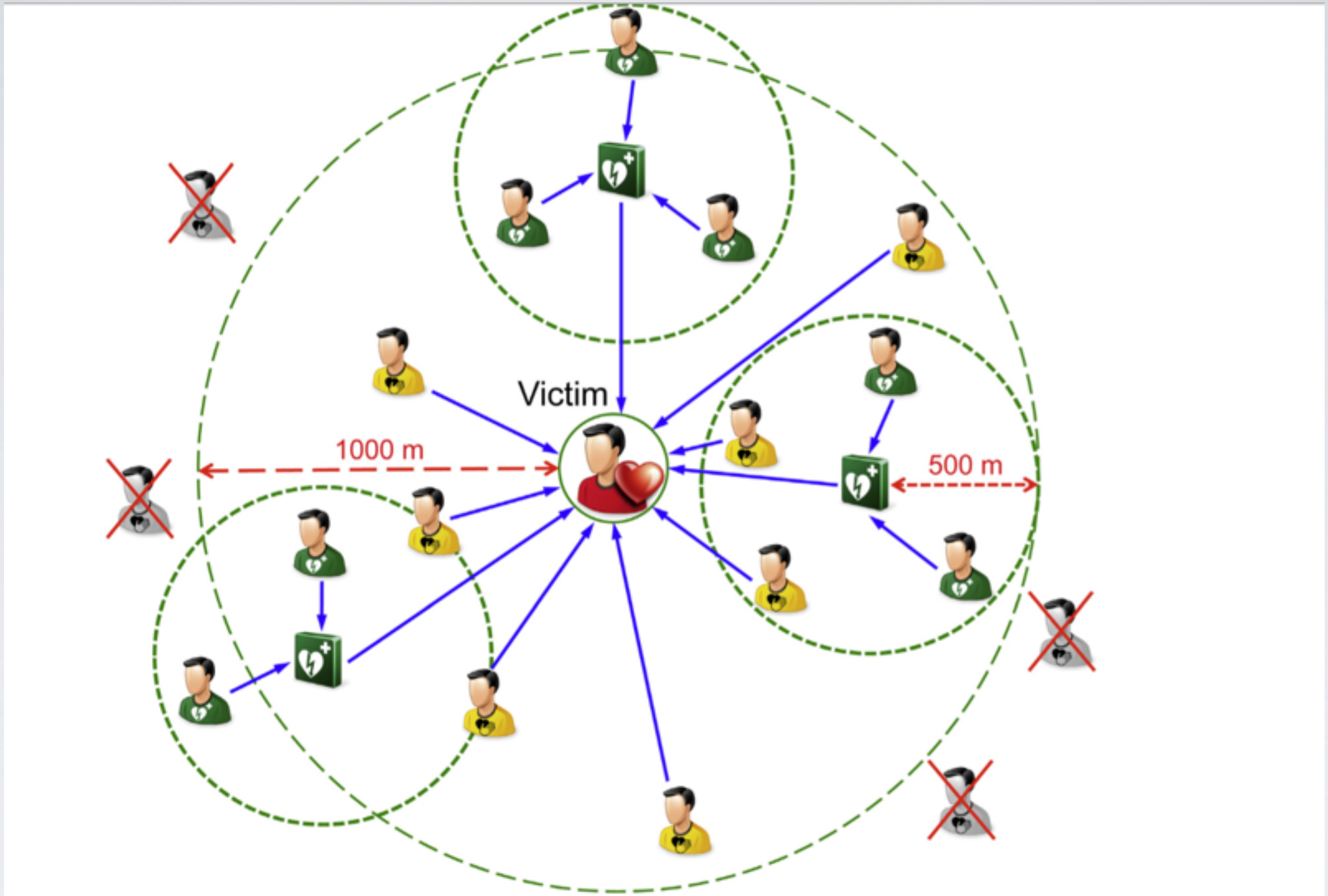
Mobile-Phone Dispatch of Laypersons for CPR in OHCA

Table 2. Primary and Secondary Outcomes.*

Outcome	Intervention	Control	Difference (95% CI)	P Value
	no. of patients/total no. (%)		*percentage points*	
Primary outcome: bystander-initiated CPR	188/305 (61.6)	172/360 (47.8)	13.9 (6.2 to 21.2)	<0.001
Secondary outcome				
30-day survival	32/286 (11.2)	28/326 (8.6)	2.6 (–2.1 to 7.8)	0.28
Return of spontaneous circulation	90/306 (29.4)	105/361 (29.1)	0.3 (–6.5 to 7.3)	0.93
Shockable rhythm: ventricular fibrillation or ventricular tachycardia	58/301 (19.3)	60/347 (17.3)	2.0 (–4.0 to 8.0)	0.52
Bystander-initiated CPR including CPR performed with telephone instructions	196/305 (64.3)	197/360 (54.7)	9.5 (2.0 to 16.9)	0.01

* CI denotes confidence interval.

Social media technologies that summon rescuers who are willing and able to perform CPR



TM-responders are alerted by text message

TM-alert system identifies the exact location of the cardiac arrest patient

Implementation of public access defibrillation

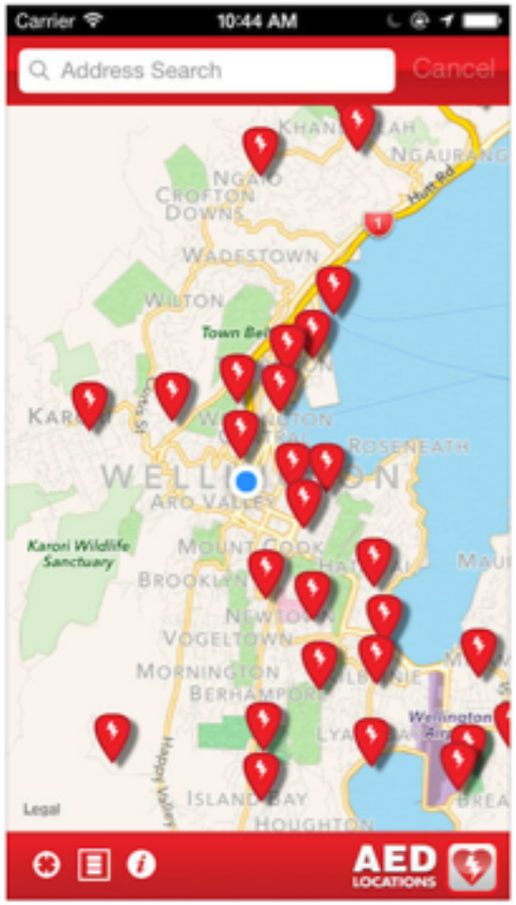
PAD programs provide bystanders with automatic electronic defibrillators (AEDs)

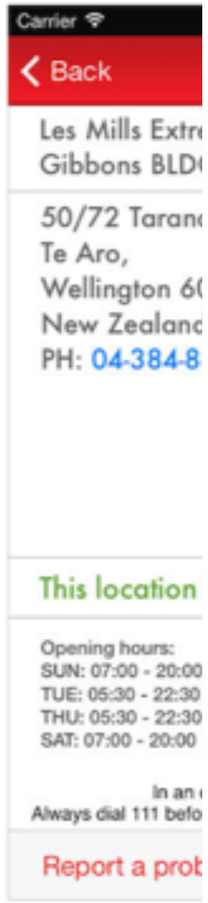
I lert U 4+
Arunsawad Dot Com

Details | Reviews

AED Locations 4+
Able Technology Limited >

Details | Reviews | Relate

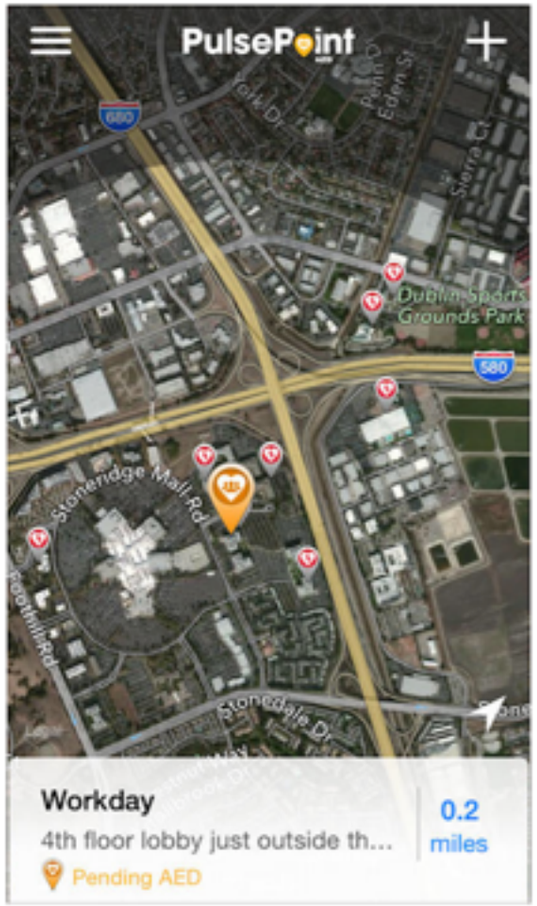


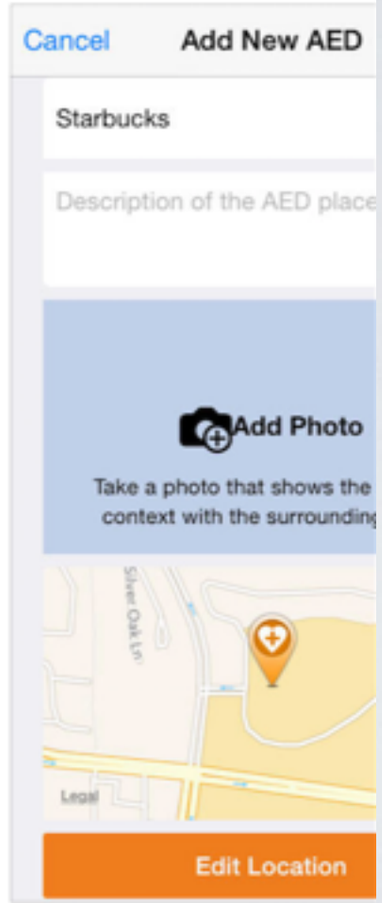


PulsePoint AED 12+
PulsePoint Foundation >

OPEN

Details | Reviews | Related

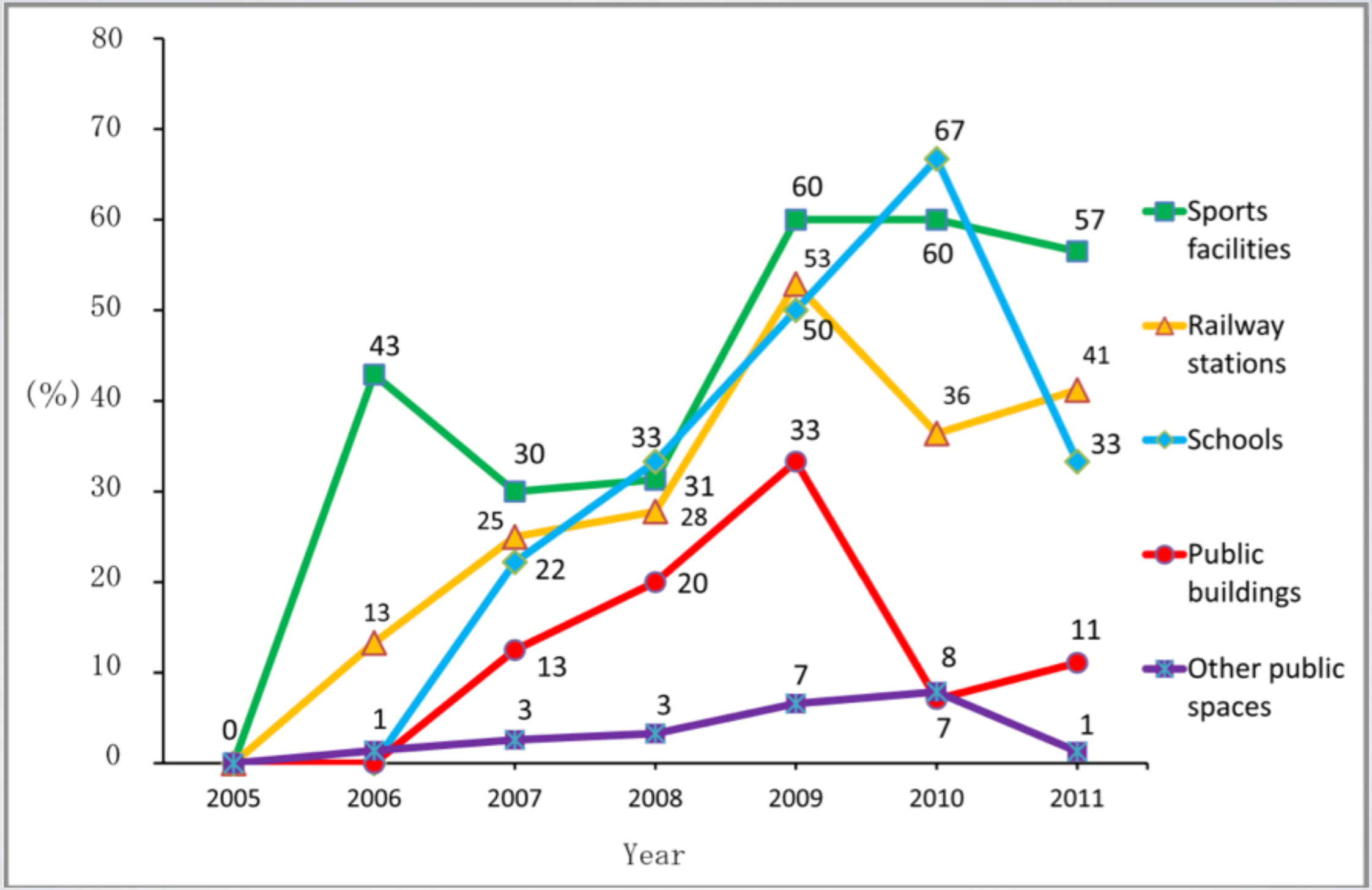





自動体外式除細動器
AED
Automated External Defibrillator
AED
cardiolife
AED
緊急時に
ご使用ください
AED


地名/施設名な
検索
地図
航空写真
日本橋兜町
タカシマヤ
日本橋
中央署
茅場町
ビー・エム
リュー
宝町
八重洲
センタ
京橋
15
宝町
八丁堀
京橋JCT
京橋
銀座
新町
中央区
銀座
築地
聖路加
看護大
明石町
築地本願寺
築地
新明石住宅
現在地周辺へ
Google

Outcomes of Out-of-Hospital Cardiac Arrest by Public Location in the Public-Access Defibrillation Era



Murakami Y. JAHA 2014;1-10

Outcomes of Out-of-Hospital Cardiac Arrest by Public Location in the Public-Access Defibrillation Era

	Railway Stations (n=118)	Sports Facilities (n=93)	Public Buildings (n=86)	Schools (n=31)	Airports (n=4)	Other Public Spaces (n=562)	*P* Value*
Prehospital ROSC, n (%)	35 (29.7)	46 (49.5)	20 (23.3)	11 (35.5)	1 (25.0)	131 (23.3)	<0.001
Total ROSC, n (%)	69 (58.5)	64 (68.8)	44 (51.2)	19 (61.3)	4 (100.0)	296 (52.7)	0.018
Hospital admission, n (%)	63 (53.4)	65 (69.9)	40 (46.5)	19 (61.3)	4 (100.0)	257 (45.7)	<0.001
1-month survival, n (%)	42 (35.6)	50 (53.8)	27 (31.4)	15 (48.4)	2 (50.0)	146 (26.1)	<0.001
Neurologically favorable outcome, n (%)	33 (28.0)	48 (51.6)	20 (23.3)	13 (41.9)	2 (50.0)	76 (13.6)	<0.001

Murakami Y. JAHA 2014;1-10

Association of Bystander Interventions With Neurologically Intact Survival Among Patients With Bystander-Witnessed Out-of-Hospital Cardiac Arrest in Japan

	Railway Stations (n=118)	Sports Facilities (n=93)	Public Buildings (n=86)	Schools (n=31)	Airports (n=4)	Other Public Spaces (n=562)	*P* Value*
Prehospital ROSC, n (%)	35 (29.7)	46 (49.5)	20 (23.3)	11 (35.5)	1 (25.0)	131 (23.3)	<0.001
Total ROSC, n (%)	69 (58.5)	64 (68.8)	44 (51.2)	19 (61.3)	4 (100.0)	296 (52.7)	0.018
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High quality ACLS

- After placement of an advanced airway, it may be reasonable for the provider to deliver 1 breath every 6 seconds (10 breaths/ min)

Providing the maximal inspired oxygen concentration during CPR


ID: 1 ADU
mmHg
ETCO2
38
INS
2
AwRR
14
SpO2(%)
99
PR(BPM)
60
50
12:54:29
EDAN

Impedance Threshold Device (ITD)

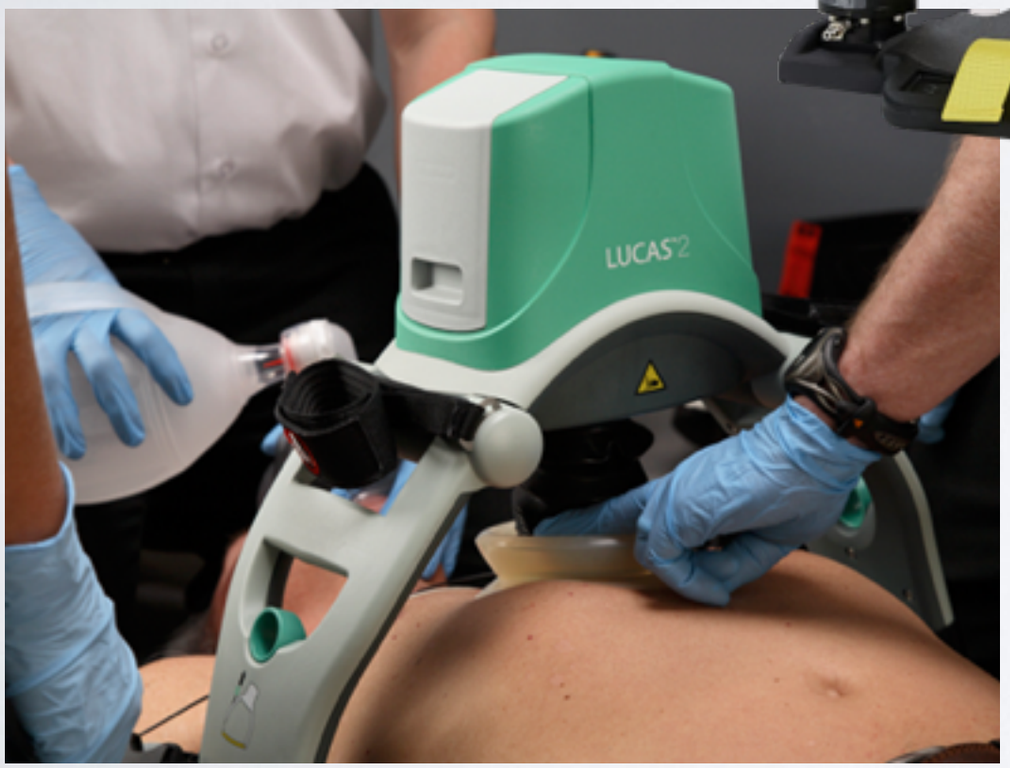
- Limits air entry into the lungs during the decompression phase of CPR
- Improving venous return to the heart and cardiac output

Active Compression Decompression CPR

- Suction cup applied over the mid sternum of the chest
- The application of external negative suction during decompression

Recommendation
Combination may be a reasonable alternative with available equipment and properly trained providers


Model
100L
LIFE
STAT
CPR
HEAD


LUCAS 2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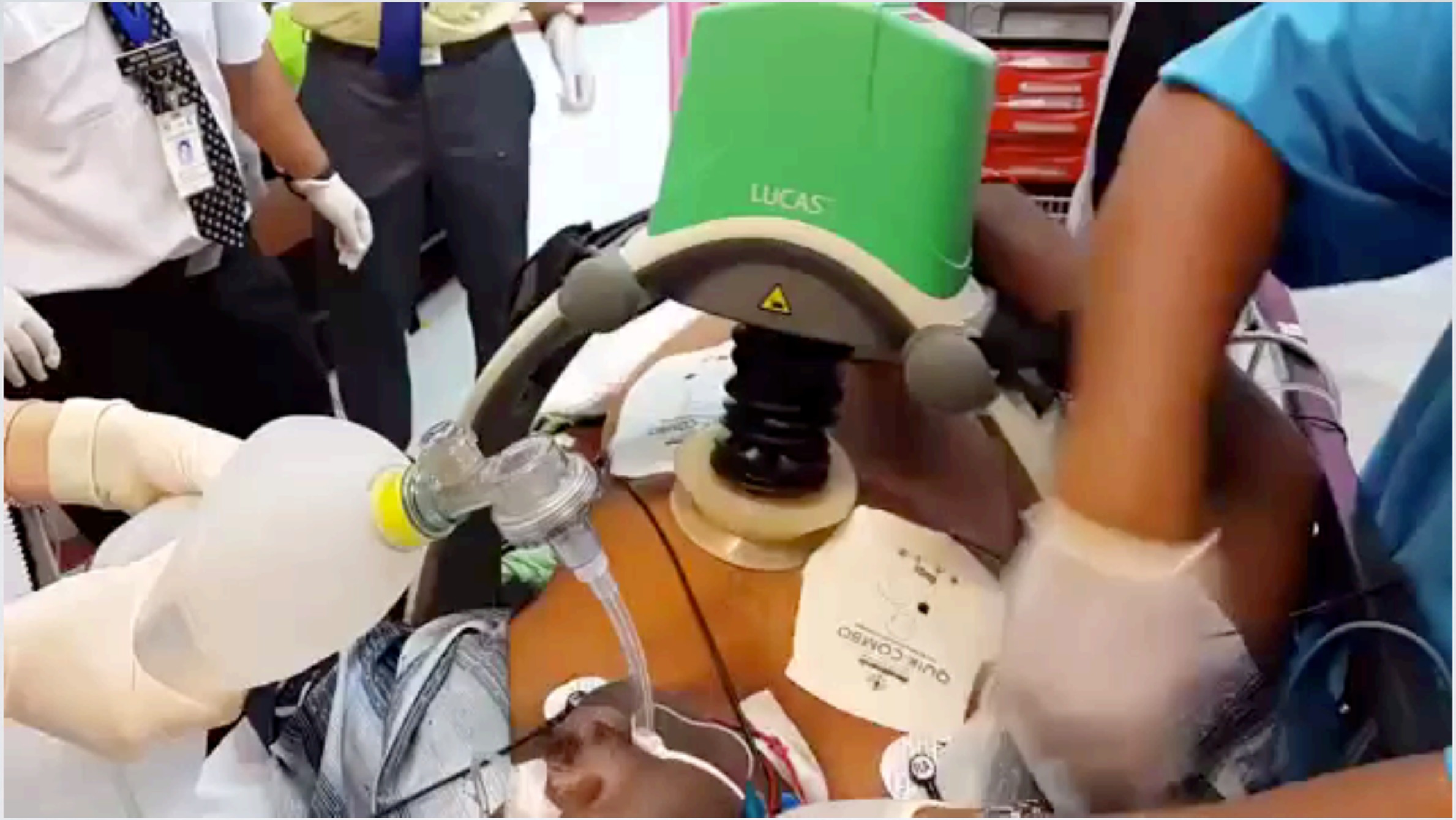

LUCAS

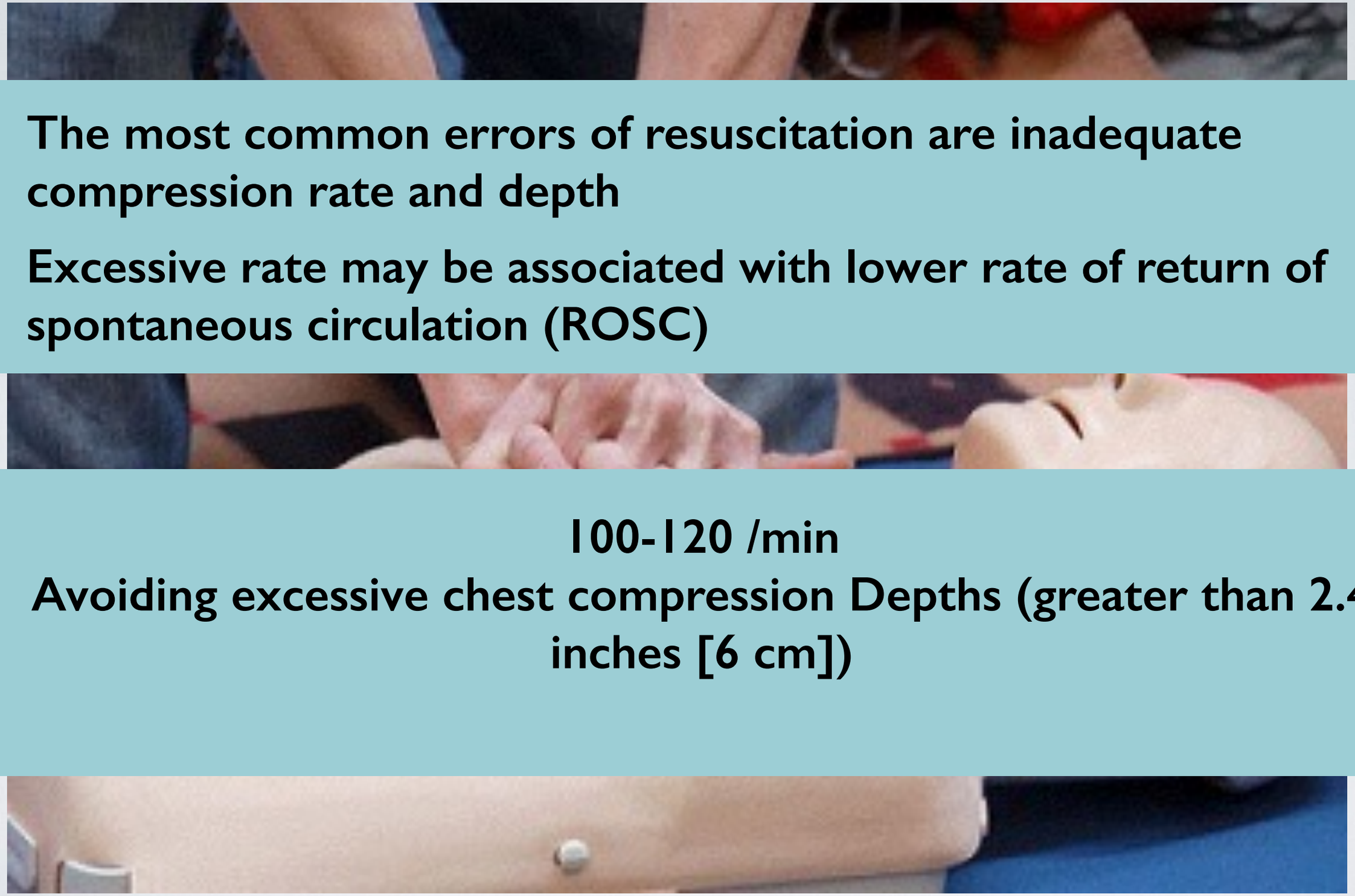

LifeBand
90°
2

Mechanical chest compression devices

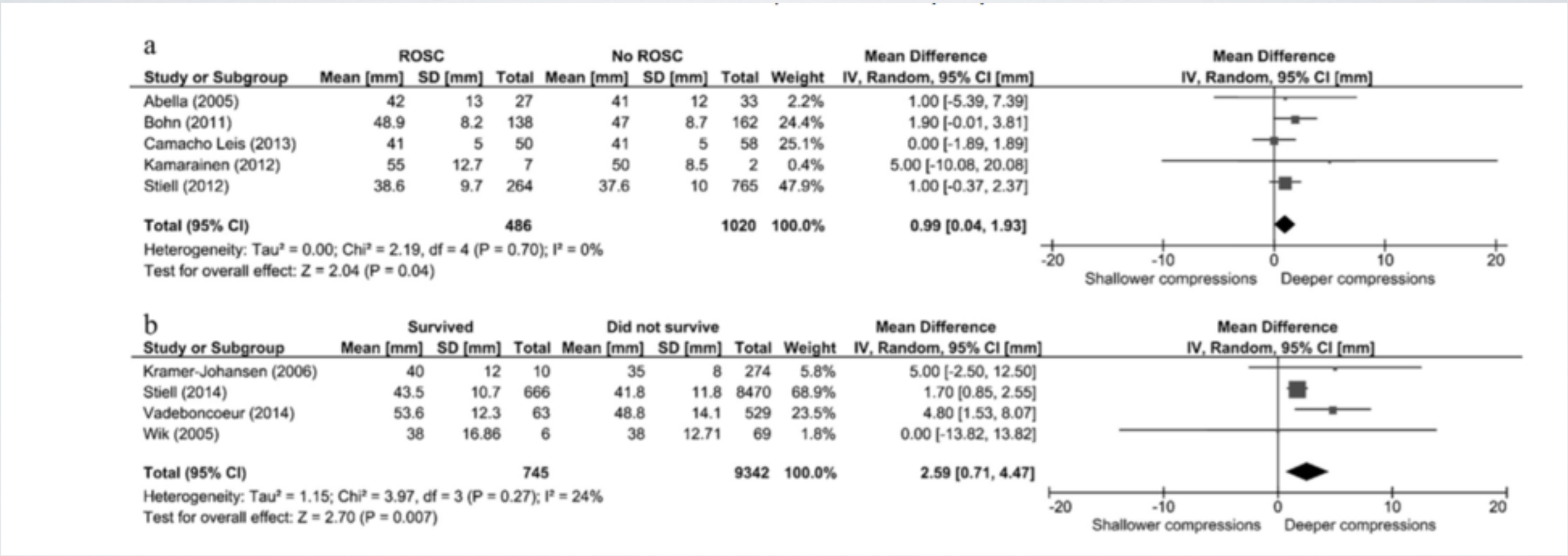
- High-quality manual compressions may be challenging or dangerous for the provider
- Prolonged CPR
- During hypothermic cardiac arrest
- CPR in a moving ambulance
- CPR in the angiography suite
- CPR during preparation for ECPR

- The most common errors of resuscitation are inadequate compression rate and depth
- Excessive rate may be associated with lower rate of return of spontaneous circulation (ROSC)

100-120 /min
Avoiding excessive chest compression Depths (greater than 2.4 inches [6 cm])



Cardiopulmonary resuscitation quality and patient survival outcome in cardiac arrest: A systematic review and meta-analysis



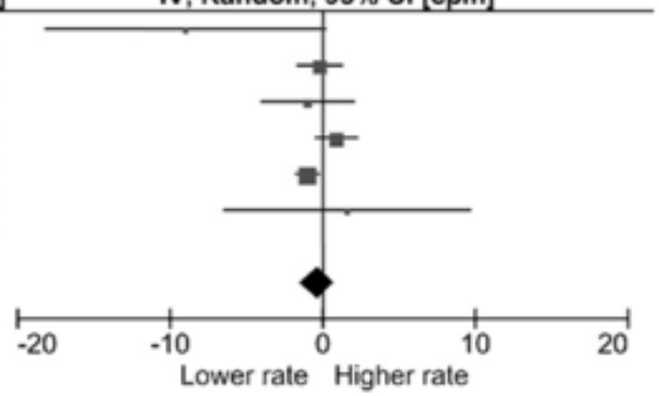
Talikowska M. Resuscitation 2015;96:66-77

Cardiopulmonary resuscitation quality and patient survival outcome in cardiac arrest: A systematic review and meta-analysis

a

Study or Subgroup	ROSC Mean [cpm]	ROSC SD [cpm]	ROSC Total	No ROSC Mean [cpm]	No ROSC SD [cpm]	No ROSC Total	Weight	Mean Difference IV, Random, 95% CI [cpm]
Abella (2005)	98	18	27	107	18	33	1.4%	-9.00 [-18.15, 0.15]
Bohn (2011)	103.25	5.76	138	103.45	7.05	162	24.6%	-0.20 [-1.65, 1.25]
Camacho Leis (2013)	105	8	50	106	8	58	10.1%	-1.00 [-4.03, 2.03]
Idris (2012)	112.4	17.6	1082	111.5	19.4	2016	26.1%	0.90 [-0.45, 2.25]
Idris (2015)	109.9	18	3549	110.9	19.2	6822	36.0%	-1.00 [-1.75, -0.25]
Kamarainen (2012)	99.1	10.8	7	97.5	0.7	2	1.8%	1.60 [-6.46, 9.66]
Total (95% CI)			**4853**			**9093**	**100.0%**	**-0.37 [-1.47, 0.73]**

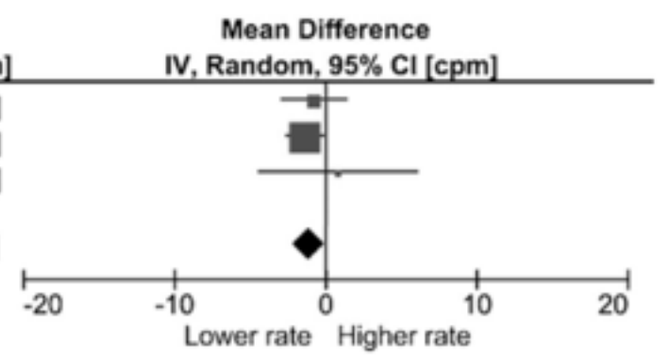
Heterogeneity: Tau² = 0.73; Chi² = 9.69, df = 5 (P = 0.08); I² = 48%
Test for overall effect: Z = 0.66 (P = 0.51)



b

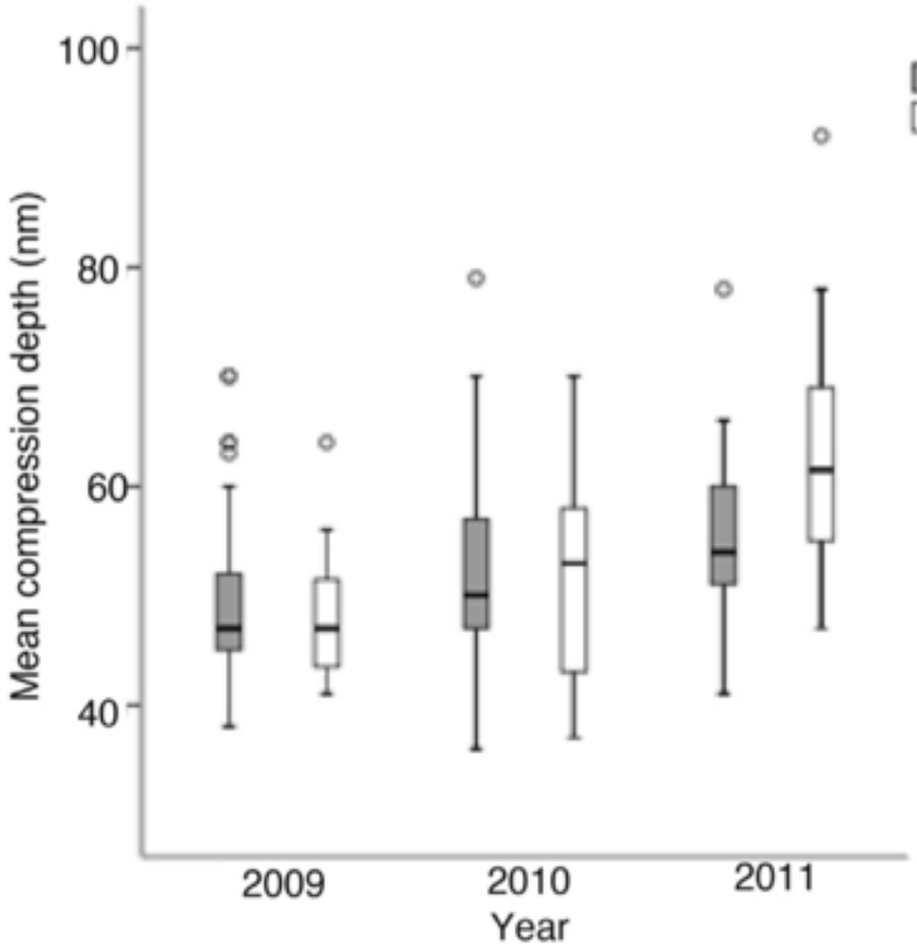
Study or Subgroup	Survived Mean [cpm]	Survived SD [cpm]	Survived Total	Did not survive Mean [cpm]	Did not survive SD [cpm]	Did not survive Total	Weight	Mean Difference IV, Random, 95% CI [cpm]
Idris (2012)	111.1	16.8	265	111.9	19	2833	23.4%	-0.80 [-2.94, 1.34]
Idris (2015)	109.3	17.9	928	110.7	18.9	9443	72.7%	-1.40 [-2.61, -0.19]
Vadeboncoeur (2014)	113.5	20	63	112.7	20.5	529	3.9%	0.80 [-4.44, 6.04]
Total (95% CI)			**1256**			**12805**	**100.0%**	**-1.17 [-2.21, -0.14]**

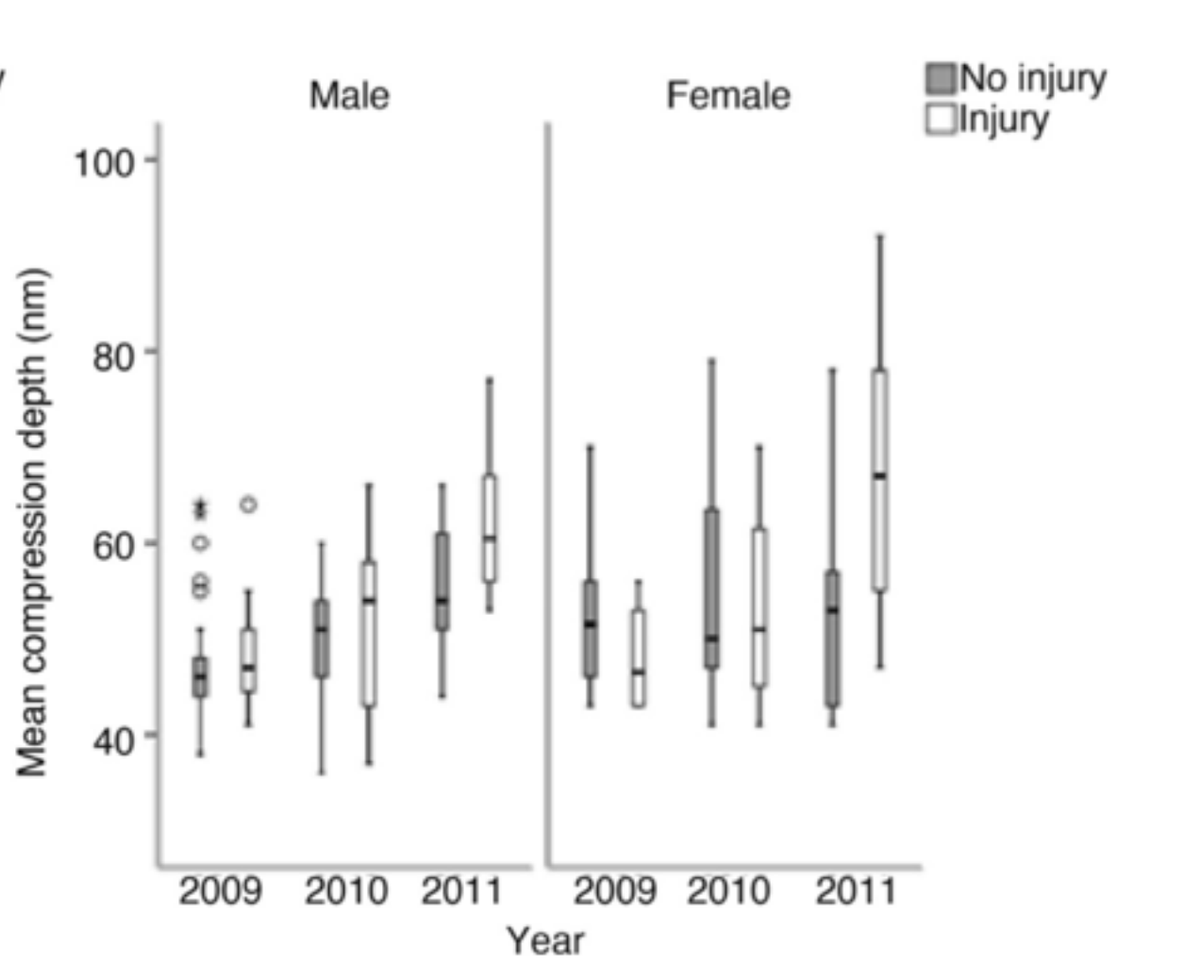
Heterogeneity: Tau² = 0.00; Chi² = 0.80, df = 2 (P = 0.67); I² = 0%
Test for overall effect: Z = 2.22 (P = 0.03)



Talikowska M. Resuscitation 2015;96:66-77

Deeper chest compression – More complications for cardiac arrest patients?





Hellevuo H. Resuscitation 2013;84:760-765

Drugs

Nonshockable rhythm → administer epinephrine as soon as feasible

Shockable rhythm → insufficient evidence about the optimal timing of epinephrine administration

Drugs

- The removal of vasopressin has been noted in the Adult Cardiac Arrest Algorithm
- Amiodarone may be considered for VF/pVT that is unresponsive to CPR, defibrillation, and a vasopressor therapy
- The routine use of magnesium for VF/pVT is not recommended in adult patients

Amiodarone, Lidocaine, or placebo in OHCAs

Table 3. Outcomes According to Trial Group in the Per-Protocol Population.*

Outcome	Amiodarone (N=974)	Lidocaine (N=993)	Placebo (N=1059)	Amiodarone vs. Placebo		Lidocaine vs. Placebo		Amiodarone vs. Lidocaine	
				Difference (95% CI)	P Value	Difference (95% CI)	P Value	Difference (95% CI)	P Value
				percentage points		*percentage points*		*percentage points*	
Primary outcome: survival to discharge — no./total no. (%)†	237/970 (24.4)	233/985 (23.7)	222/1056 (21.0)	3.2 (–0.4 to 7.0)	0.08	2.6 (–1.0 to 6.3)	0.16	0.7 (–3.2 to 4.7)	0.70
Secondary outcome: modified Rankin score ≤3 — no./total no. (%)‡	182/967 (18.8)	172/984 (17.5)	175/1055 (16.6)	2.2 (–1.1 to 5.6)	0.19	0.9 (–2.4 to 4.2)	0.59	1.3 (–2.1 to 4.8)	0.44
Mechanistic (exploratory) outcomes									
Return of spontaneous circulation at ED arrival — no./total no. (%)	350/974 (35.9)	396/992 (39.9)	366/1059 (34.6)	1.4 (–2.8 to 5.5)	0.52	5.4 (1.2 to 9.5)	0.01	–4.0 (–8.3 to 0.3)	0.07
Admitted to hospital — no. (%)	445 (45.7)	467 (47.0)	420 (39.7)	6.0 (1.7 to 10.3)	0.01	7.4 (3.1 to 11.6)	<0.001	–1.3 (–5.7 to 3.1)	0.55
Modified Rankin score in all patients‡	5.0±1.9	5.1±1.8	5.2±1.8	–0.14 (–0.30 to 0.02)	0.09	–0.06 (–0.22 to 0.10)	0.45	–0.08 (–0.24 to 0.08)	0.34
Modified Rankin score in survivors‡	2.0±2.7	2.2±2.7	2.0±2.6						
Distribution of modified Rankin scores — no./total no. (%)‡									
0	60/966 (6.2)	49/981 (5.0)	55/1053 (5.2)						
1	47/966 (4.9)	37/981 (3.8)	39/1053 (3.7)						
2	41/966 (4.2)	46/981 (4.7)	40/1053 (3.8)						
3	34/966 (3.5)	37/981 (3.8)	41/1053 (3.9)						
4	31/966 (3.2)	36/981 (3.7)	27/1053 (2.6)						
5	21/966 (2.2)	24/981 (2.4)	18/1053 (1.7)						
6	732/966 (75.8)	752/981 (76.7)	833/1053 (79.1)						

* CI denotes confidence interval, and ED emergency department.
† The difference and 95% CI were adjusted for sequential monitoring.
‡ Scores on the modified Rankin scale range from 0 (no symptoms) to 6 (death). A score of 3 or less indicates the ability to conduct daily activities independently or with minimal assistance.

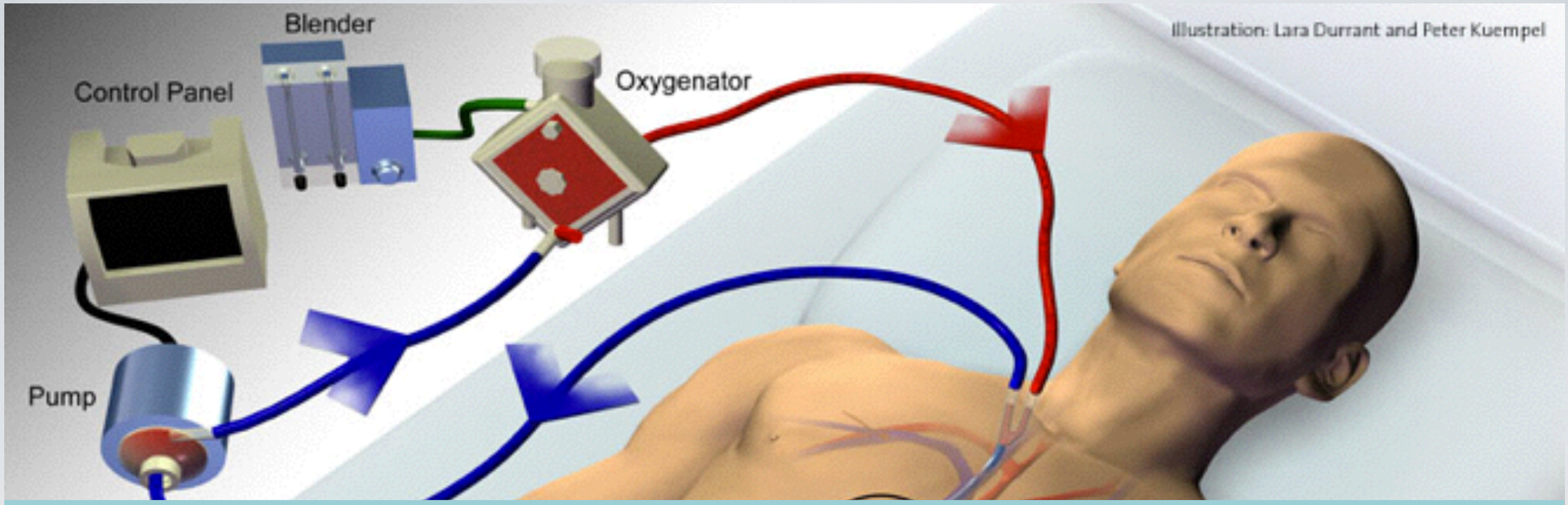
Kudenchuk J P. N Eng J Med 2016;374;1711-1722

Prehospital Assessment of the Role of Adrenaline : Measuring the Effectiveness of Drug administration In Cardiac Arrest

- Adrenaline versus Placebo in OHCAs
- Primary endpiont 30-day survival
- 1646 were recruited
- Estimated finish 2017

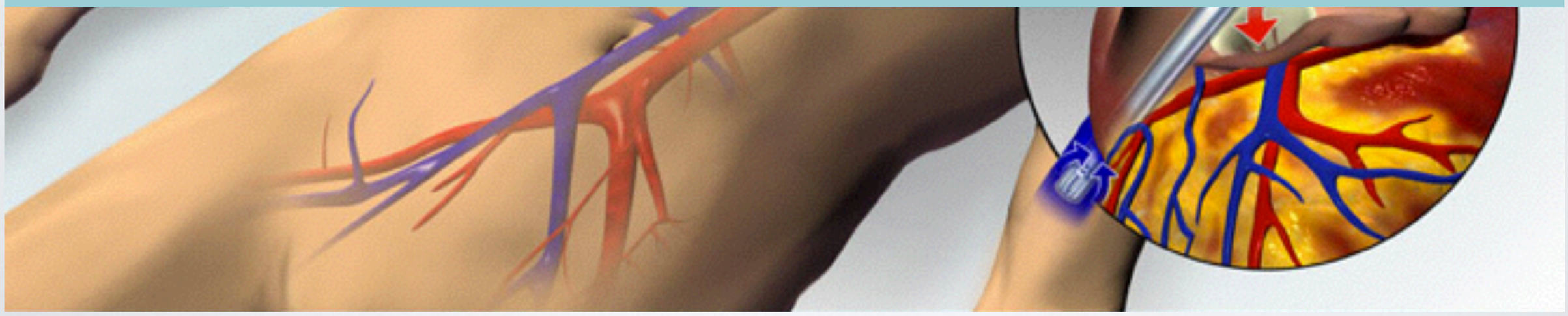
PARAMEDIC2

The Adrenaline Trial

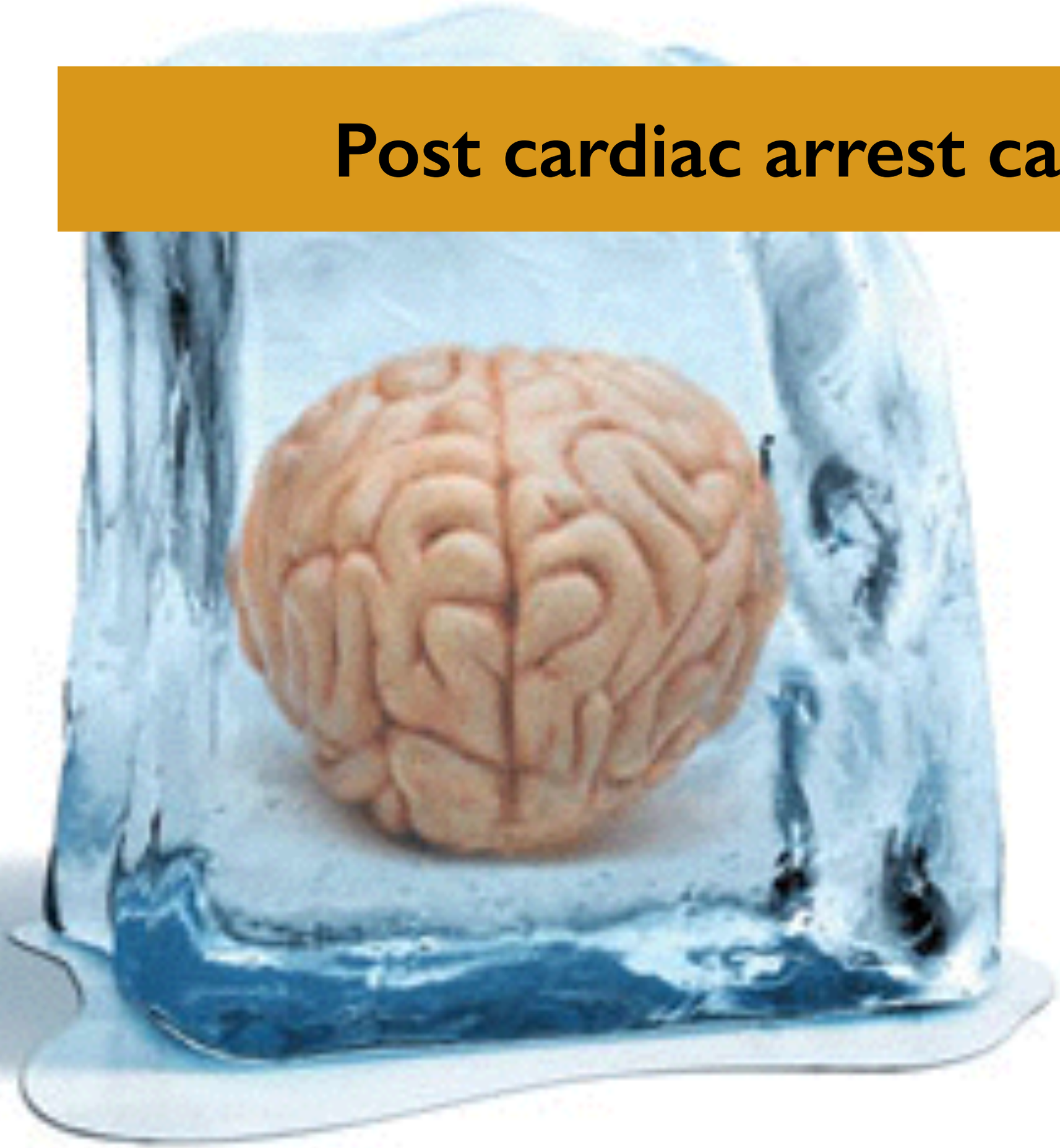


Potentially reversible conditions are addressed

Requires a highly trained team, specialized equipment, and multidisciplinary support



Post cardiac arrest care



Acute Cardiovascular Interventions

Prognostication of Outcome

Neurologic Care

Respiratory Care

Hemodynamic Goals

Targeted Temperature Management

Critical Care Interventions

Acute Cardiovascular Interventions

OHCA patients with suspected cardiac etiology of arrest and ST elevation on ECG

Electrically or hemodynamically unstable) adult patients who are comatose after OHCA of suspected cardiac origin but without ST elevation on ECG

Post–cardiac arrest patients for whom coronary angiography is indicated regardless of whether the patient is comatose or awake

Hemodynamic Goals

Avoiding and immediately correcting hypotension (systolic blood pressure less than 90 mm Hg, MAP less than 65 mm Hg) during postresuscitation care

Targeted Temperature Management

VF/pVT OHCA

non-VF/pVT in hospital cardiac arrest

Comatose patients

Maintaining a constant temperature between 32oC and 36oC during TTM

Respiratory Care

Use the highest available oxygen concentration until the arterial oxyhemoglobin saturation or the partial pressure of arterial oxygen can be measured

Normocarbia (end-tidal CO_2 30–40 mmHg or $PaCO_2$ 35– 45 mmHg) may be a reasonable goal

Decrease the FIO_2 when oxyhemoglobin saturation is 100%, provided the oxyhemoglobin saturation can be maintained at 94% or greater

Neurologic Care

The same anticonvulsant regimens for the treatment of status epilepticus caused by other etiologies may be considered after cardiac arrest

Outcomes for out-of-hospital cardiac arrests across 7 countries in Asia: The Pan Asian Resuscitation Outcomes Study (PAROS)

Patient demographics, out-of-hospital cardiac arrest characteristics and outcomes for all cases.

Characteristics	Japan (*n* = 51,377)	Korea (*n* = 7990)	Malaysia (*n* = 389)	Singapore (*n* = 3023)	Thailand (*n* = 573)	Taiwan (*n* = 3023)	UAE (*n* = 405)
Age							
Mean (SD)	71.7 (18.4)	63.5 (19.0)	57.0 (17.0)	63.5 (18.2)	55.7 (22.1)	70.5 (18.6)	49.7 (18.3)
Median (IQR)	76.0 (63.0, 85.0)	66.5 (52.0, 78.0)	59.0 (47.0,70.0)	65.0 (53.0,77.0)	57.0 (40.0, 74.0)	75.0 (59.0, 85.0)	50.0 (38.0, 63.0)
Gender (%)							
Male	29,760 (57.9)	5243 (65.6)	276 (71.0)	1988 (65.7)	367 (64.0)	1936 (64.1)	335 (82.7)
Past medical history (%)							
Heart disease	2958 (28.1)[a]	837 (21.5)	88 (22.6)	1090 (36.0)	100 (17.5)	751 (26.5)	53 (13.1)
Location type (*n*, %)							
Home residence	8409 (63.0)	5057 (64.9)	278 (71.5)	2127 (70.4)	354 (61.8)	2201 (73.1)	220 (54.3)
Healthcare facility	50 (0.4)	137 (1.8)	11 (2.8)	110 (3.6)	11 (1.9)	Not available	7 (1.7)
Public/commercial building	964 (7.2)	449 (5.8)	44 (11.3)	236 (7.8)	30 (5.2)	70 (2.3)	52 (12.8)
Nursing home	1555 (11.7)	286 (3.7)	6 (1.5)	111 (3.7)	7 (1.2)	240 (8.0)	Not available
Street/highway	809 (6.1)	465 (6.0)	26 (6.7)	155 (5.1)	86 (15.0)	238 (7.9)	71 (17.5)
Industrial place	Not available	95 (1.2)	1 (0.3)	63 (2.1)	5 (0.9)	78 (2.6)	18 (4.4)
Transport center	Not available	101 (1.3)	3 (0.8)	37 (1.2)	2 (0.3)	4 (0.1)	Not available
Place of recreation	Not available	187 (2.4)	2 (0.5)	57 (1.9)	6 (1.0)	54 (1.8)	24 (5.9)
In EMS[b]/private ambulance	852 (6.4)	382 (4.9)	9 (2.3)	69 (2.3)	33 (5.8)	Not available	Not available
Other	700 (5.2)	629 (8.1)	9 (2.3)	58 (1.9)	39 (6.8)	125 (4.2)	13 (3.2)
Arrest witnessed by (*n*, %)							
Not witnessed	30,532 (59.4)	3158 (46.7)	176 (45.2)	1302 (43.1)	151 (26.4)	1939 (67.9)	205 (50.6)
Bystander	17,221 (33.5)	3144 (46.5)	183 (47.0)	1482 (49.0)	373 (65.1)	630 (22.1)	186 (45.9)
EMS	3624 (7.1)	459 (6.8)	30 (7.7)	239 (7.9)	49 (8.6)	288 (10.1)	14 (3.5)
First arrest rhythm (*n*, %)[c]							
VT[d]/VF[e]/unknown shockable	3831 (7.5)	1233 (15.4)	9 (4.1)	554 (18.7)	19 (7.1)	296 (9.8)	80 (19.8)
Unknown unshockable	13,889 (27.0)	251 (3.1)	82 (37.1)	24 (0.8)	2 (0.7)	23 (0.8)	6 (1.5)
Asystole	26,005 (50.6)	4487 (56.2)	54 (24.4)	1585 (53.3)	105 (39.2)	1716 (56.8)	282 (69.6)
Pulseless electrical activity	7601 (14.8)	1132 (14.2)	4 (1.8)	805 (27.1)	24 (9.0)	561 (18.6)	37 (9.1)
Unknown	51 (0.1)	887 (11.1)	72 (32.6)	5 (0.2)	118 (44.0)	427 (14.1)	0 (0)
Prehospital intervention (*n*, %)							
Bystander CPR[f–g]	19,176 (40.2)	2854 (40.9)	81 (22.6)	677 (24.3)	83 (15.8)	845 (31.4)	41 (10.5)
Prehospital defibrillation[c]	5260 (10.2)	1833 (22.9)	9 (2.6)	697 (23.4)	32 (9.2)	357 (11.8)	145 (35.8)
Bystander defibrillation[c–g]	313 (0.6)	22 (0.3)	Not available	29 (1.1)	1 (0.3)	Not available	3 (0.8)
Prehospital adrenaline[c]	4346 (8.5)	Not available	44 (12.7)	1414 (47.4)	135 (23.6)	552 (18.3)	4 (1.0)
Prehospital advanced airway (*n*, %)[c]							
Oral/nasal endotracheal tube	4129 (8.0)	153 (1.9)	22 (6.4)	18 (0.6)	132 (38.0)	402 (13.2)	5 (1.2)
Combitube	0	2 (0.02)	0	0	0	0	0
Laryngeal mask airway	4004 (7.8)	470 (5.9)	36 (10.4)	2368 (79.3)	2 (0.6)	535 (17.7)	20 (4.9)
King airway	6478 (12.6)	183 (2.3)	0	0	0	0	0
Other	4450 (8.7)	381 (4.8)	20 (5.8)	1 (0.01)	2 (0.6)	0	5 (1.2)
Post-resuscitation care (*n*, %)							
Hypothermia therapy	Not available	617 (7.7)	1 (0.3)	29 (1.0)	2 (0.3)	Not available	1 (0.2)
Etiology of cardiac arrest (*n*, %)[h]							
Trauma	7495 (14.6)	718 (9.3)	20 (5.9)	99 (3.3)	77 (22.2)	228 (7.8)	13 (3.2)
Presumed cardiac etiology	29,928 (58.3)	5605 (72.7)	285 (84.1)	2251 (74.5)	189 (54.5)	2384 (81.1)	362 (89.4)
Respiratory	2293 (4.5)	65 (0.8)	15 (4.4)	240 (7.9)	47 (13.5)	192 (6.5)	4 (1.0)
Drowning	308 (0.6)	91 (1.2)	3 (0.9)	22 (0.7)	5 (1.4)	14 (0.5)	11 (2.7)
Other	11,352 (22.1)	1230 (16.0)	16 (4.7)	411 (13.6)	29 (8.4)	120 (4.1)	15 (3.7)
Outcomes (*n*, %)							
Survived to admission	3644/13,339 (27.3)[a]	1593 (20.4)	31 (8.0)	514 (17.0)	159 (27.7)	179 (5.9)	32 (7.9)
Survived to discharge	2677 (5.2)	681 (8.5)	2 (0.5)	76 (2.5)	24 (4.2)	139 (4.6)	12 (3.0)
Post arrest CPC[i] 1/2	1436 (2.8)	236 (3.0)	Not available	50 (1.7)	9 (1.6)	87 (2.9)	11 (2.7)

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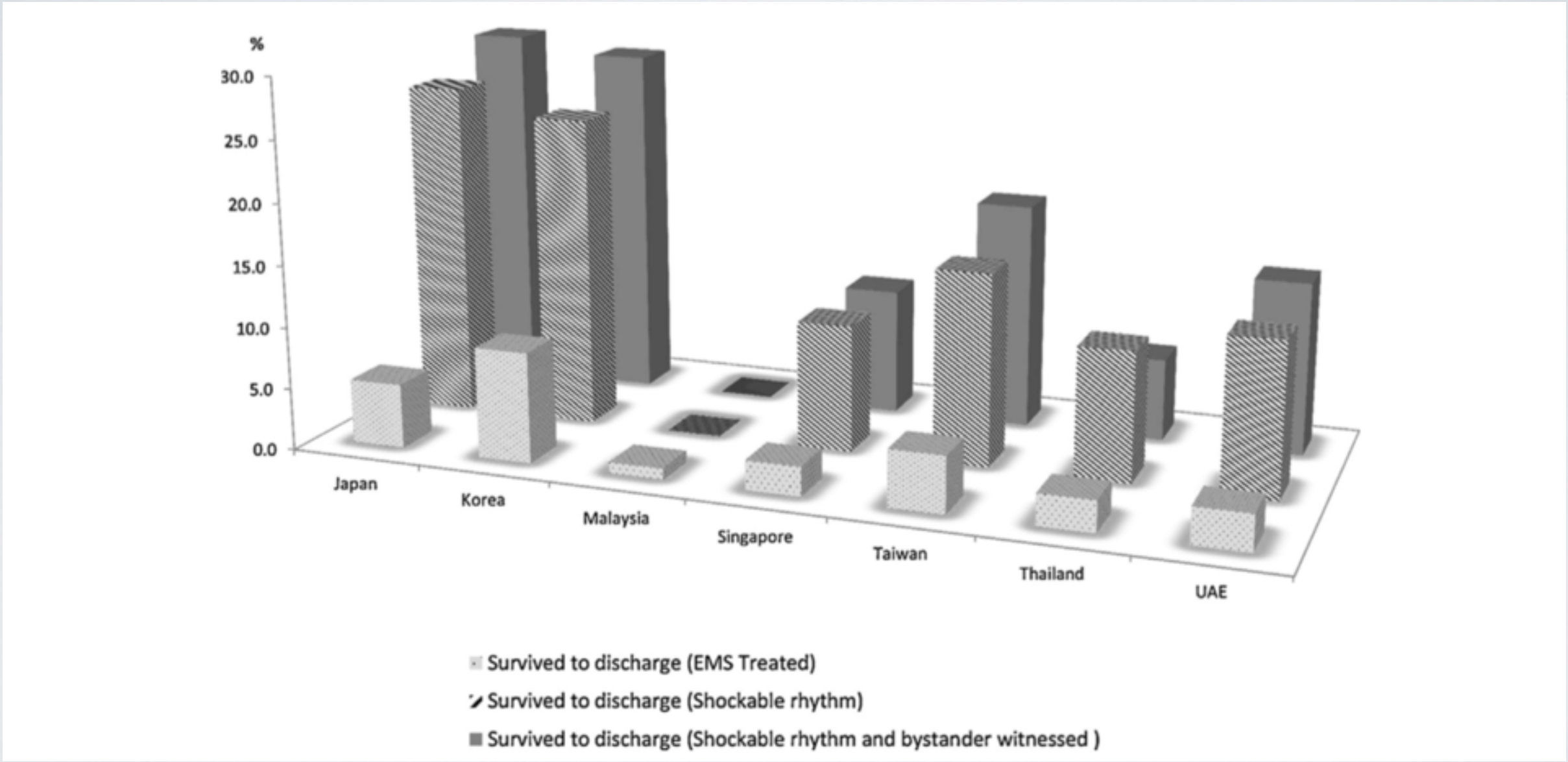
Outcomes for out-of-hospital cardiac arrests across 7 countries in Asia: The Pan Asian Resuscitation Outcomes Study (PAROS)



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THANK YOU