



## **Resuscitation Council of Asia 2021 Update: Basic Life Support**

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Chair of BLS Task Force, RCA  
Emergency Med, Yonsei University, Korea



# Conflict of interest

- No financial COI
- ILCOR, BLS Task Force member
- RCA, BLS Task Force chair
- KACPR, General secretary
- 2020 ILCOR CoSTR: BLS coauthor
- Korean CPR guideline: 2006, 2011, 2015, 2020 coauthor



# Asia

- 51 countries
- 4.6 billion people (2020)
  - 60% of the Earth's population
- RCA
  - 7 countries
    - Taiwan, Japan, Singapore, Korea, Thailand, Hong Kong, Philippine
  - 8.5% of Asian population



# 2015 RCA: adult BLS algorithm for layperson

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**Resuscitation**

journal homepage: [www.elsevier.com/locate/resuscitation](http://www.elsevier.com/locate/resuscitation)

EUROPEAN RESUSCITATION COUNCIL

Short communication

**The 2015 Resuscitation Council of Asia (RCA) guidelines on adult basic life support for lay rescuers\***

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**ABSTRACT**

This paper introduces adult basic life support (BLS) guidelines for lay rescuers of the resuscitation council of Asia (RCA) developed for the first time. The RCA BLS guidelines for lay rescuers have been established by expert consensus among BLS Guidelines Taskforce of the RCA on the basis of the 2015 International Consensus on Cardiopulmonary Resuscitation (CPR) and Emergency Cardiovascular Care Science with Treatment Recommendations. The RCA recommends compression-only CPR for lay rescuers and emphasizes high-quality CPR with chest compression depth of approximately 5 cm and chest compression rate of 100–120 min<sup>-1</sup>. Role of emergency medical dispatchers in helping lay rescuers recognize cardiac arrest and perform CPR is also emphasized. The RCA guidelines will contribute to help Asian countries establish and implement their own CPR guidelines in the context of their domestic circumstances.

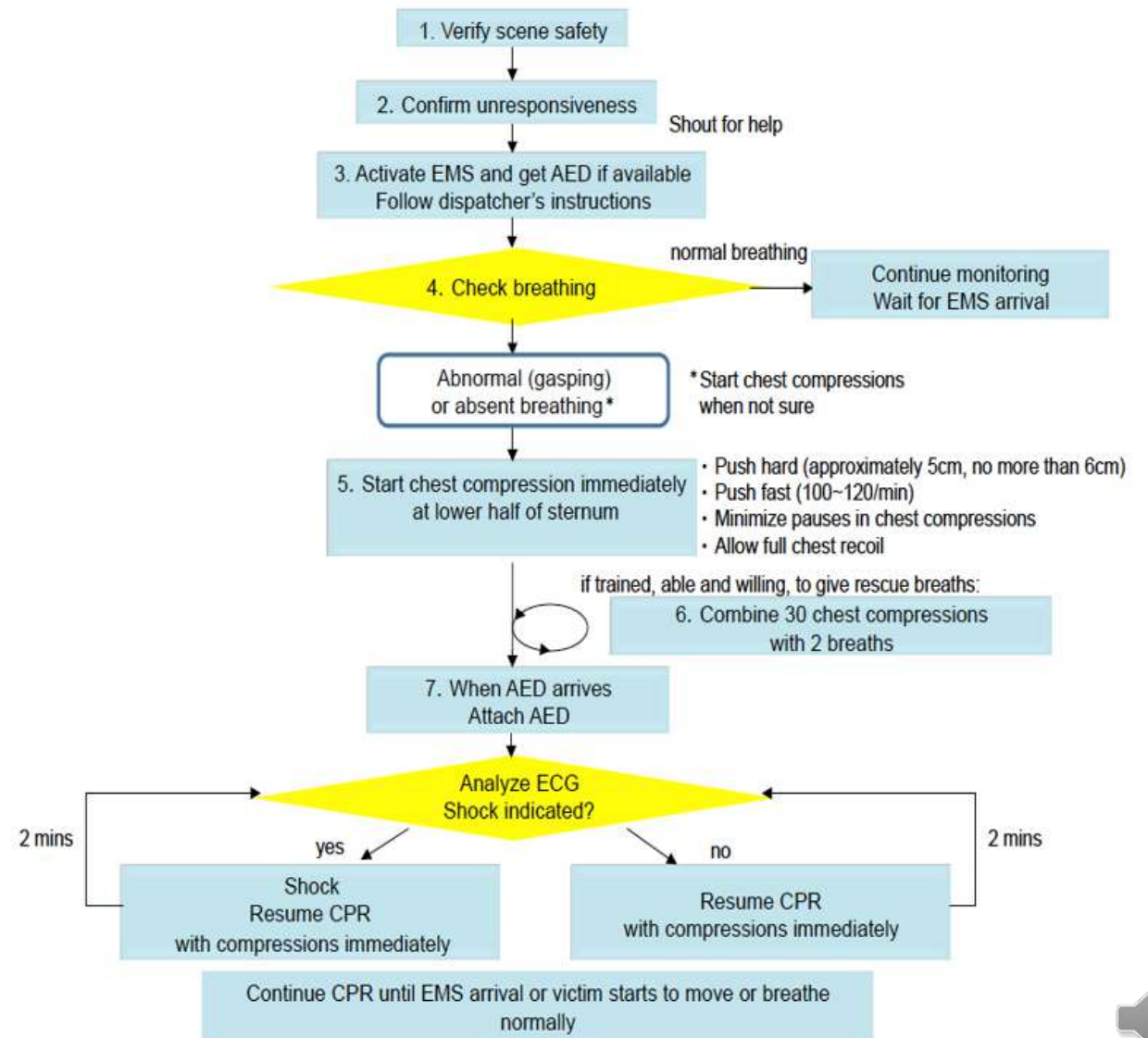
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**Introduction**

Outcome of victims with out-of-hospital cardiac arrest (OHCA) in Asian countries shows a wide range of variation which is attributed to differences in various factors including cause of cardiac arrest, bystander cardiopulmonary resuscitation (CPR) rate, or effectiveness of emergency medical system (EMS) of the country. The survival discharge rate and favorable neurological recovery rate of OHCA in Asian countries ranges from 0.9 to 9.0% and from 1.6 to 3.1%, respectively.<sup>1</sup> The Resuscitation Council of Asia (RCA), a regional organization on resuscitation science representing the Asian countries, was founded in 2005 to preserve life by improving standards of resuscitation and the chain of survival in Asia and to co-ordinate the activities of Asian organizations with a major interest in resuscitation medicine. Active members of the RCA include resuscitation councils or organizations from Japan, Korea, Singapore, Taiwan, Philippines, Thailand, and Hong Kong. Since 2006, RCA has been an official member of the International Liaison Committee on Resuscitation (ILCOR). Members of the RCA contributed to the guidelines developing process as either taskforce members or evidence reviewers. Even though member countries of the RCA established their own guidelines for CPR on the basis of the ILCOR recommendations, the RCA itself did not produce the CPR guidelines due to a lack of evidence from the Asian population regarding cardiac arrest as well as a wide diversity of community emergency medical systems around Asia.<sup>2</sup> Recently, several Asian countries including Japan, Korea, Singapore, and Taipei reported nationwide population-based outcome of OHCA in the literature.<sup>3–6</sup> A multi-national research network for cardiac arrest among Asian countries named the Pan-Asian Resuscitation Outcome Study was successfully operated.<sup>7</sup>

\* A Spanish translated version of the abstract of this article appears as Appendix in the final online version at <http://dx.doi.org/10.1016/j.resuscitation.2016.05.025>.  
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 E-mail address: [shwang@yonsei.ac.kr](mailto:shwang@yonsei.ac.kr) (S.O. Hwang).  
<sup>1</sup> Sung Phil Chung and Tetsuya Sakamoto have contributed equally to this paper.

<http://dx.doi.org/10.1016/j.resuscitation.2016.05.025>  
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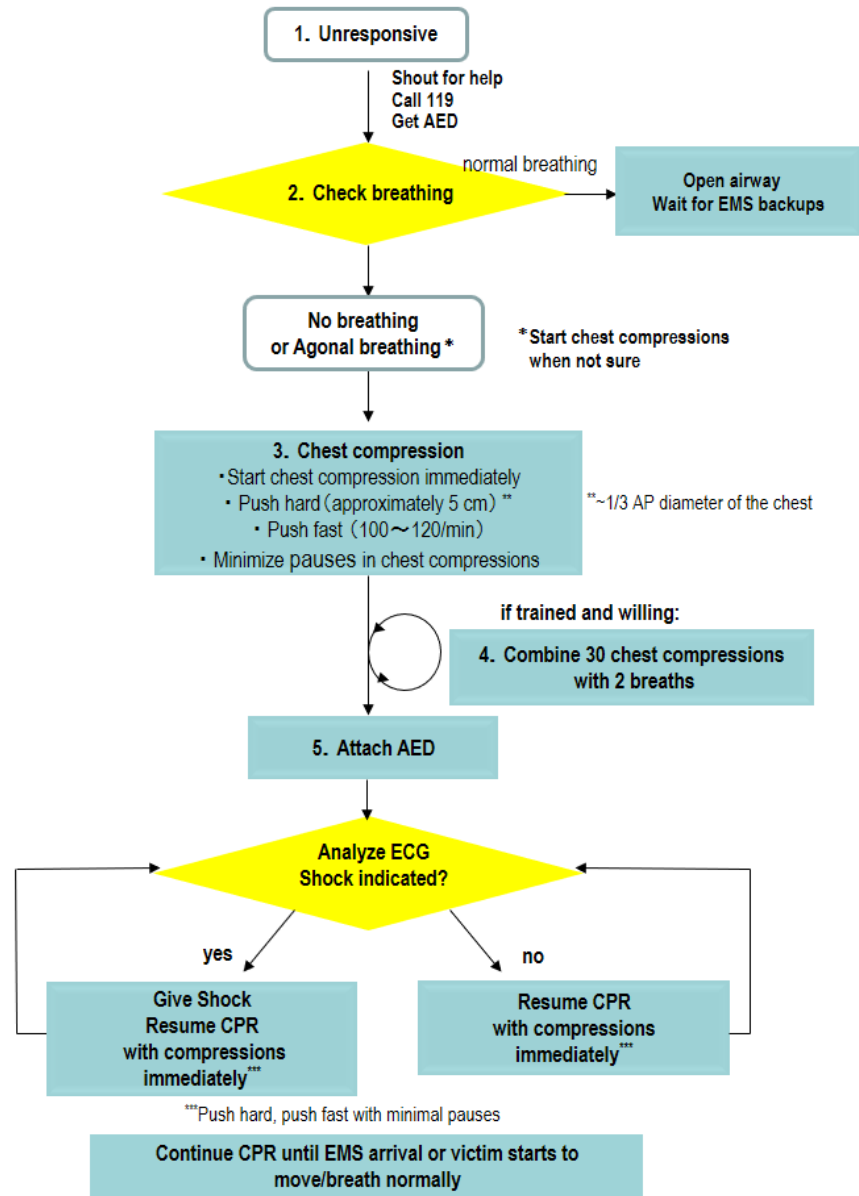


# RCA BLS Task Force members (2019 Sep)

	Country	Council	Name
1	Hong Kong	RCHK	Chun-tat Lui
2		RCHK	David Chan
3	Japan	JRC	Tetsuo Hatanaka
4		JRC	Hiroya Wakamatsu
5	Korea	KACPR	Gyu Chong Cho
6		KACPR	Sung Phil Chung
7	Phillippine	PHA	Francis Lavapie
8	Singapore	NRCS	Swee Han Lim
9	Taiwan	NRCT	Yan-Ren Lin
10		NRCT	Yung-Cheng Su
11	Thailand	TRC	Borwon Wittayachamnankul

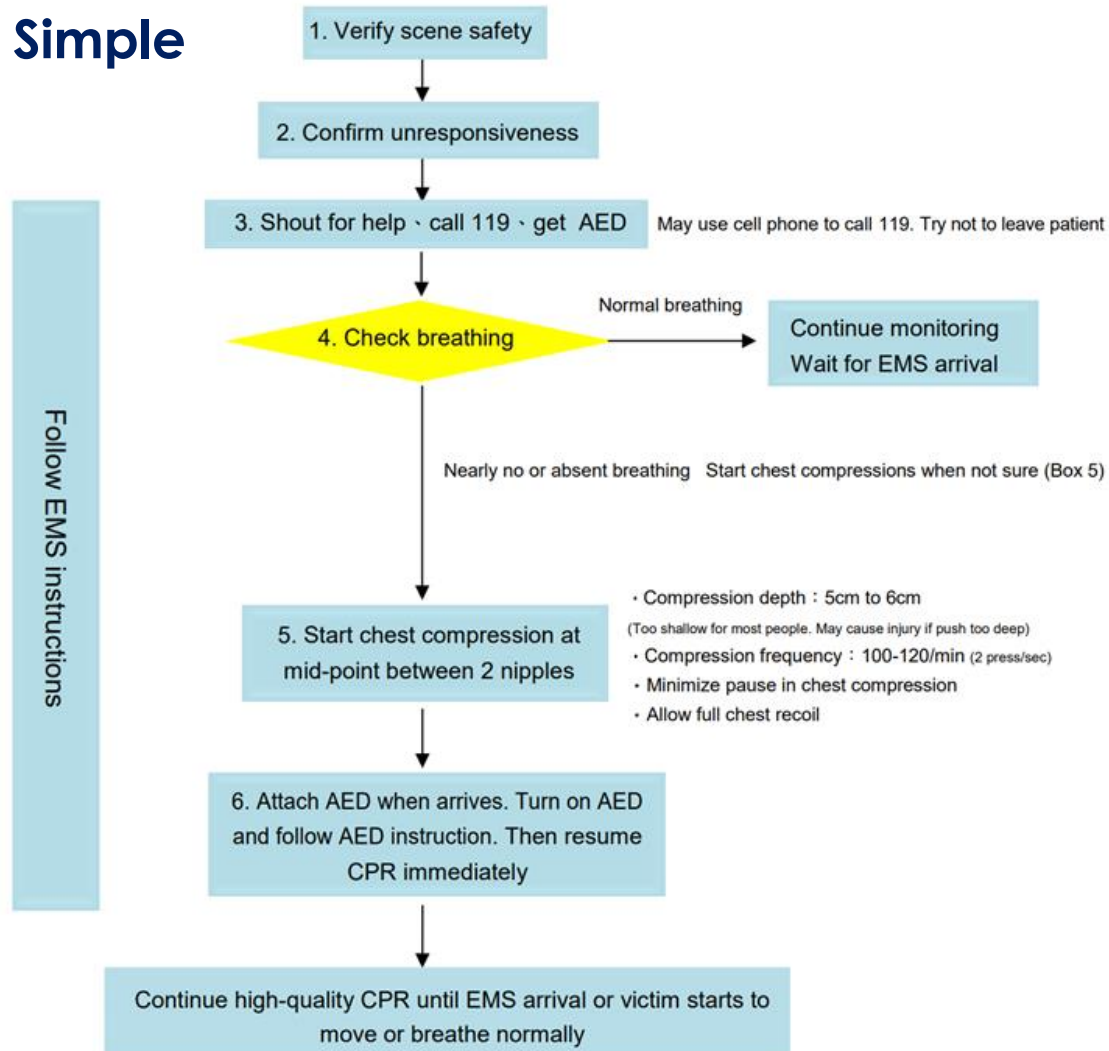


# 2015 Japanese BLS algorithm for lay rescuer

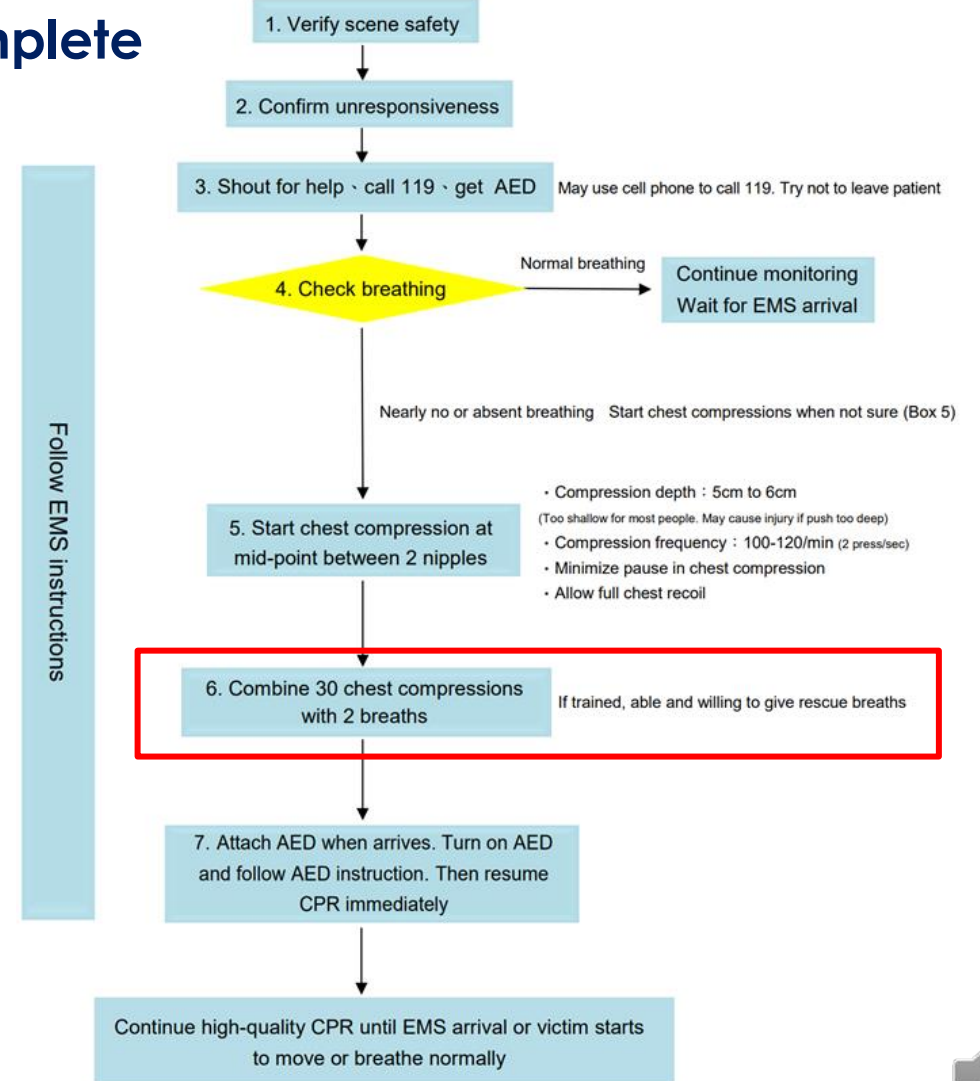


# 2015 Taiwan adult CPR+AED algorithm

## Simple

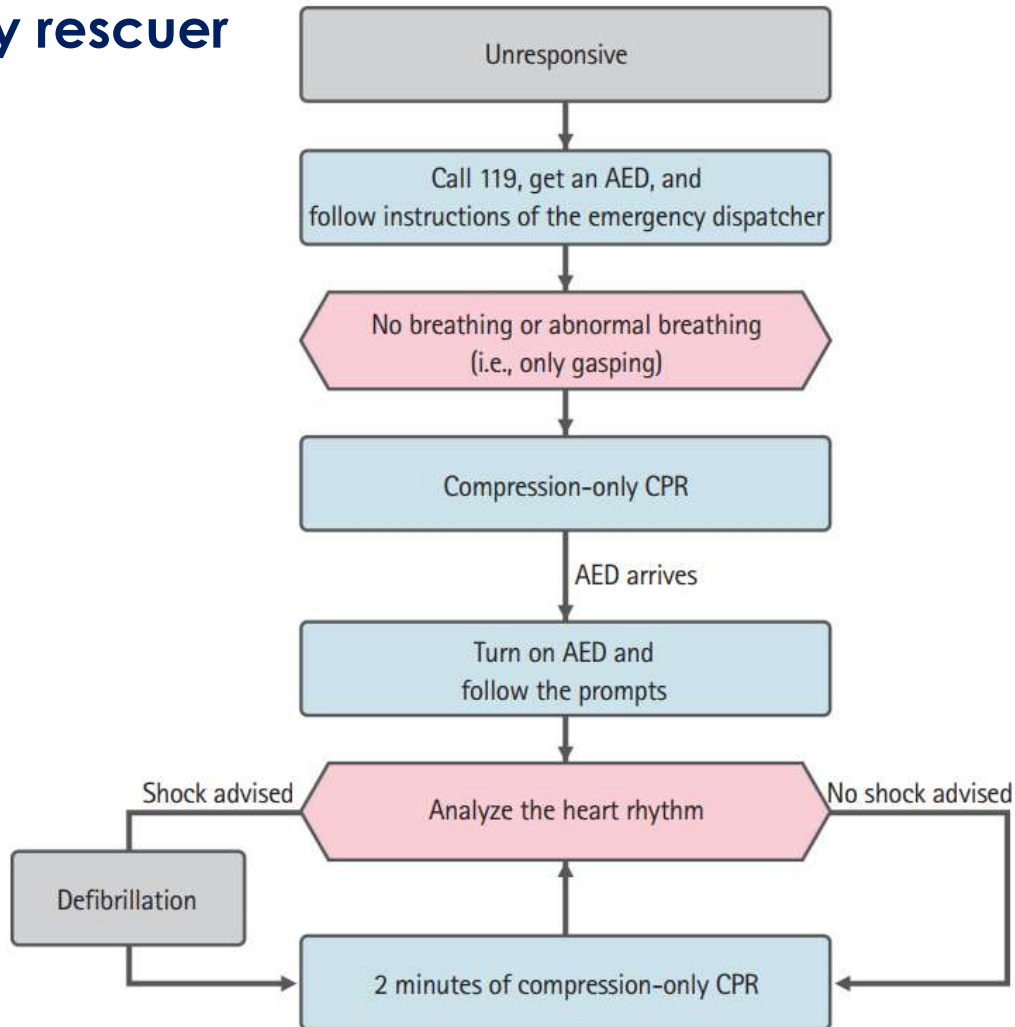


## Complete

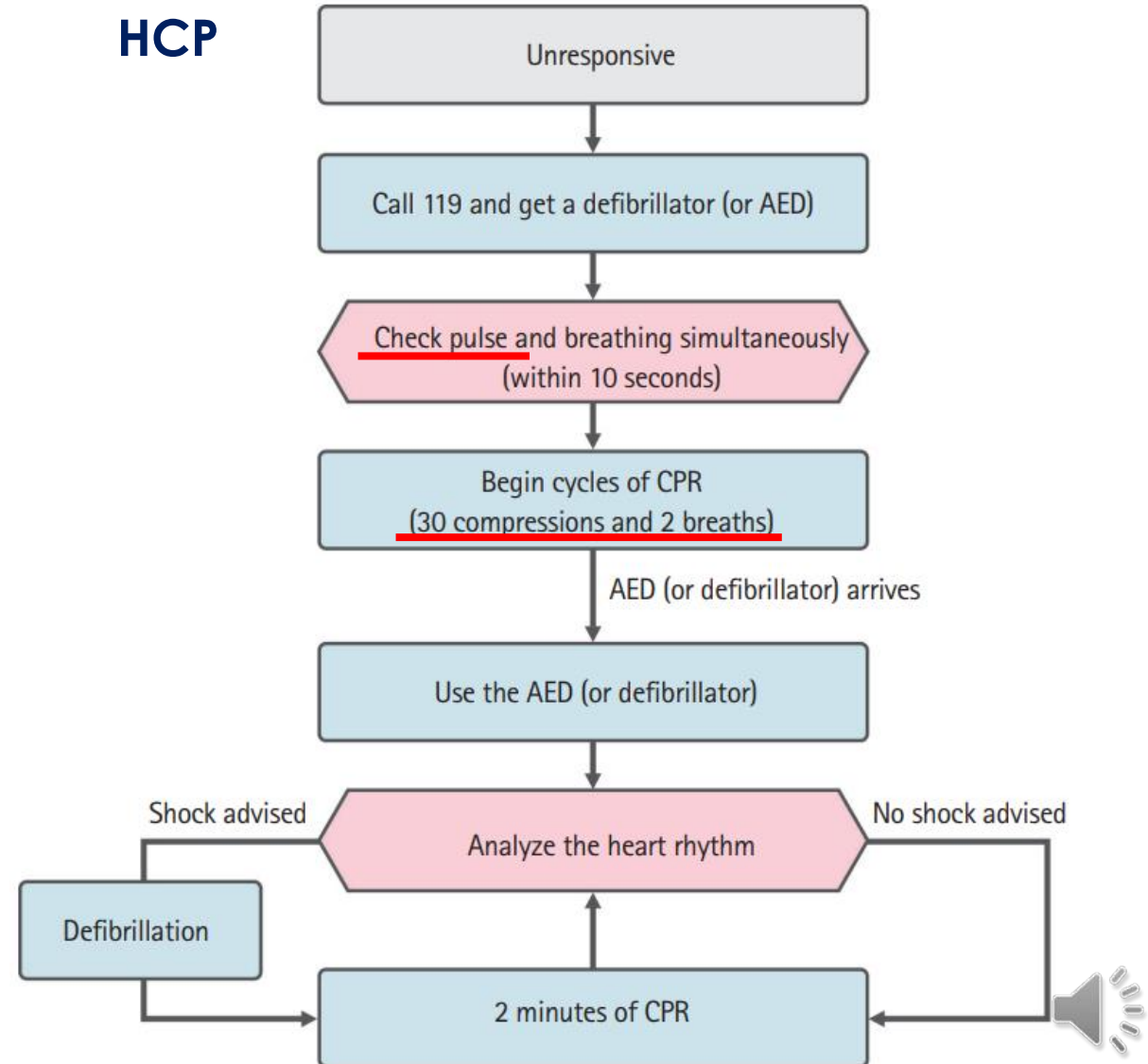


# 2015 Korean adult BLS algorithm

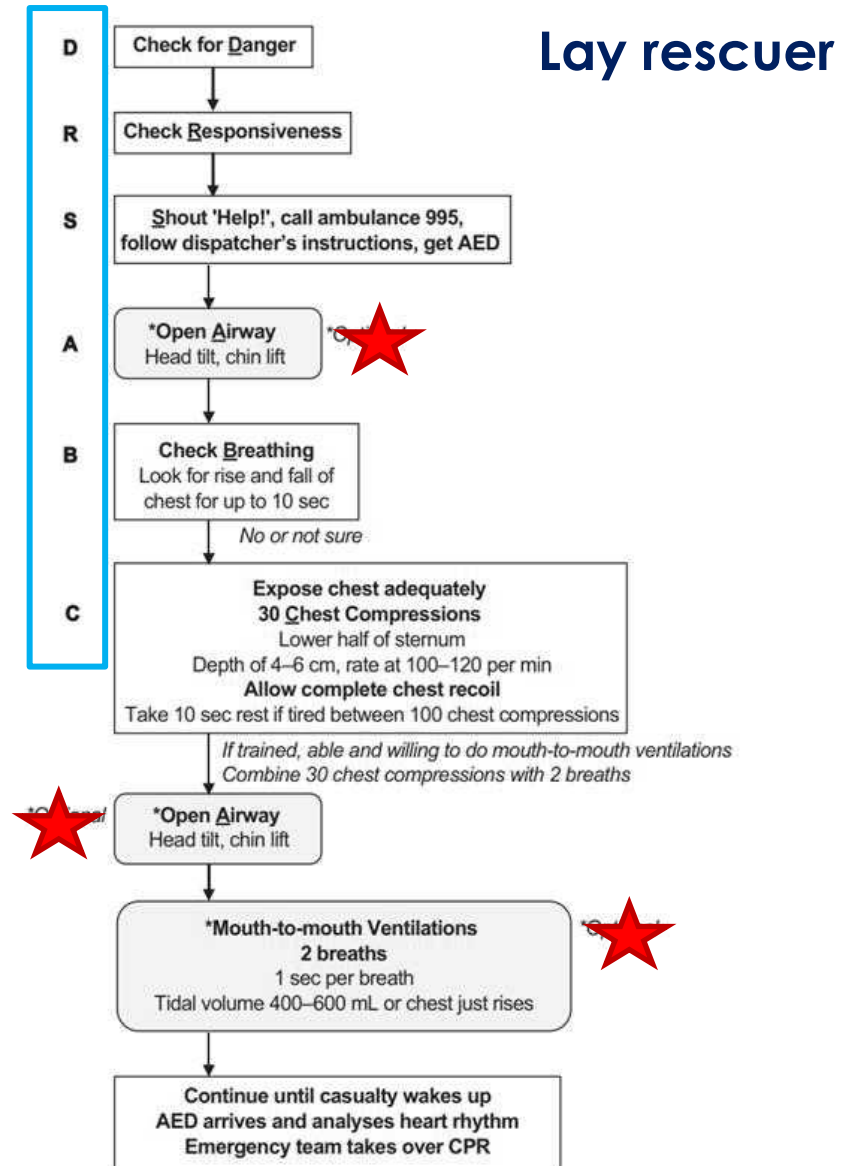
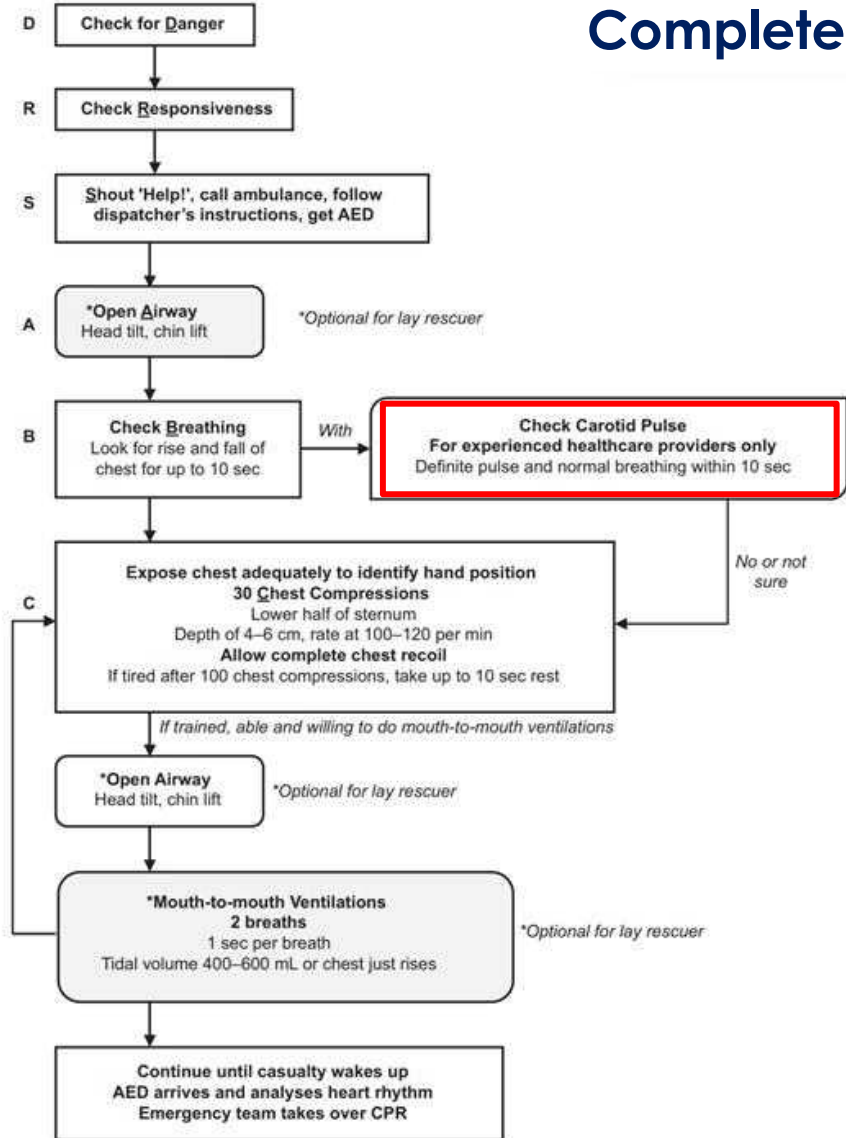
## Lay rescuer



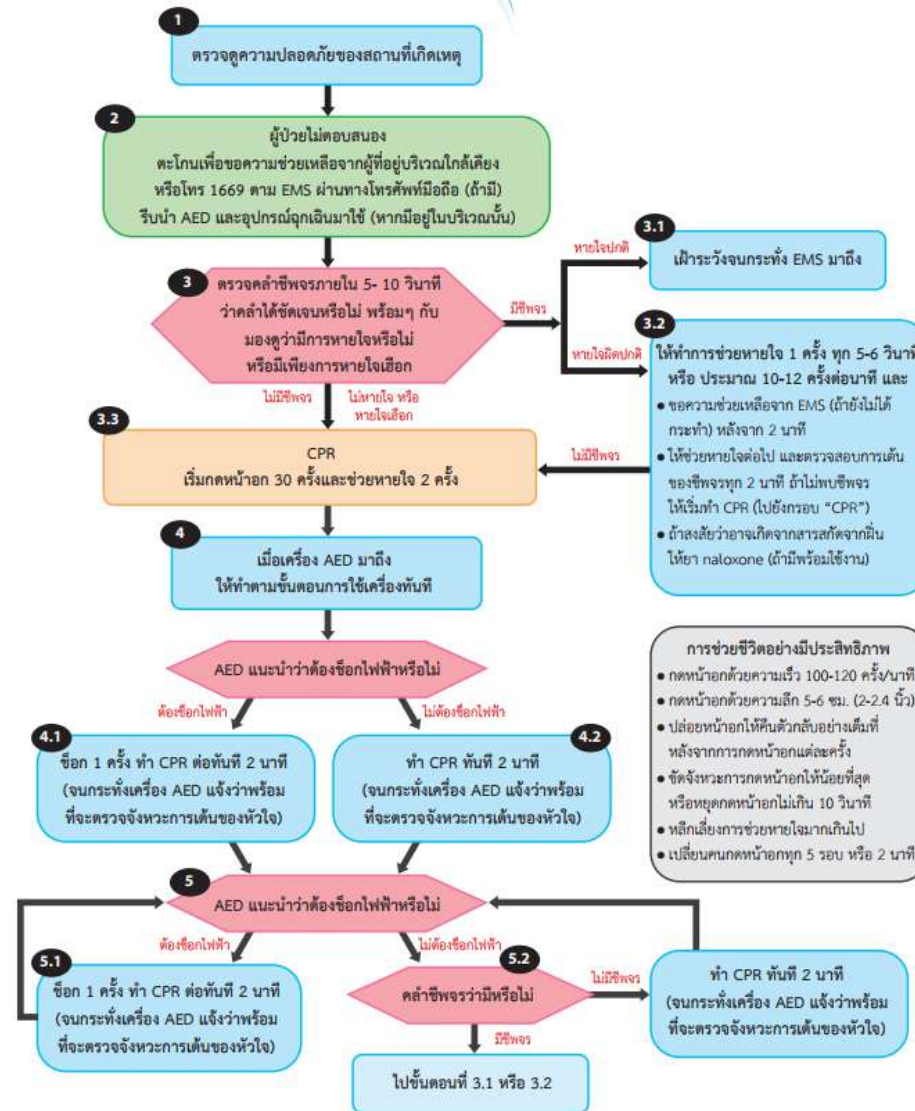
## HCP



# 2015 Singapore adult BLS algorithm



# 2015 BLS algorithm of Thailand



# Recommendations for chest compression (2015)

Council/Country	depth	rate
ILCOR	approximately 5 cm while avoiding excessive chest compression depths (greater than 6 cm)	100-120
AHA	at least 5 cm, while avoiding excessive chest compression depths (greater than 6 cm)	100-120
ERC	approx. 5cm, not more than 6cm	100-120
RCA	approx. 5cm, not more than 6cm	100-120
Singapore	4-6cm	100-120
Japan	approx. 5cm	100-120
Korea	approx. 5cm	100-120
Thailand	5-6cm	100-120
Taiwan	5cm to 6cm	100-120



# Brief survey from BLS TF members

## ■ Usefulness of RCA 2015 guideline

- All members responded Yes

## ■ Reasons

- Simple and acceptable for all Asian countries
- Easy to follow
- Take into consideration local evidence eg. compression depth
- It is straightforward and useful for most practitioners
- simple & resonable for Asian people



# Need to revise 2015 guideline

## ■ Less than half responded yes

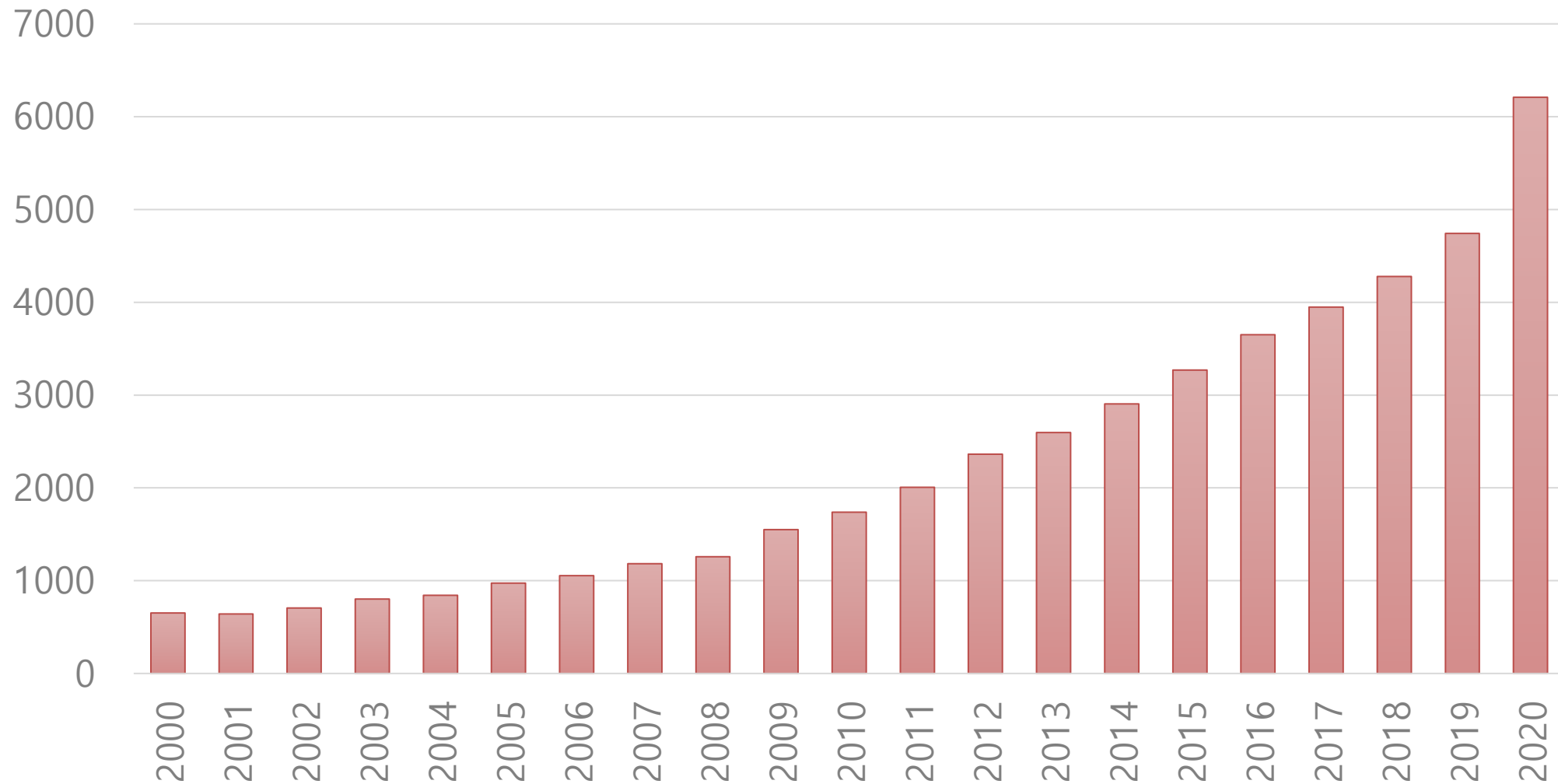
- abnormal breath (gaspings) may be difficult to understand
- May consider “middle between nipples”
- breaths (add 1 second)
- Suggest add “CPR on firm surface”

## ■ Suggested additional algorithms

- Healthcare provider algorithm
- Foreign body obstruction



# CPR related papers from RCA countries in PubMed



# PAROS research network

## ■ Pan-Asian Resuscitation Outcomes Study

## ■ Clinical research network

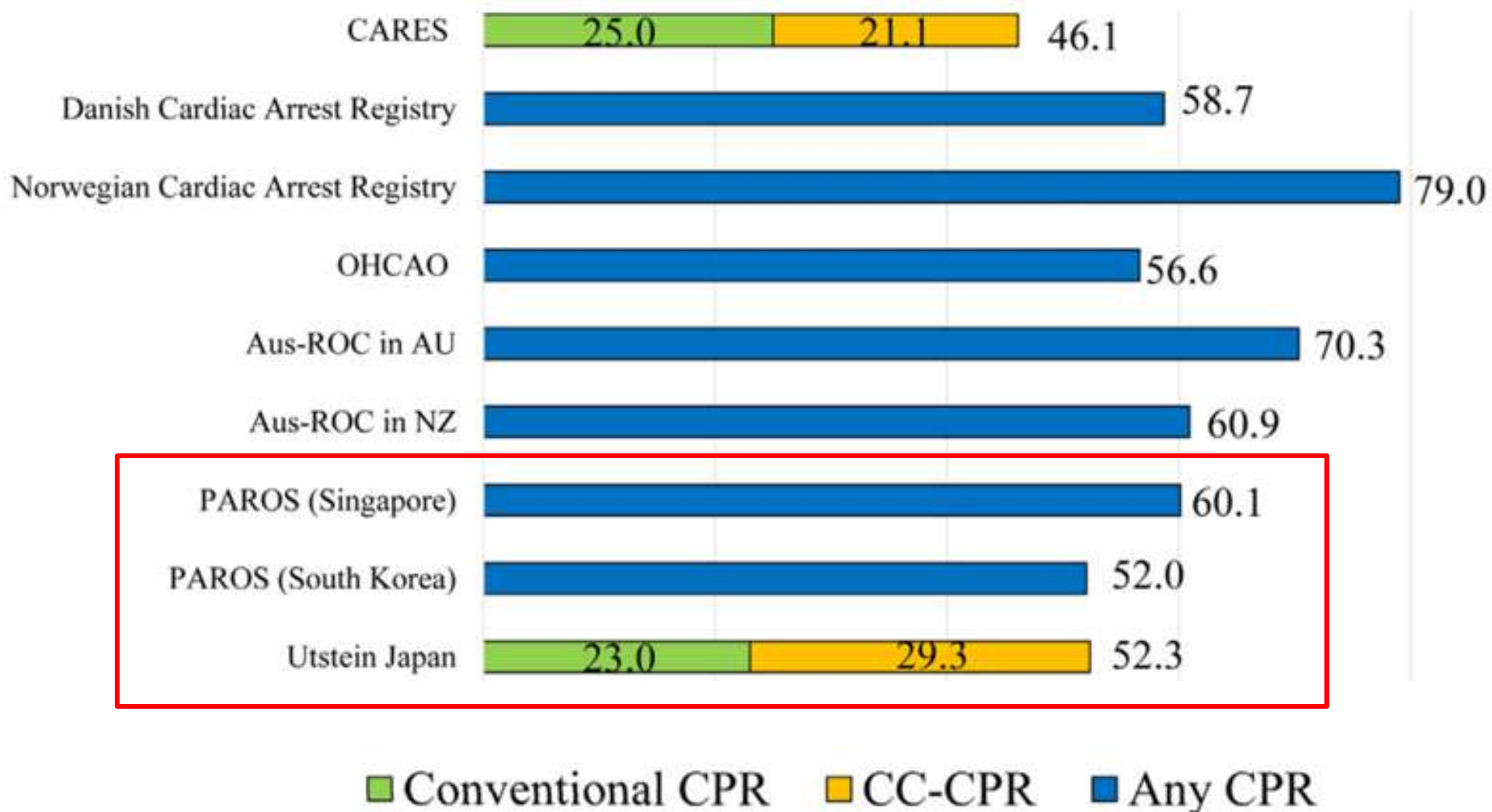
- Formed in 2010 by dedicated pre-hospital and emergency Care providers in the Asia-Pacific region
- Japan, Korea, Malaysia, Singapore, Taiwan, Thailand, United Arab Emirates, China, Philippines, Indonesia, Vietnam, and Pakistan (12 countries)



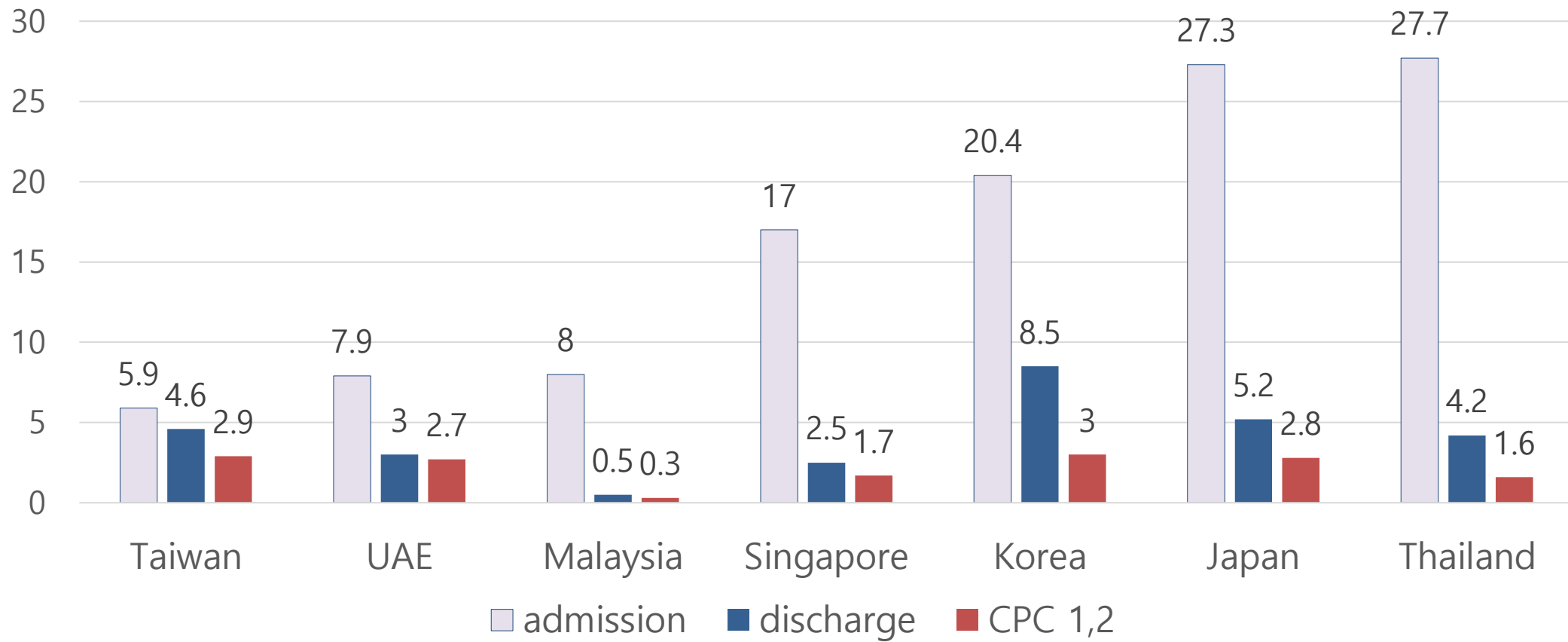
# Asian status of OHCA (2018)

	Japan	Singapore	South Korea	Taiwan (Tainan City)
Incidence (/100,000)	97.1	42.0	54.2	84.8
location, home (%)	NA	71	58.2	72.8
Dispatcher CPR instruction (%)	54.7	53.8	37.7	16.3
witnessed arrest (%)	41.4	54	37.9	57.1
shockable (%)	6.5	16.2	13	7.9
bystander shock delivery (%)	1.6	1.6	0.5	NA
call to EMS arrival, min (median)	7 (6, 9)	9.0 (7.1, 11.5)	7 (5, 10)	6 (4,6, 8.1)
call to ED arrival, min (median)	32 (26, 40)	37.7 (33, 42.8)	26 (21, 33)	23 (19, 29)

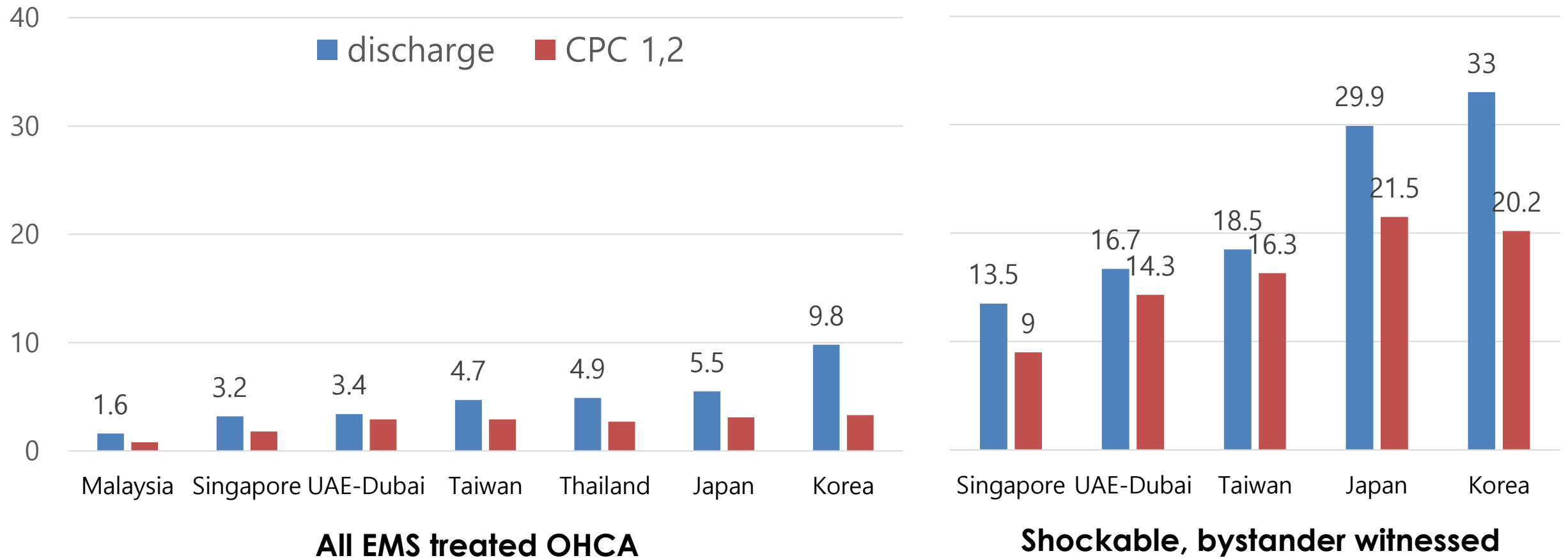
# Bystander CPR rate in Asia



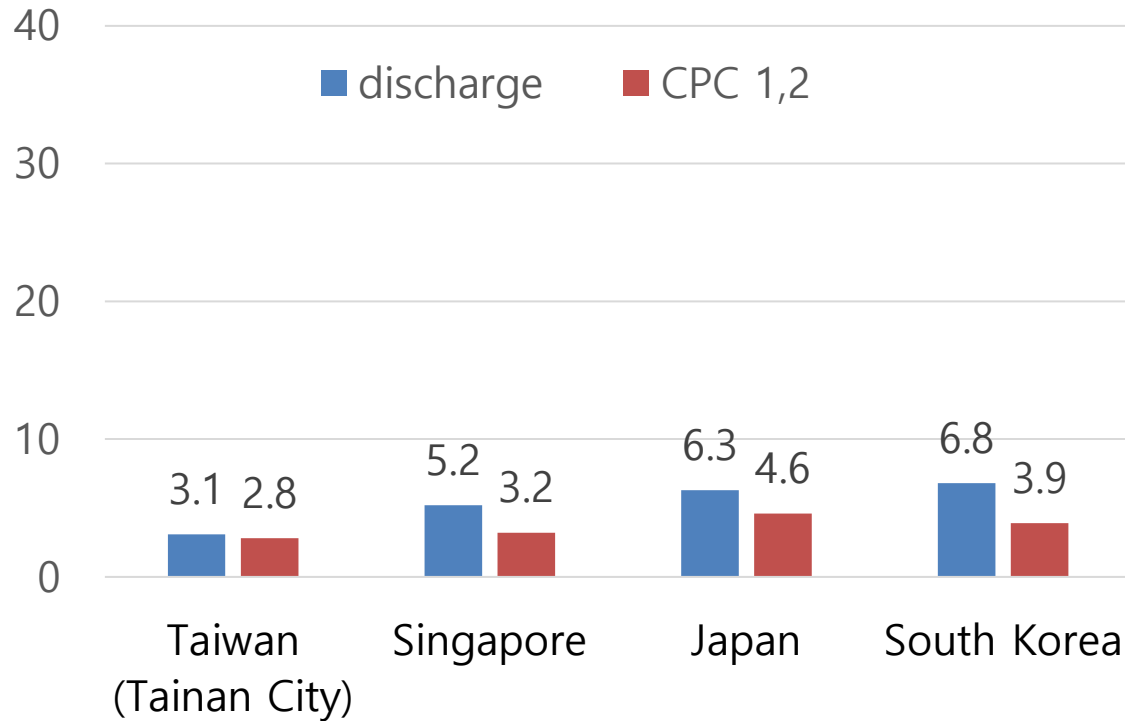
# OHCA outcomes of Asian countries (2015)



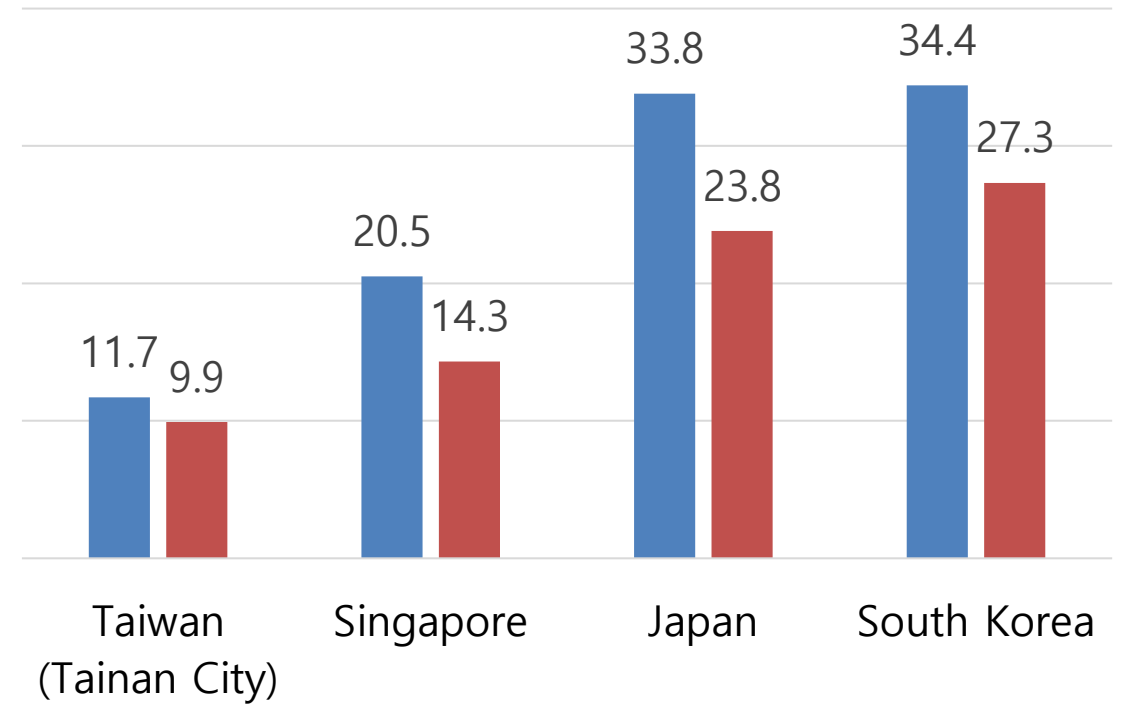
# OHCA outcomes of Asian countries (2018)



# OHCA outcomes of Asian countries (2020)



**All EMS treated OHCA**



**Shockable, bystander witnessed**



# Form for adaptation of ILCOR CoSTR

<b>Short title of PICO:</b>	
<b>Full PICO: (ILCOR PICO No)</b>	(costr.ilcor.org)
<b>ILCOR Consensus on science</b>	(costr.ilcor.org)
<b>ILCOR Treatment recommendation</b>	(costr.ilcor.org)
<b>Relevant references for Asian patients</b>	
<b>Summary of Asian evidences</b>	
<b>Reviewer's suggestion</b>	<input type="checkbox"/> Maintain ILCOR's recommendation <input type="checkbox"/> Change ILCOR's recommendation
	If you suggest change, what is the evidence:



# Reviewed PICO list

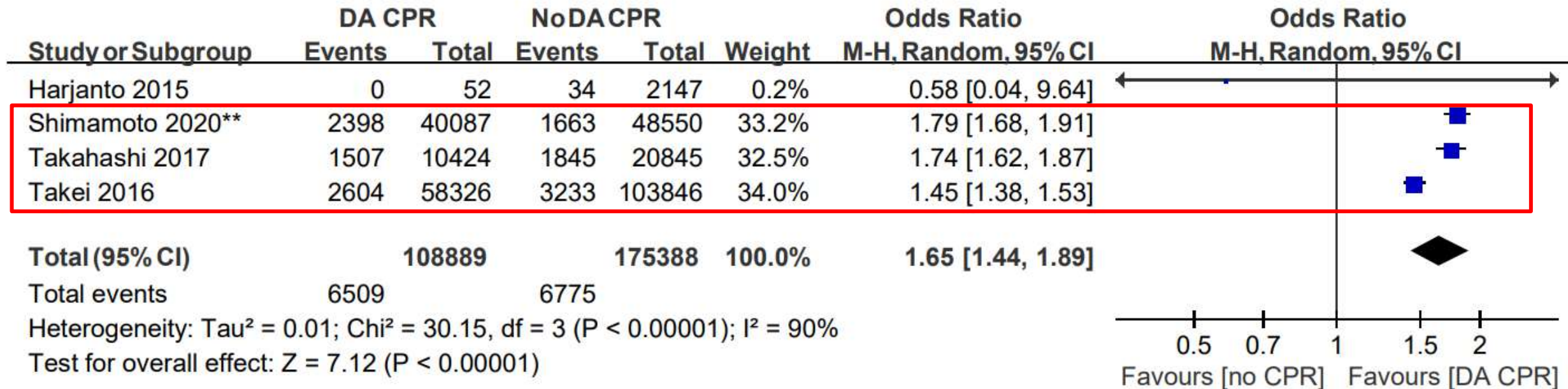
Reviewer	BLS topic
Borwon Wittayachamnankul	Timing of CPR cycles (2 min vs other) (BLS #346)
Borwon Wittayachamnankul	Starting CPR (ABC vs. CAB) (BLS #661)
Chun-tat Lui	Emergency Care: Dispatcher instruction in CPR (BLS #359)
Chun-tat Lui	Feedback for CPR quality (BLS #361)
David Chan	Firm Surface for CPR (BLS #370)
David Chan	Hand position during compressions (BLS #357)
Francis Lavapie	Harm from CPR to Victims Not in Cardiac Arrest (BLS #353)
Francis Lavapie	Public Access AED Program (BLS #347)
Hiroya Wakamatsu	Rhythm check timing (BLS #345)
Hiroya Wakamatsu	Alternative compression techniques (BLS #374)
Sung Phil Chung	Analysis of rhythm during chest compression (BLS #373)
Sung Phil Chung	Compression to Ventilation Ratio - Adult (BLS #362)
Tetsuo Hatanaka	Compression to Ventilation Ratio - EMS delivered (BLS #362)
Tetsuo Hatanaka	CPR Prior to Call for Help (BLS #1527)
Yan-Ren Lin	CPR prior to defibrillation (BLS #363)
Yan-Ren Lin	Dispatch Diagnosis of Cardiac Arrest (BLS #740)
Yung-Cheng Su	Drowning (BLS #856)
Yung-Cheng Su	COVID-19 infection risk to rescuers



# Dispatcher assisted CPR

- References in ILCOR review: 23
- References from Asia: 10 (43%)

## 2.3 1-month CPC1,2



# Dispatcher assisted CPR

## 2.5 Discharge survival

Study or Subgroup	DA CPR		NoDA CPR		Weight	Odds Ratio M-H, Random, 95% CI
	Events	Total	Events	Total		
Bang 1999	10	119	5	82	1.0%	1.41 [0.46, 4.30]
Dami 2015	36	364	6	319	1.5%	5.73 [2.38, 13.78]
Eisenberg 1985	12	58	15	112	1.7%	1.69 [0.73, 3.89]
Hiltunen 2015	24	53	19	47	1.8%	1.22 [0.55, 2.70]
Lee 2019**	1504	12154	756	10103	26.1%	1.75 [1.59, 1.91]
Lewis 2013	38	210	16	94	2.7%	1.08 [0.57, 2.05]
Oman 2016	2	47	1	22	0.2%	0.93 [0.08, 10.88]
Rea 2001	283	1584	361	2844	18.2%	1.50 [1.26, 1.77]
Ro 2017	861	11791	1003	20715	25.9%	1.55 [1.41, 1.70]
Shah 2017	123	1056	165	1783	12.3%	1.29 [1.01, 1.65]
Wu 2018	120	1002	63	758	8.6%	1.50 [1.09, 2.07]
<b>Total (95% CI)</b>		<b>28438</b>		<b>36879</b>	<b>100.0%</b>	<b>1.56 [1.39, 1.74]</b>

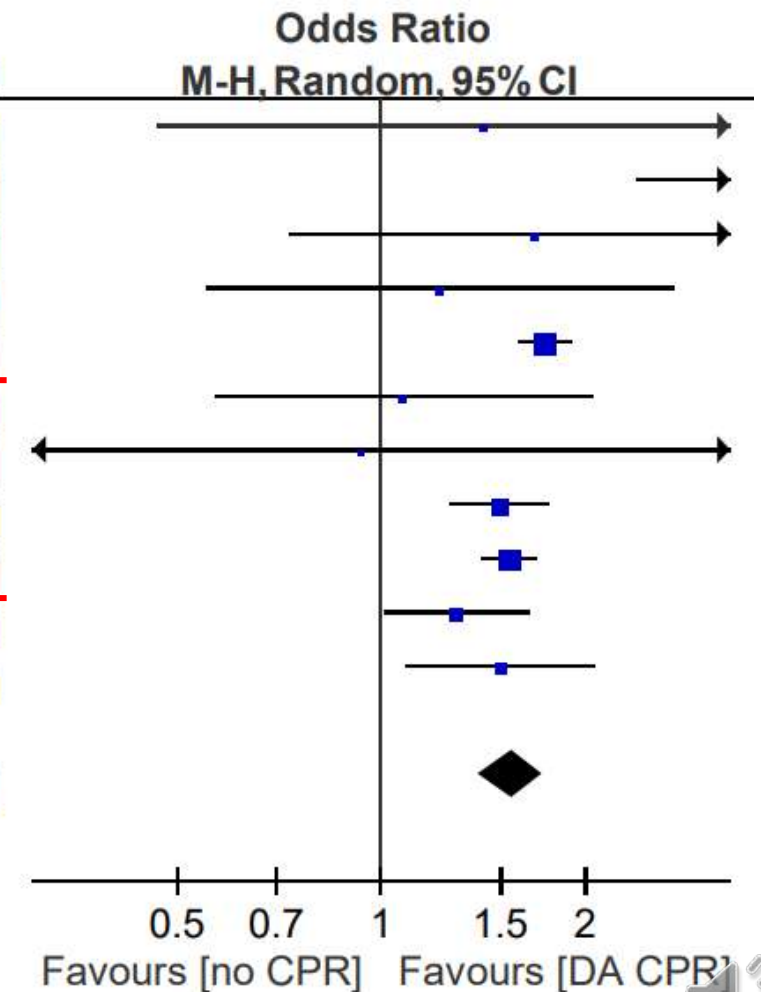
Total events

3013

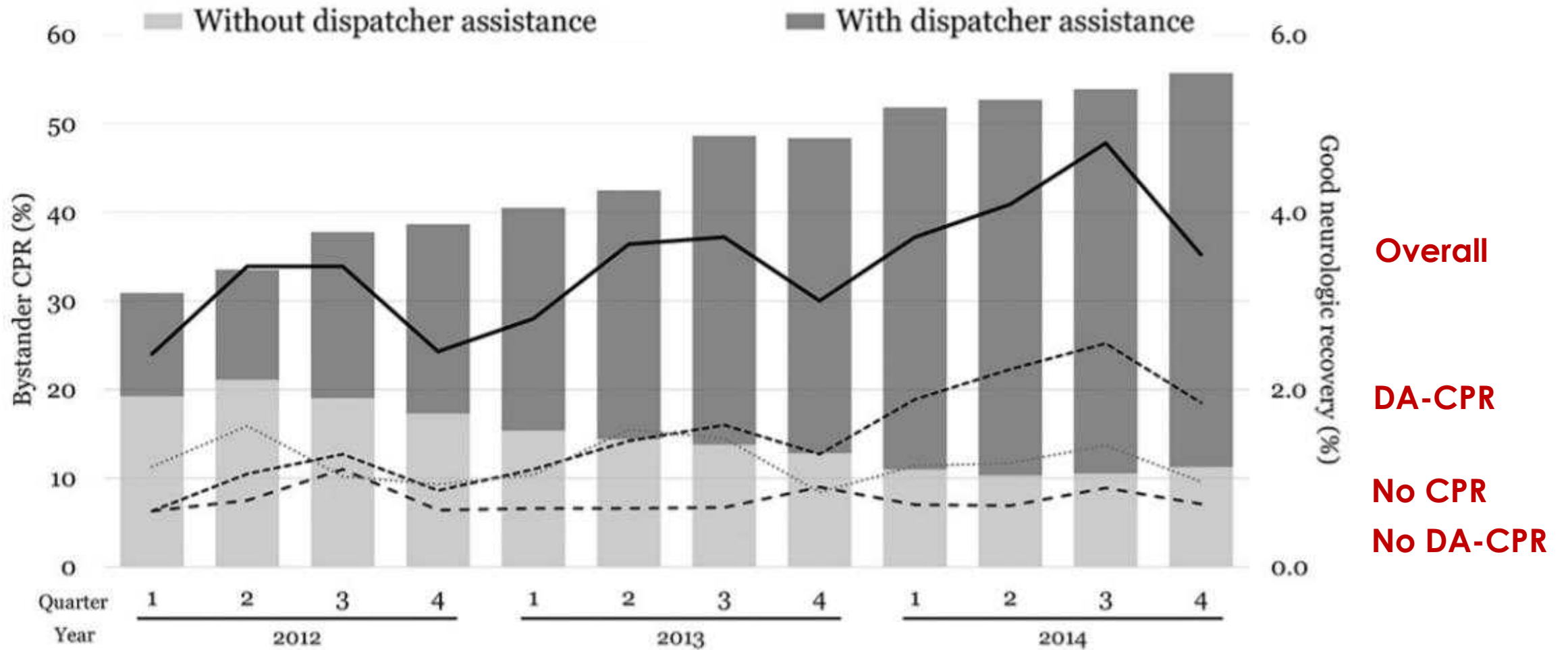
2410

Heterogeneity:  $\tau^2 = 0.01$ ;  $\chi^2 = 17.86$ ,  $df = 10$  ( $P = 0.06$ );  $I^2 = 44\%$

Test for overall effect:  $Z = 7.86$  ( $P < 0.00001$ )



# Dispatcher assisted CPR



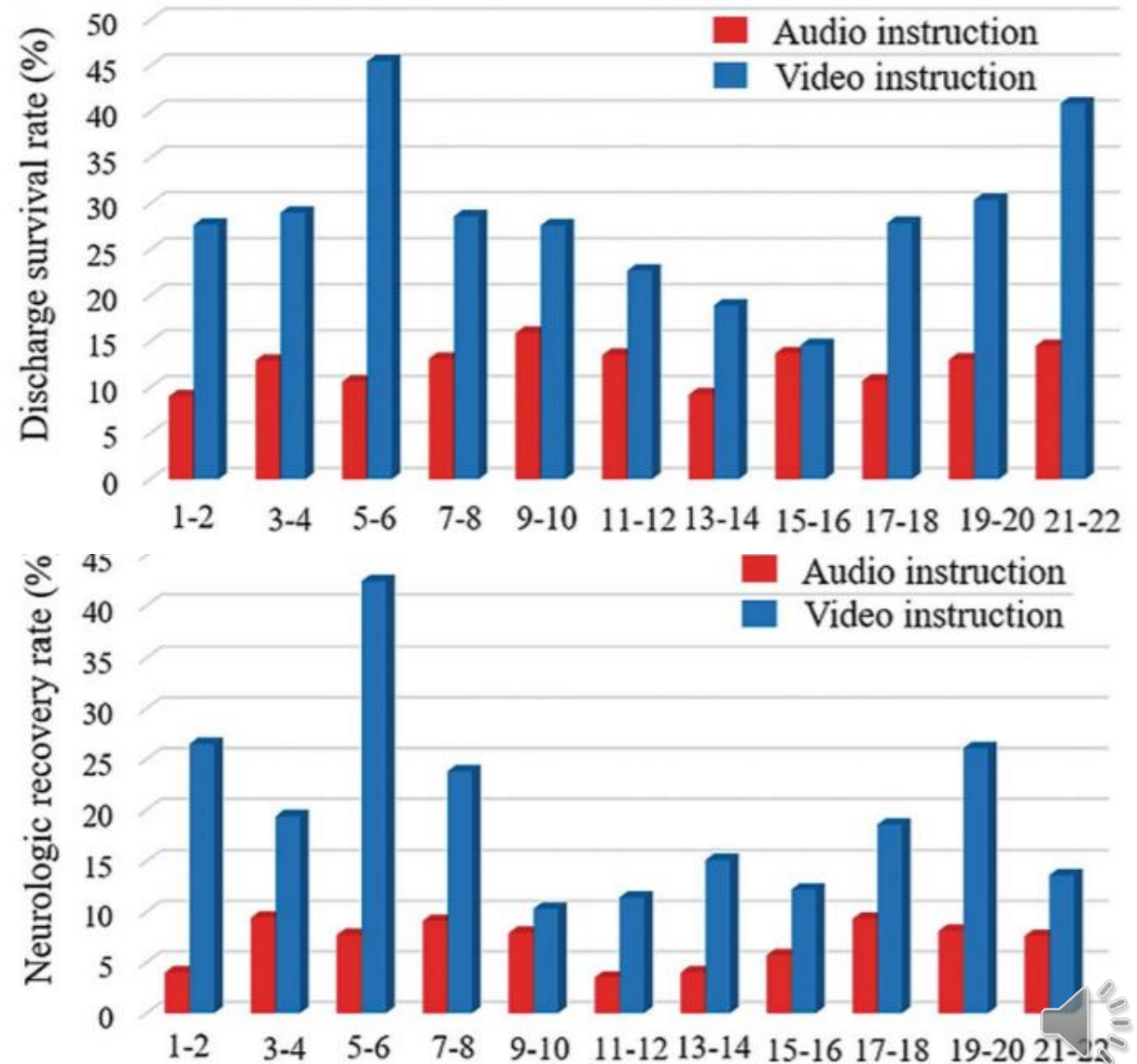
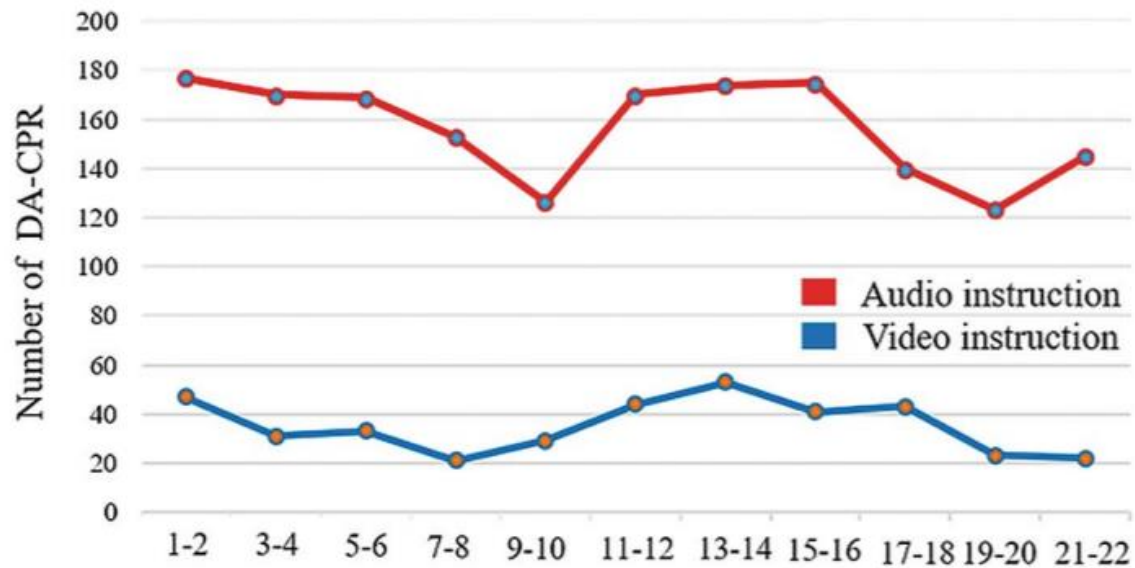
# Dispatcher-assisted CPR in Asia

DS	Seoul	Tokyo	Miri	Davao	Tainan	Singapore	Bangkok
Country	Korea	Japan	Malaysia	Philippines	Taiwan	Singapore	Thailand
Year Introduced	2011	1994	2013	2017	2013	2011	1995
Year Data Collected	2015	2015	2016	2016	2013	2016	2017
DACPR in > 1 Language	No	Yes	Yes	Yes	Yes	Yes	No
Dispatch Staff Trained (%)	100	100	100	60	100	100	80
Script Source	Internally Developed	Internally Developed	Commercially Acquired	Internally Developed	Internally Developed	Internally Developed	Internally Developed
Computer or Card-Based	Card Based	Computer Aided	Computer Aided	Computer Aided	Card Based	Computer Aided	Card Based
DACPR Instructions	Compression Only	Compression Only	Compression Only	Compression Only	Compression Only	Compression Only	Compression Only
30:2 CPR in Specific Indications	No	Yes	Yes	Yes	Yes	Yes	No
Lookout for AEDs	Yes	Yes	Yes	Yes	Yes	Yes	No



# Video based dispatch instruction

2018.1-2019.10  
Seoul, Korea  
N=2,109



# Review result: Dispatch assisted CPR

## ■ ILCOR recommendation

- We recommend that emergency medical dispatch centers have systems in place to enable call handlers to provide CPR instructions for adult patients in cardiac arrest. (strong recommendation, very-low-certainty evidence)
- We recommend that emergency call takers provide CPR instructions (when required) for adult patients in cardiac arrest. (strong recommendation, very-low-certainty evidence)

## ■ RCA Reviewer's suggestion

- Maintain ILCOR's recommendation



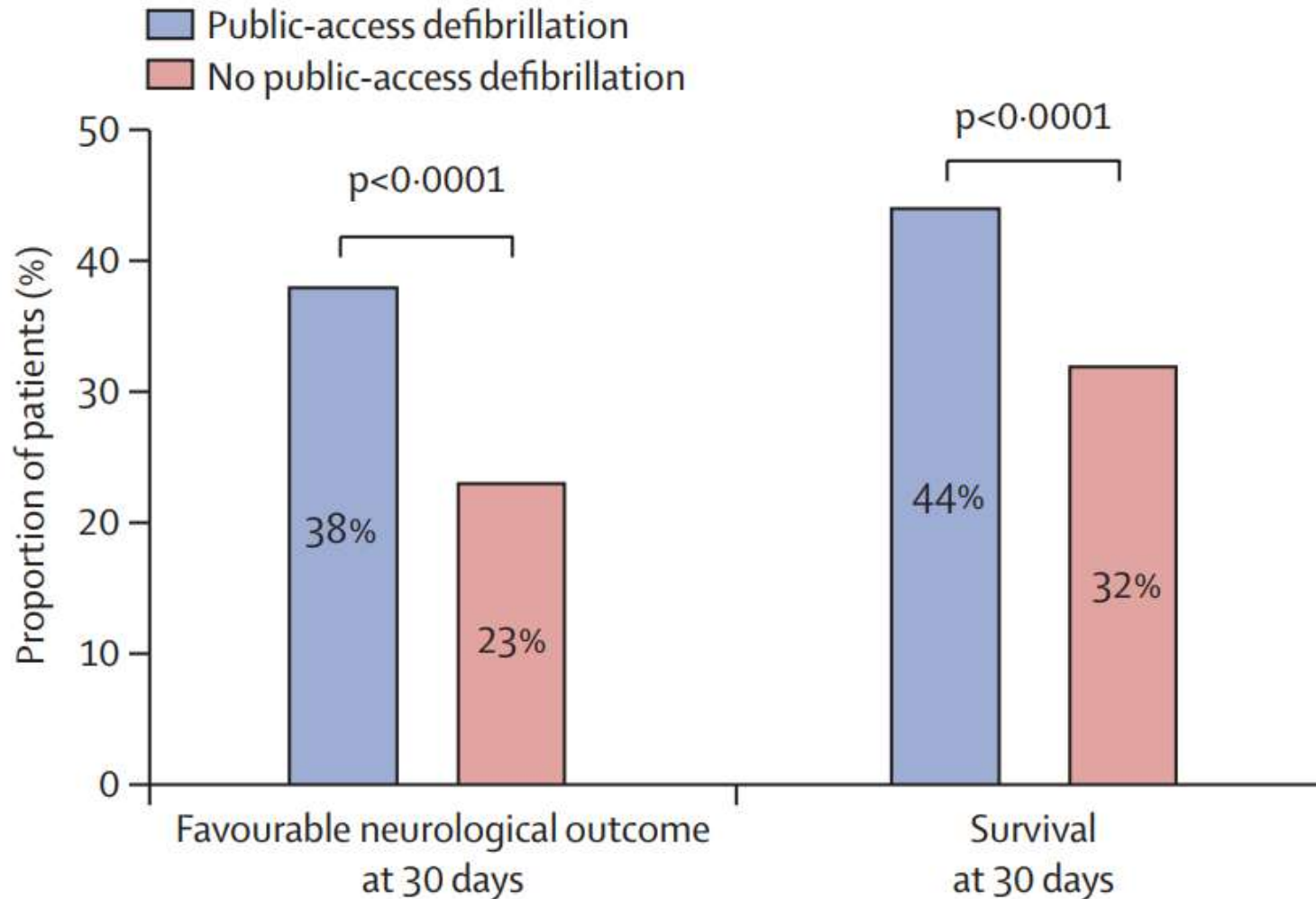
# Public access defibrillation

- References in ILCOR review: 31
- References from ASIA: 8 (26%)

Author	Year	Country	Author	Year	Country
Capucci	2002	Italy	Fordyce	2017	USA
Kuisma	2003	Finland	Fukada	2017	Japan
Culley	2004	USA	Garcia	2017	France, USA, Spain
Hallstrom	2004	USA, Canada	Hansen	2017	Denmark
Fleischhackl	2008	Austria	Karam	2017	France
Colquhoun	2008	UK	Anderson	2018	USA
Weisfeldt	2010	USA, Canada	Aschieri	2018	Italy
Berdowski	2011	Netherlands	Dicker	2018	New Zealand
Kim	2014	Korea	Nas	2018	Netherlands
Edwards	2015	UK	Pollack	2018	USA, Canada
Gianotto-Oliveira	2015	Brazil	Takeuchi	2018	Japan
Nakahara	2015	Japan	Tay	2019	Singapore
Ringh	2015	Sweden	Kiguchi	2019	Japan
Capucci	2016	Italy	Matsui	2019	Japan
Kitamura	2016	Japan	Nehme	2019	Austria
Claesson	2017	Sweden			



# Public access defibrillation

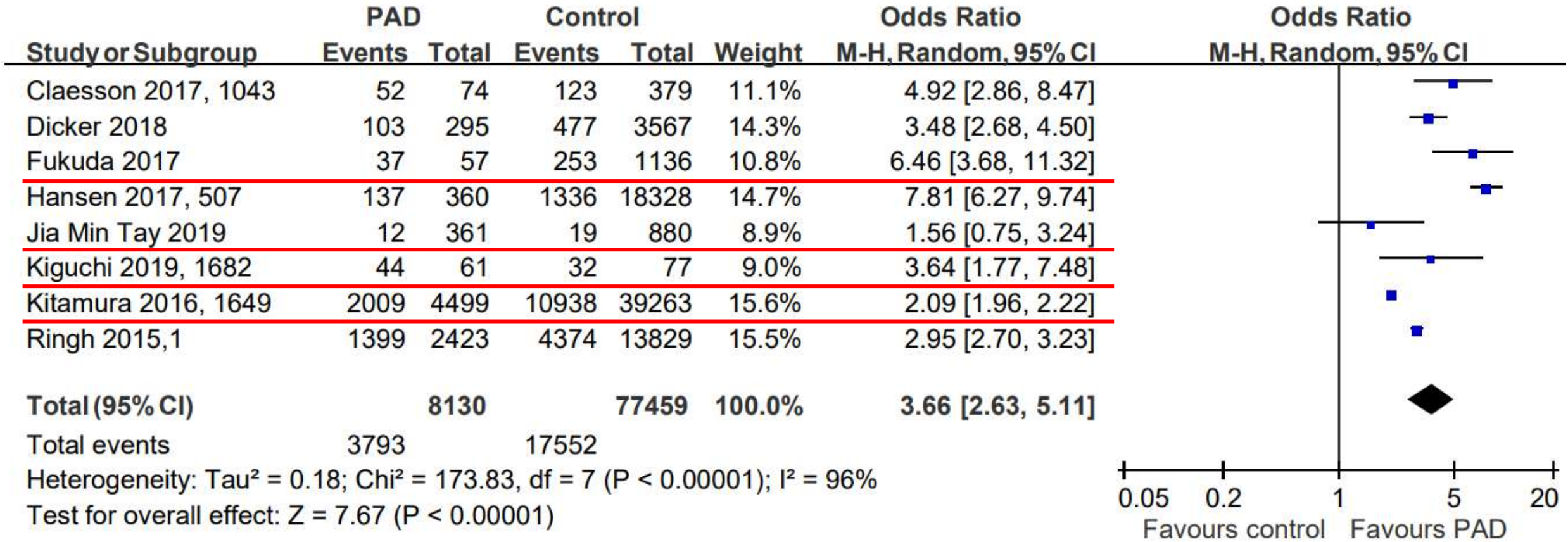


2005-2015  
N=28,019  
bystander-witnessed OHCA  
and shockable rhythm who  
had received CPR from a  
bystander.



# Public access defibrillation

## 1.4 30-day survival



# Review result: Public access defibrillation

## ■ ILCOR recommendation

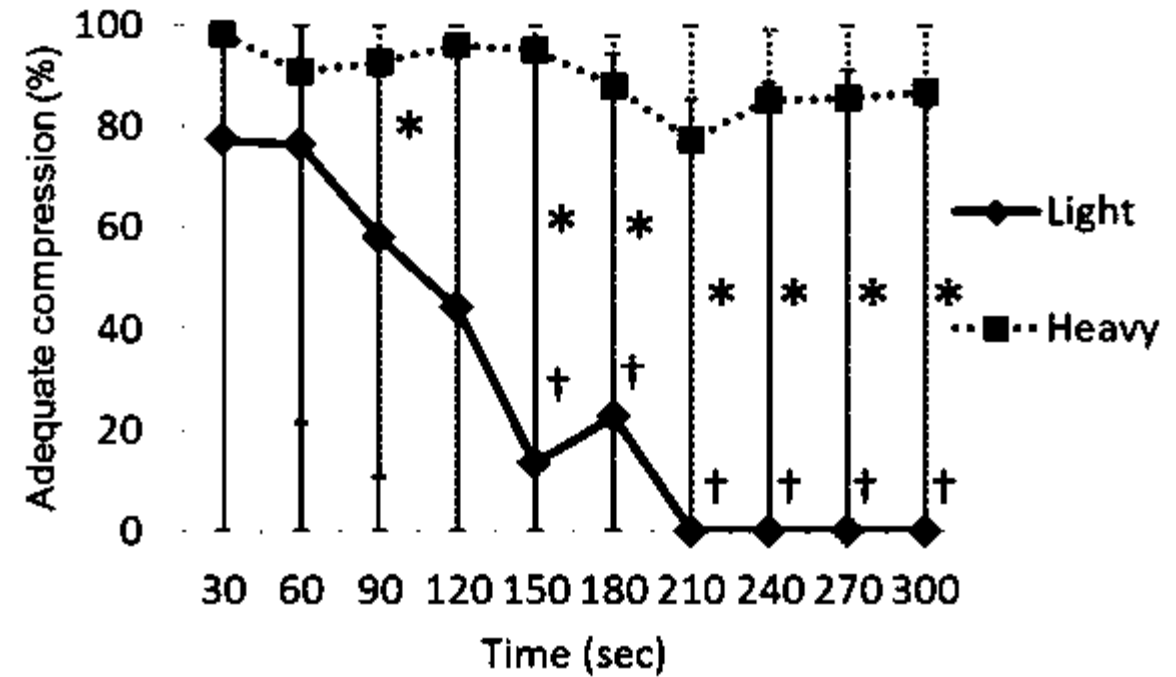
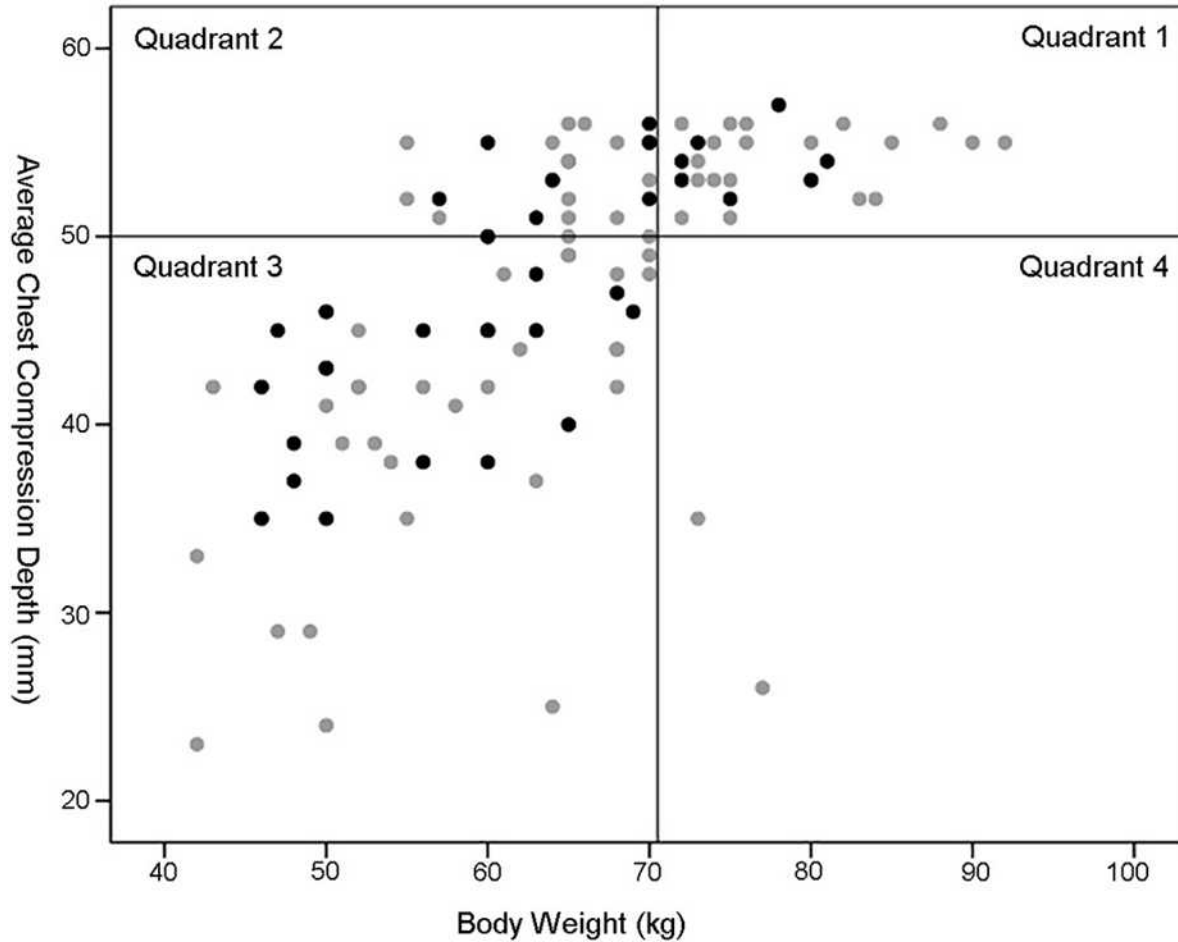
- We recommend the implementation of public-access defibrillation programs for patients with OHCA. (Strong recommendation, low-certainty evidence)

## ■ RCA Reviewer's suggestion

- Maintain ILCOR's recommendation



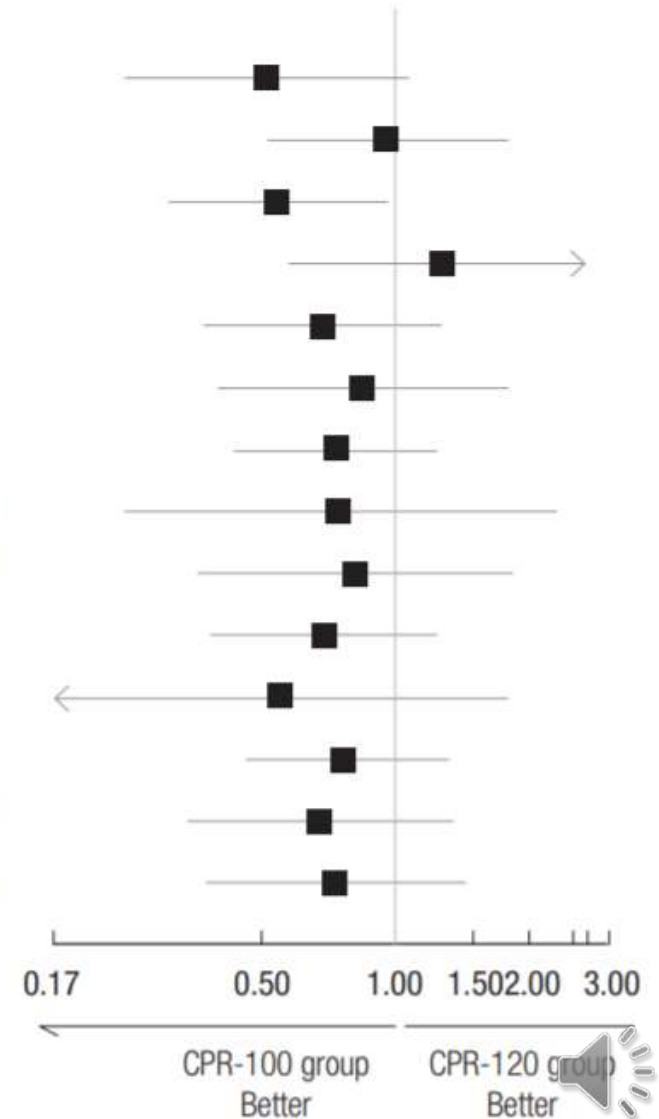
# Compression depth vs rescuer's body weight



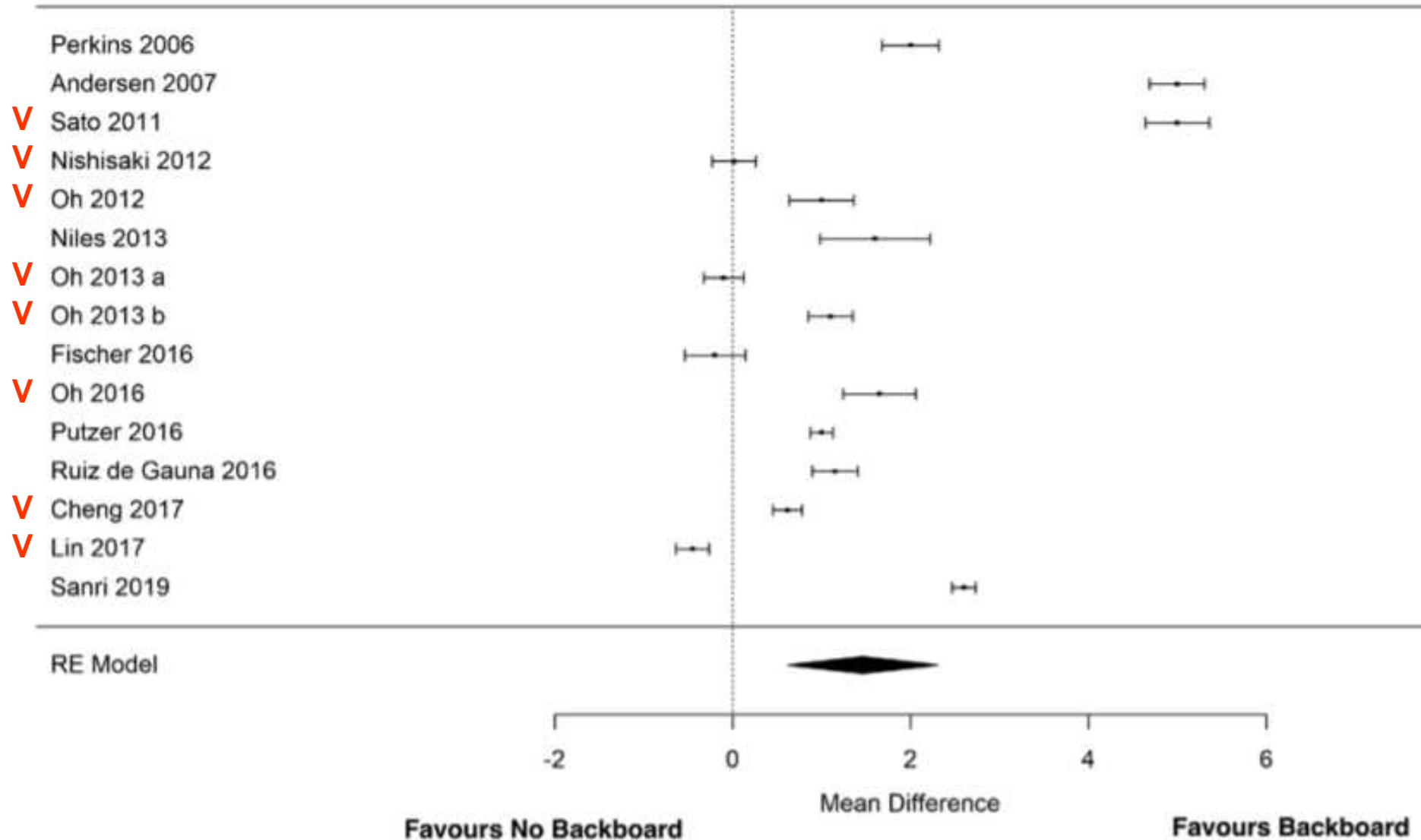
# Compression rate

Outcomes	P value
ROSC (%)	0.183
Survival discharge (%)	0.325
One-month survival (%)	0.073
One-month survival with CPC	
≤ 2	0.154
3-5	
1	
2	
3	
4	
5	

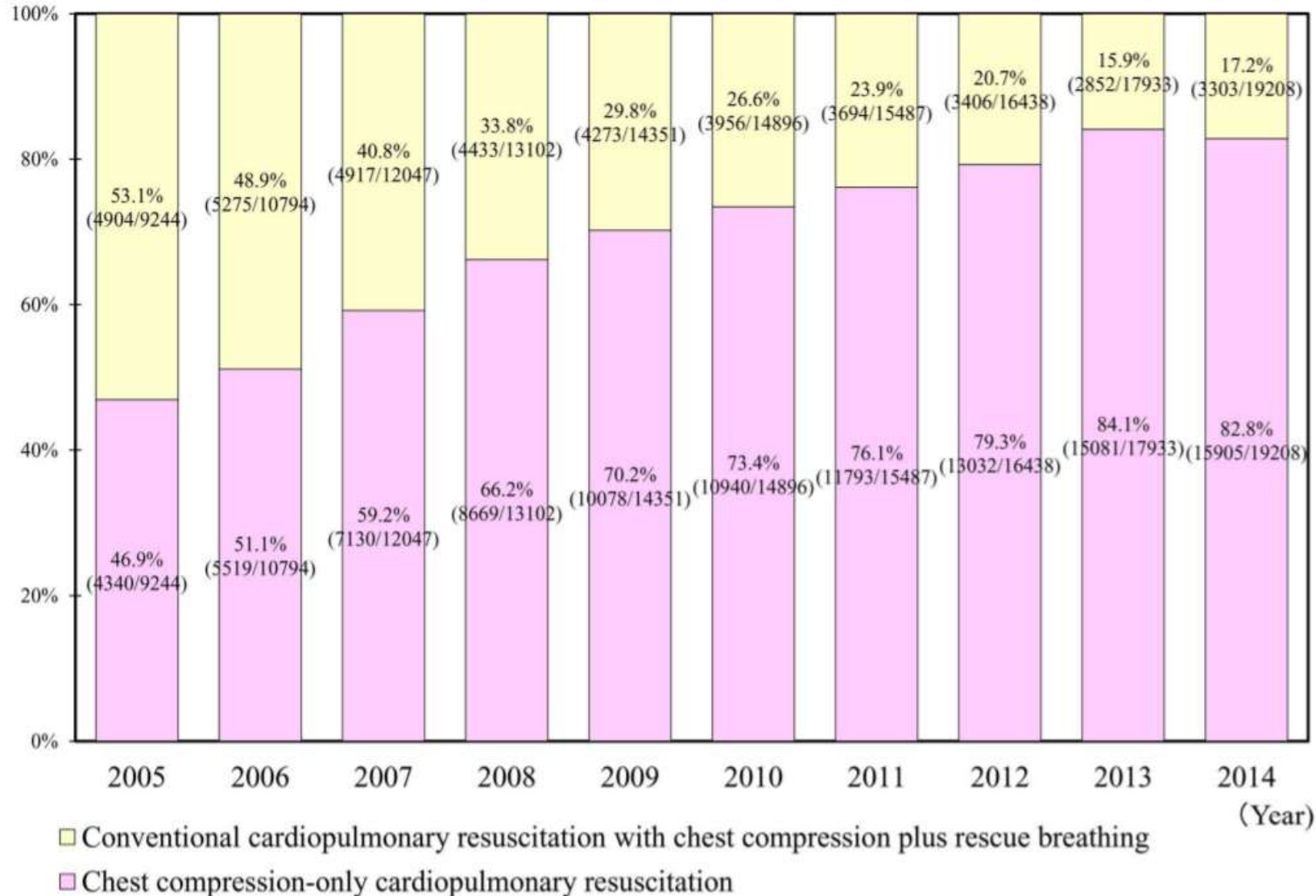
Variables	Subgroup	OR	95% CI
Age (yr)	< 65	0.52	0.25-1.06
	≥ 65	0.95	0.52-1.75
Sex	Male	0.54	0.31-0.97
	Female	1.27	0.58-2.78
Cause of arrest	Cardiac	0.68	0.37-1.25
	Non-cardiac	0.84	0.41-1.74
Witness	Witnessed	0.74	0.44-1.24
	Unwitnessed	0.74	0.25-2.21
Bystander CPR	Yes	0.81	0.36-1.81
	No	0.7	0.39-1.23
Initial rhythm	Shockable	0.55	0.17-1.76
	Non-shockable	0.77	0.47-1.28
Collapse to ED arrival (min)	< 23	0.67	0.35-1.31
	≥ 23	0.73	0.38-1.41



# Backboard (firm surface)



# Compression only CPR



Kitamura et al.  
Resuscitation.  
2018 May;126:29-35.

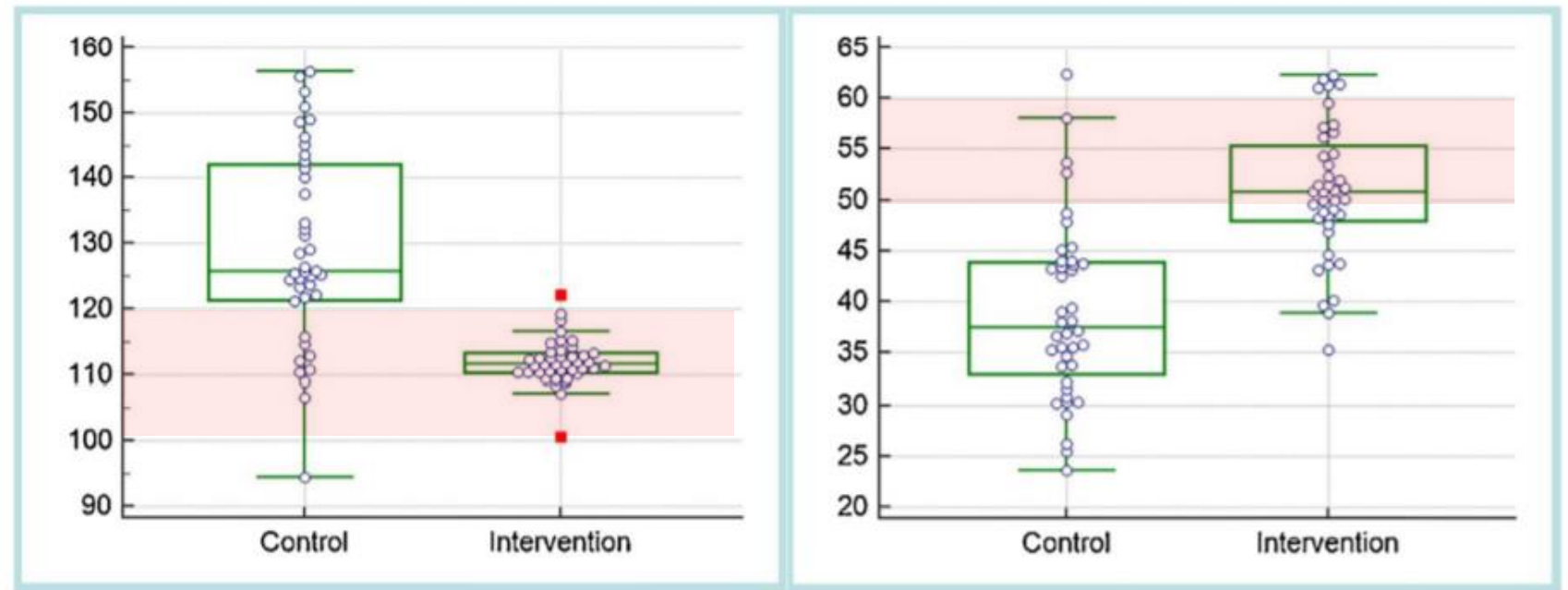


# Outcomes of compression only CPR

	Total	Chest compression-only CPR	Conventional CPR with rescue breathing	Adjusted OR (95% CI)	P value
All patients <sup>a</sup>	(N = 143500)	(N = 102487)	(N = 41013)		
Prehospital ROSC	20,682 (14.4%)	14,618 (14.3%)	6064 (14.8%)	0.99 (0.96–1.03)	0.729
One-month survival	14,369 (10%)	9899 (9.7%)	4470 (10.9%)	1.05 (1.01–1.10)	0.021
CPC 1 or 2	8431 (5.9%)	5749 (5.6%)	2682 (6.5%)	1.12 (1.06–1.19)	0.028
Propensity score-matched patients <sup>a</sup>	(N = 80192)	(N = 40096)	(N = 40096)		
Prehospital ROSC	11,959 (14.9%)	6020 (15.0%)	5939 (14.8%)	1.01 (0.97–1.06)	0.504
One-month survival	8907 (11.1%)	4545 (11.3%)	4362 (10.9%)	1.06 (1.01–1.12)	0.011
CPC 1 or 2	5504 (6.9%)	2894 (7.2%)	2610 (6.5%)	1.14 (1.08–1.22)	< 0.001



# Smart-watch as feedback device



# Bystander alerting technology

## ■ Smartphone application

- AED delivery time was significantly shorter in the application group

Hatakeyama et al. Simul Healthc. 2018

## ■ Text message alerting system

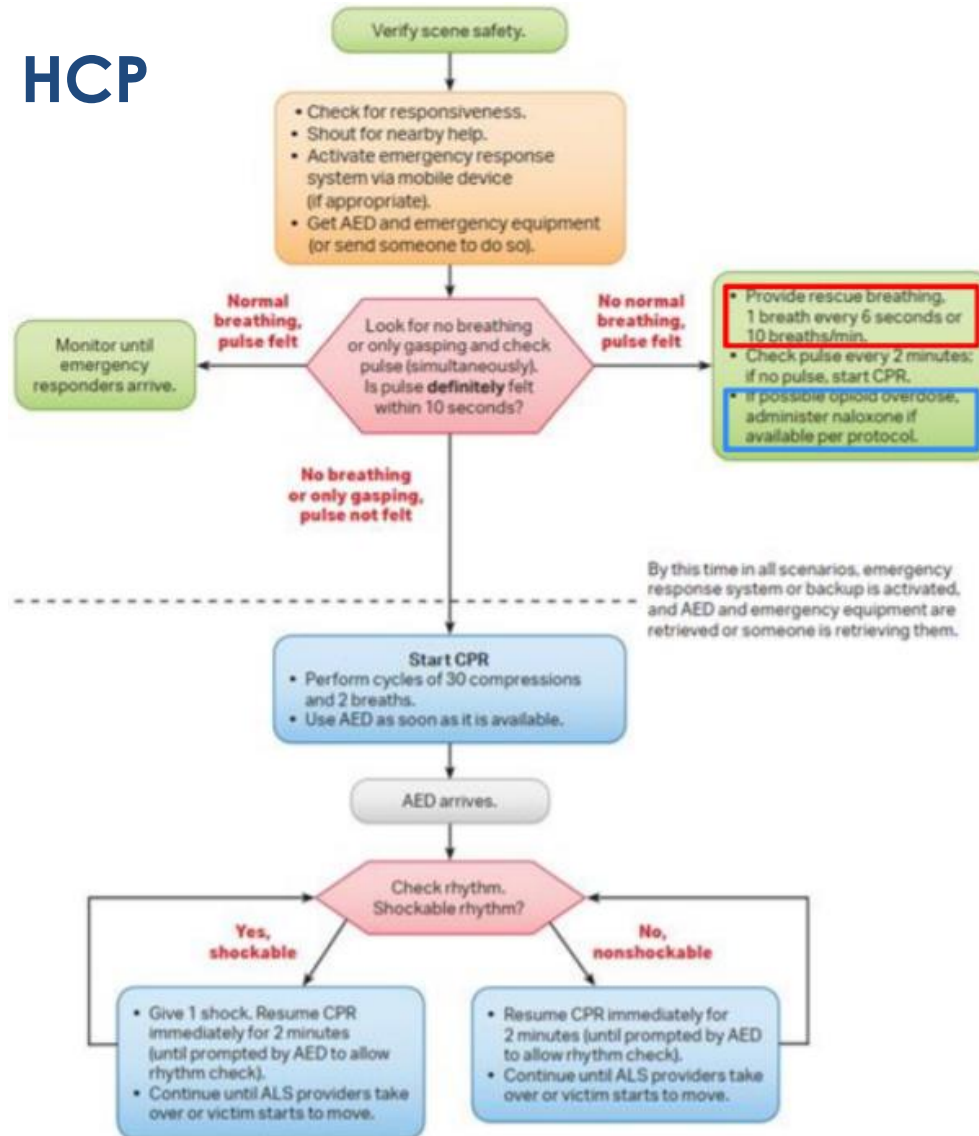
- Compared with control periods, the bystander CPR rate, survival to discharge and good neurological outcome of the intervention period were all improved.

Lee et al. Resuscitation. 2019 May

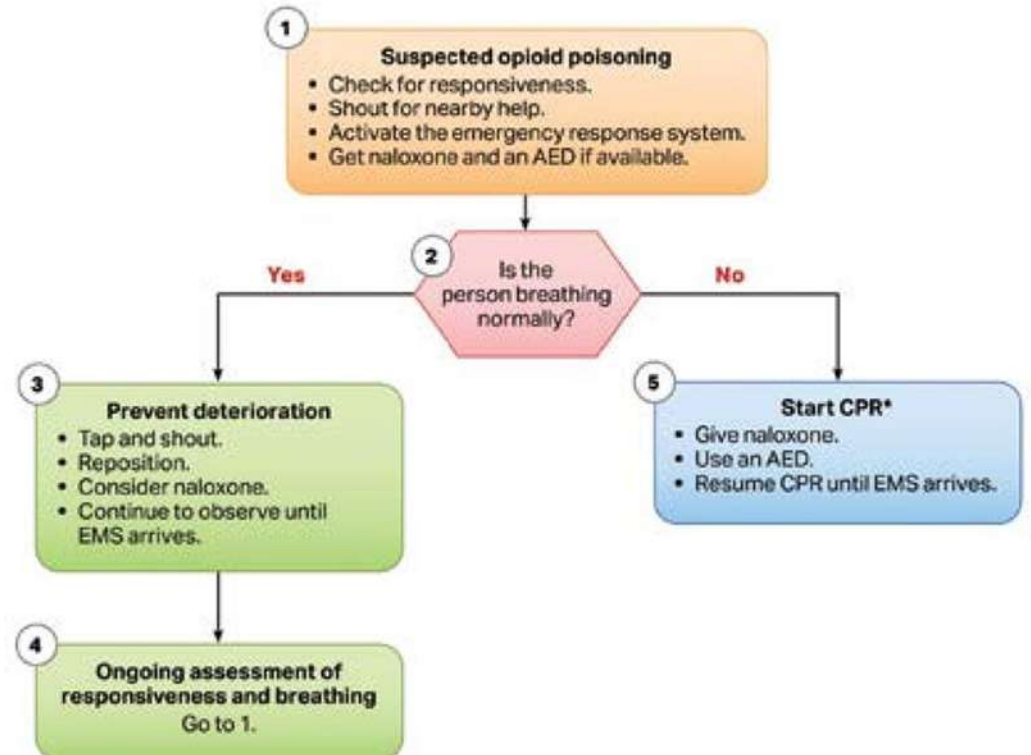


# 2020 AHA BLS algorithm

HCP

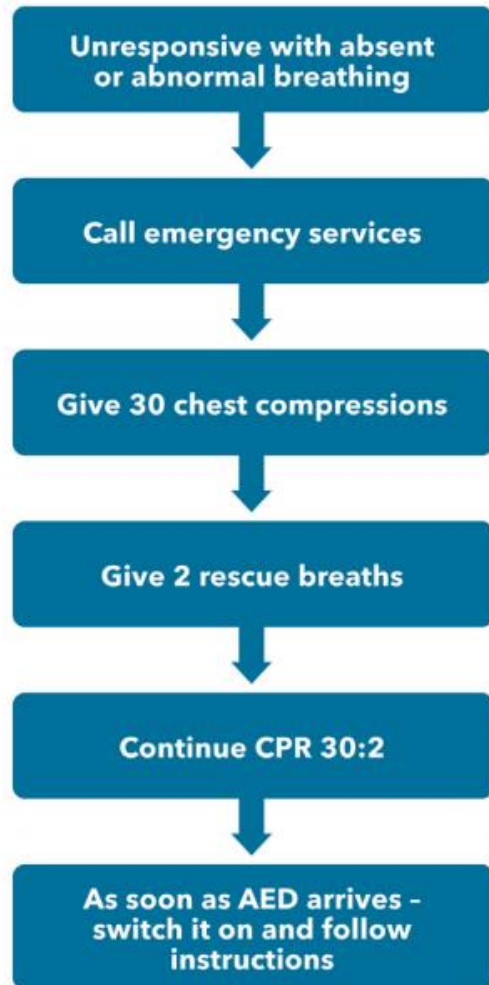


## Opioid-associated emergency for lay responders



# 2021 ERC BLS algorithm

## BLS algorithm

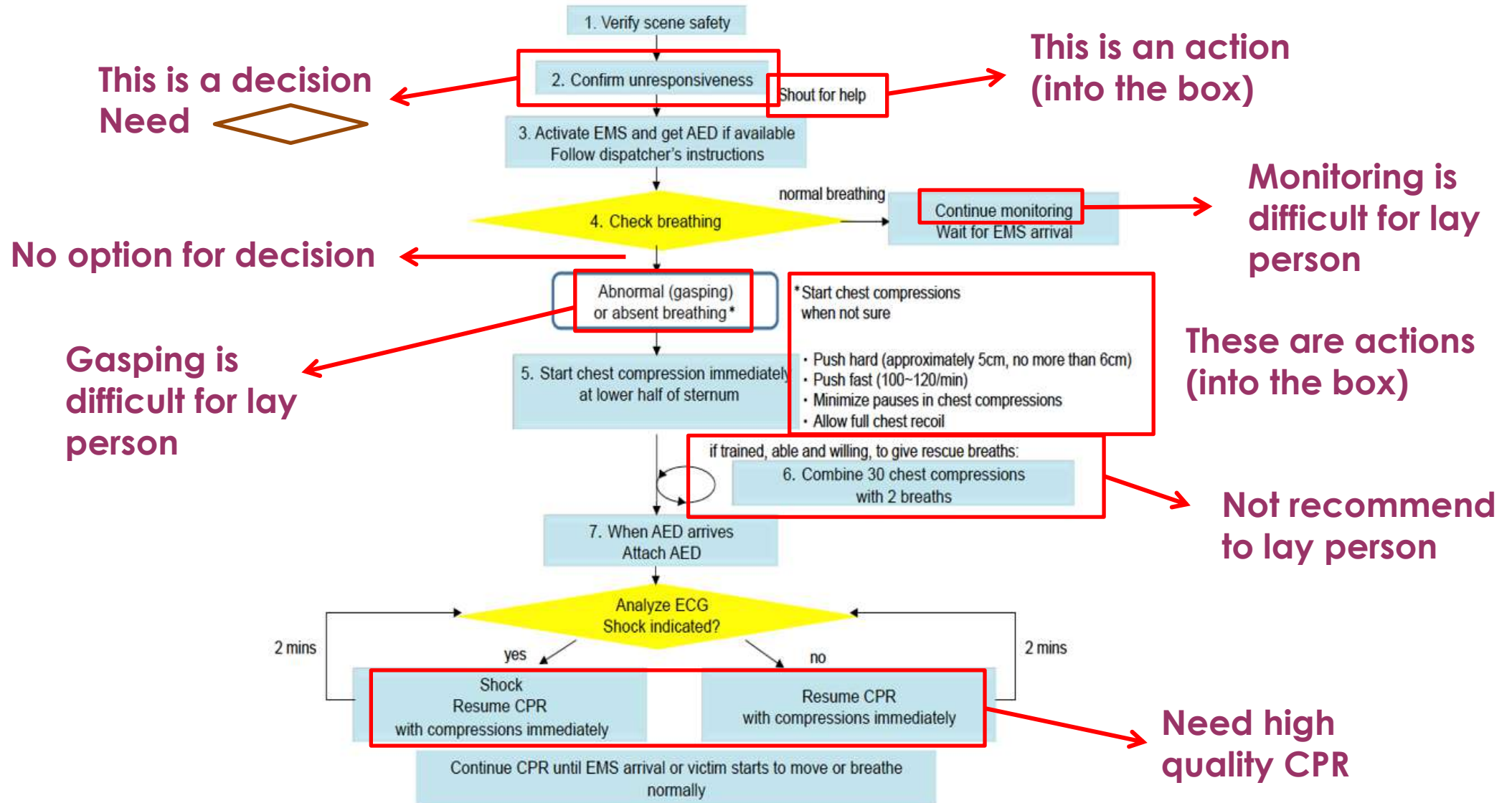


## BASIC LIFE SUPPORT STEP-BY-STEP

SEQUENCE/ACTION	TECHNICAL DESCRIPTION
<b>SAFETY</b> 	<ul style="list-style-type: none"> <li>• Make sure that you, the victim and any bystanders are safe</li> </ul>
<b>RESPONSE</b> Check for a response 	<ul style="list-style-type: none"> <li>• Shake the victim gently by the shoulders and ask loudly: "Are you all right?"</li> </ul>
<b>AIRWAY</b> Open the airway 	<ul style="list-style-type: none"> <li>• If there is no response, position the victim on their back</li> <li>• With your hand on the forehead and your fingertips under the point of the chin, gently tilt the victim's head backwards, lifting the chin to open the airway</li> </ul>
<b>BREATHING</b> Look, listen and feel for breathing 	<ul style="list-style-type: none"> <li>• Look, listen and feel for breathing for <b>no more</b> than 10 seconds</li> <li>• A victim who is barely breathing or taking</li> </ul>

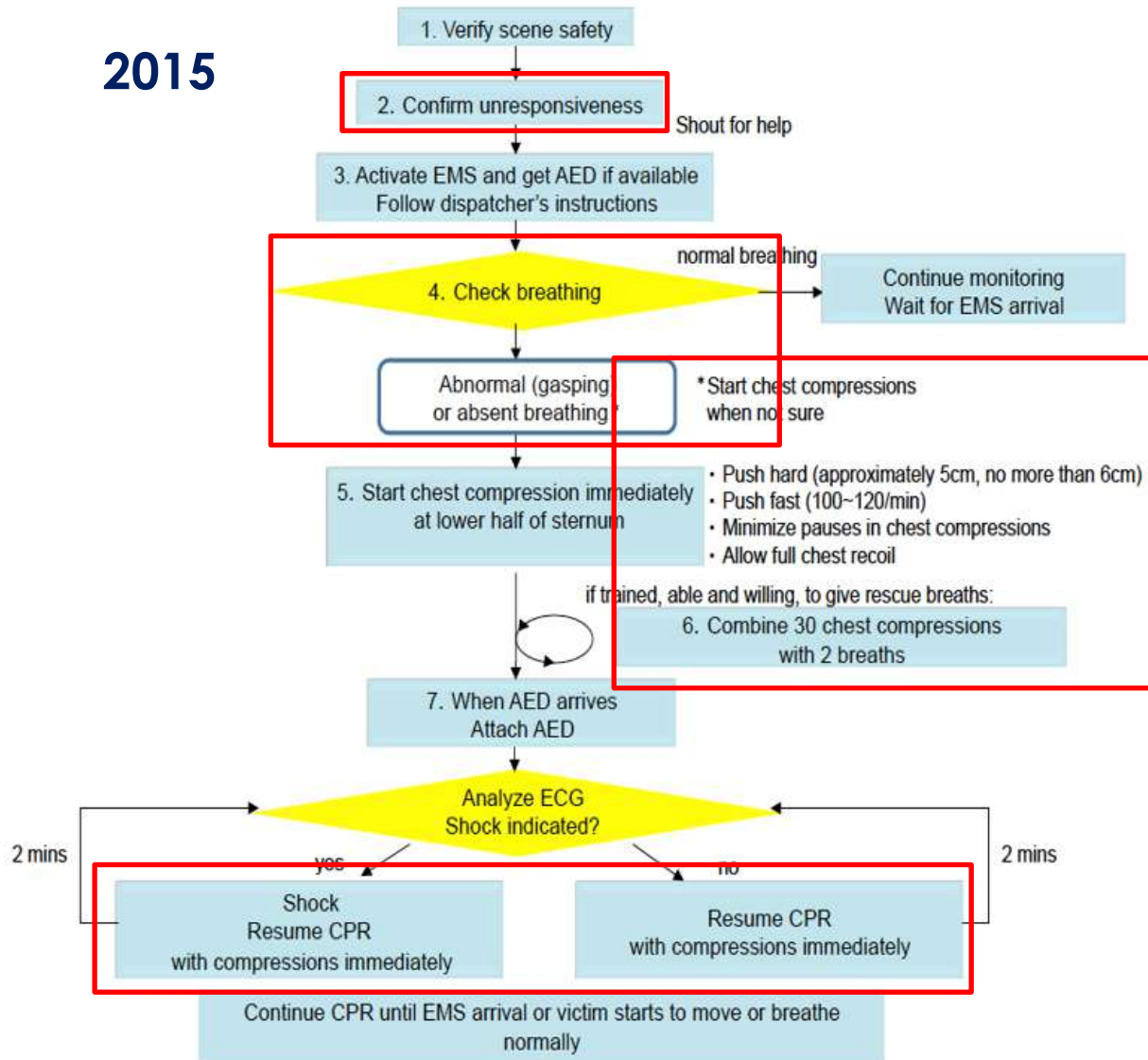


# Opinions to change of 2015 algorithm

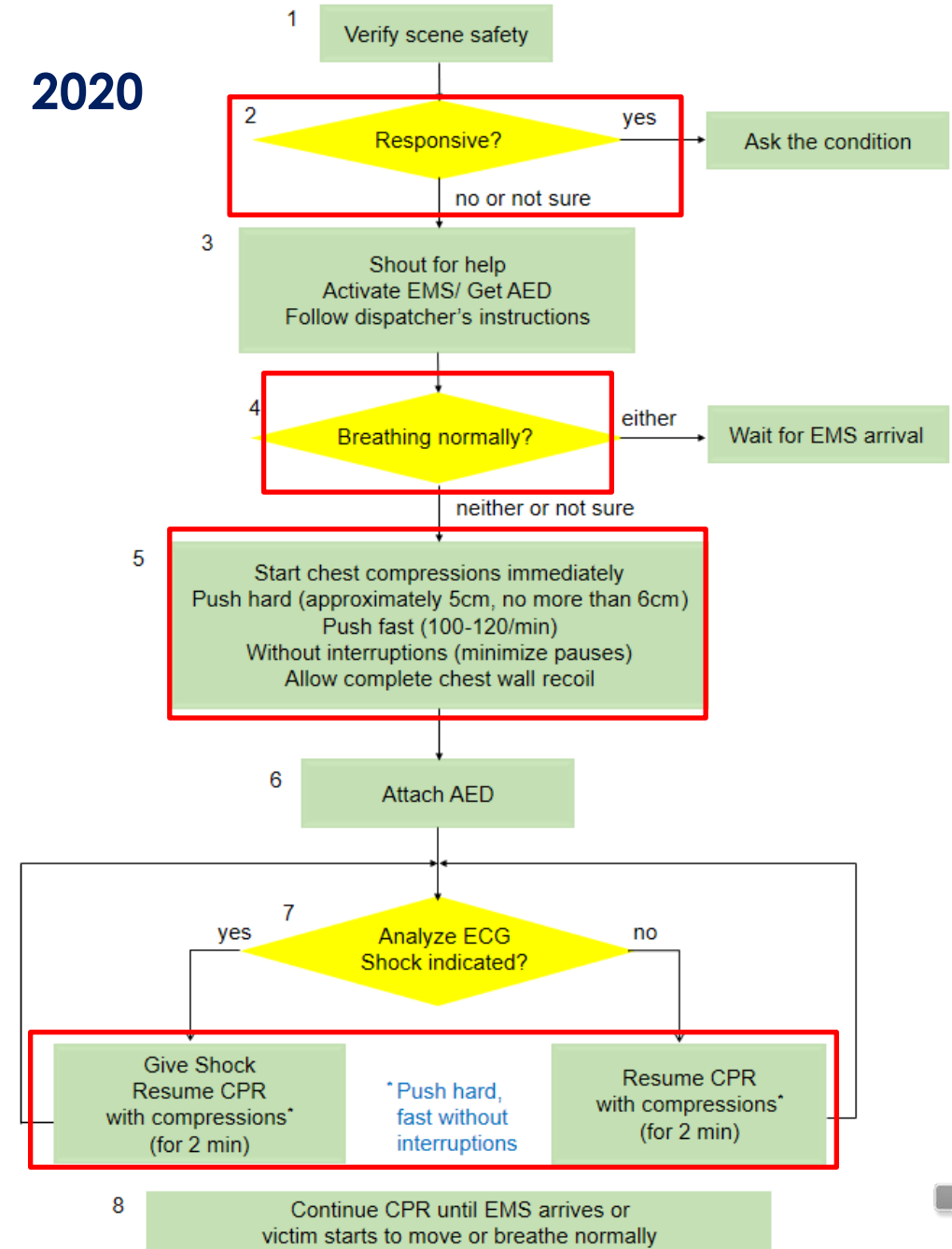


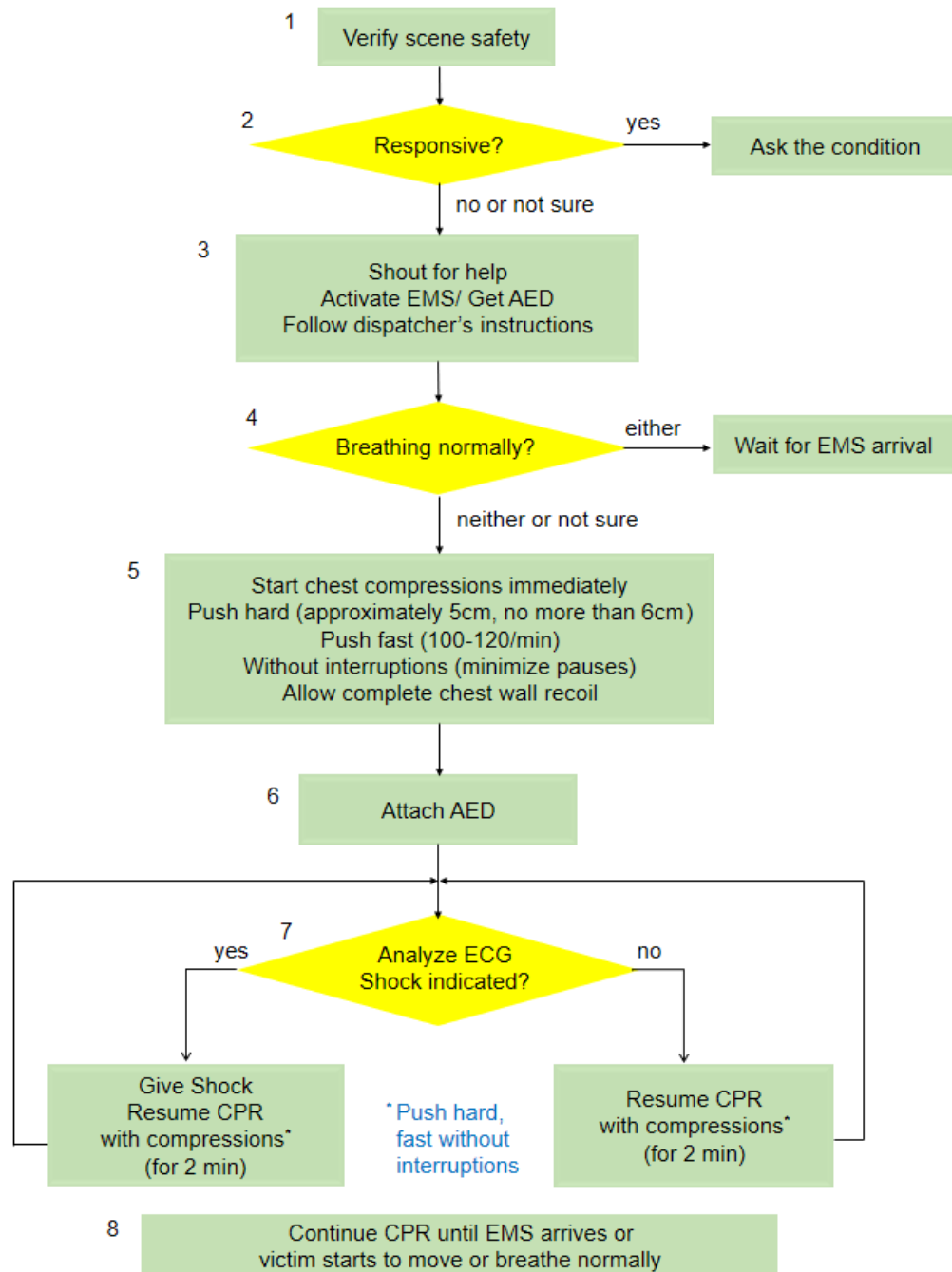
# RCA BLS algorithm for layperson

2015



2020

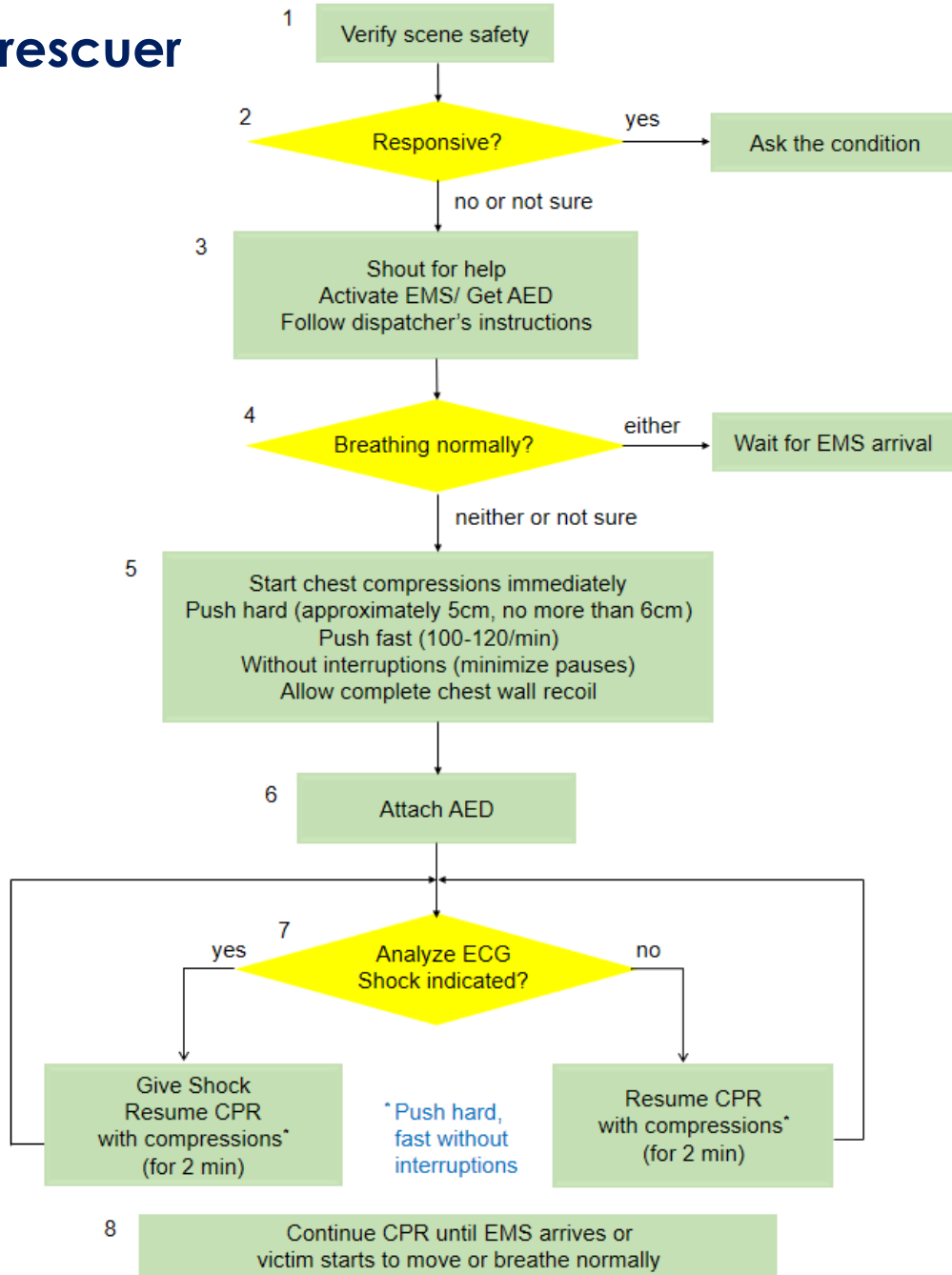




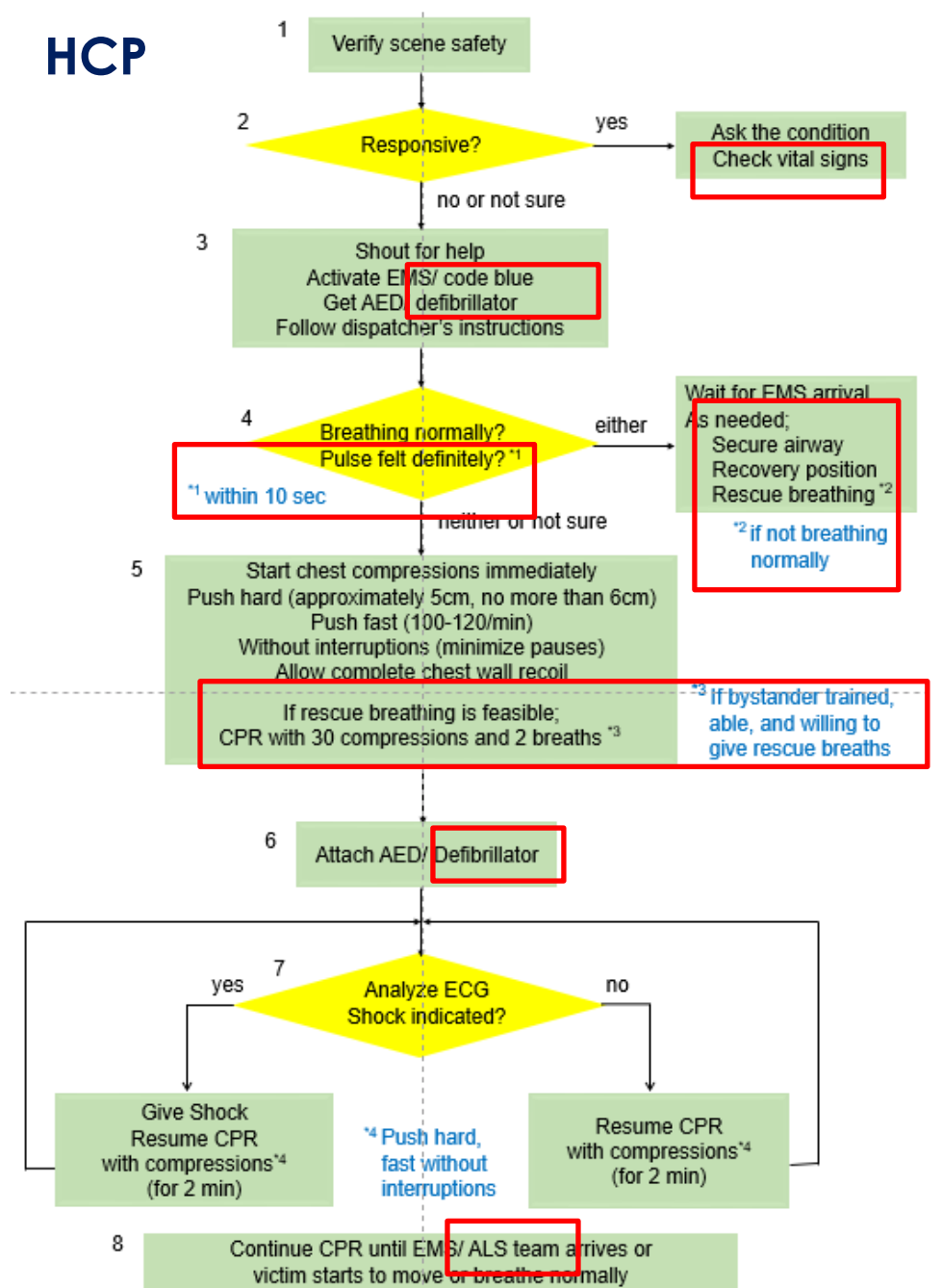
1. The safety of the scene needs to be assessed first before approaching the collapsed victim
2. Confirm responsiveness. If victim is unresponsive or in case of not sure
3. Shout for help and activate EMS, get AED and follow the dispatcher's instruction
4. If victim's breathing is not normal or not sure
5. Begin chest compression. The depth of compression should be approximately 5 cm, and the rate should be maintained at 100–120 /min. Minimize pauses during chest compression and allow full chest recoil to accomplish high-quality CPR.
6. When AED arrives, turn on the AED and attached the electrodes immediately.
7. Analyze ECG and follow the voice instruction from the AED. Push the shock button if shock indicated. Then resume chest compressions immediately and continue for 2 min.
8. If AED do not recommend shock, one should continue chest compression until EMS arrival or victim starts to move or breathe normally.



# Lay rescuer



# HCP



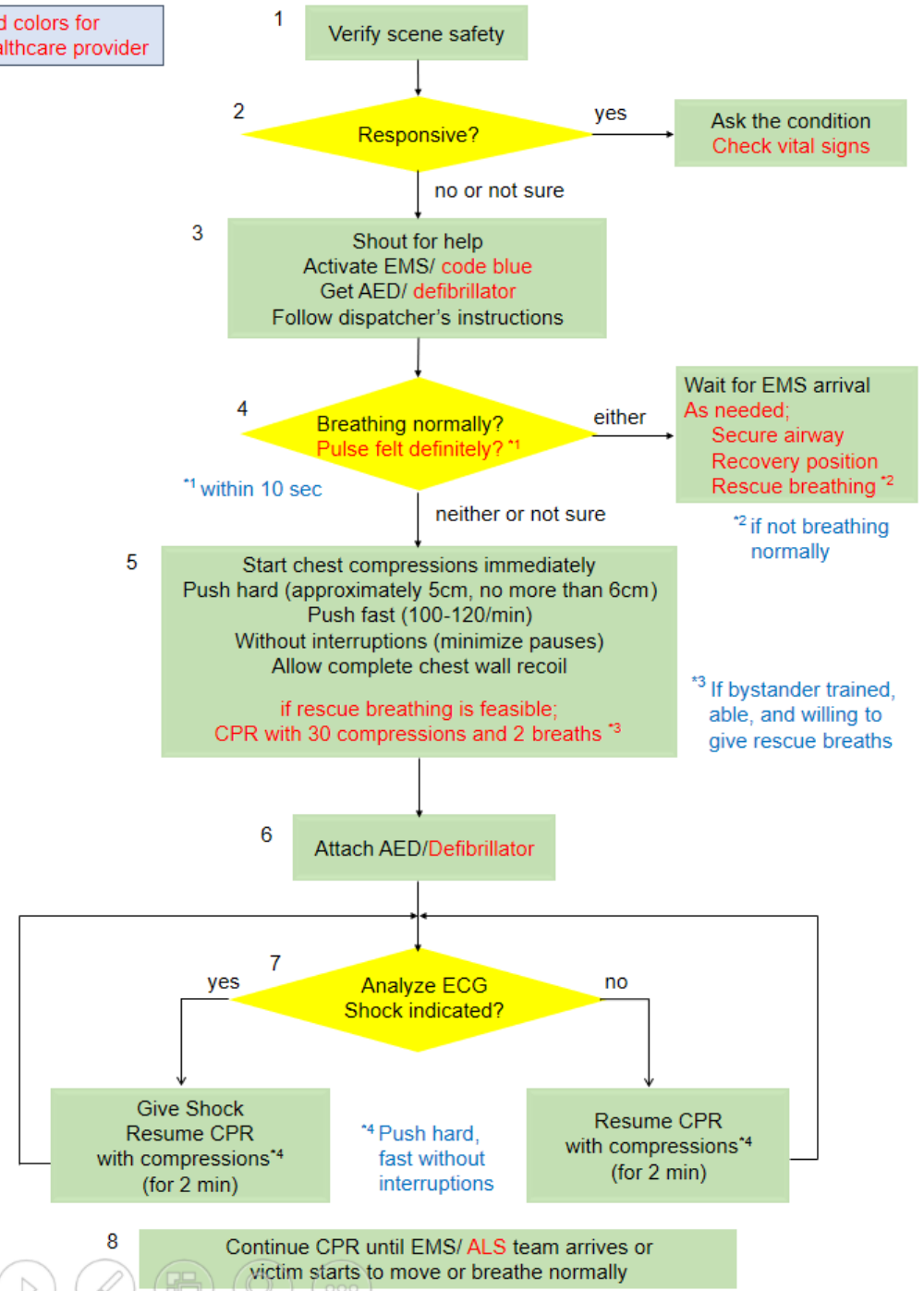
# Comparison of lay vs HCP algorithm

Box	Lay person	Healthcare provider
2	Ask the condition	+Check vital signs
3	Activate EMS/Get AED	Activate EMS/ <b>code blue</b> Get AED/ <b>defibrillator</b>
4	Breathing normally?	+Pulse felt definitely?
	Wait for EMA arrival	+As needed; secure airway, recovery position, rescue breathing
5	Chest compression only	+If rescue breathing is feasible, CPR with 30 compressions and 2 breaths
6	Attach AED	Attach AED/ <b>defibrillator</b>
8	Until EMS arrives	Until EMS/ <b>ALS team</b> arrives



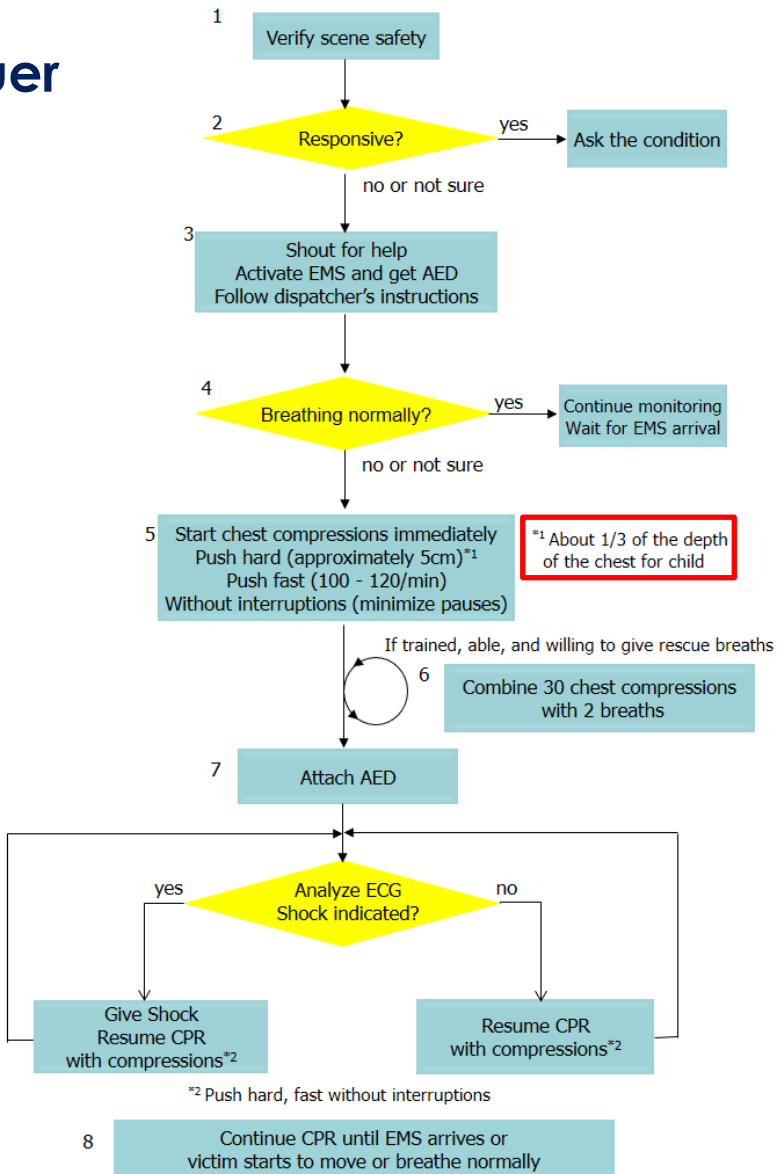
# 2020 RCA BLS draft algorithm: combined version (not accepted)

Red colors for  
healthcare provider

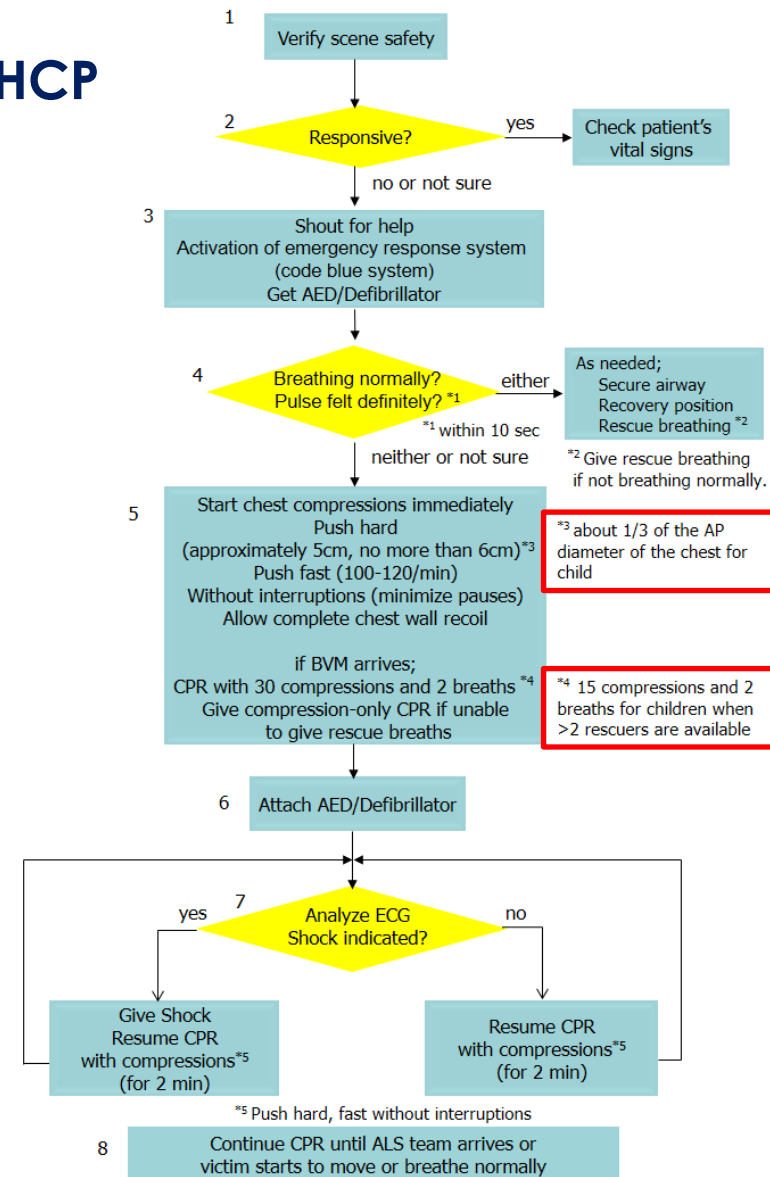


# 2020 Japanese BLS algorithm

## Lay rescuer

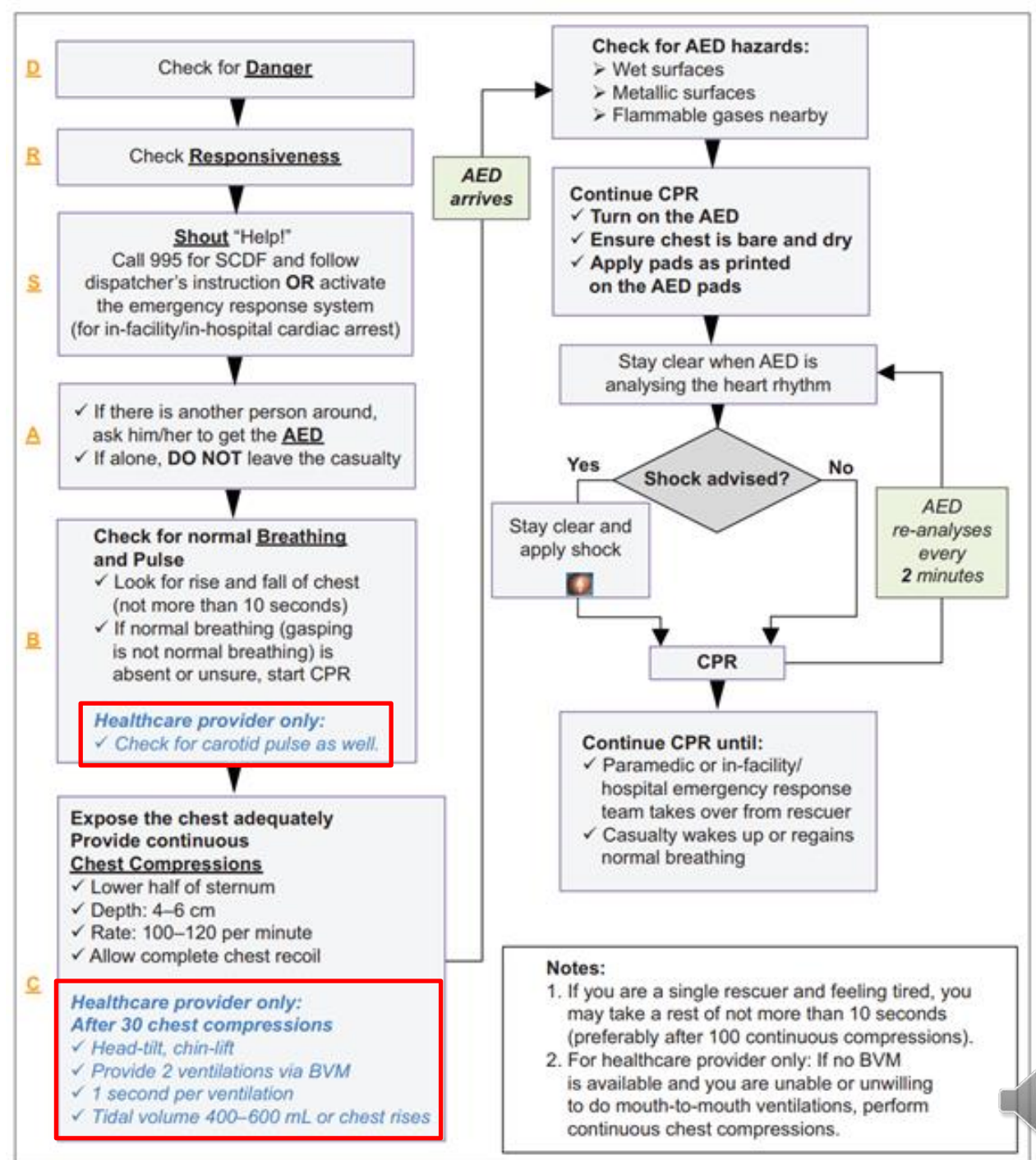


## HCP



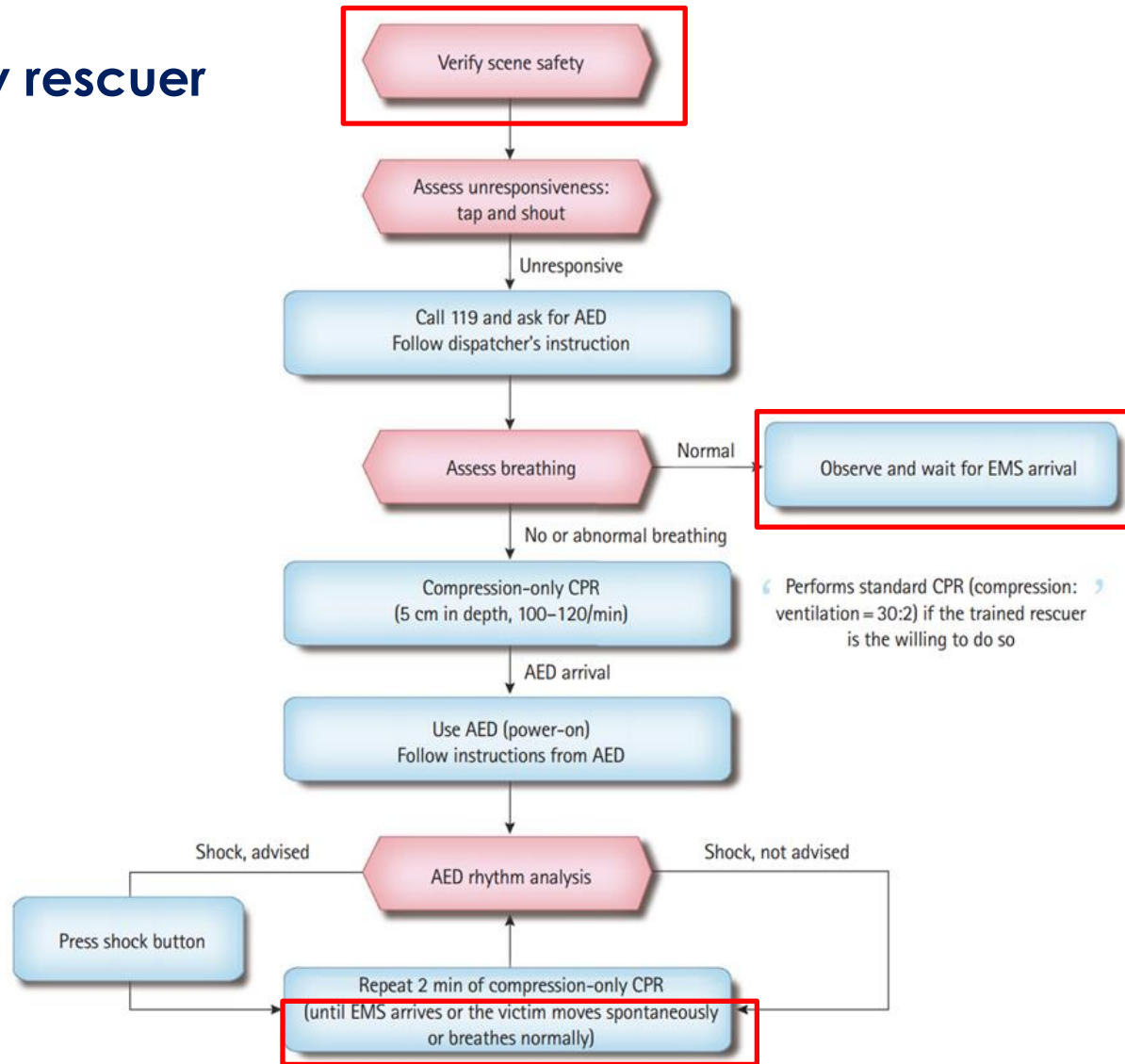
# 2020 Singapore

## Algorithm for one-rescuer CPR and use of AED

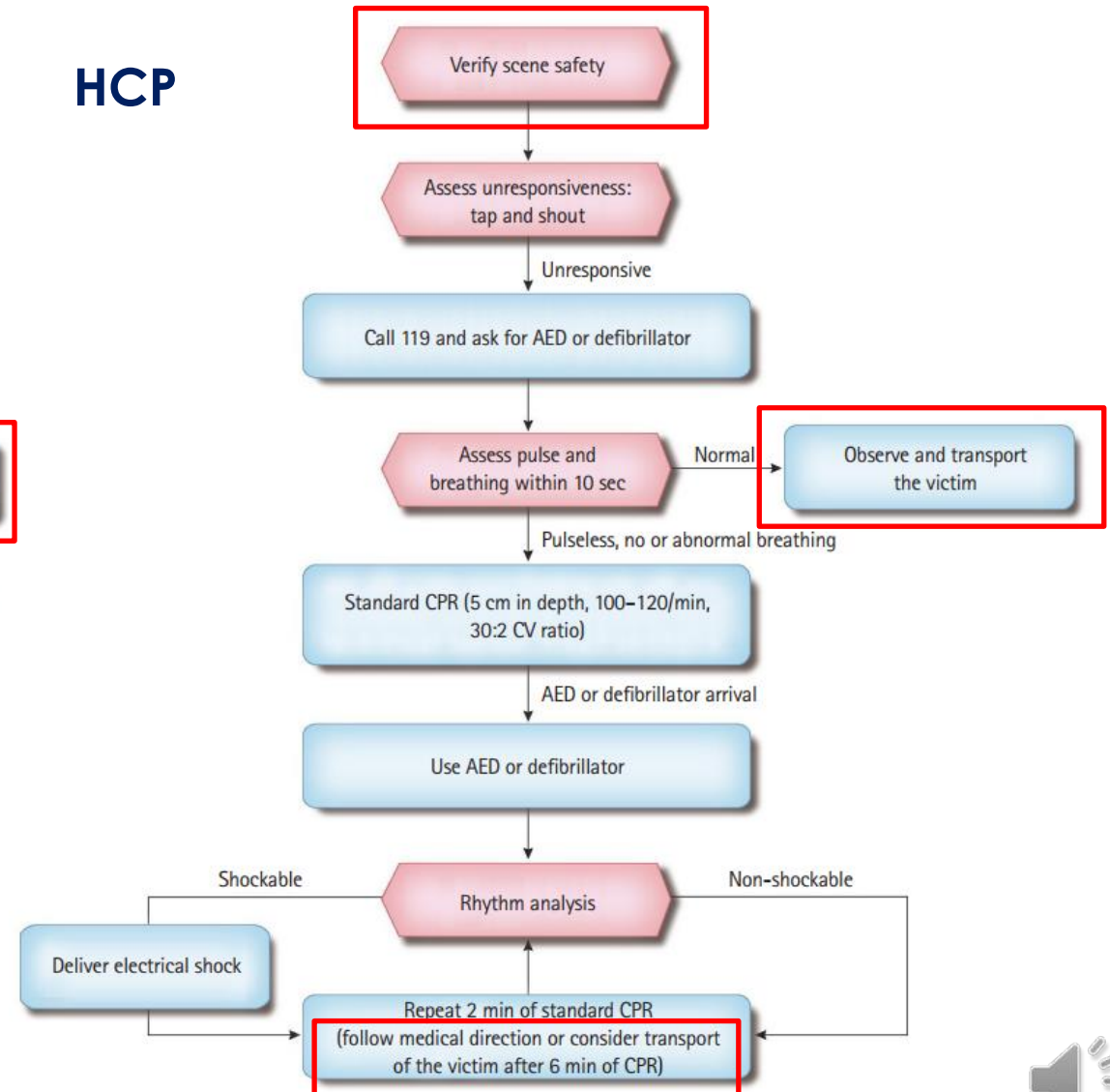


# 2020 Korean BLS algorithm

## Lay rescuer




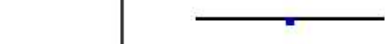


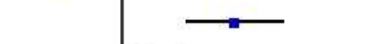

## HCP





# Bystander CPR rate during pandemic

## 1.1 Bystander CPR

Study or Subgroup	Favours[Control]		Control		Weight	Odds Ratio M-H, Random, 95% CI	Odds Ratio M-H, Random, 95% CI
	Events	Total	Events	Total			
<b>1.1.1 Asia-pacific</b>							
Ball	299	380	889	1218	4.9%	1.37 [1.04, 1.80]	
Cho <b>Korea</b>	87	171	50	158	3.6%	2.24 [1.43, 3.51]	
Lim <b>Singapore</b>	729	1400	772	1280	5.7%	0.71 [0.61, 0.83]	
Nishiyama <b>Japan</b>	272	825	356	862	5.4%	0.70 [0.57, 0.85]	
Yu <b>Taiwan</b>	409	622	301	570	5.2%	1.72 [1.36, 2.17]	
<b>Subtotal (95% CI)</b>		<b>3398</b>		<b>4088</b>	<b>24.8%</b>	<b>1.18 [0.77, 1.82]</b>	
Total events	1796		2368				
Heterogeneity: Tau <sup>2</sup> = 0.22; Chi <sup>2</sup> = 67.59, df = 4 (P < 0.00001); I <sup>2</sup> = 94%							
Test for overall effect: Z = 0.77 (P = 0.44)							



# Summary of RCA BLS guideline

## ■ **Compression depth**

- Maintain approximately 5 cm, which allows 4 or 4.5 cm
- Compression only CPR for lay people

## ■ **Recommend and emphasize**

- Dispatcher assisted CPR
- Public access defibrillation

## ■ **Local modification may be necessary**

- Epidemiology of cardiac arrest, EMS system, level of EMT
- Legal and cultural background of each country





**Thank you for your  
attention 😊**

