

Sudden Cardiac Arrest

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Disclosures

- No relevant financial disclosures

Do you know what to do ?



Objectives

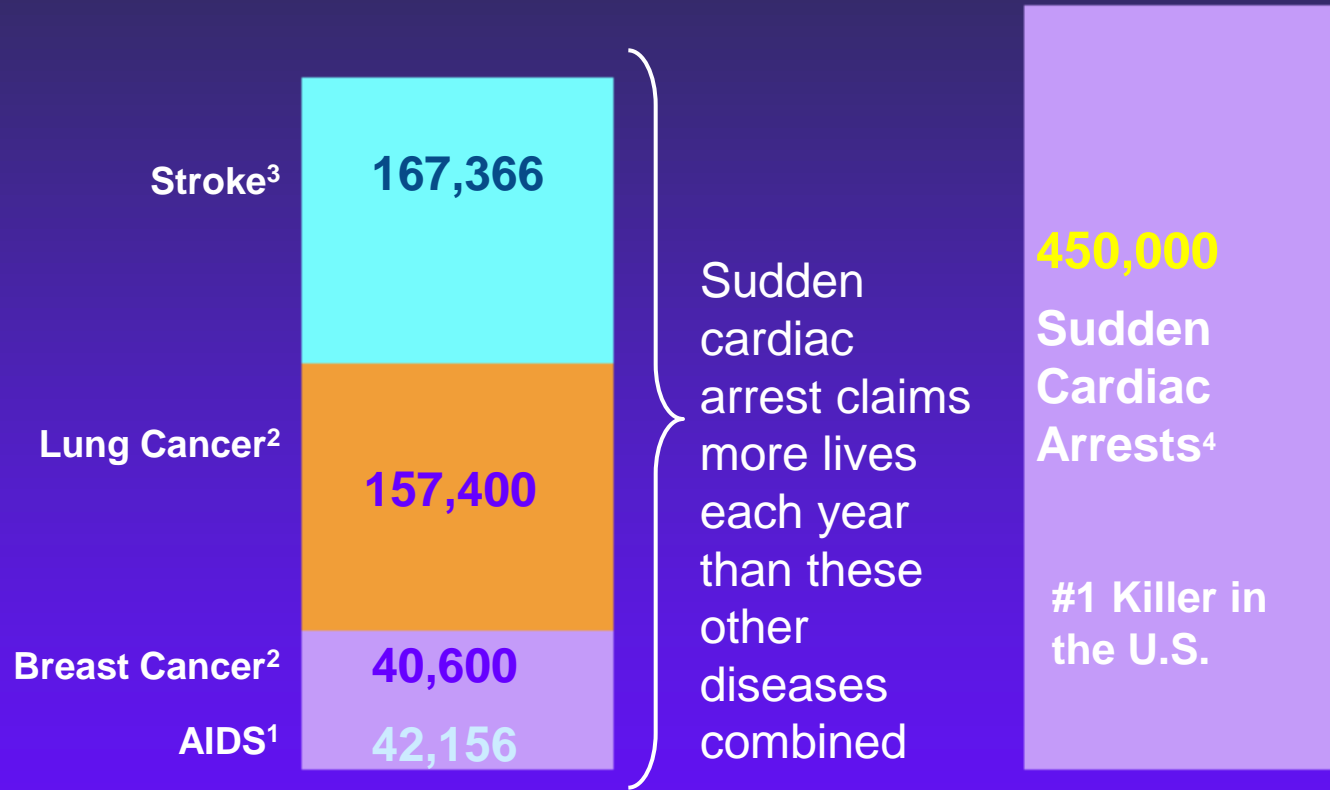
- Recognize common errors in ACLS /BLS
- Identify what is important and what is not during Codes
- Review updated ACLS guidelines
- Simplify the process

Foster Confidence



I ain't scurred.

Magnitude of Sudden Cardiac Arrest in the U.S.



¹ U.S. Census Bureau, *Statistical Abstract of the United States: 2001*.

² American Cancer Society, Inc., *Surveillance Research, Cancer Facts and Figures 2001*.

³ *2002 Heart and Stroke Statistical Update*, American Heart Association.

⁴ Zheng Z. *Circulation*. 2001;104:2158-2163.

Risk of Cardiac Arrest

- A 40 year old American Male has a 1 in 8 chance of having sudden cardiac death.
- Average age of adults with out of hospital cardiac arrest is in their mid – 60s

ORIGINAL ARTICLE

Long-Term Outcomes in Elderly Survivors of In-Hospital Cardiac Arrest

Paul S. Chan, M.D., Brahmajee K. Nallamothu, M.D., M.P.H.,

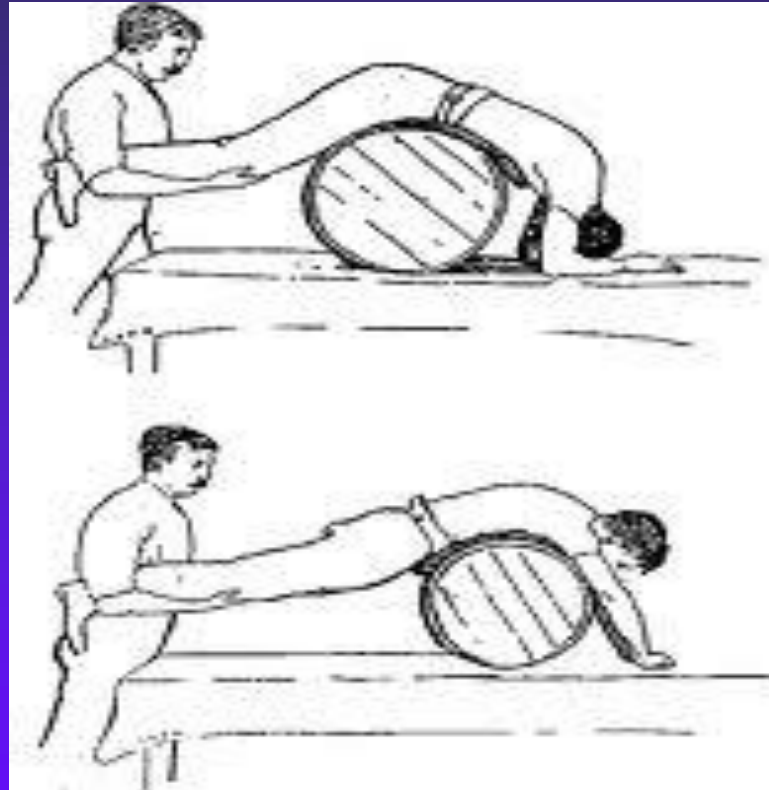
- 60 % elderly after suffering cardiac arrest alive at 1 year
- Mortality and Hospital Re admission not any higher than heart failure

2 Kings 4:34

- And he went up, and lay upon the child, and put his mouth upon his mouth, and his eyes upon his eyes, and his hands upon his hands; and he stretched himself upon the child; and the flesh of the child waxed warm."



Resuscitation :1700 - 1900



*The "barrel" method.
Top: Expiratory phase.
Left: Commencement
of inspiratory phase.
Reproduced from
the Lancet, 1909.*

“Blow smoke up in one’s ..”



A brave German doctor administers an enema of tobacco smoke to a corpse in this curious late eighteenth-century plate.

Case -1

- 37 Y Indian Business Executive
- Sudden Collapse at the Airport
- Janitor starts Hands only “CPR”
- AED & 911 . No ETI attempted
- ER – Therapeutic Hypothermia
- RCA STEMI – Cath Lab
- Extubated – 3rd day
- Asks for internet and Masala Chai

Safest place to have cardiac arrest?



Response time to arrest in a Casino ?

TABLE 1. CHARACTERISTICS OF SUBJECTS WITH CARDIAC ARREST IN CASINOS.*

CHARACTERISTIC	ALL CARDIAC ARRESTS (N= 148)	WITNESSED ARRESTS WITH AN INITIAL RHYTHM OF VENTRICULAR FIBRILLATION (N= 90)
Age — yr	64±12	65±11
Male sex — %	80	84
CPR administered before arrival of defibrillator — no. (%)	63 (43)	49 (54)
Interval from collapse to CPR — min	— †	2.9±2.8
Initial rhythm of ventricular fibrillation — no. (%)	105 (71)	90 (100)
Interval from collapse to attachment of defibrillator — min	— †	3.5±2.9
Interval from collapse to first defibrillation — min	— †	4.4±2.9
Interval from collapse to arrival of paramedics — min	— †	9.8±4.3
Survival to discharge from hospital — no. (%)	56 (38)	53 (59)



In hospital arrest — SHD : 6-25%

Valenzuela TD et al. N Engl J Med 2000;343:1206-1209.



Compare a casino to a hospital?

Resuscitation 80 (2009) 65–68



Contents lists available at ScienceDirect

Resuscitation

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



Clinical paper

Cardiac arrests of hospital staff and visitors: Experience from the national registry of cardiopulmonary resuscitation[☆]

Bruce D. Adams^{a,*}, Robert J. Jones^b, Roxana E. Delgado^a, Gregory Luke Larkin^c,
The American Heart Association National Registry of Cardiopulmonary Resuscitation Investigators¹

^a Department of Clinical Investigation, William Beaumont Army Medical Center, 5005 North Piedras Street, El Paso, TX 79920-5001, United States

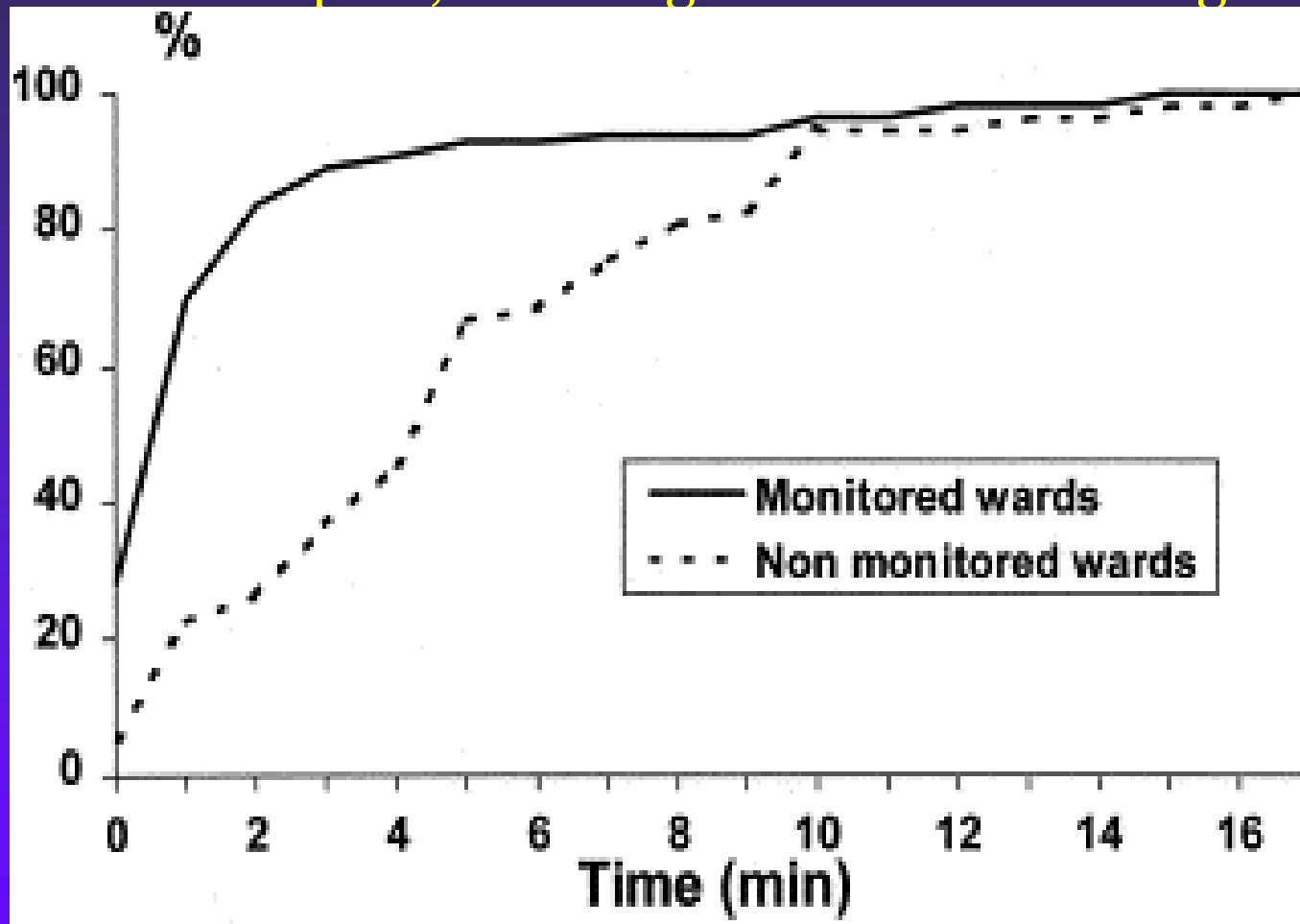
^b Department of Emergency Medicine, Brooke Army Medical Center, San Antonio, TX, United States

^c Emergency Medicine Section, Surgery Department, Yale School of Medicine, New Haven, CT, United States

Hospital Visitors

- Survival to Hospital Discharge:
 - Hospital Visitors- 23 %
 - 59 % in Vegas and up to 75 % at Major US Airports !

In the hospital, how long does it take to recognize cardiac arrest?

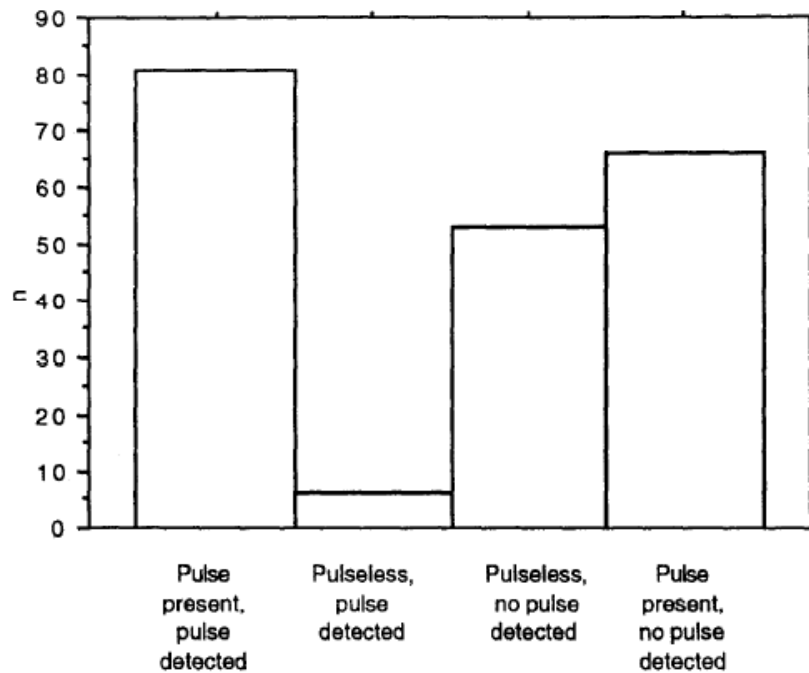


Herlitz et al. *Resuscitation* 2001.

Yep, I feel the pulsereally ?

110

B. Eberle et al. / Resuscitation 33 (1996) 107-116



Sensitivity **90%**
Specificity **55%**
Accuracy **65%**

Median time needed to identify presence or absence of pulse:
24 seconds overall, 32 seconds for pulse absent patients

Chest Compressions

Push
Hard

Pump
Fast

Good
Recoil

Start
Now

Chest Compressions



CPR when done
perfectly provides
only...

- 1/3 normal cardiac output
- 10-15% normal cerebral blood flow
- 1-5% normal cardiac blood flow

Sanders et al.
Resuscitation 1985.

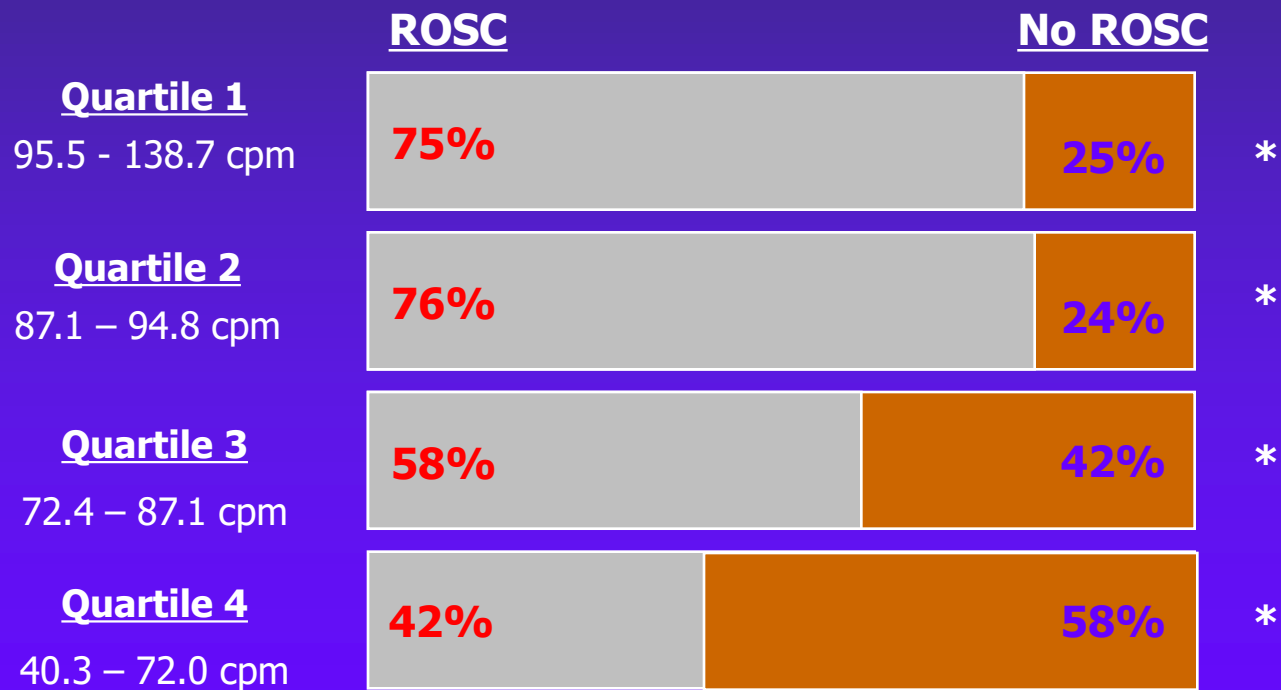
Quality of Chest Compressions : Push hard

- A compression depth of *at least* 2 inches (5 cm)
- Would need 120 lbs
- When to ask for help ?



Quality of Chest Compressions : Pump – Fast

- Compressions too slow 71.9% of the time



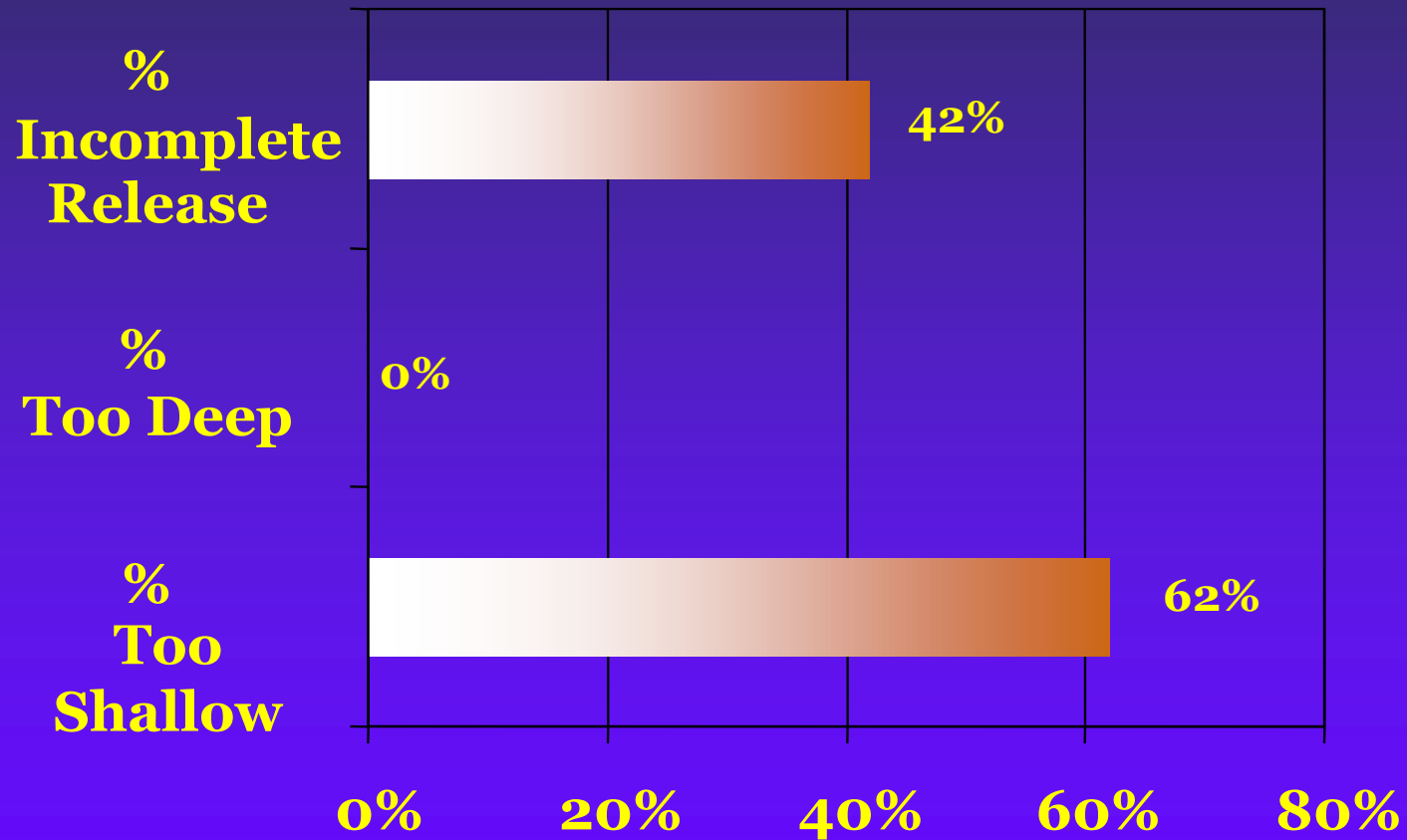
* p < 0 .0083

Incomplete Recoil

- Coronary Perfusion
- Venous return
- Decreases MAP



Quality: Chest Compressions:



Rhythm

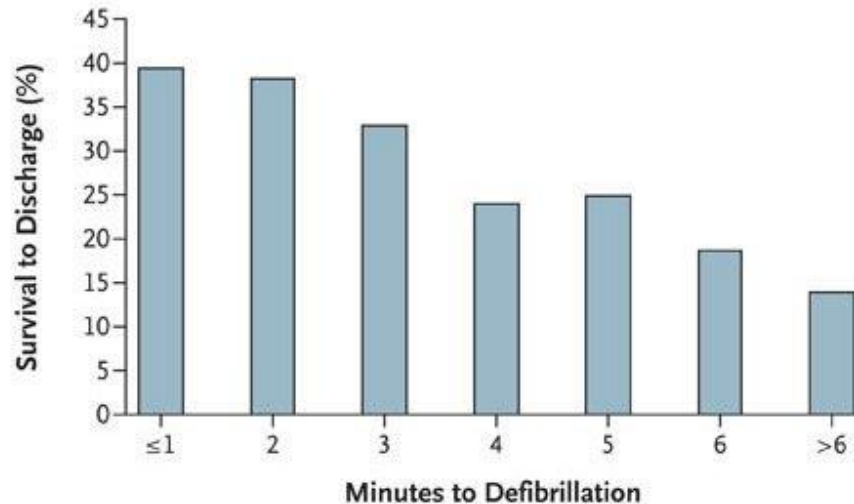
Shockable

- V fib
- V tach
- Hmm...I think this is ...hmm....

Not – Shockable

- PEA
- Asystole

How sooner should you shock ?



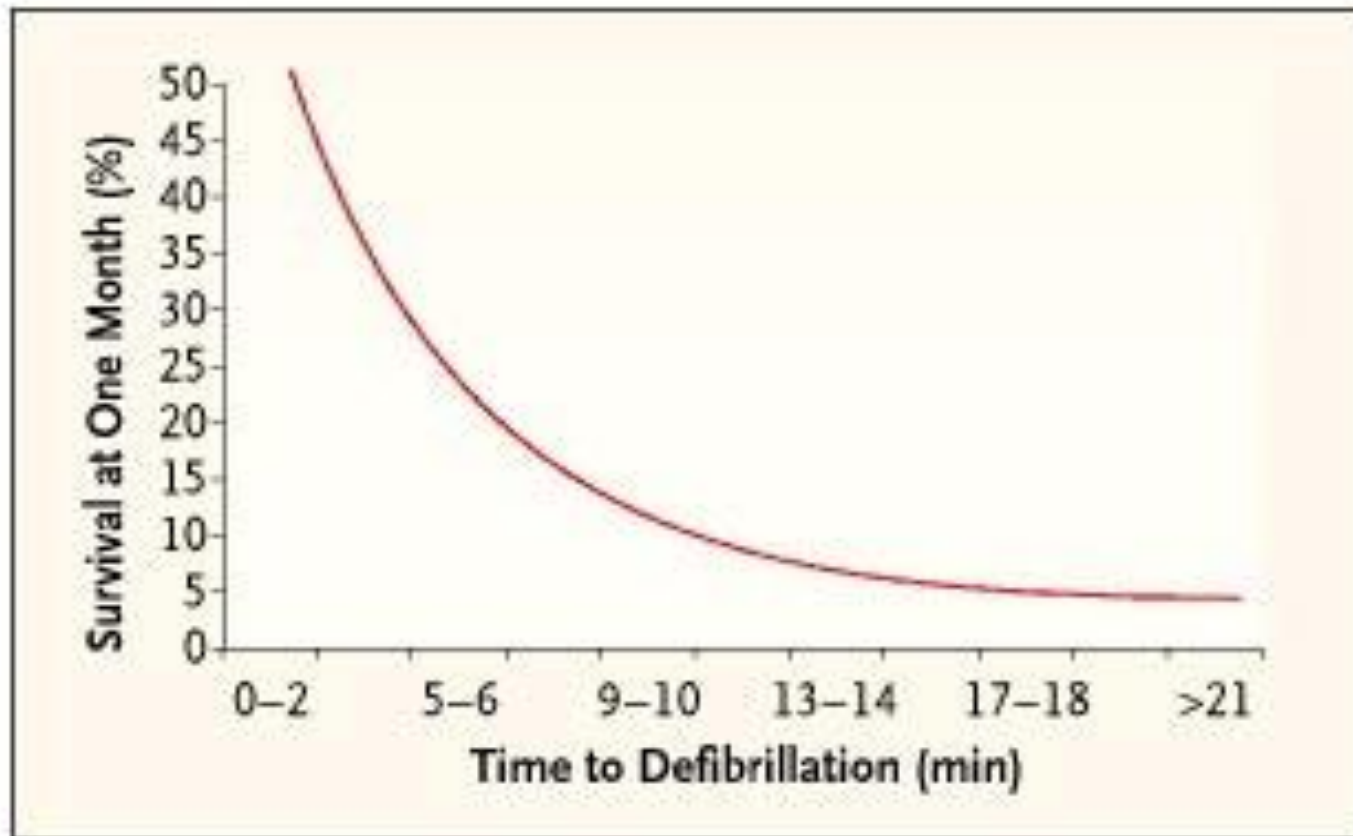
Minutes to Defibrillation	No. of Patients	Survived to Discharge	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)	P Value
≤1	3994	1577	Reference	Reference	—
2	750	286	0.94 (0.81–1.10)	1.02 (0.85–1.21)	0.85
3	472	160	0.78 (0.64–0.96)	0.84 (0.67–1.05)	0.12
4	291	67	0.46 (0.35–0.61)	0.50 (0.37–0.67)	<0.001
5	394	98	0.51 (0.40–0.64)	0.54 (0.42–0.70)	<0.001
6	145	27	0.35 (0.23–0.54)	0.39 (0.25–0.61)	<0.001
>6	743	103	0.25 (0.20–0.31)	0.27 (0.21–0.34)	<0.001

Chan PS et al. N Engl J Med 2008;358:9



The NEW ENGLAND
JOURNAL of MEDICINE

Rate of Survival after SCD: Time to Defibrillation Increases.



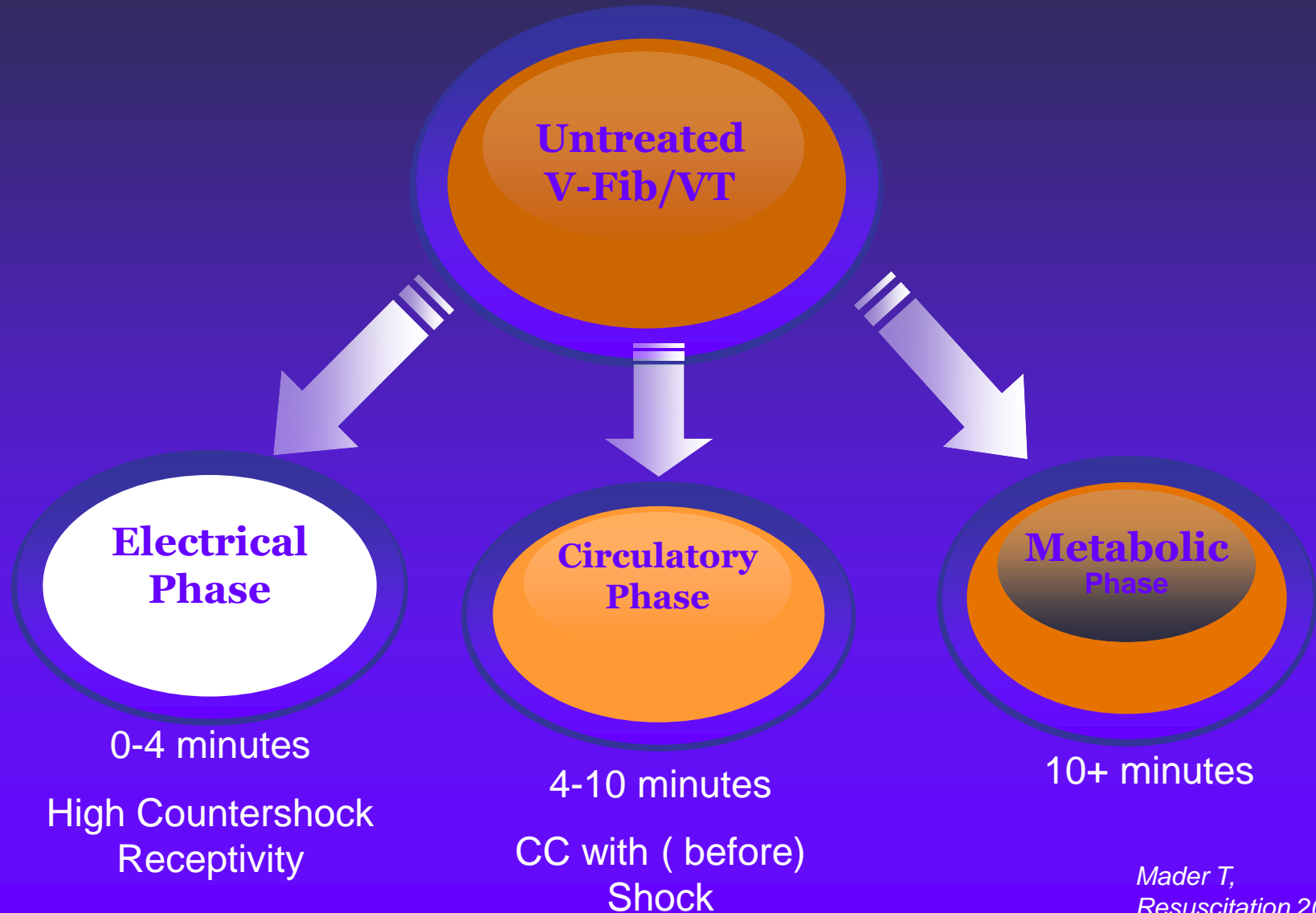


OUTCOMES OF RAPID DEFIBRILLATION BY SECURITY OFFICERS
AFTER CARDIAC ARREST IN CASINOS

TERENCE D. VALENZUELA, M.D., M.P.H., DENISE J. ROE, DR.P.H., GRAHAM NICHOL, M.D., M.P.H., LANI L. CLARK, B.S.,
DANIEL W. SPAITE, M.D., AND RICHARD G. HARDMAN, B.S.

- Survival rate **74 %** in patients who received first shock with in 3 minutes

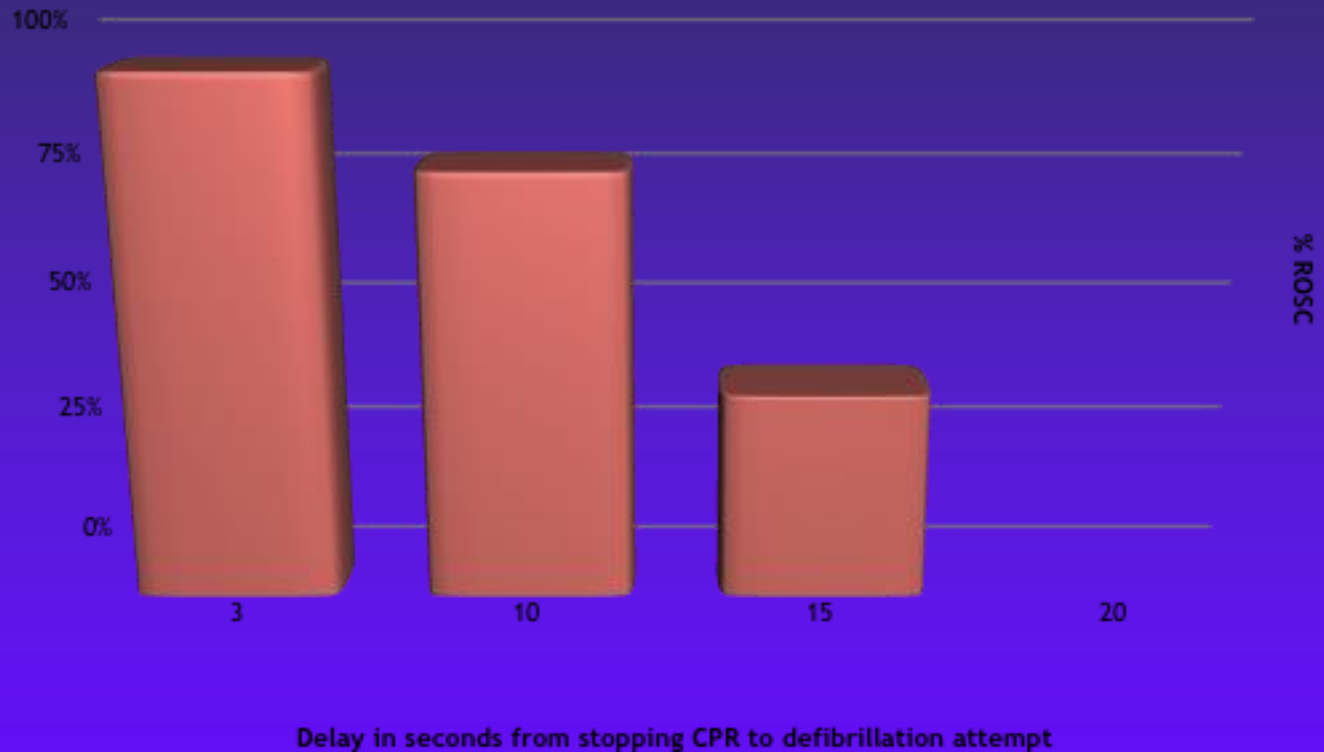
Cardiac Arrest Physiology



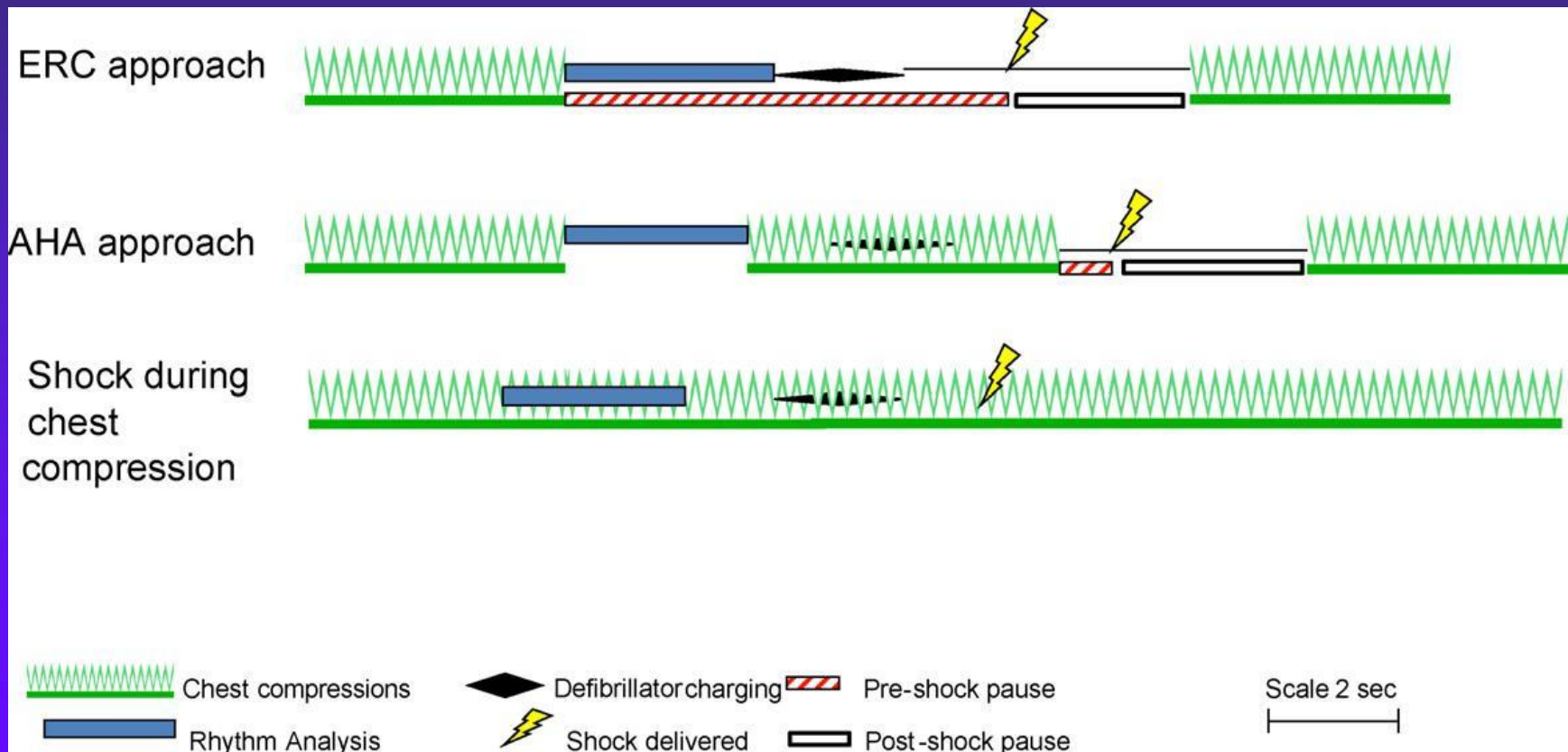
Prevalence of VF on arrival of EMS

- Not Witnessed 16 %
- Witnessed but no bystander CPR 36 %
- Witnessed and bystander CPR 52%

Chest Compressions: The Hands Off Interval



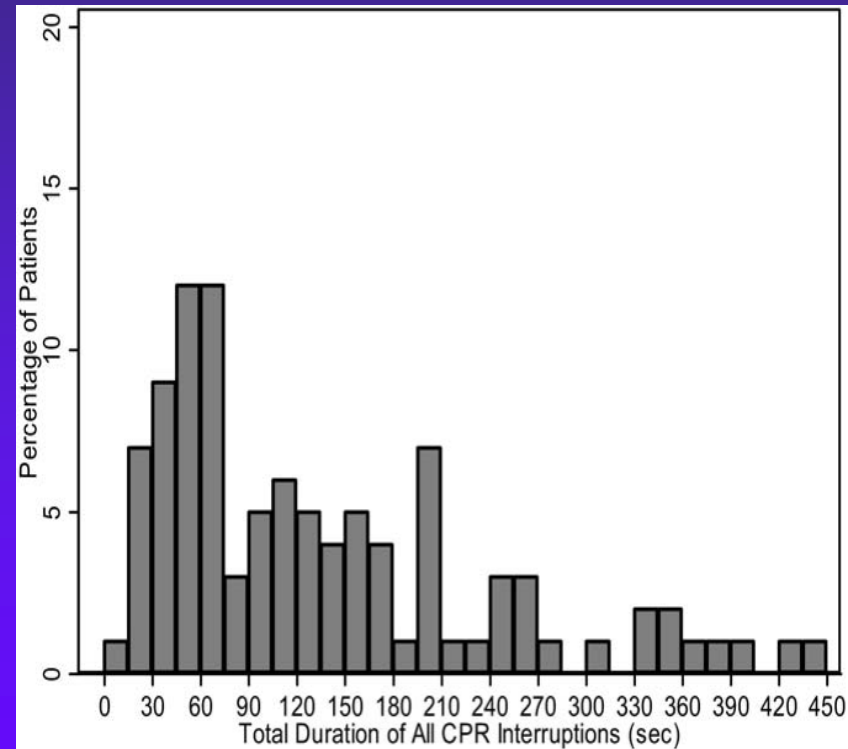
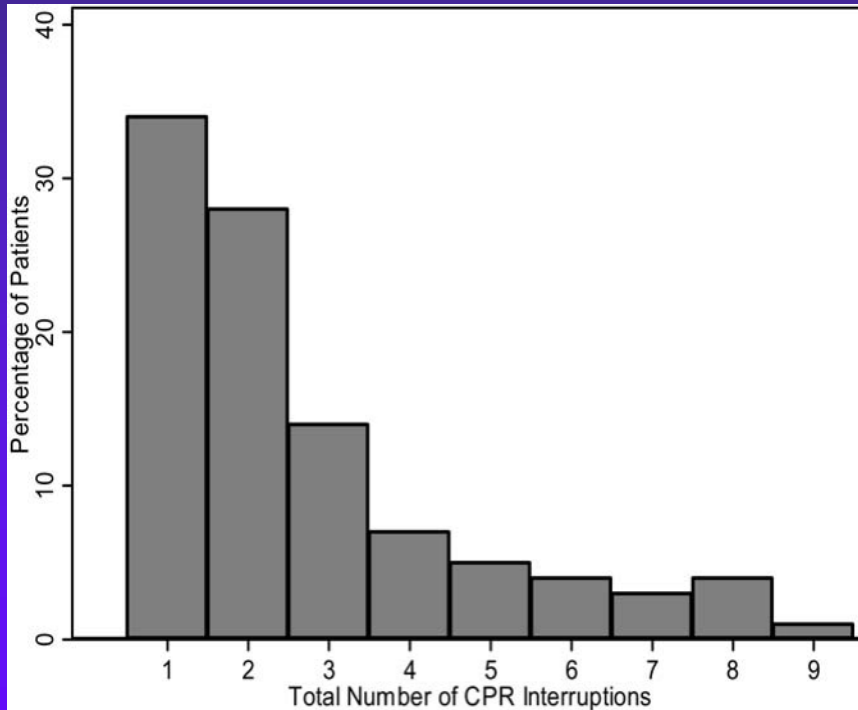
Decreasing the hands off interval



Airway / Breathing



Avoid early intubation



Prehospital ET intubation & Survival

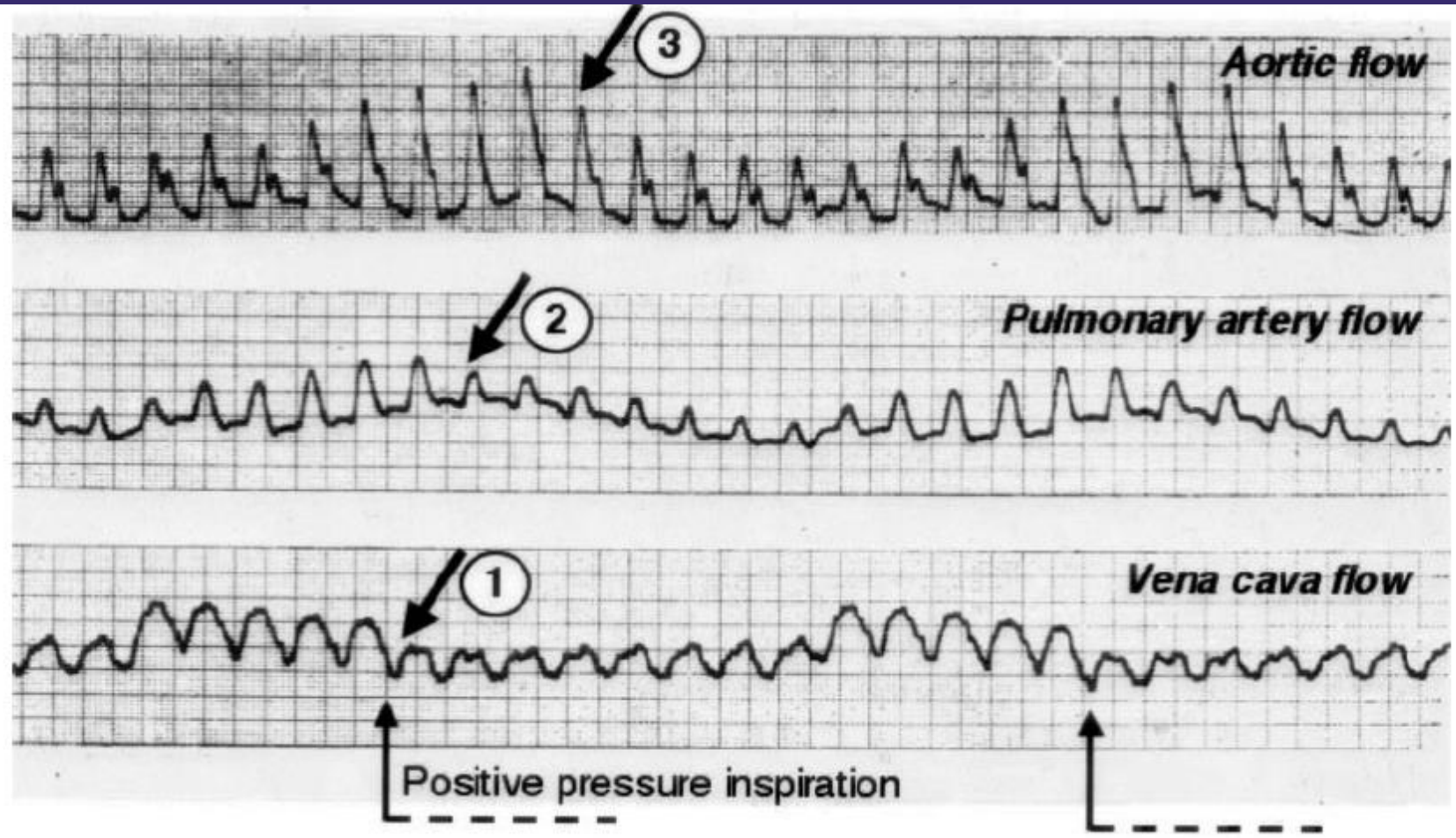
- No ETI attempted 2.3 (CI 1.6-3.3) times more likely to have ROSC
- No ETI 5.2 times more likely to make full neurological recovery and d/c home.

If/ When intubated :

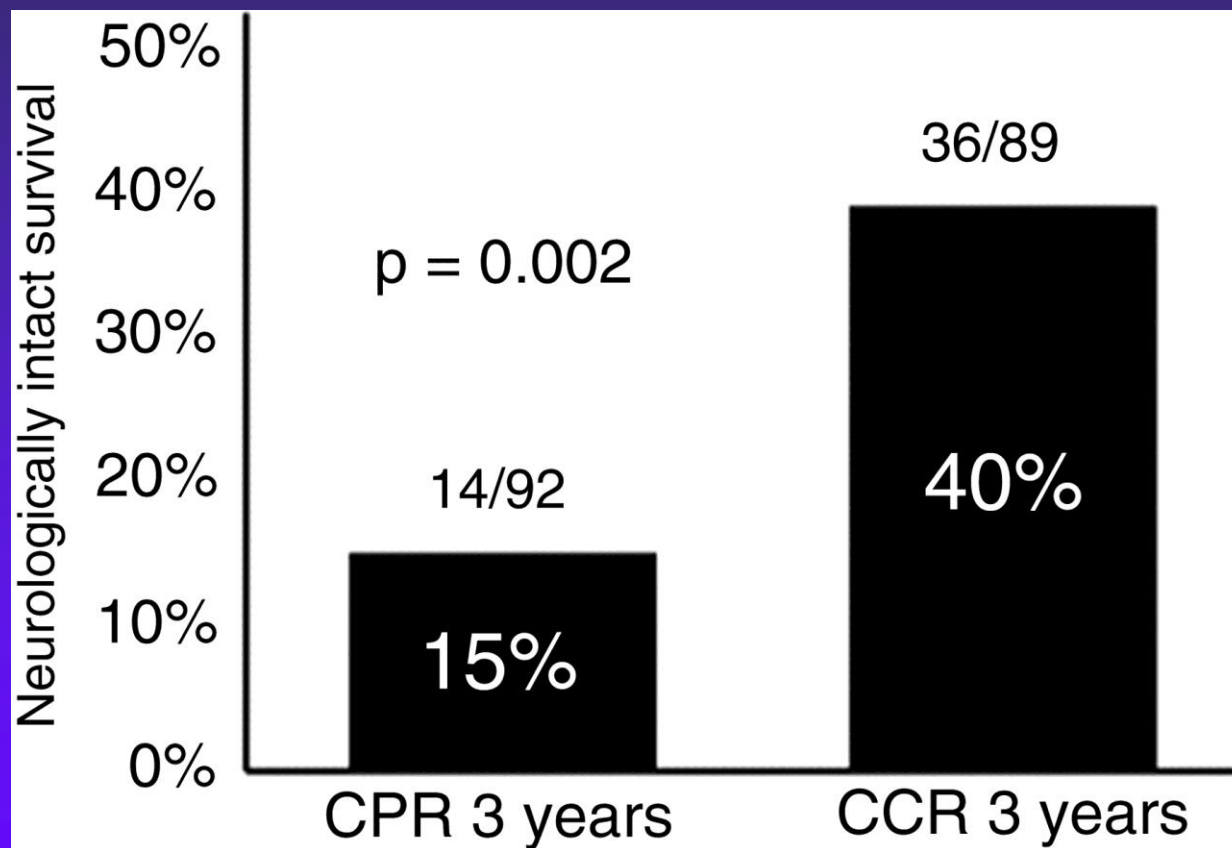
- **Rate : Shouldn't exceed 8 /min**
- **TV not more than 750 cc/hr**



Dangers of overzealous ventilation



Neurologically Normal Survival of Patients With Witnessed Out-of-Hospital Cardiac Arrest



Ewy, G. A. et al. J Am Coll Cardiol 2009;53:149-157

What about rescue breathing ?

But if 2 rescuers are available shouldn't 1 of them do mouth -to-mouth "rescue breathing"?

Rescue breathing

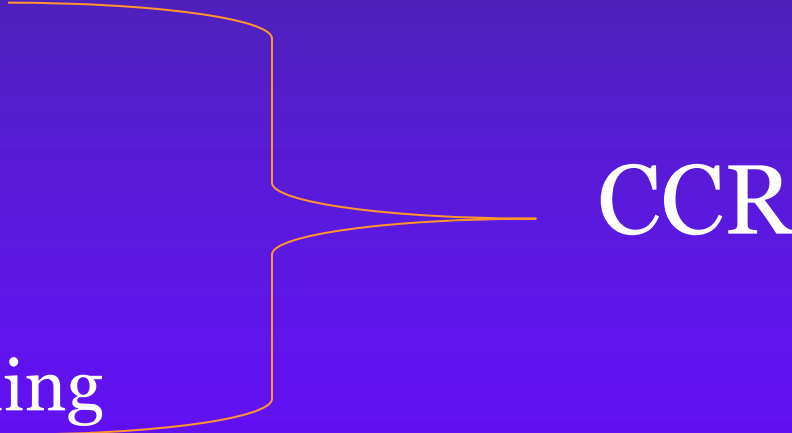
NO !

- Negative intra –chest pressure allow blood return when standing
- During resuscitation – positive pressure ventilations – increases the pressure in the chest – decreases blood return to the chest and thus the heart

Gasping is a sign of cardiac arrest

- EMT dispatch recording of 445 cardiac arrest
- Witnessed arrest – 55% gasping ($P < 0.001$)
- Prognosis of Gasping –
 - Gasping – 27 %
 - Not Gasping – 9 %
- Bottom line
Gasping = perfusion of brain stem

Gasping is good

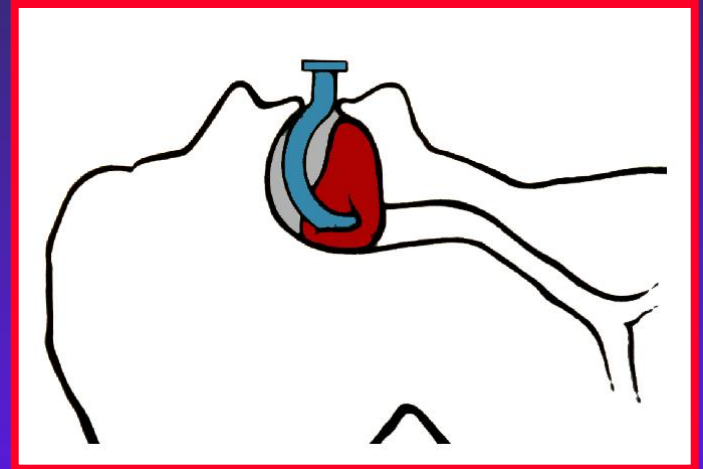
- Gasping = perfusion of brain stem
 - Gasping is common and often delays recognition of cardiac arrest
 - synonyms of Agonal Breathing :
 - Gasping
 - Snoring
 - Gurgling
 - Moaning
 - Heavy Breathing
- CCR
- 

How do you know if a person has primary arrest

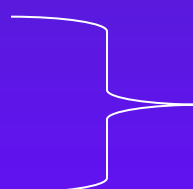
- Unexpected , witnessed (seen or heard) collapse in a person who is not responsive
- ~~Pulse~~
- ~~Breathing~~

What about O₂ ?

- Oro-Phynx device
- Passive o₂ insuffilation
- Non rebreather
- In first 10 minutes avoid interruption to CC



ACLS : Drugs

- Antiarrhythmics :
 - Increase Qtc
 - Increase risk of Cardiac arrest
 - May be beneficial :
 - Amiodarone – on admission
 - Beta Blockers
 - ACE I
- Peri- resuscitation
- 

ACLS Medications

- Vasopressin :
 - Survival in Pediatrics only
 - Stick to Epi – No high dose.
- Calcium : may increase death
- Bicarb : High risk of death
- Atropine : High risk of death
- Magnesium : No change in survival in any subgroup
(give in Torsades)

Summary



What to remember :

- Elderly patients have >60 % survival from SCD
- CCR
- CC –Now, Fast , hard, good recoil
- CAB
- Shock when indicated (or when in doubt)
- 2 mins of compressions before & after each shock
- Cooling is cool

What to forget :

- Pulse check
- “CPR”
- Early intubation
- $RR > 10$
- $TV > 750$
- Worrying too much about meds

Questions?

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