

## The Chain of Survival in Out-of-Hospital Cardiac Arrest

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### What can we attribute the variation in survival to?

Links in the "Chain of Survival"



Disparate outcomes are almost certainly due to timeliness and quality of treatment

### Dispatch Chain of Survival



### Identification of Patients in Cardiac Arrest



### Why don't more people do CPR?

- Too complicated
- Too costly
- Too time-consuming
- Too embarrassing
- Too scary
- Too icky
- Too easily forgotten

### We aren't training the right people

- The average victim of OHCA is:
  - Older: 64 (mean)
  - 60% are men
  - 66% of events occur at home
  - Victims often less educated / non professionals
- But most CPR courses are given to young, well-educated adults

## CPR Truths

1. Any CPR better than no CPR.
2. Doing CPR well is considerably better than doing it poorly.

## If it works, why don't people do it more often?

- Despite widespread knowledge of benefit, rates of bystander CPR are abysmally low in most communities

## Should lay rescuers even attempt rescue breathing?

*"Why is it that every time I press on his chest he opens his eyes, and every time I stop to breathe for him he goes back to sleep?"*

Woman caller providing dispatcher-assisted CPR, circa 1999

## Building Blocks of CPR.



Travers A H et al. Circulation 2010;122:S676-S684

Arizona Heart Foundation  
Save a Life

## Chest Compression Only CPR

*Save your Breath...  
Save a Life*

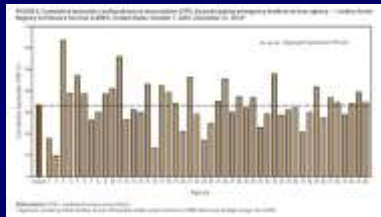


## Cardiocerebral resuscitation (CCR)

- Also known as "hands-only" CPR
- Continuous-compression CPR without mouth-to-mouth breathing in adults
- Time required to deliver breaths detracts from compressions, which perfuse the coronaries
- Animal models and some human data show improved rates of survival vs. traditional CPR

Ewy G. Circulation. 2005;111:2134-2142.

### National Bystander CPR Data



Cardiac Arrest Registry to Enhance Survival (CARES) 2005-2010

### Who First Initiated CPR

Who First Initiated CPR	N	%
Lay Person	3,275	10.4
Lay Person Family Member	3,361	10.6
Lay Person Medical Provider	3,698	12.3
First Responder	11,279	35.7
Responding EMS Personnel	9,612	31.0
	31,625	

Cardiac Arrest Registry to Enhance Survival (CARES) 2005-2010

### Does CPR make a difference?

- Delaying CPR for >10 min renders defibrillation ineffective (Valenzuela 1997)
- Bystander CPR triples the odds of survival and halves the risk of brain death (Herlitz 1994)
- Early CPR improved survival in 16 of 17 studies (odds ratios ranged from 1.9-11.5) (Cummins 1990)

### Early CPR



Three Phase Model of CA  
 Gilmore, et al AJC 2006  
 Beneficial Association of CPR Increased as the Collapse to Shock Interval Increased

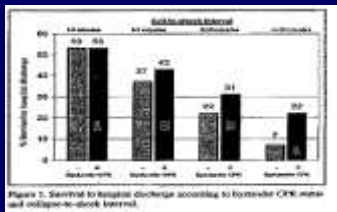
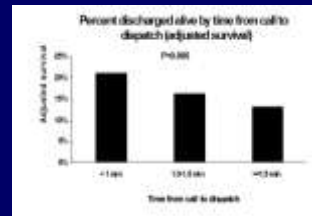


Figure 3. Survival to hospital discharge according to bystander CPR status and collapse-to-shock interval.

Odds Ratio (0.96) (1.25) (1.62) (2.11)



**“At a cardiac arrest, the first procedure is to take your own pulse.”**

Rule 3 – *House of God*, by Samuel Shem

Most of us pump too slow and blow too fast.

## AHA Guidelines for CPR 2005

### Emphasized 3 Important Points

- 1) High quality CPR is an important determinant of survival
- 2) More victims of OHCA should receive bystander CPR
- 3) CPR must be performed effectively by bystanders and healthcare providers

## AHA Scientific Statement on Bystander CPR 2008

“CPR is an inexpensive and readily available technique that can save lives. Therefore, the number of people trained in CPR must increase, and the quality of CPR provided by every rescuer must improve.”

Dr Ben Abella

## Dispatcher-Assisted CPR

- First implemented in King County, WA
- Subsequently replicated in Memphis TN
- Programs now widespread

## DISPATCH

Quick and efficient call handling

Rapid Dispatch BLS

Immediate recognition of cardiac arrest

Dispatch of ALS

Recognize presence of Public Access AED

Quick and efficient delivery of CPR

## Time is Critical

Survival decreases by **10%** for every **minute** treatment is delayed



## AHA DA-CPR Position Paper Four Recommendations for EMD

- Dispatchers should assess whether someone has had a cardiac arrest and if so, tell callers how to administer CPR immediately.
- Dispatchers should confidently give Hands-Only CPR instructions for adults who have had a cardiac arrest *not* caused by asphyxia (as in drowning).
- Communities should measure performance of dispatchers and local EMS agencies, including how long it takes until CPR is begun.**
- Performance measurements should be part of a quality assurance program involving the entire emergency response system including EMS and hospitals.**

## Metrics for Evaluation

**Table. Metrics for Evaluation of Dispatch and CPR Prearrival Instructions**

Categorical Measure	Time Component
Dispatch of appropriate EMS resources	Interval from receipt of call to EMS dispatch
Adherence to the identification algorithm	Interval from receipt of call to completion of algorithm
Recognition of arrest/provision of CPR prearrival instructions	Interval from receipt of call to provision of CPR instructions
Performance of bystander CPR	Interval from receipt of call to performance of CPR
Primary obstacle to CPR	---

CPR indicates cardiopulmonary resuscitation; EMS, emergency medical service.



## Public Access Defibrillation

**TABLE 3. Number\* and percentage of persons who experienced and those who survived an out-of-hospital cardiac arrest†, by clinical characteristics — Cardiac Arrest Registry to Enhance Survival (CARES) United States, October 1, 2005–December 31, 2010**

Characteristic	Experienced		Survived	
	No.	(%)	No.	(%)
Who first applied AED/monitor				
Bystander	1,188	(3.7)	274	(23.2)
911 responder	32,417	(86.3)	2,356	(7.3)
Total	33,605	(100.0)	2,630	(7.8)

Cardiac Arrest Registry to Enhance Survival (CARES) 2005-2010

**TABLE 5. Number and percentage of persons who experience and those who survive bystander-initiated out-of-hospital cardiac arrest and are found in a shockable rhythm: clinical characteristics — United States, 2005-2010**

Characteristic	Experienced		%
	No.	(%)	
Who first initiated CPR			
Bystander	1,816	(81.0)	8
911 Responder	2,564	(91.0)	5
Total	4,380	(90)	1.3
Who first applied AED/monitor			
Bystander	816	(8.9)	1.8
911 Responder	3,867	(91.1)	1.3
Total	4,683	(90)	1.3



For Witnessed VF/VT Cases\*

Survival rates by Response time & Bystander CPR status:

Response Time	< 4 minutes	4-8 minutes	> 8 minutes
B CPR YES	44%	33%	31%
B CPR NO	36%	26%	20%

\* Excluding arrests after arrival of EMS/First Responders)



## Acknowledgements

Arizona SHARE (Save Hearts in Arizona Registry and Education)

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