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Director  
Arizona Department of Health Services

**Public Health  
&  
Pre-hospital Care**



*Health and Wellness for all Arizonans*

azdhs.gov



# ADHS Focus

- Our mission is to work with the pre-hospital community to improve patient outcomes.
- Public health is in a unique position to mobilize Stakeholders and measure patient outcomes.

# ADHS Strategy

- Assist EMS agencies to implement focused, evidence-based interventions and on-going active measurement of incidence and outcomes.
- Evidence-based Focused Leverage Points:
  - Out-of-hospital cardiac arrest
  - Traumatic Brain Injury
  - ST-Elevation Myocardial Infarction (STEMI-Heart Attack)
  - Acute Stroke

# Interventions:

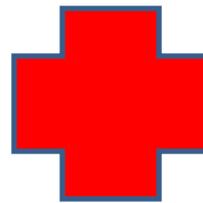
- Active measurement of pre-hospital data & link with hospital outcome data (You get what you *inspect*, not what you *expect*).
- Active Measurement *is* an intervention in itself
- Training
- Programmatic support
- Grant acquisition - data helps!
- EMS research (e.g., CPR Guidelines)

# EMS- Public Health Leverage Points

- Out-of-hospital cardiac arrest (OHCA)
- Traumatic Brain Injury (TBI)
- ST-Elevation Myocardial Infarction (STEMI-Heart Attack)
- Acute Stroke (AS)



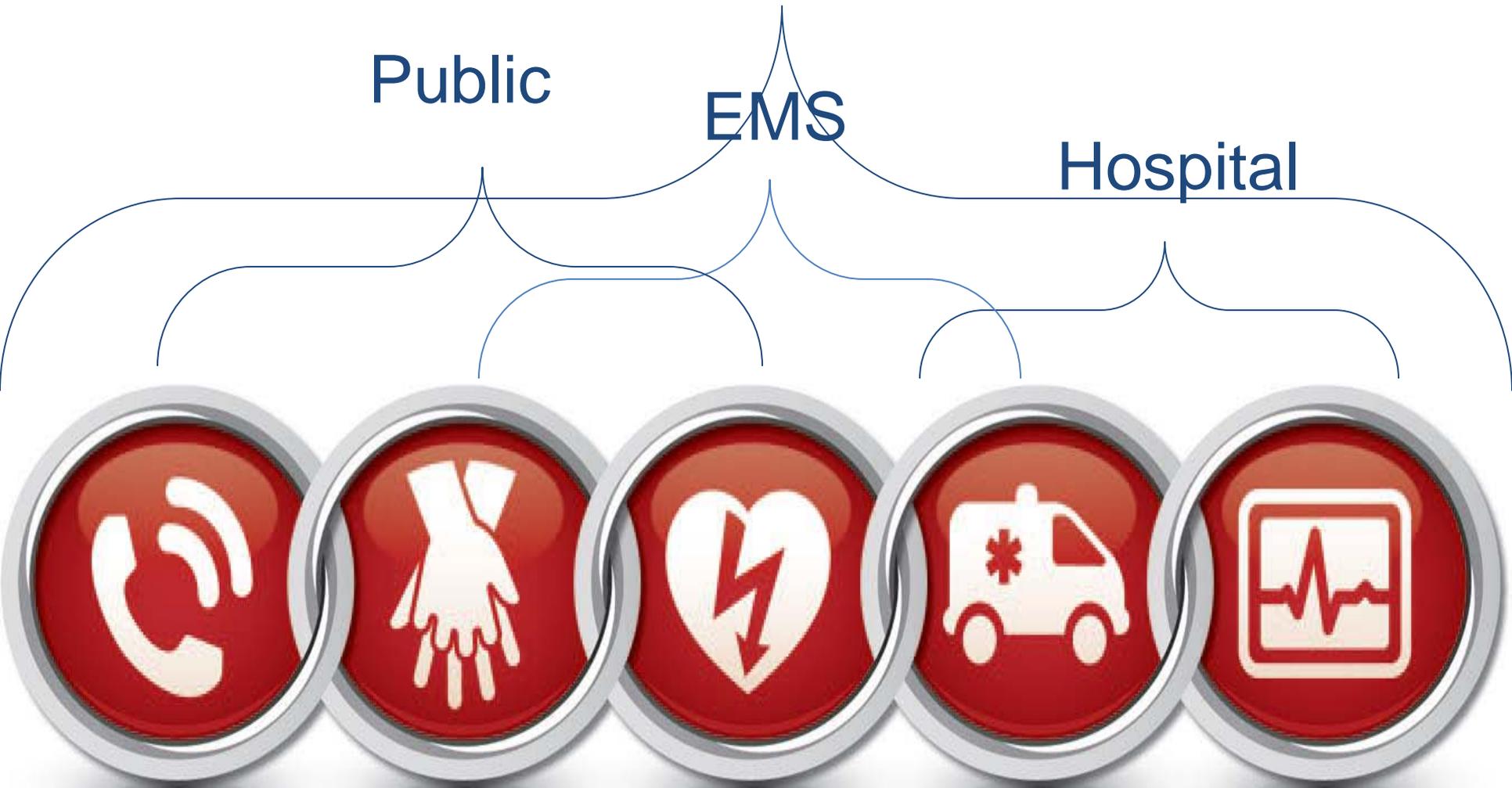
Implementation



Active Measurement and Management

# EMS Public Health System of Care

Measurement Across System





# SHARE Timeline

Assemble stakeholders

Identify cardiac as public health problem

Create reliable data collection system w/ feedback to all stakeholders

Develop State AED Registry

Focus on EMS Cardiocerebral Resuscitation

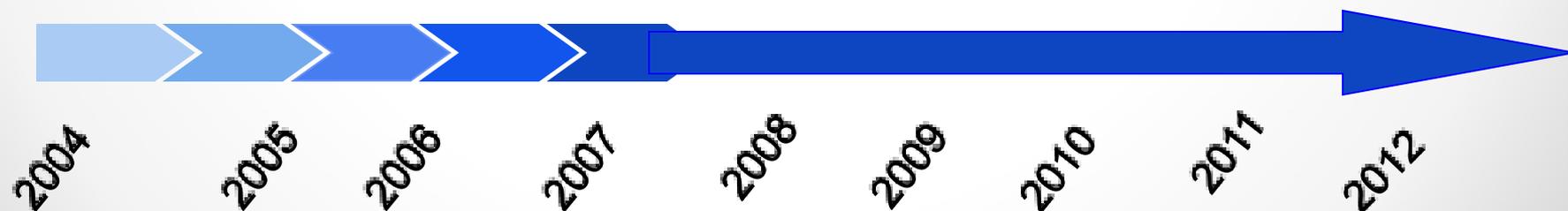
MEASURE PERFORMANCE

Public Compression-Only CPR campaign

Statewide CCR Program

Recognize Cardiac Arrest Centers

EMS bypass protocol (to CACRs)



**Improved outcomes**





# Chest-Compression-Only **LCPR**

If an adult collapses & is not breathing normally

- 1.** Shake & Shout – *Are You OK?*
- 2.** **CALL 9-1-1**
- 3.** Push **HARD & FAST** in the center of chest!



Sarver Heart Center

[www.AZshare.gov](http://www.AZshare.gov)

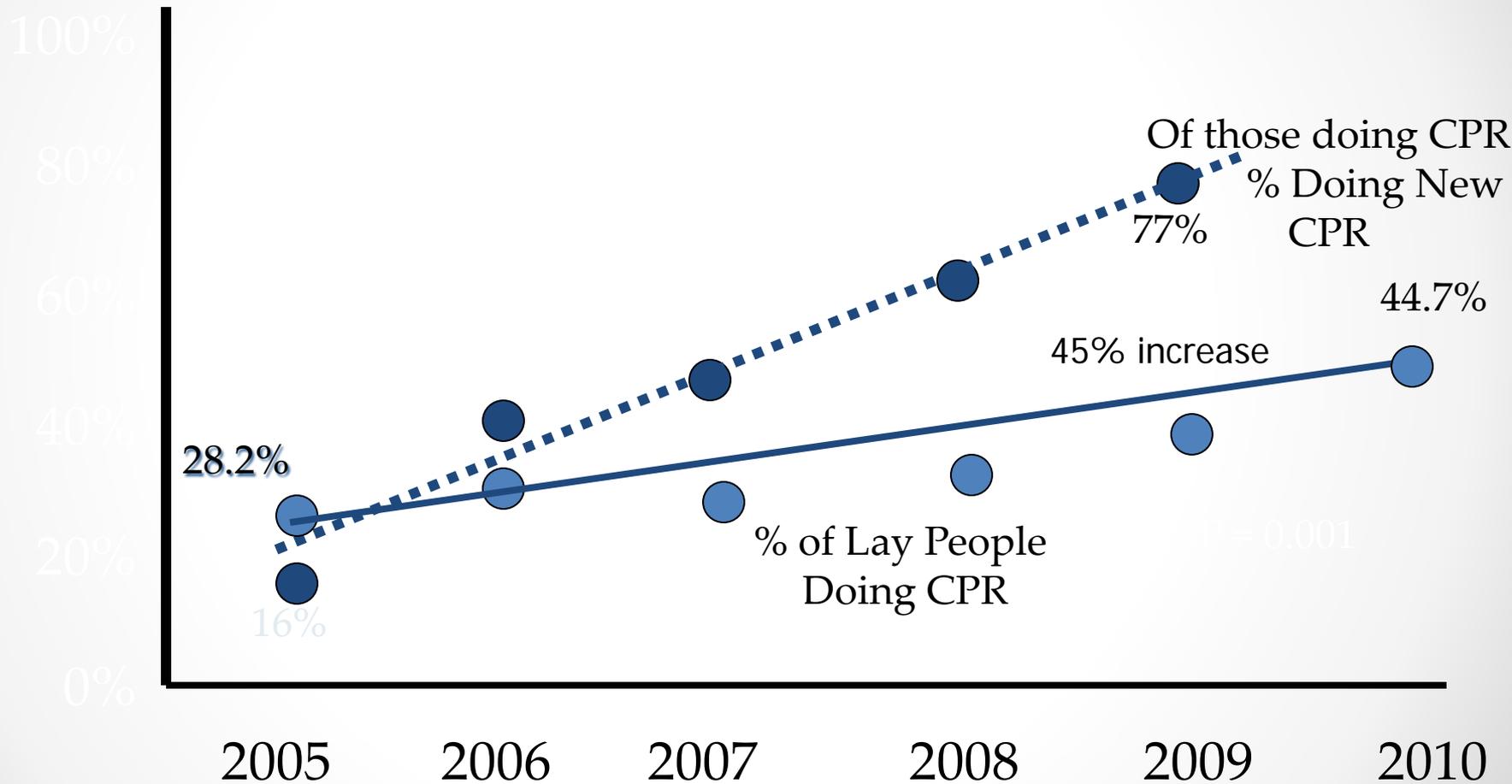


HeartRescue  
PROJECT

Every second counts. Every action matters.

**Harkins Theatres**  
ULTIMATE MOVIEGOING®

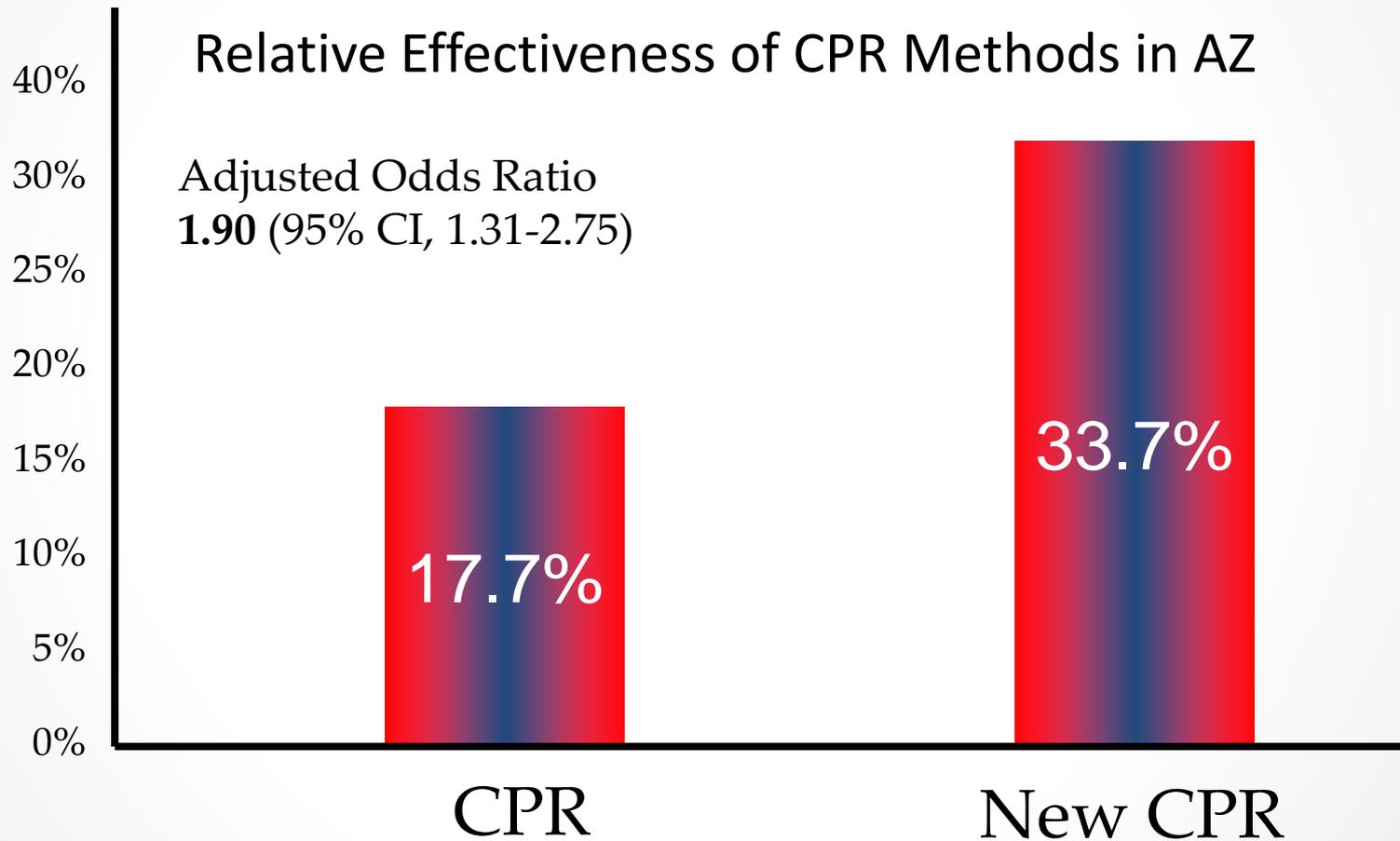
# Bystander CPR in AZ: Incidence and Type



# Witnessed Out of Hospital Cardiac Arrest

n=1,017

Survival to Hospital Discharge



SHARE - JAMA 2010; Oct

A woman with long brown hair, wearing a headset and a dark blue uniform with a patch, is seated at a workstation in a dispatch center. She is looking at two computer monitors displaying data. The workstation includes a keyboard, a mouse, and a multi-line office phone. The text "Dispatch-Assisted CPR Pre-Arrival Instructions for Out-of-Hospital Cardiac Arrest" is overlaid in white on the image.

**Dispatch-Assisted CPR  
Pre-Arrival Instructions  
for Out-of-Hospital  
Cardiac Arrest**

# Arizona SHARE CPR Dispatch Academy

April 2<sup>nd</sup> 2012



*More than 60 people from across Arizona attended our CPR Dispatch Academy Dec. 2<sup>nd</sup>, gaining a sound introduction to SHARE's 9-1-1 CPR Program through presentations and workshops at the Arizona State Laboratory in Phoenix.*

*Dispatchers and dispatch supervisors represented agencies from Casa Grande, Cochise County, Sedona, Gila River, Mohave County, Mesa, Phoenix, Prescott, and Yuma. 9-1-1 personnel from Lifeline Ambulance, PMT Ambulance and Southwest Ambulance also attended, as did SHARE team members and Heart Rescue partners from Pennsylvania.*

# Table 1: Measurements Before and After Staff Training and Protocol Revisions

MEASUREMENT	BEFORE REVISIONS	POST-REVISIONS	CHANGE
1. <b>% Mesa recognition of need for CPR</b>	<b>82.2</b>	<b>97.2</b>	<b>+15</b>
2. % refusal or inability to do CPR	31.5	7.2	-24.3
3. Ave. time to recognition	89.3 sec	86.8 sec	-2.5 sec (-3%)
4. Mesa/SHARE recognition time	1.61	1.43	-.18 (-11%)
5. % instructions started	31.4	57.7	+26.3
6. Ave. time to start instructions	175.1 sec	130.0 sec	-45.1 sec (26%)
7. Ave. time to first compression	240.4	182.0	-58.4 sec (24%)
8. <b>% of telephone-assisted CPR</b>	<b>17.9*</b>	<b>46.4</b>	<b>+ 28.5</b>

### Definitions

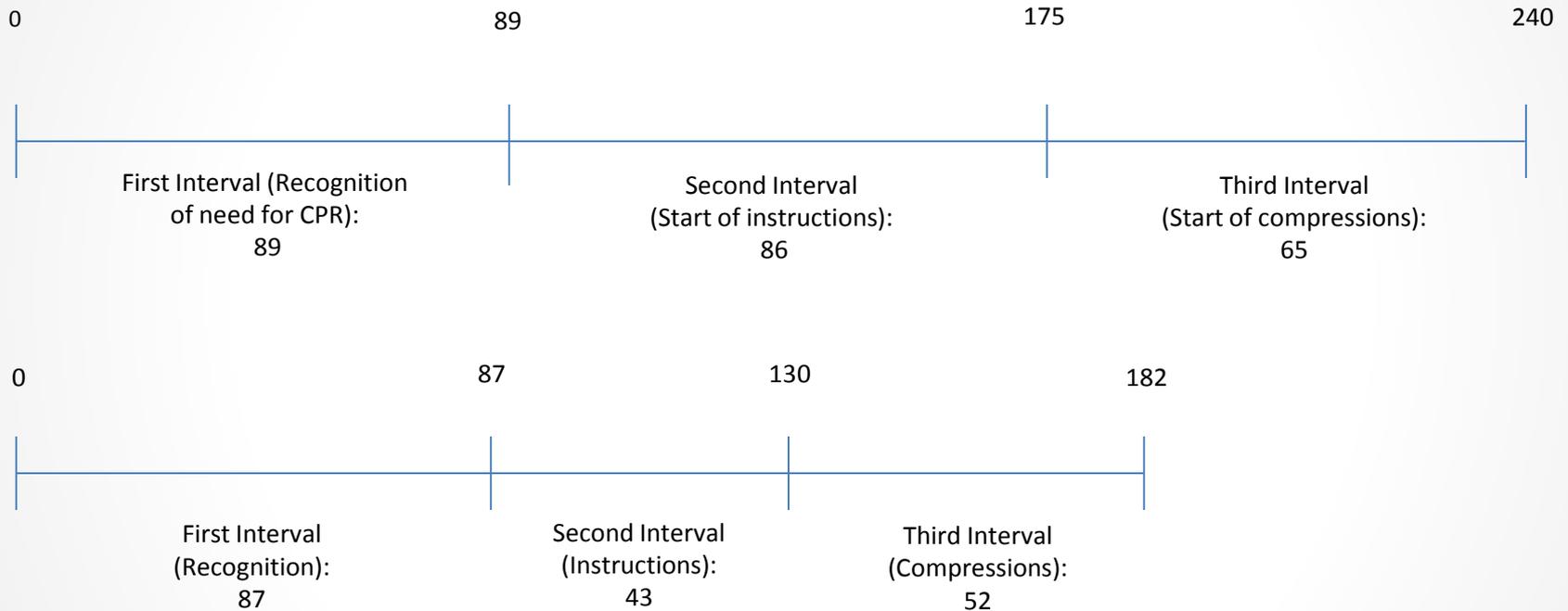
1. **The fraction of qualifying calls where Mesa call-takers and dispatchers recognized the need for CPR.**
2. The fraction of qualifying calls where the caller refused or was unable to perform CPR.
3. The average time elapsed from call receipt to the moment when call-takers and dispatchers recognized the need for CPR.
4. The value from #3 divided by the average time to recognition by SHARE evaluators.
5. The fraction of qualifying calls where CPR instructions were started.
6. The average time elapsed from call receipt to the moment when CPR instructions began.
7. The average time elapsed from call receipt to the moment when the rescuer delivered the first compression.
8. **The fraction of qualifying calls where telephone CPR instructions resulted in bystander CPR.**

\* This figure is 30% if cases where only ventilations were given are included.

# Timelines

The graphics below represent three intervals inherent in providing telephone-assisted bystander CPR. The top shows baseline numbers (in seconds). The bottom reveals numbers generated from calls evaluated after training and protocol revisions. They suggest that the First Interval is a key in efforts to further reduce time to first compression.

## Time in Seconds



# Cardiac Arrest Care Receiving Centers- A Creative Policy Initiative

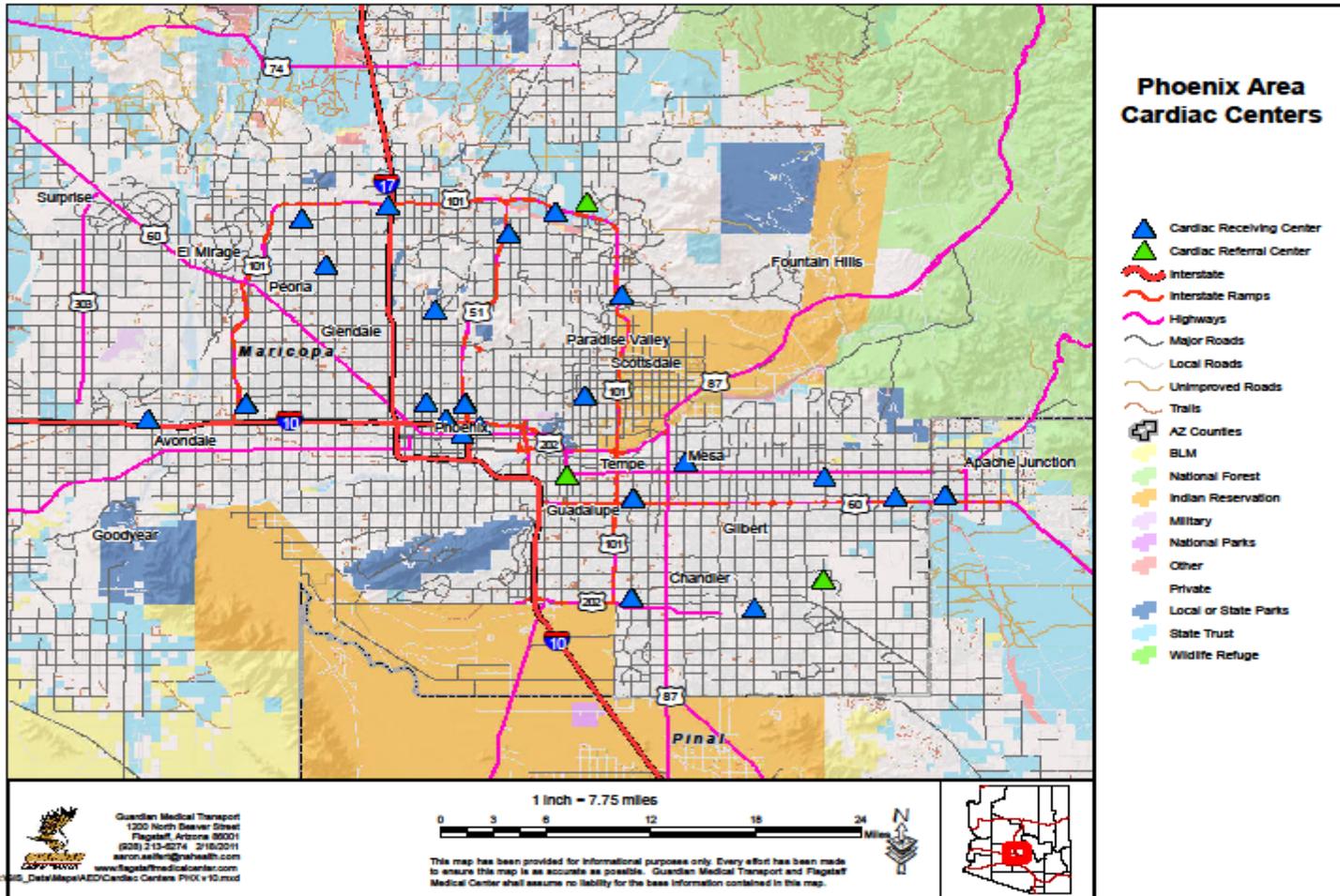
Measurement of In-hospital Care for (out of hospital) Cardiac Arrest and Stroke

- Pre-hospital data is linked with hospital data (n=34)
- Criteria for hospitals
- Sample protocols for hospitals
- Data collection process
- Sample reports given to hospitals

## Requirements for Being Recognized as an Arizona Cardiac Receiving Center

In order to be recognized as a Cardiac Receiving Center, a hospital must have:

- 1) a Therapeutic Hypothermia (TH) method and associated protocol for out-of-hospital cardiac arrest (OHCA)
- 2) primary Percutaneous Coronary Intervention (PCI) capability with protocol for OHCA including consultation with a Cardiology Interventionist for consideration of emergent PCI
- 3) a system, included in the protocol, for timely completion and submission of the one-page data form for **EACH OHCA patient** (NOT just cooled patients) and the one-page data form for ALL EMS and ALL walk-in STEMI patients. The data forms can be found on the SHARE website:  
<http://www.azshare.gov/Info4CAC.htm>
- 4) an evidence-based termination of resuscitation protocol (including a 72-hour moratorium on termination of care for patients receiving TH)
- 5) a protocol to address organ donation
- 6) CPR training for the community



Sample protocols  
Distributed to each  
hospital

**UMC**  
UNIVERSITY MEDICAL CENTER  
Tucson, Arizona 85724

**HYPOTHERMIA  
POST CARDIAC ARREST**  
Page 1 of 2

1 \_\_\_\_\_  
2 \_\_\_\_\_  
3 \_\_\_\_\_

Chief Complaint (CC): \_\_\_\_\_  
Reason for test or service (ICD-9 codable) \_\_\_\_\_

ALLERGIES: (DRUG, FOOD, ENVIRONMENTAL)  NO KNOWN FOOD ALLERGIES  NO KNOWN ENVIRONMENTAL ALLERGIES  
 NO KNOWN DRUG ALLERGIES  NO KNOWN ENVIRONMENTAL ALLERGIES

Attending Physician: \_\_\_\_\_ Wt: \_\_\_\_\_

**ARTIC SUN HYPOTHERMIA DEVICE**

**PATIENT INCLUSION CRITERIA:**  
Resuscitated cardiac arrest > 18 years of age  
Comatose (GCS <8) after return of spontaneous circulation  
Endotracheal intubation with mechanical ventilation  
Mean Arterial Pressure > 60mm Hg with or without vasopressors and volume

**Note:** Adequate sedation and analgesia and paralytics are required for Artic Sun study

**ORDERS**

1. Insert Foley urinary catheter with temperature probe
2. Vital Signs - Record heart rate, blood pressure, cardiac rhythm and secondary (Tympanic/Esophageal  Rectal) temperature at 15 minute intervals during active cooling, 30 minutes intervals during the first 2 hours of hypothermia maintenance and one hour intervals during maintenance, record temperatures at 30 minutes intervals during active rewarming
3. Maintain target temperature at 33.5 degrees C for 24 hours
4. Check skin integrity every 8 hours
5. Continuous EEG monitoring for patients who have paralytics administered, STAT neurology consult to arrange EEG monitoring.
6. Cooling method: Artic Sun Hypothermia Device
  - a. USE ARTIC SUN HYPOTHERMIA DEVICE
    - i. If time permits, turn the Artic Sun to the ON position.
    - ii. Press Manual Mode to begin pre-cooling the water to 4° C
    - iii. Place the Artic Sun Energy Transfer Pads. Ensure that all pads in a kit are used to cover the back, abdomen, and thighs
    - iv. Connect the Artic Sun Energy Transfer Pads to the fluid delivery line from the Artic Sun. Connect the Foley catheter to the Artic Sun temperature cable
    - v. Press Automatic Mode. Confirm the Patient Target Temperature displayed on the screen is set to 33.5° C
  - b. REWARM PROTOCOL FOR ARTIC SUN:
    - i. Press the stop key
    - ii. Press the down arrow to the Patient Target Temperature screen and follow the directions to change Patient Target Temperature to 36° C
    - iii. Press the down arrow again to 0.25° or 3° C/hour. Corresponding hours will be shown on the display screen.
    - iv. Press Automatic to start.



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## SHARE CARDIAC CENTER STEMI DATA FORM

Complete this form for ALL EMS and ALL walk-in patients with an ST elevated ECG:

# Web-based STEMI data process for hospitals

Hospital:		Transported by:	
Hospital Transfer? Yes <input type="checkbox"/> No <input type="checkbox"/>		<input type="checkbox"/> EMS - Agency Name:	
From which facility? To which facility?		<input type="checkbox"/> Privately Owned Vehicle (POV)	
Patient Name (Last):		(First):	DOB: 00/00/0000
		Gender: M <input type="checkbox"/> F <input type="checkbox"/>	
Date of Incident: 00/00/0000	Dispatch Time*: 00:00	Time* arrive ED: 00:00	Date of symptom onset: 00/00/0000 Time of symptom onset*: 00:00
Time* EMS notified hospital: 00:00	Did EMS crew CORRECTLY identify a STEMI? Yes <input type="checkbox"/> No <input type="checkbox"/> If <u>not</u> , was it <input type="checkbox"/> a missed STEMI <input type="checkbox"/> an overcall STEMI		
Prehospital 12-lead performed: Yes <input type="checkbox"/> No <input type="checkbox"/> N/A (POV) <input type="checkbox"/> If Yes, Time* acquired: 00:00 If Yes, was it successfully transmitted to ED? Yes <input type="checkbox"/> No <input type="checkbox"/>			
Did patient bypass ED? Yes <input type="checkbox"/> No <input type="checkbox"/>			
Time* of 1 <sup>st</sup> in-hospital ECG: 00:00		Time* of 2 <sup>nd</sup> in-hospital ECG: 00:00	N/A <input type="checkbox"/>
Cardiac Team activated for intended primary PCI? Yes <input type="checkbox"/> No <input type="checkbox"/> <input type="checkbox"/> Based on prehospital notification? <input type="checkbox"/> Based on ED evaluation? <input type="checkbox"/> Based on Cardiology evaluation?			
Time* Cardiac Team Activated: 00:00 <input type="checkbox"/> Based on prehospital 12-lead ECG? <input type="checkbox"/> Based on 1 <sup>st</sup> in-hospital ECG? <input type="checkbox"/> Based on subsequent ECG?			
Time* of <u>balloon inflation</u> or <u>device equivalent</u> : 00:00 - OR - Time* <u>thrombolytic</u> administered: 00:00			
If patient did not undergo <u>catheterization</u> ... Was it due to a confirmed false positive? Yes <input type="checkbox"/> No <input type="checkbox"/> If not, other reason:			
Did this STEMI patient survive to hospital discharge? Yes <input type="checkbox"/> No <input type="checkbox"/>			
Date of discharge or death: 00/00/0000			
Additional notes/comments:			

\*please use military time  
Ver.5

Please mail to [brazilp@azdhs.gov](mailto:brazilp@azdhs.gov)  
Thank You



Health and Wellness for all

# SHARE Data Form

SHARE Cardiac Arrest Data Form				*use 24 hr clock	
Hospital:		Transporting Agency:		POV? Yes <input type="checkbox"/> No <input type="checkbox"/>	
Responding Agency:		same as transporting agency <input type="checkbox"/>		Unknown <input type="checkbox"/>	
Hospital Transfer? Yes <input type="checkbox"/> No <input type="checkbox"/>		To which facility?		From which facility?	
Patient Name (Last):		(First):	DOB: 00/00/0000	Gender M <input type="checkbox"/> F <input type="checkbox"/>	
Date of Collapse: 00/00/0000	Date Arrive ED: 00/00/0000	Intubated? Yes <input type="checkbox"/> No <input type="checkbox"/>	If yes, where? in field <input type="checkbox"/> in ED <input type="checkbox"/>		
Time of Collapse*: 00:00 Unk <input type="checkbox"/>	Time Arrive ED*: 00:00				
Initial Arrest Rhythm (EMS): CHOOSE ONE On arrival ED Cardiac Rhythm: CHOOSE ONE GCS					
On arrival ED: Temp		Pulse	BP	RR	Assisted <input type="checkbox"/> or Spont. <input type="checkbox"/>
Suspected CAUSE OF INITIAL CARDIAC ARREST: CHOOSE ONE					
Time of ROSC*: 00:00		Date: 00/00/0000	N/A <input type="checkbox"/>	Time arrive ICU*: 00:00	Date: 00/00/0000
Time to Cath Lab*: 00:00		Date: 00/00/0000	N/A <input type="checkbox"/>	Intervention: CHOOSE ONE	
STEMI? Yes <input type="checkbox"/> No <input type="checkbox"/> 12-lead ECG not performed <input type="checkbox"/>			Did patient receive Cardiology Consultation in ED? Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>		
Complete artery occlusion on cardiac cath? Yes <input type="checkbox"/> No <input type="checkbox"/> N/A (did not go to cath lab) <input type="checkbox"/>					
ADVERSE EVENTS AS INPATIENT:					
None <input type="checkbox"/>	Infection <input type="checkbox"/>	Bleeding <input type="checkbox"/>	DVT <input type="checkbox"/>	Hyperkalemia <input type="checkbox"/>	Other: <input type="checkbox"/>
WAS CARE TERMINATED? Yes <input type="checkbox"/> No <input type="checkbox"/> Date: 00/00/0000 Time*: 00:00 Where? ED <input type="checkbox"/> Other <input type="checkbox"/>					
DNR/AND invoked? Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, established prehospital <input type="checkbox"/> established in hospital <input type="checkbox"/>					
OUTCOME: Discharged alive <input type="checkbox"/> Death <input type="checkbox"/> Date of D/C or death: 00/00/0000					
Cerebral Performance Category (CPC) Score on discharge (1-5): CHOOSE ONE (click for link to detailed CPC scale categories)					
Did patient receive AICD on discharge? Yes <input type="checkbox"/> No <input type="checkbox"/> No, but scheduled <input type="checkbox"/> N/A (death) <input type="checkbox"/>			Organ(s) or Tissue harvested at facility? Yes <input type="checkbox"/> No <input type="checkbox"/> N/A (discharged) <input type="checkbox"/>		
Did patient receive Rehabilitation Medicine consult prior to discharge? Yes <input type="checkbox"/> No <input type="checkbox"/> N/A (death) <input type="checkbox"/>					
Was Therapeutic Hypothermia initiated? Yes <input type="checkbox"/> No <input type="checkbox"/>					
If No, why not?					
<input type="checkbox"/> >60 minutes of CPR prior to ED arrival					
<input type="checkbox"/> no return of spontaneous circulation/lost spontaneous circulation					
<input type="checkbox"/> regained consciousness <input type="checkbox"/> other: CHOOSE ONE					
Therapeutic Hypothermia (TH) was initiated in the: Field <input type="checkbox"/> ED <input type="checkbox"/> ICU <input type="checkbox"/>					
What method of TH was used? Where? (check all that apply)					
Ice <input type="checkbox"/> Prehospital <input type="checkbox"/> ED <input type="checkbox"/> ICU <input type="checkbox"/>	Cold IV fluids <input type="checkbox"/> Prehospital <input type="checkbox"/> ED <input type="checkbox"/> ICU <input type="checkbox"/>	Cooling blanket <input type="checkbox"/> Prehospital <input type="checkbox"/> ED <input type="checkbox"/> ICU <input type="checkbox"/>	Intravascular Catheter <input type="checkbox"/> Prehospital <input type="checkbox"/> ED <input type="checkbox"/> ICU <input type="checkbox"/>	External cooling <input type="checkbox"/> Prehospital <input type="checkbox"/> ED <input type="checkbox"/> ICU <input type="checkbox"/>	
TH TIME/TEMP ELEMENTS*:			Time re-warming started: 00:00 Date: 00/00/0000		
Time cooling started: 00:00 Date: 00/00/0000			Target re-warming temp: or range:		
Target temp: or range:			Time re-warming ended: 00:00 Date: 00/00/0000		
Time target temp reached: 00:00 Date: 00/00/0000			Date patient able to follow commands: 00/00/0000		
For survivors, please provide mailing address:					
Additional notes:					

Thank you! Mail to: Margaret Mullins [mjmullins@medadmin.arizona.edu](mailto:mjmullins@medadmin.arizona.edu) cc: Paula Brazil [Paula.Brazil@azdhs.gov](mailto:Paula.Brazil@azdhs.gov) 9/3/10 B



**Table 4: # of Patients received Hypothermia and # of Patients went to Cath Lab**

	Year						Overall	
	2008		2009		2010			
	N	%	N	%	N	%	N	%
<b>Hypothermia</b>				11.68				
*Not documented	0	0	9	%	0	0	9	4.66%
Received Hypothermia	8	20.00%	12	15.58%	9	11.84%	29	15.02%
No TH initiated: > 60 minutes of CPR	1	2.50%	0	0	0	0	1	0.51%
No TH initiated: No ROSC	21	52.50%	41	53.24%	46	60.52%	108	55.95%
No TH initiated: Regained Consciousness	2	5.00%	3	3.89%	7	9.21%	12	6.21%
Patient Appeared Eligible but no TH Initiated	7	17.50%	12	15.58%	14	18.42%	33	17.09%
No TH initiated - Other Reasons	1	2.50%	0	0	0	0	1	0.51%
<b># Patients went to Cath Lab</b>						10.52		
Yes	3	7.50%	2	2.59%	8	%	13	6.73%
No	37	92.50%	75	97.40%	68	89.47%	180	93.26%

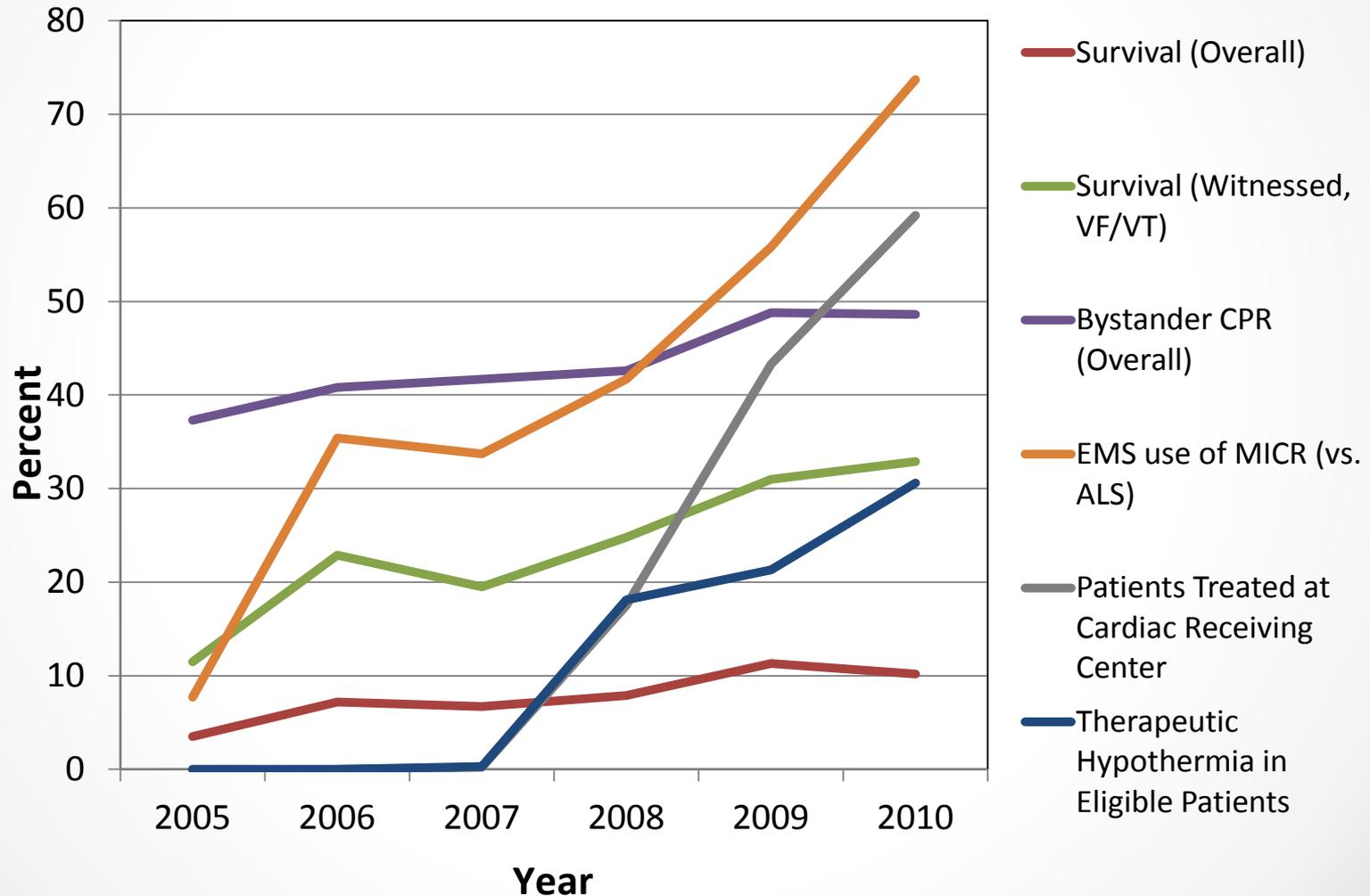
**Table 12: Final Outcome among Patients with Suspected Cardiac Cause**

Survival Rate		Overall	Admitted Patients	Hypothermia Only Patients	PCI and/or CABG Only Patients	Hypothermia, PCI and/or CABG Patients
Year						
2008	Total Cases (N)	17	4	4	0	0
	# Survived	3	3	3	0	0
	% Survived	17.6	75.0	75.0	0	0
2009	Total Cases (N)	18	8	6	0	0
	# Survived	4	3	1	0	0
	% Survived	22.2	37.5	16.7	0	0
2010	Total Cases (N)	30	13	8	4	4
	# Survived	10	10	5	3	3
	% Survived	33.3	76.9	62.5	75.0	75.0
Overall	Total Cases (N)	65	25	18	4	4
	# Survived	17	16	9	3	3
	% Survived	26.2	64.0	50.0	75.0	75.0

Sample  
Hospital  
Report  
Given  
Bi-annually

Data  
Feedback  
Loop

# Annual rates for survival, provision of bystander CPR, EMS use of MICR, OHCA treatment at CRC and use of therapeutic hypothermia in eligible patients



# Traumatic Brain Injury- EPIC Project is Unique

- A statewide public health initiative to improve outcome from Traumatic Brain Injury
  - Avoid over-ventilation
  - Maintain adequate blood pressure (monitor CO2)
  - More than **150**: Fire Departments, EMS agencies, and Air Medical Programs Participating
  - The University of Arizona & ADHS



Traumatic Brain Injury



Save Hearts in Arizona  
Registry & Education



Participants Participant Map In the News Contact Us Calendar Training More Info

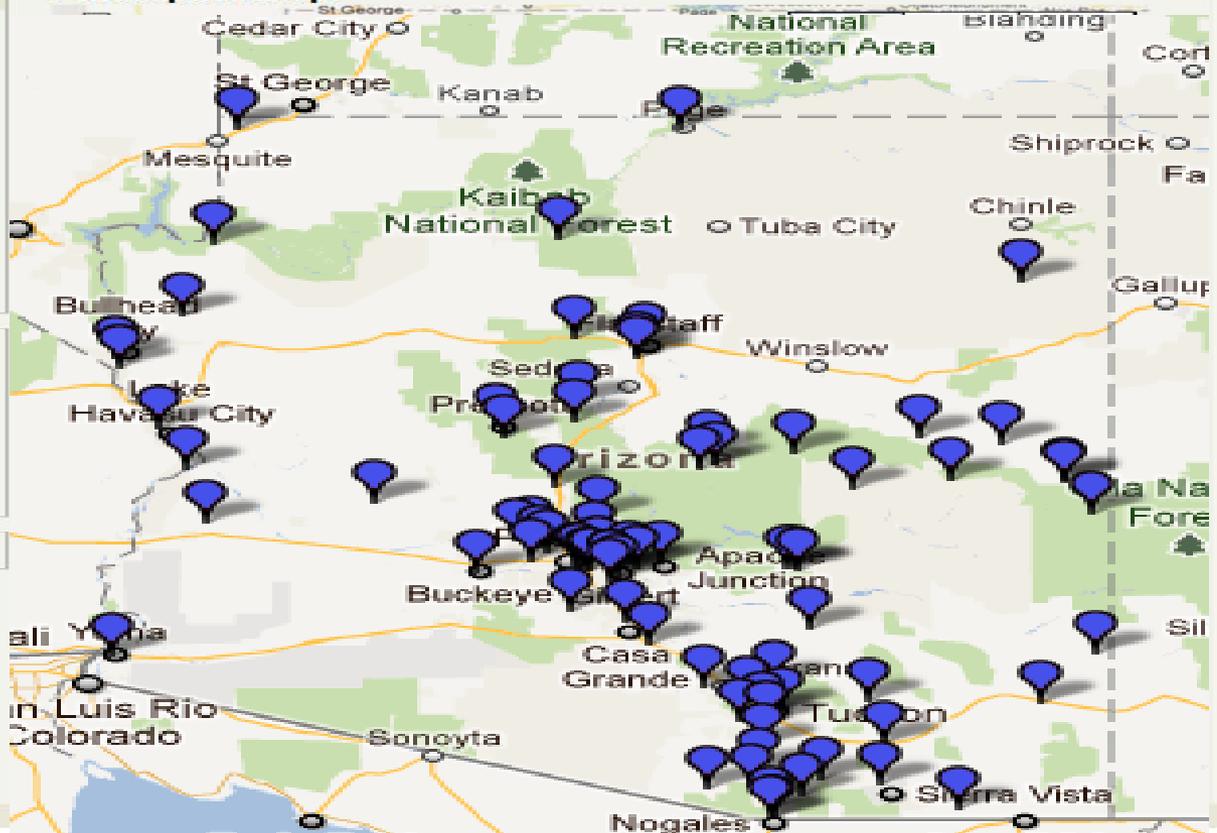
Upcoming Events

- EPIC Master Trainer Session  
Event Date/Time:  
Wed, 02/22/2012 - 13:00 to 16:00
- 7th Annual Traumatic Brain Injury Symposium  
Event Date/Time:  
Fri, 03/30/2012 - 08:00 to Sat, 03/31/2012 - 16:00
- EPIC Provider Training  
Event Date/Time:  
Wed, 05/09/2012 - 09:00 to 11:00

February

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29			

Participant Map



# Brain Injury in the US: 2010 & 10-yr Trend

➤ 1.7 million  
total TBIs

Up 21%

52,000  
Deaths

Up 4%

275,000  
Hospitalizations

Up 17%

1,365,000  
Emergency Department Visits

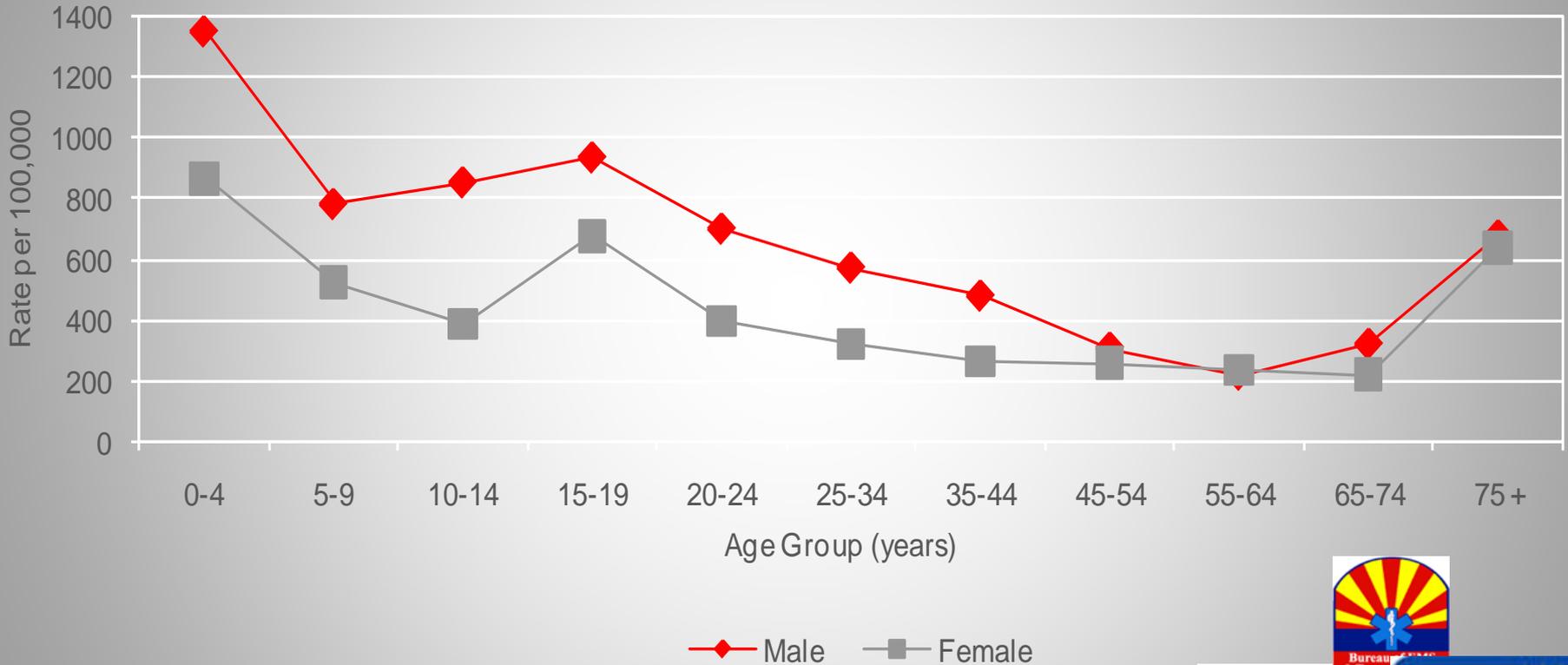
Up 23%

Receiving Other Medical Care or No Care?



Traumatic Brain Injury

# TBI by Gender



Average annual rates, 1995-2001; ED visits, hospitalizations, and deaths combined



**Traumatic Brain Injury**

# Rescue Medic's ePCR Network with the StarWest Active Management System

1. Crew creates ePCR in Rescue Medic Toughbook



3. ePCR Transmitted to E.D.

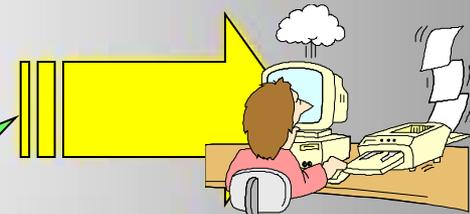


2. Transmitted via Internet <<<<CAD DATA >>>>



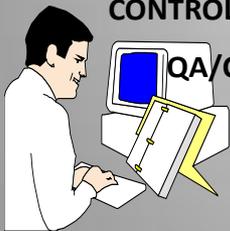
MEDICAL RESEARCH

4. eValidated ePCR and CAD Info for processing



Medical Direction

7. OPs/ TRAINING/QUALITY CONTROL-CENTER



QA/CQI identifies training needs  
"Crews are notified of deficiencies, and corrects behavior"

5. Concurrent Management  
ePCR reviewed electronically for BQI



6. Electronic Report Cards

Concurrent, Retrospective & Prospective Managing Workflow Data in Distinct Timeframes... 



BILLING DEPARTMENT  
Traumatic Brain Injur

# Summary

- The Pre-hospital System is uniquely positioned to significantly improve the delivery of emergency medical care and save lives in focused areas.
- Pre-hospital Leverage Points:
  - Out-of-hospital cardiac arrest
  - Traumatic Brain Injury
  - ST-Elevation Myocardial Infarction (STEMI-Heart Attack)
  - Acute Stroke
- Success requires collaboration between pre-hospital, hospital and public health and requires tools to measure outcomes