Why You Should Care About CARES

Kimberly Vellano, MPH
CARES Director of Operations & Strategic Planning

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EMORY | WOODRUFF HEALTH SCIENCES CENTER

CARES
Cardiac Arrest Registry to Enhance Survival

Conflicts of Interest

CARES is partially funded by the
American Heart Association & the American Red Cross.

FINANCIAL DISCLOSURE:
No relevant financial relationship exists

Presentation Outline

- Importance of measurement
- What is CARES?
  - Surveillance
  - Quality Improvement
  - Research
- State Participation

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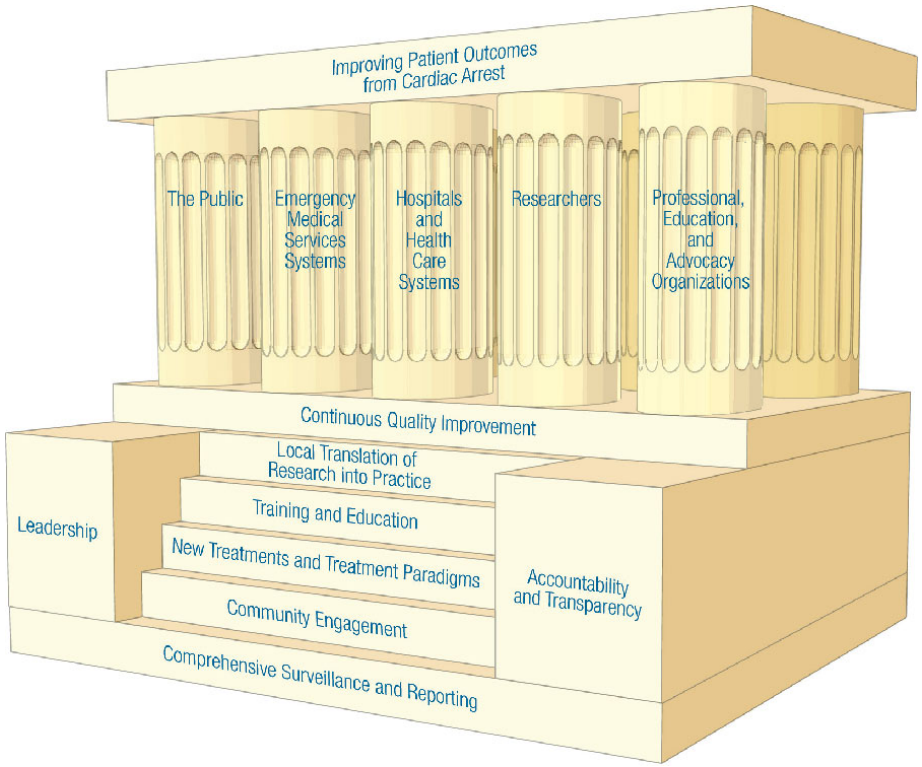
Why Measure?

Data Collection as the Foundation for Improvement



Institute of Medicine's
Strategies to Improve Cardiac Arrest Survival: "A Time to Act"

June 2015; The National Academy Press

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You can't manage what you don't measure!

CARES communities show….

- **14** -fold difference in Overall Survival rate
- **12** -fold difference in Utstein Survival rate
- **10** -fold difference in Bystander CPR rate

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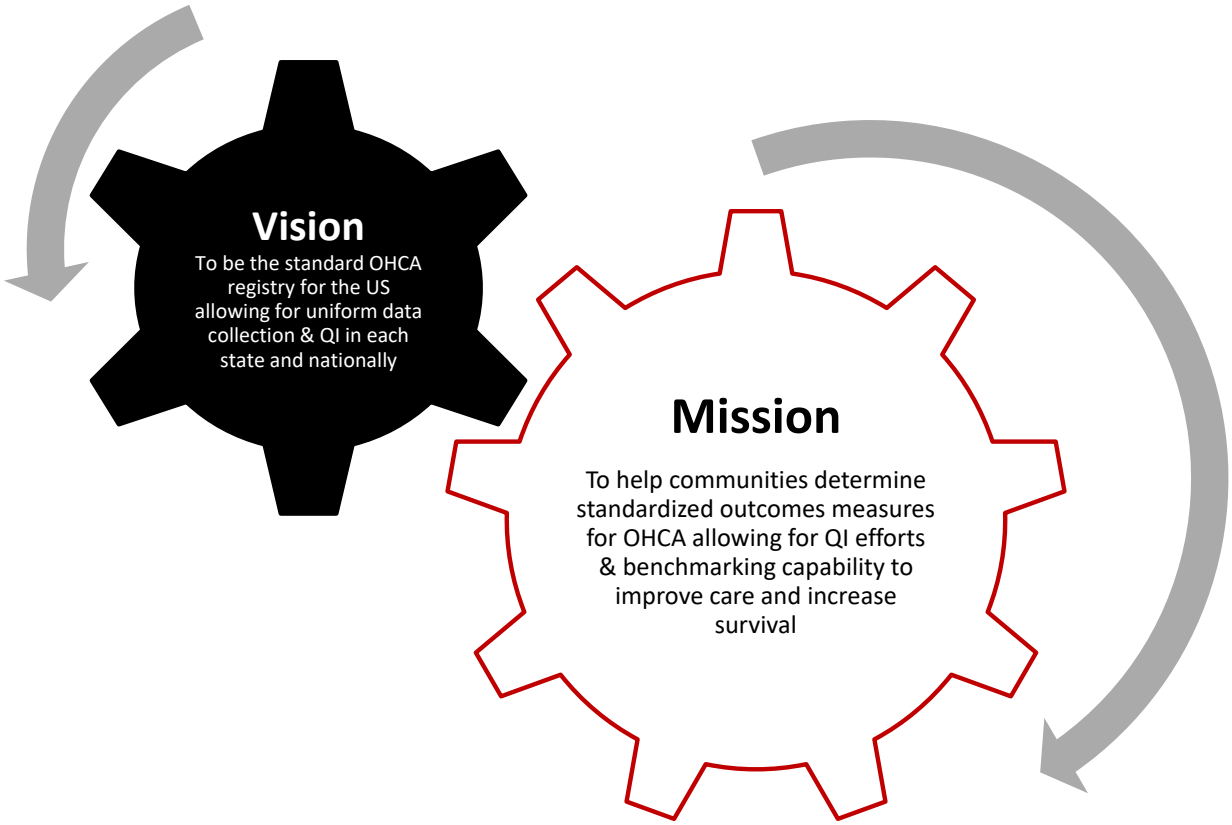
What is CARES?

CARES Vision & Mission



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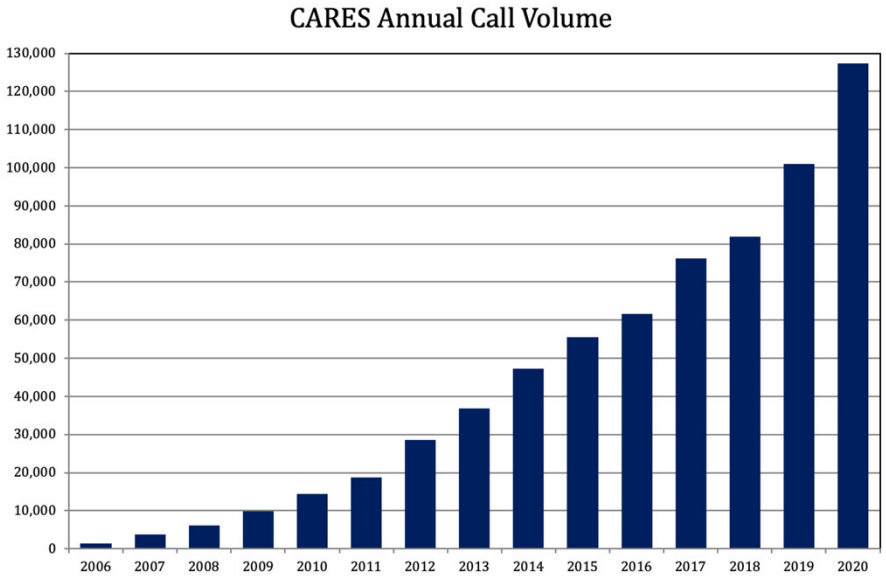
CARES 2021 Footprint

- **167** million population catchment
- **50.6**% U.S. population covered
- More than **2,000** EMS agencies
- More than **2,300** hospitals
- **29** state-based registries
- **60** additional communities in **15** states



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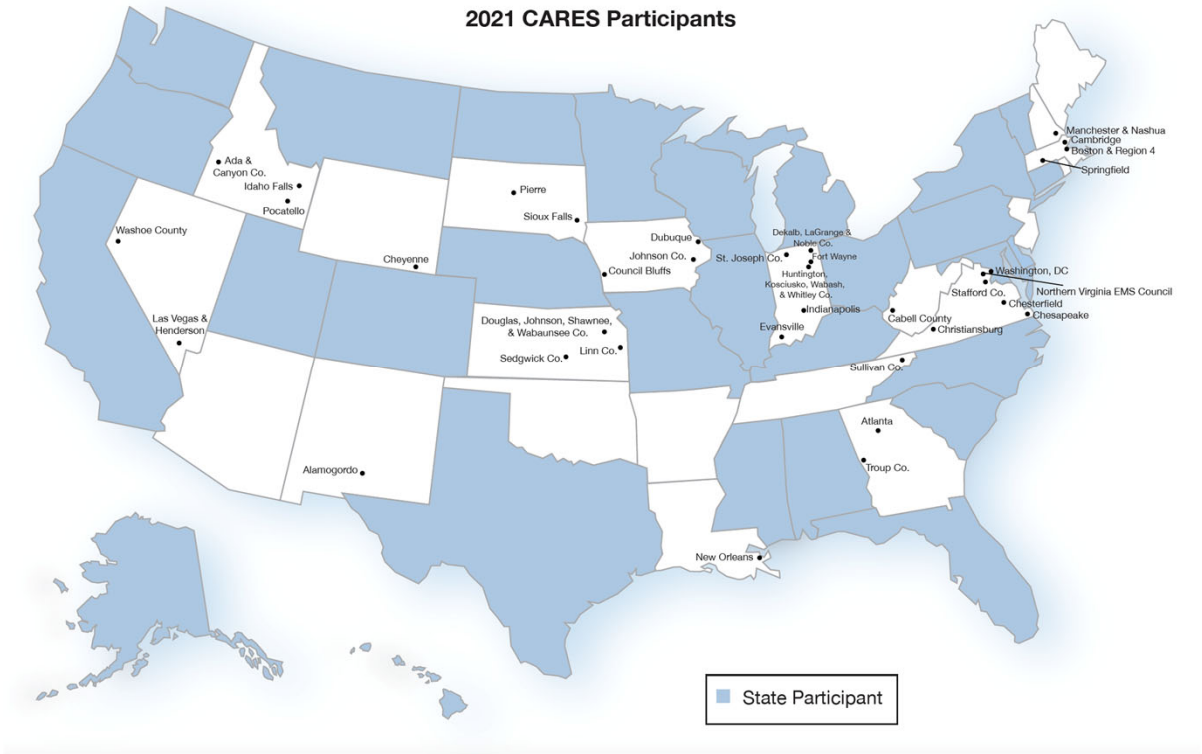
Current Participant Map



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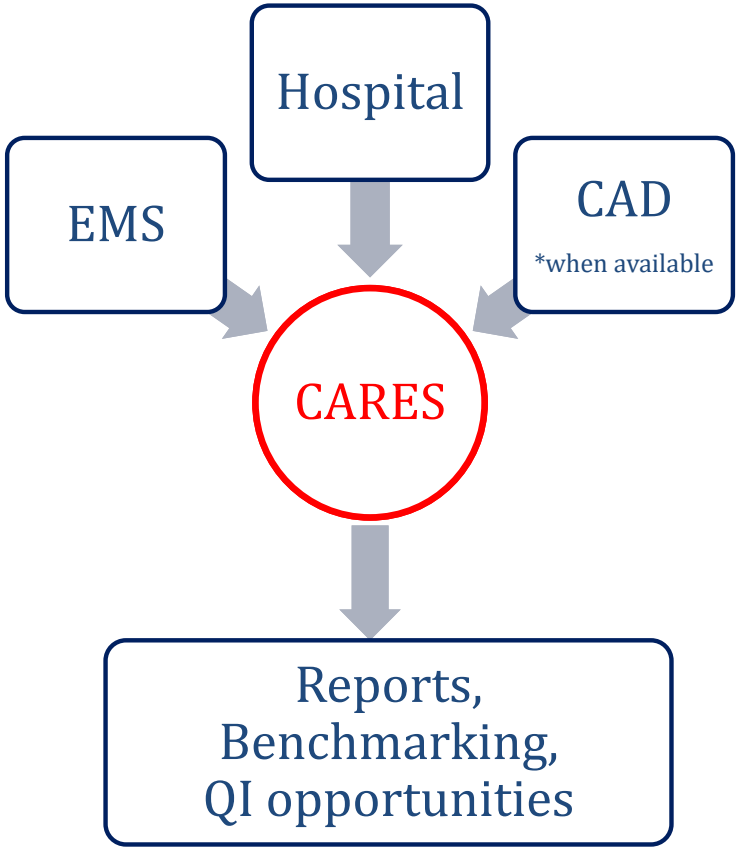
SURVEILLANCE

QUALITY IMPROVEMENT

RESEARCH

CARES Software is Web Based

- Internet database system
  - https://mycares.net
  - HIPAA compliant security
  - Unique user credentials
- EMS & Hospital Reporting Features
  - Bystander intervention metrics
  - Survival metrics
  - Ability to export into Excel
- Unifies EMS, dispatch, and hospital data
  - Applicable to any EMS system



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Two Methods for EMS data collection

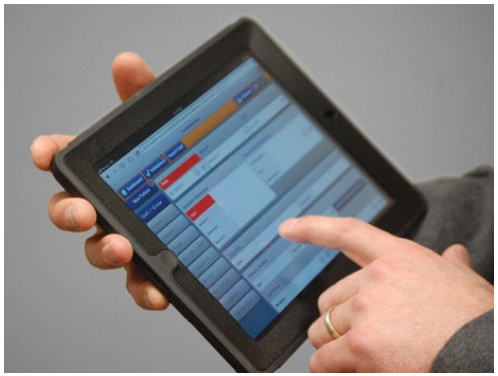
Direct Data Entry Online

- Data entered anywhere there is internet access
  - Entered when convenient but at least monthly
- Real-time data auditing

ePCR Extraction

> 10 records/month

- CARES compliant vendors:
  - ImageTrend
  - ESO Solutions
  - HealthEMS
  - R1-TripTix
  - SafetyPAD
  - Global Medical Response (MEDS)



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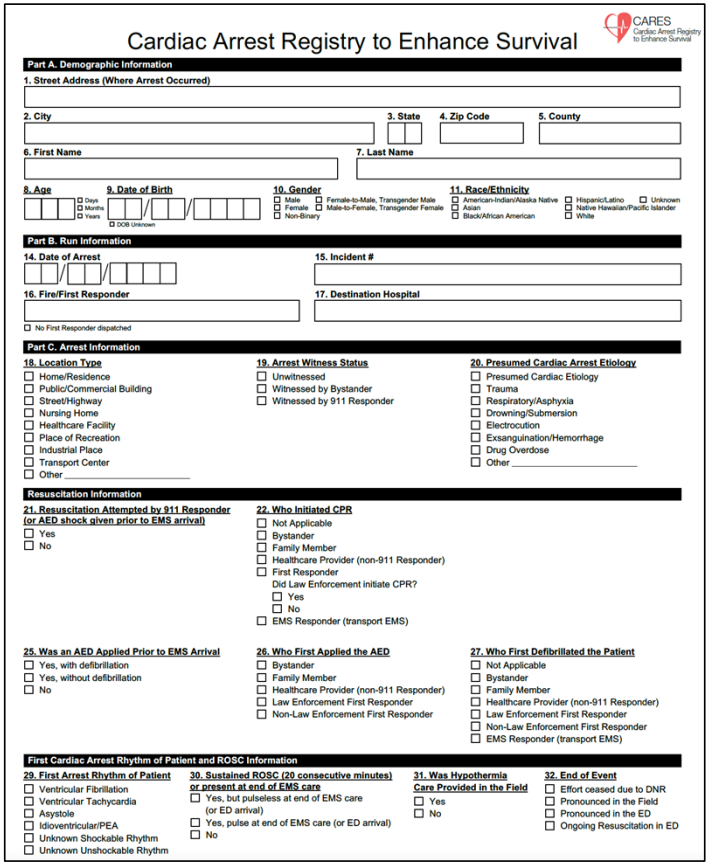
What information does CARES collect?

Required EMS Dataset

- CARES event is defined as:
  - Non-traumatic cardiac arrest
  - Resuscitation attempted by 911 responder
- EMS entry “initiates” the event
- Majority multiple choice fields
- KEEP IT SIMPLE philosophy



Cardiac Arrest Registry to Enhance Survival

CARES Cardiac Arrest Registry to Enhance Survival

Part A. Demographic Information

1. Street Address (Where Arrest Occurred)
2. City | 3. State | 4. Zip Code | 5. County
6. First Name | 7. Last Name
8. Age (☐ Days ☐ Months ☐ Years) | 9. Date of Birth (☐ DOB Unknown) | 10. Gender (☐ Male ☐ Female ☐ Non-Binary ☐ Female-to-Male, Transgender Male ☐ Male-to-Female, Transgender Female) | 11. Race/Ethnicity (☐ American-Indian/Alaska Native ☐ Asian ☐ Black/African American ☐ Hispanic/Latino ☐ Native Hawaiian/Pacific Islander ☐ White ☐ Unknown)

Part B. Run Information

14. Date of Arrest | 15. Incident #
16. Fire/First Responder | 17. Destination Hospital
☐ No First Responder dispatched

Part C. Arrest Information

18. Location Type: ☐ Home/Residence ☐ Public/Commercial Building ☐ Street/Highway ☐ Nursing Home ☐ Healthcare Facility ☐ Place of Recreation ☐ Industrial Place ☐ Transport Center ☐ Other
19. Arrest Witness Status: ☐ Unwitnessed ☐ Witnessed by Bystander ☐ Witnessed by 911 Responder
20. Presumed Cardiac Arrest Etiology: ☐ Presumed Cardiac Etiology ☐ Trauma ☐ Respiratory/Asphyxia ☐ Drowning/Submersion ☐ Electrocution ☐ Exsanguination/Hemorrhage ☐ Drug Overdose ☐ Other

Resuscitation Information

21. Resuscitation Attempted by 911 Responder (or AED shock given prior to EMS arrival): ☐ Yes ☐ No
22. Who Initiated CPR: ☐ Not Applicable ☐ Bystander ☐ Family Member ☐ Healthcare Provider (non-911 Responder) ☐ First Responder (Did Law Enforcement initiate CPR? ☐ Yes ☐ No) ☐ EMS Responder (transport EMS)
25. Was an AED Applied Prior to EMS Arrival: ☐ Yes, with defibrillation ☐ Yes, without defibrillation ☐ No
26. Who First Applied the AED: ☐ Bystander ☐ Family Member ☐ Healthcare Provider (non-911 Responder) ☐ Law Enforcement First Responder ☐ Non-Law Enforcement First Responder
27. Who First Defibrillated the Patient: ☐ Not Applicable ☐ Bystander ☐ Family Member ☐ Healthcare Provider (non-911 Responder) ☐ Law Enforcement First Responder ☐ Non-Law Enforcement First Responder ☐ EMS Responder (transport EMS)

First Cardiac Arrest Rhythm of Patient and ROSC Information

29. First Arrest Rhythm of Patient: ☐ Ventricular Fibrillation ☐ Ventricular Tachycardia ☐ Asystole ☐ Idioventricular/PEA ☐ Unknown Shockable Rhythm ☐ Unknown Unshockable Rhythm
30. Sustained ROSC (20 consecutive minutes) or present at end of EMS care: ☐ Yes, but pulseless at end of EMS care (or ED arrival) ☐ Yes, pulse at end of EMS care (or ED arrival) ☐ No
31. Was Hypothermia Care Provided in the Field: ☐ Yes ☐ No
32. End of Event: ☐ Effort ceased due to DNR ☐ Pronounced in the Field ☐ Pronounced in the ED ☐ Ongoing Resuscitation in ED

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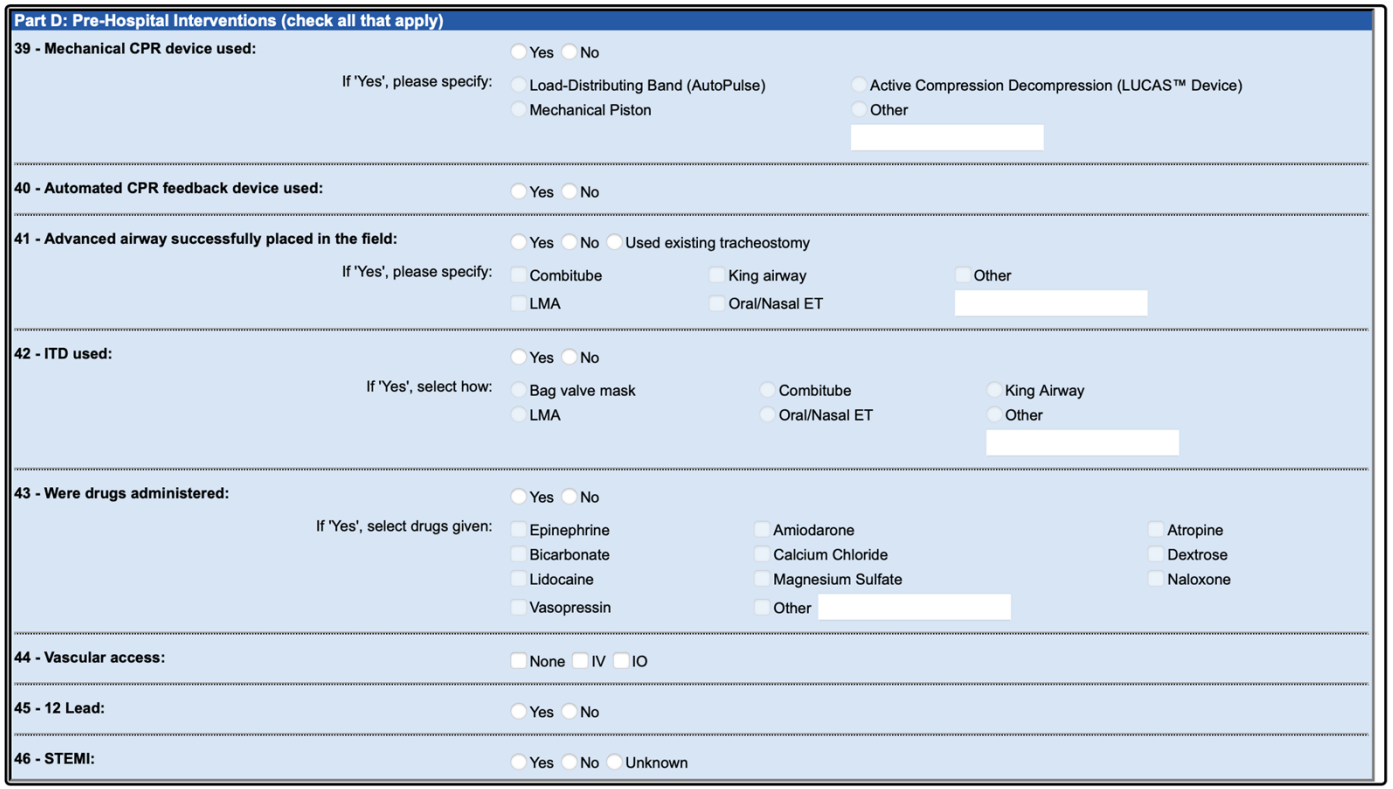
Supplemental EMS Dataset



Part D: Pre-Hospital Interventions (check all that apply)

39 - Mechanical CPR device used: ○ Yes ○ No

If 'Yes', please specify:
○ Load-Distributing Band (AutoPulse) ○ Active Compression Decompression (LUCAS™ Device)
○ Mechanical Piston ○ Other

40 - Automated CPR feedback device used: ○ Yes ○ No

41 - Advanced airway successfully placed in the field: ○ Yes ○ No ○ Used existing tracheostomy

If 'Yes', please specify:
☐ Combitube ☐ King airway ☐ Other
☐ LMA ☐ Oral/Nasal ET

42 - ITD used: ○ Yes ○ No

If 'Yes', select how:
○ Bag valve mask ○ Combitube ○ King Airway
○ LMA ○ Oral/Nasal ET ○ Other

43 - Were drugs administered: ○ Yes ○ No

If 'Yes', select drugs given:
☐ Epinephrine ☐ Amiodarone ☐ Atropine
☐ Bicarbonate ☐ Calcium Chloride ☐ Dextrose
☐ Lidocaine ☐ Magnesium Sulfate ☐ Naloxone
☐ Vasopressin ☐ Other

44 - Vascular access: ☐ None ☐ IV ☐ IO

45 - 12 Lead: ○ Yes ○ No

46 - STEMI: ○ Yes ○ No ○ Unknown

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Hospital Data Entry

- Hospital contact established at each EMS agency's receiving facilities
- Hospital follow-up only required for patients with:
  - Non-traumatic etiology
  - Resuscitation attempted = Yes
  - Ongoing Resuscitation in ED
- CARES software emails the primary POC at selected destination hospital
- When CARES form is complete, identifiers are removed

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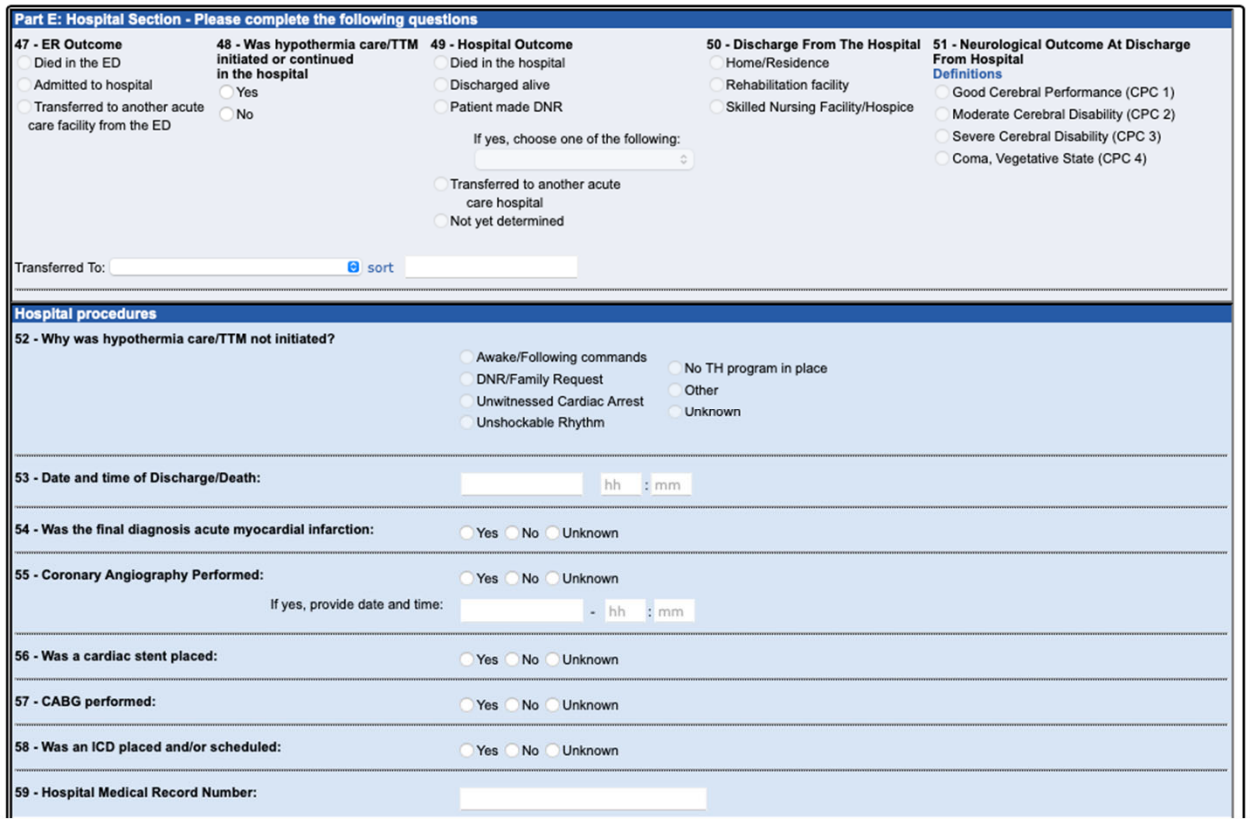
CARES Hospital Dataset: Required & Supplemental

Required

Supplemental



Part E: Hospital Section - Please complete the following questions

47 - ER Outcome
- Died in the ED
- Admitted to hospital
- Transferred to another acute care facility from the ED

48 - Was hypothermia care/TTM initiated or continued in the hospital
- Yes
- No

49 - Hospital Outcome
- Died in the hospital
- Discharged alive
- Patient made DNR

If yes, choose one of the following:
- Transferred to another acute care hospital
- Not yet determined

Transferred To: sort

50 - Discharge From The Hospital
- Home/Residence
- Rehabilitation facility
- Skilled Nursing Facility/Hospice

51 - Neurological Outcome At Discharge From Hospital
Definitions
- Good Cerebral Performance (CPC 1)
- Moderate Cerebral Disability (CPC 2)
- Severe Cerebral Disability (CPC 3)
- Coma, Vegetative State (CPC 4)

Hospital procedures

52 - Why was hypothermia care/TTM not initiated?
- Awake/Following commands
- DNR/Family Request
- Unwitnessed Cardiac Arrest
- Unshockable Rhythm
- No TH program in place
- Other
- Unknown

53 - Date and time of Discharge/Death: hh : mm

54 - Was the final diagnosis acute myocardial infarction: Yes No Unknown

55 - Coronary Angiography Performed: Yes No Unknown

If yes, provide date and time: - hh : mm

56 - Was a cardiac stent placed: Yes No Unknown

57 - CABG performed: Yes No Unknown

58 - Was an ICD placed and/or scheduled: Yes No Unknown

59 - Hospital Medical Record Number:

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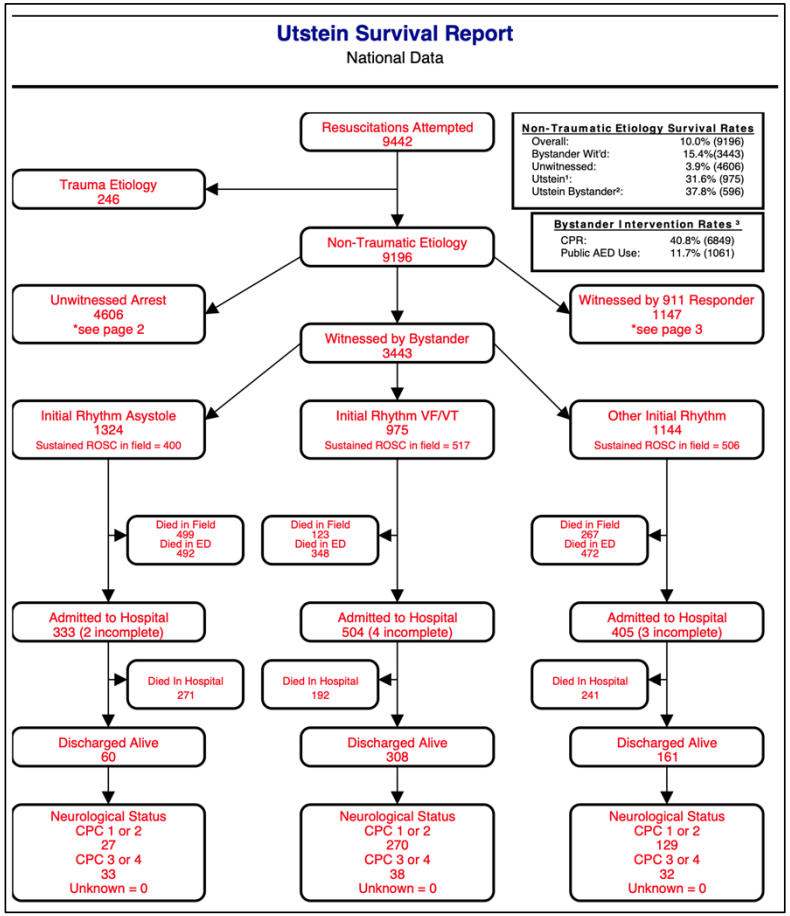
What is the output?

CARES Utstein Survival Report



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CARES EMS Summary Report

CARES Summary Report

Demographic and Survival Characteristics of OHCA

Data	EMS Agency N=162	State N=848	National N=26641
Age	**N=162**	**N=848**	**N=26632**
Mean	61.1	62.9	63.0
Median	63.0	65.0	65.0
Gender (%)	**N=162**	**N=848**	**N=26636**
Female	78 (48.1)	354 (41.7)	10215 (38.4)
Male	84 (51.9)	494 (58.3)	16421 (61.6)
Race (%)	**N=162**	**N=848**	**N=26639**
American-Indian/Alaskan	0 (0.0)	4 (0.5)	122 (0.5)
Asian	0 (0.0)	16 (1.9)	592 (2.2)
Black/African-American	123 (75.9)	413 (48.7)	5827 (21.9)
Hispanic/Latino	1 (0.6)	24 (2.8)	1735 (6.5)
Native Hawaiian/Pacific Islander	0 (0.0)	1 (0.1)	128 (0.5)
White	30 (18.5)	355 (41.9)	13728 (51.5)
Multi-racial	0 (0.0)	0 (0.0)	0 (0.0)
Unknown	8 (4.9)	35 (4.1)	4507 (16.9)
Location of Arrest (%)	**N=162**	**N=848**	**N=26641**
Home/Residence	101 (62.3)	588 (69.3)	18938 (71.1)
Nursing Home	22 (13.6)	118 (13.9)	2957(11.1)
Public Setting	39 (24.1)	142 (16.7)	4746 (17.8)
Arrest witnessed (%)	**N=162**	**N=848**	**N=26641**
Bystander Witnessed	83 (51.2)	324 (38.2)	10056 (37.7)
Witnessed by 911 Responder	23 (14.2)	118 (13.9)	3290 (12.3)
Unwitnessed	56 (34.6)	406 (47.9)	13295 (49.9)
Who Initiated CPR? (%)	**N=162**	**N=848**	**N=26639**
Not Applicable	0 (0.0)	0 (0.0)	16 (0.1)
Bystander	45 (27.8)	317 (37.4)	11041 (41.4)
First Responder	52 (32.1)	251 (29.6)	7400 (27.8)
Emergency Medical Services (EMS)	65 (40.1)	280 (33.0)	8182 (30.7)
Was an AED applied prior to EMS arrival? (%)	**N=162**	**N=848**	**N=26641**
Yes	59 (36.4)	295 (34.8)	7579 (28.4)
No	103 (63.6)	553 (65.2)	19062 (71.6)
Who first applied automated external defibrillator? (%)	**N=59**	**N=295**	**N=7573**
Bystander	6 (10.2)	42 (14.2)	1719 (22.7)
First Responder	53 (89.8)	253 (85.8)	5854 (77.3)
Who first defibrillated the patient?* (%)	**N=162**	**N=848**	**N=26282**
Not Applicable	111 (68.5)	620 (73.1)	18262 (69.5)
Bystander	2 (1.2)	9 (1.1)	441 (1.7)
First Responder	15 (9.3)	62 (7.3)	1447 (5.5)
Responding EMS Personnel	34 (21.0)	157 (18.5)	6132 (23.3)
First Arrest Rhythm (%)	**N=162**	**N=848**	**N=26638**
Vfib/Vtach/Unknown Shockable Rhythm	35 (21.6)	153 (18.0)	4810 (18.1)
Asystole	91 (56.2)	425 (50.1)	13562 (50.9)
Idioventricular/PEA	34 (21.0)	200 (23.6)	5959 (22.4)
Unknown Unshockable Rhythm	2 (1.2)	70 (8.3)	2307 (8.7)
Sustained ROSC (%)	**N=162**	**N=848**	**N=26635**
Yes	46 (28.4)	229 (27.0)	8118 (30.5)
No	116 (71.6)	619 (73.0)	18517 (69.5)
Was hypothermia care provided in the field? (%)	**N=162**	**N=848**	**N=26641**
Yes	0 (0.0)	5 (0.6)	924 (3.5)
No	162 (100.0)	843 (99.4)	25717 (96.5)
Pre-hospital Outcome (%)	**N=162**	**N=848**	**N=26641**
Pronounced in the Field	36 (22.2)	86 (10.1)	9651 (36.2)
Pronounced in ED	27 (16.7)	220 (25.9)	3553 (13.3)
Ongoing Resuscitation in ED	99 (61.1)	542 (63.9)	13437 (50.4)
Overall Survival (%)	**N=162**	**N=848**	**N=26641**
Overall Survival to Hospital Admission	40 (24.7)	191 (22.5)	7311 (27.4)
Overall Survival to Hospital Discharge	17 (10.5)	81 (9.6)	2659 (10.0)
With Good or Moderate Cerebral Performance	13 (8.0)	60 (7.1)	2121 (8.0)
Missing hospital outcome	2	2	45
Utstein[1] Survival (%)	**N=25**	**N=83**	**N=2849**
	32.0%	24.1%	31.8%
Utstein Bystander[2] Survival (%)	**N=9**	**N=51**	**N=1700**
	55.6%	31.4%	36.7%

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CARES EMS Survival Report

CARES Survival Report

National Data

	OVERALL N = 8126				
	Total N (%)	Sustained ROSC (%)	Survival to hospital admission (%)	Survival to hospital discharge (%)	Survival to discharge with CPC 1 or 2[†] (%)
Total	8126	2652 (32.6)	2405 (29.6)	974 (12.0)	771 (9.5)
Location of Arrest					
Home/Residence	5599 (68.9)	1732 (30.9)	1532 (27.4)	543 (9.7)	410 (7.3)
Nursing Home	902 (11.1)	218 (24.2)	170 (18.8)	44 (4.9)	23 (2.5)
Public Setting	1625 (20.0)	702 (43.2)	703 (43.3)	387 (23.8)	338 (20.8)
Arrest Witnessed Status					
Unwitnessed	4002 (49.3)	855 (21.4)	762 (19.0)	206 (5.1)	137 (3.4)
Bystander witnessed	3100 (38.2)	1357 (43.8)	1195 (38.5)	551 (17.8)	466 (15.0)
911 Responder witnessed	1022 (12.6)	439 (43.0)	447 (43.7)	217 (21.2)	168 (16.4)
Bystander CPR*					
Bystander CPR	3398 (47.8)	1157 (34.0)	1021 (30.0)	445 (13.1)	381 (11.2)
No Bystander CPR	3704 (52.2)	1055 (28.5)	936 (25.3)	312 (8.4)	222 (6.0)
Bystander CPR (excludes nursing home/healthcare facility events)	2537 (41.7)	921 (36.3)	832 (32.8)	378 (14.9)	334 (13.2)
No Bystander CPR (excludes nursing home/healthcare facility events)	3541 (58.3)	1011 (28.6)	903 (25.5)	301 (8.5)	218 (6.2)
Initial Arrest Rhythm					
Shockable	1572 (19.3)	807 (51.3)	793 (50.4)	484 (30.8)	418 (26.6)
Non-shockable	6554 (80.7)	1845 (28.2)	1612 (24.6)	490 (7.5)	353 (5.4)
AED Use					
Bystander AED use*	553 (7.8)	203 (36.7)	183 (33.1)	95 (17.2)	82 (14.8)
Bystander AED use* (excludes nursing home/healthcare facility events)	174 (2.9)	89 (51.1)	92 (52.9)	57 (32.8)	54 (31.0)
Trained provider (First Responder) AED use	1815 (22.3)	583 (32.1)	500 (27.5)	215 (11.8)	184 (10.1)
Utstein					
Witnessed and shockable	1116 (13.7)	625 (56.0)	615 (55.1)	408 (36.6)	364 (32.6)
Bystander witnessed and shockable	938 (11.5)	525 (56.0)	509 (54.3)	332 (35.4)	295 (31.4)
Hypothermia					
Field hypothermia	274 (3.4)	148 (54.0)	129 (47.1)	53 (19.3)	41 (15.0)
In-hospital hypothermia/TTM (among admitted patients)	1082 (45.0)	--	--	376 (34.8)	276 (25.5)

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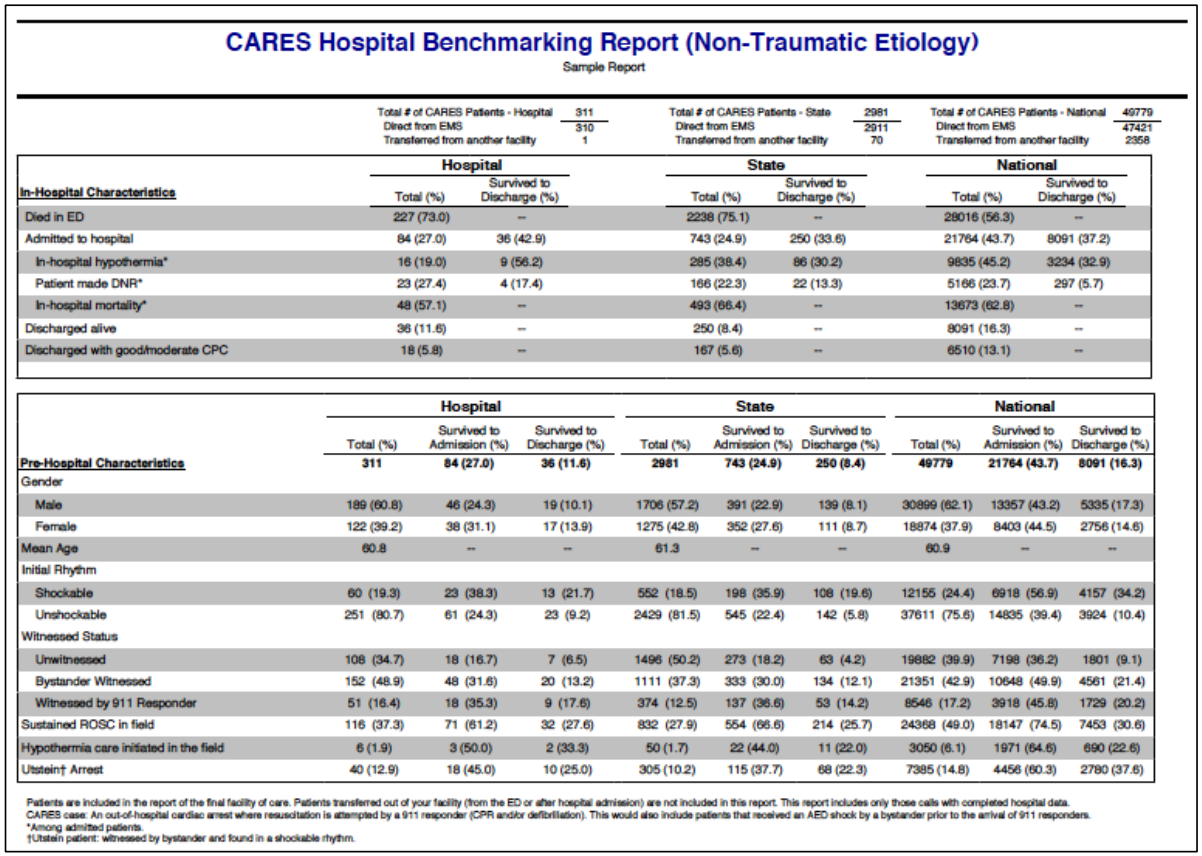
CARES Hospital Benchmarking Report



CARES Hospital Benchmarking Report (Non-Traumatic Etiology)

Sample Report

	Hospital		State		National	
Total # of CARES Patients	311		2981		49779	
Direct from EMS	310		2911		47421	
Transferred from another facility	1		70		2358	
In-Hospital Characteristics	Total (%)	Survived to Discharge (%)	Total (%)	Survived to Discharge (%)	Total (%)	Survived to Discharge (%)
Died in ED	227 (73.0)	--	2238 (75.1)	--	28016 (56.3)	--
Admitted to hospital	84 (27.0)	36 (42.9)	743 (24.9)	250 (33.6)	21764 (43.7)	8091 (37.2)
In-hospital hypothermia*	16 (19.0)	9 (56.2)	285 (38.4)	86 (30.2)	9835 (45.2)	3234 (32.9)
Patient made DNR*	23 (27.4)	4 (17.4)	166 (22.3)	22 (13.3)	5166 (23.7)	297 (5.7)
In-hospital mortality*	48 (57.1)	--	493 (66.4)	--	13673 (62.8)	--
Discharged alive	36 (11.6)	--	250 (8.4)	--	8091 (16.3)	--
Discharged with good/moderate CPC	18 (5.8)	--	167 (5.6)	--	6510 (13.1)	--

	Hospital			State			National		
	Total (%)	Survived to Admission (%)	Survived to Discharge (%)	Total (%)	Survived to Admission (%)	Survived to Discharge (%)	Total (%)	Survived to Admission (%)	Survived to Discharge (%)
Pre-Hospital Characteristics	**311**	**84 (27.0)**	**36 (11.6)**	**2981**	**743 (24.9)**	**250 (8.4)**	**49779**	**21764 (43.7)**	**8091 (16.3)**
Gender									
Male	189 (60.8)	46 (24.3)	19 (10.1)	1706 (57.2)	391 (22.9)	139 (8.1)	30899 (62.1)	13357 (43.2)	5335 (17.3)
Female	122 (39.2)	38 (31.1)	17 (13.9)	1275 (42.8)	352 (27.6)	111 (8.7)	18874 (37.9)	8403 (44.5)	2756 (14.6)
Mean Age	60.8	--	--	61.3	--	--	60.9	--	--
Initial Rhythm									
Shockable	60 (19.3)	23 (38.3)	13 (21.7)	552 (18.5)	198 (35.9)	108 (19.6)	12155 (24.4)	6918 (56.9)	4157 (34.2)
Unshockable	251 (80.7)	61 (24.3)	23 (9.2)	2429 (81.5)	545 (22.4)	142 (5.8)	37611 (75.6)	14835 (39.4)	3924 (10.4)
Witnessed Status									
Unwitnessed	108 (34.7)	18 (16.7)	7 (6.5)	1496 (50.2)	273 (18.2)	63 (4.2)	19882 (39.9)	7198 (36.2)	1801 (9.1)
Bystander Witnessed	152 (48.9)	48 (31.6)	20 (13.2)	1111 (37.3)	333 (30.0)	134 (12.1)	21351 (42.9)	10648 (49.9)	4561 (21.4)
Witnessed by 911 Responder	51 (16.4)	18 (35.3)	9 (17.6)	374 (12.5)	137 (36.6)	53 (14.2)	8546 (17.2)	3918 (45.8)	1729 (20.2)
Sustained ROSC in field	116 (37.3)	71 (61.2)	32 (27.6)	832 (27.9)	554 (66.6)	214 (25.7)	24368 (49.0)	18147 (74.5)	7453 (30.6)
Hypothermia care initiated in the field	6 (1.9)	3 (50.0)	2 (33.3)	50 (1.7)	22 (44.0)	11 (22.0)	3050 (6.1)	1971 (64.6)	690 (22.6)
Utstein† Arrest	40 (12.9)	18 (45.0)	10 (25.0)	305 (10.2)	115 (37.7)	68 (22.3)	7385 (14.8)	4456 (60.3)	2780 (37.6)

Patients are included in the report of the final facility of care. Patients transferred out of your facility (from the ED or after hospital admission) are not included in this report. This report includes only those calls with completed hospital data.
CARES case: An out-of-hospital cardiac arrest where resuscitation is attempted by a 911 responder (CPR and/or defibrillation). This would also include patients that received an AED shock by a bystander prior to the arrival of 911 responders.
*Among admitted patients.
†Utstein patient: witnessed by bystander and found in a shockable rhythm.

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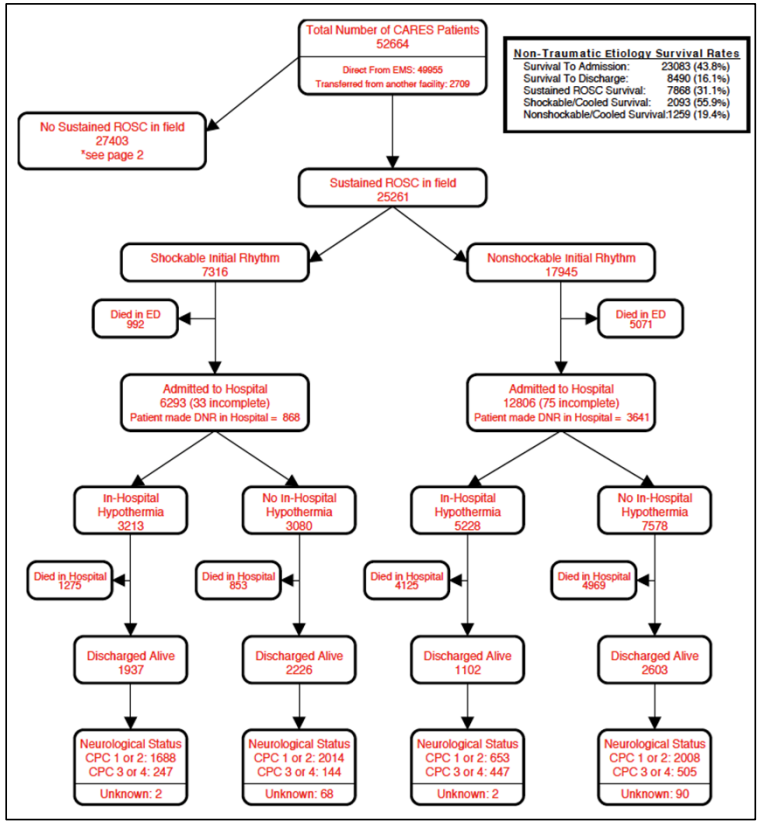
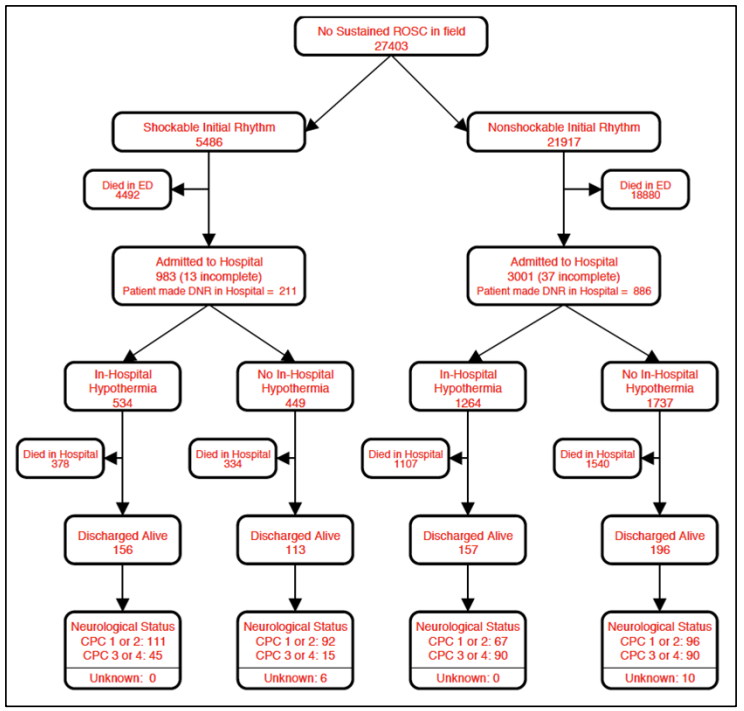
CARES Hospital Survival Report





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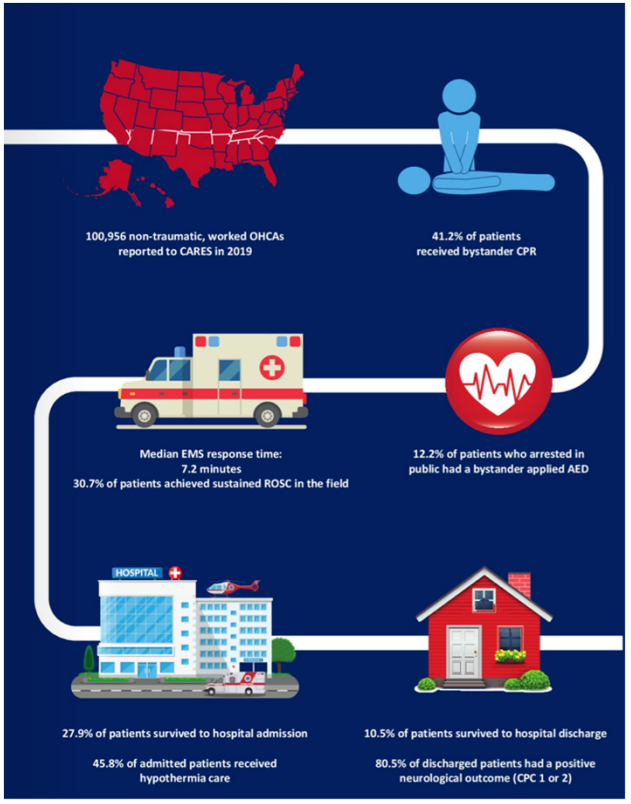
CARES Annual Report



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State Public Reporting

	OHCA Incidence					Non-Traumatic Etiology Survival Rates		Bystander Intervention Rates	
	CARES Cases Reported	2020 CARES Population Catchment	2020 Total State Population	% Population Covered	Incidence Rate (per 100,000)	Overall Survival to Hospital Discharge (%)	Utstein Survival (%)	CPR (%)	Public AED Use (%)
National	127,376	143,450,892	328,239,523	43.7%	88.8	9.0	29.2	40.2	9.0
State									
Alaska	474	606,242	731,545	82.9%	78.2	10.1	27.0	72.0	9.7
California	19,908	24,114,025	39,512,223	61.0%	82.6	7.9	29.1	41.8	7.6
Colorado	3,347	5,300,270	5,758,736	92.0%	63.1	13.1	33.2	40.1	7.0
Connecticut	1,817	2,180,601	3,565,287	61.2%	83.3	6.5	25.4	25.8	3.6
Delaware	1,271	973,764	973,764	100.0%	130.5	9.9	34.2	34.8	6.4
Hawaii	1,296	1,415,872	1,415,872	100.0%	91.5	9.4	29.4	45.2	5.2
Michigan	9,290	8,413,271	9,986,857	84.2%	110.4	7.1	27.4	36.2	8.3
Minnesota	3,063	4,567,272	5,639,632	81.0%	67.1	12.4	32.4	37.0	9.4
Mississippi	2,306	2,332,822	2,976,149	78.4%	98.9	6.2	24.7	42.4	7.9
Montana	571	914,114	1,068,778	85.5%	62.5	10.2	31.9	49.6	6.3
Nebraska	694	1,021,561	1,934,408	52.8%	67.9	14.6	33.1	49.1	16.3
North Carolina	7,346	7,918,744	10,488,084	75.5%	92.8	11.5	29.4	42.9	9.5
Oregon	2,677	3,928,444	4,217,737	93.1%	68.1	12.4	29.4	56.0	13.5
Pennsylvania	8,516	9,260,573	12,801,989	72.3%	92.0	8.0	22.8	35.8	10.3
Utah	1,417	3,205,958	3,205,958	100.0%	44.2	9.7	34.5	35.6	9.5
Vermont	517	623,989	623,989	100.0%	82.9	10.3	24.2	53.8	6.2
Washington	4,792	7,333,526	7,614,893	96.3%	65.3	13.7	37.9	56.3	10.9
District of Columbia	956	705,749	705,749	100%	135.5	4.6	31.7	28.0	5.3

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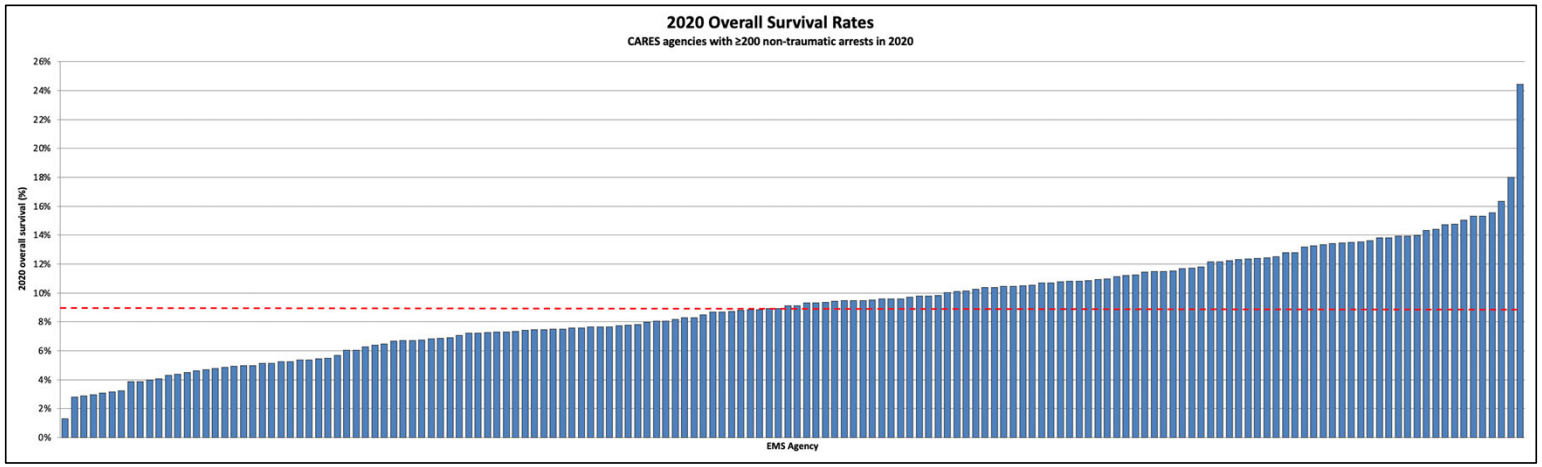
Regional Variation – Overall Survival



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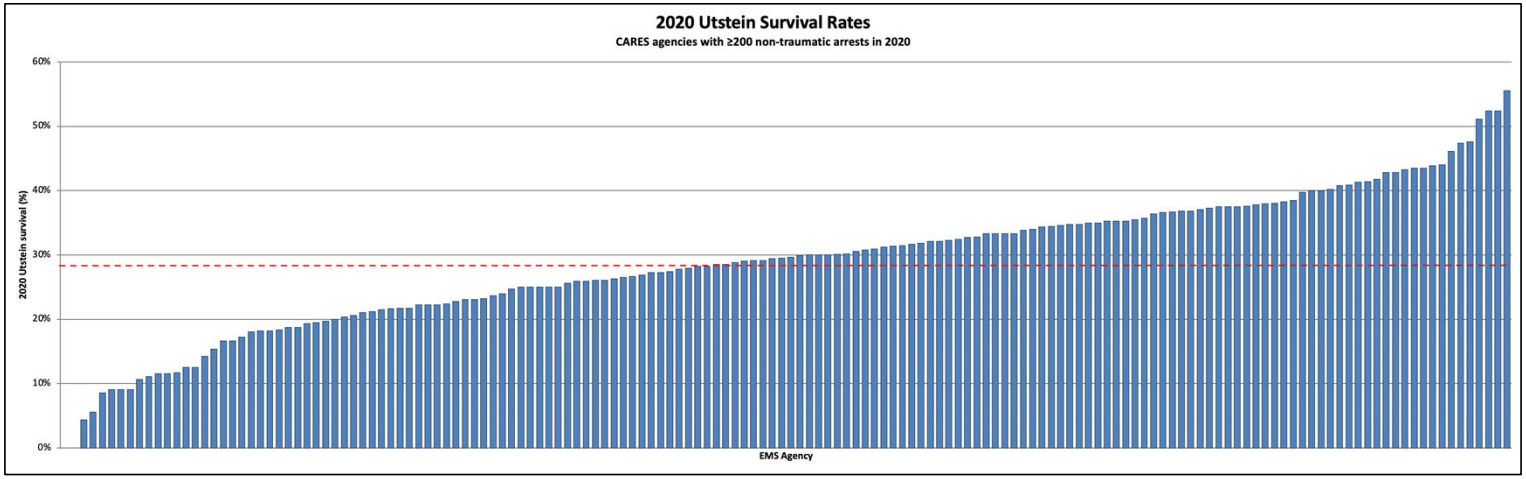
Regional Variation – Utstein Survival



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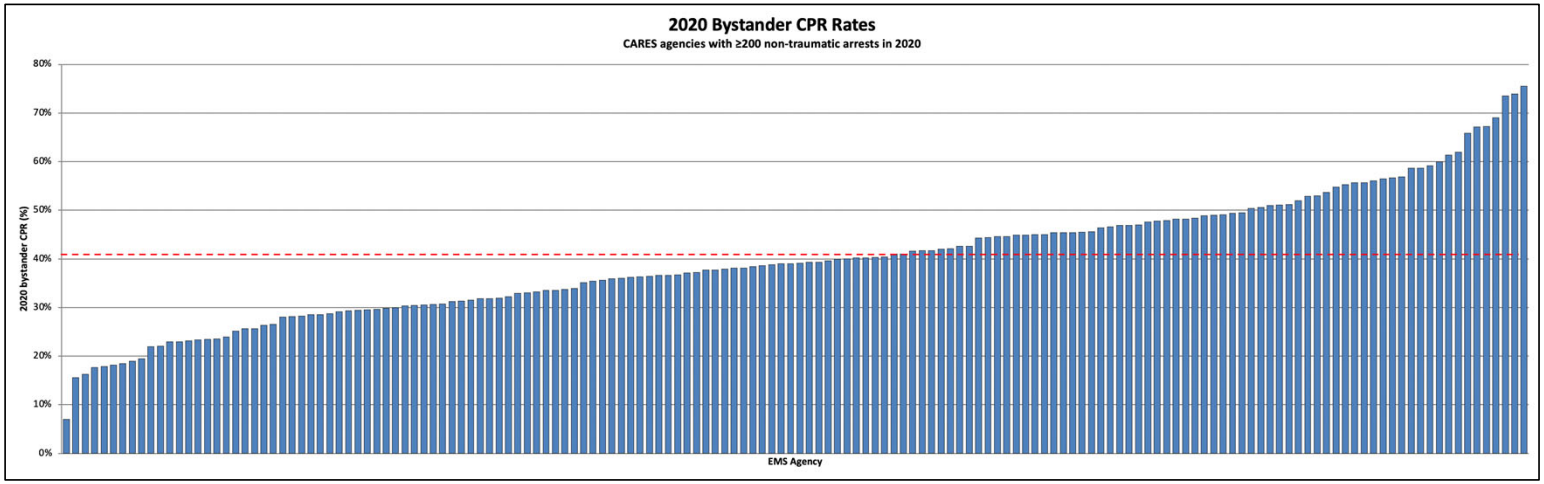
Regional Variation – Bystander CPR



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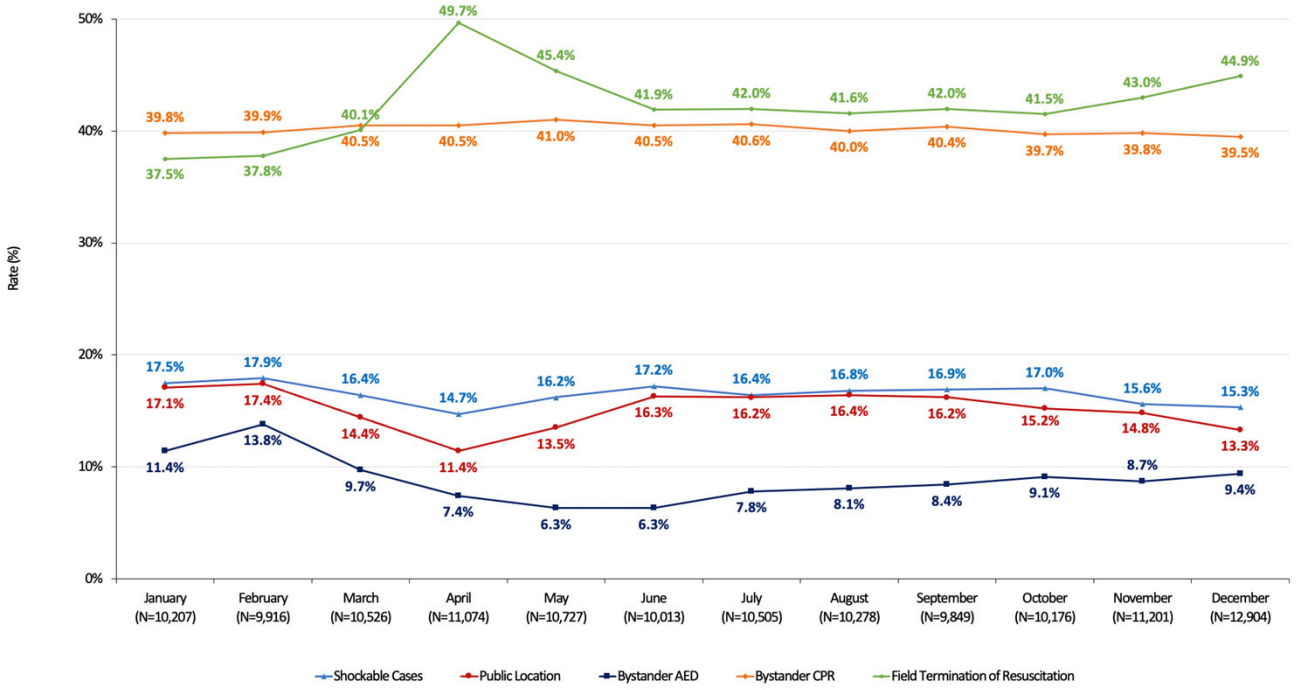
2020 Coronavirus Impact



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Coronavirus Research

Research

JAMA Cardiology | Original Investigation

Outcomes for Out-of-Hospital Cardiac Arrest in the United States During the Coronavirus Disease 2019 Pandemic

Paul S. Chan, MD, MSc; Saket Girotra, MD, SM; Yuanyuan Tang, PhD; Rabab Al-Araji, MPH; Brahmajee K. Nallamothu, MD, MPH; Bryan McNally, MD, MPH

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Conclusions

The COVID-19 pandemic has dramatically eroded recent survival gains for OHCA in the U.S., even in communities with low COVID-19 mortality which did not experience a meaningful increase in OHCA incidence.

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SURVEILLANCE

QUALITY IMPROVEMENT

RESEARCH

Measure & Improve Cycle

Measurement

Benchmarking

Feedback & Change

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What can we attribute variation in survival to?

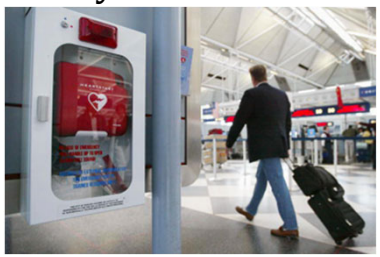
Links in the "Chain of Survival"

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

Early Access to Care

Early CPR

Early Defibrillation



Rapid Delivery of EMS Care

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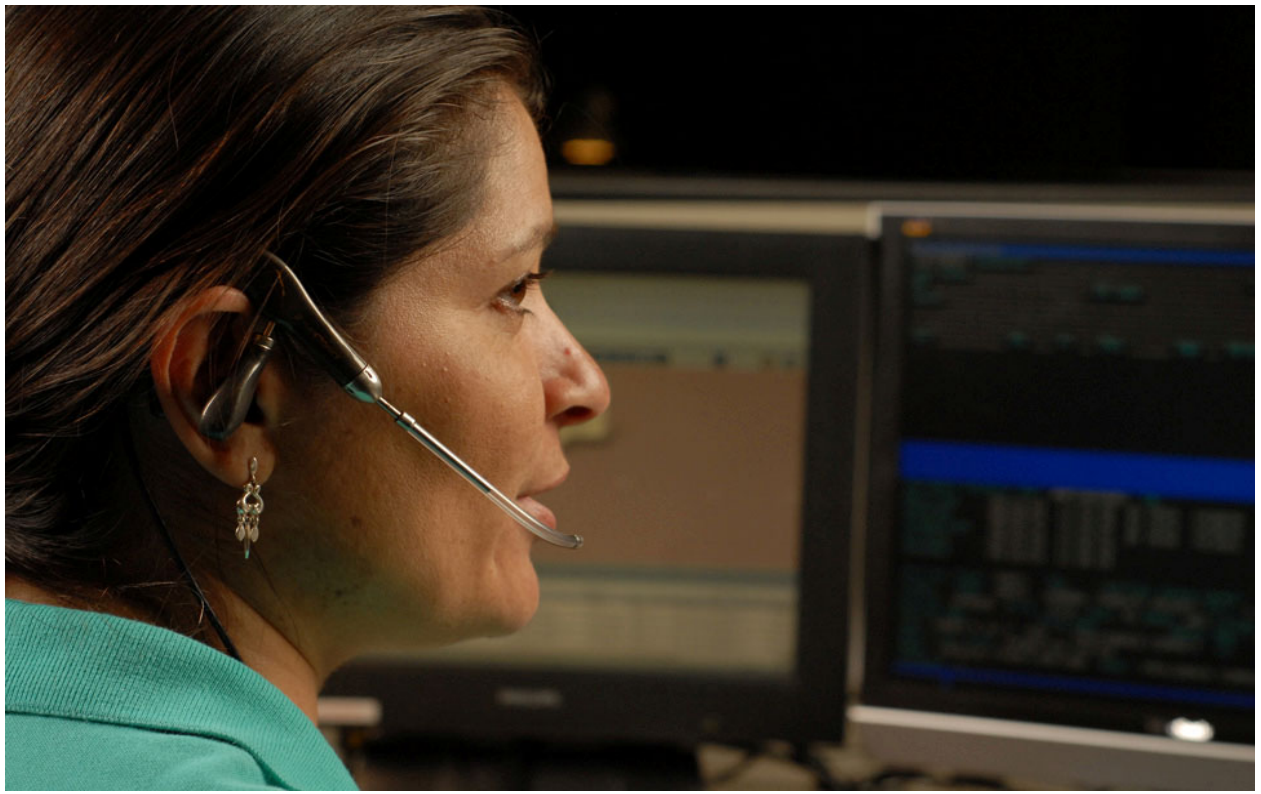
Dispatcher CPR



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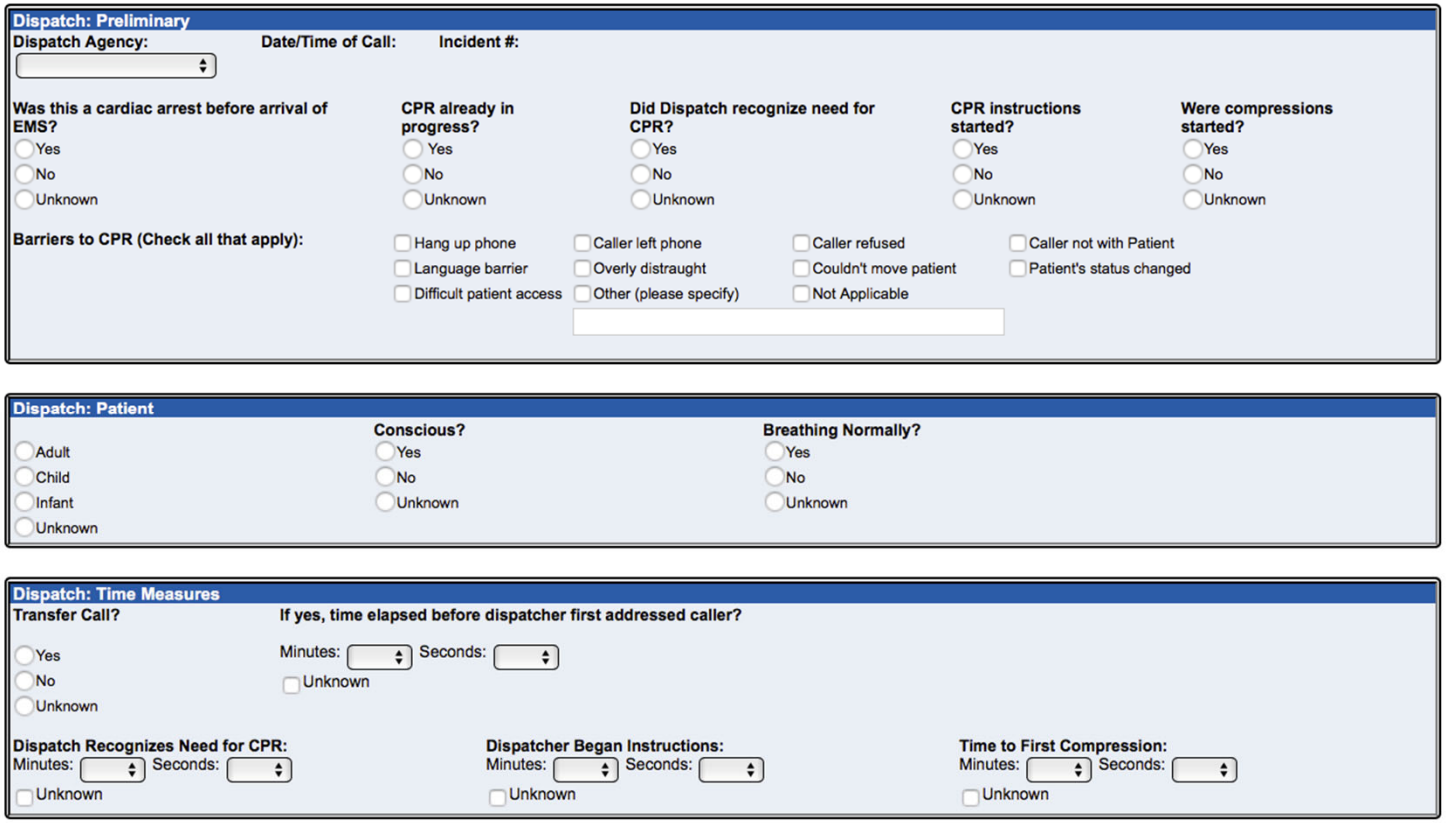
Dispatcher CPR Module



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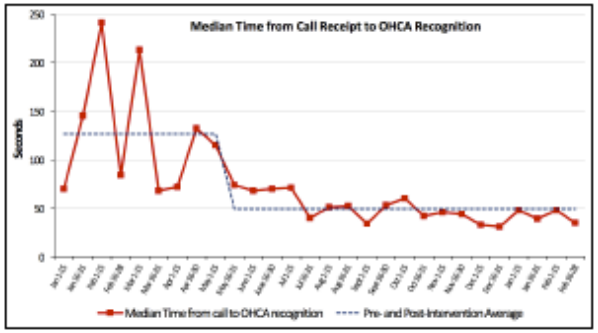
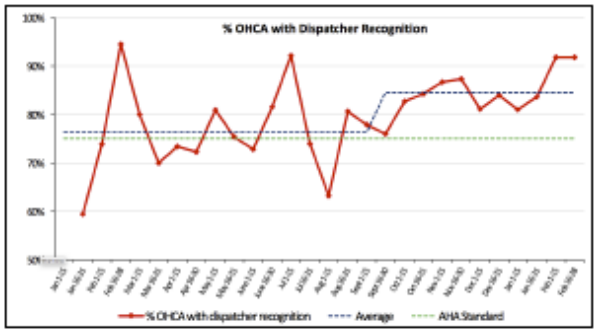
New Castle County EMS

- CARES participant for over a decade
- In 2018, committed to 100% OHCA call review
  - Goal to increase bystander CPR by targeting early recognition and initiation of pre-arrival instructions
- Methods included:
  - Baseline assessment from Jan-April 2018
  - Utilized CARES optional module
  - Trained supervisors reviewed every call
  - Twice monthly progress reports dissemination
  - Regular feedback from Medical Director
- Results within 8 months:
  - Improvements in all telecommunicator metrics
  - Telecommunicator recognition time decreased by 60 seconds
  - Bystander CPR improved in frequency & time of first compression decreased by 30 seconds on average





	Pre-intervention	Post-intervention
Recognition of OHCA by telecommunicator	76.3%	84.6%
Time to recognition of OHCA	127 seconds	50 seconds
Time to first compression	162 seconds	136 seconds
Bystander CPR after witnessed cardiac arrest	<45%	50%

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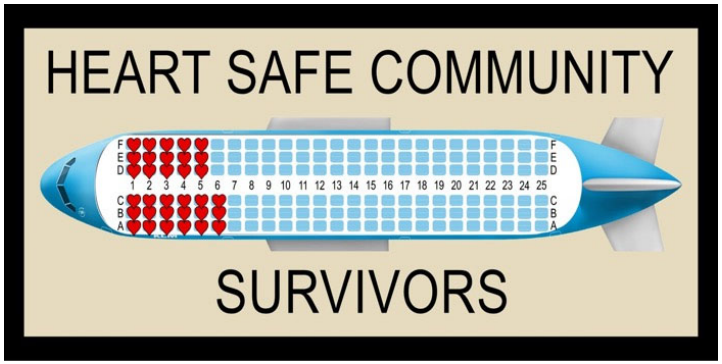
Hilton Head Fire Rescue

- Joined CARES in 2010 with no idea how they were performing
- Inspired by “Miracle on the Hudson”
- Implemented system improvements:
  - Pit crew CPR
  - Dispatcher TCPR training
  - Checklist for on scene and post resuscitative care
  - Meetings with hospitals
  - Feedback to crews
- Continuous Measure & Improve
  - Successful year in 2010
  - Slumped in 2013-2014
  - Highest performance to date this past year



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Eagle County, Colorado

- Vail & Beaver Creek ski resorts
- Starting Hearts *Call.Push.Shock* training program
- Partnered with ski patrol to place AEDs in strategic locations
- "Guerilla CPR & AED" training program at resort staff meetings
  - Trained 4,000+ employees

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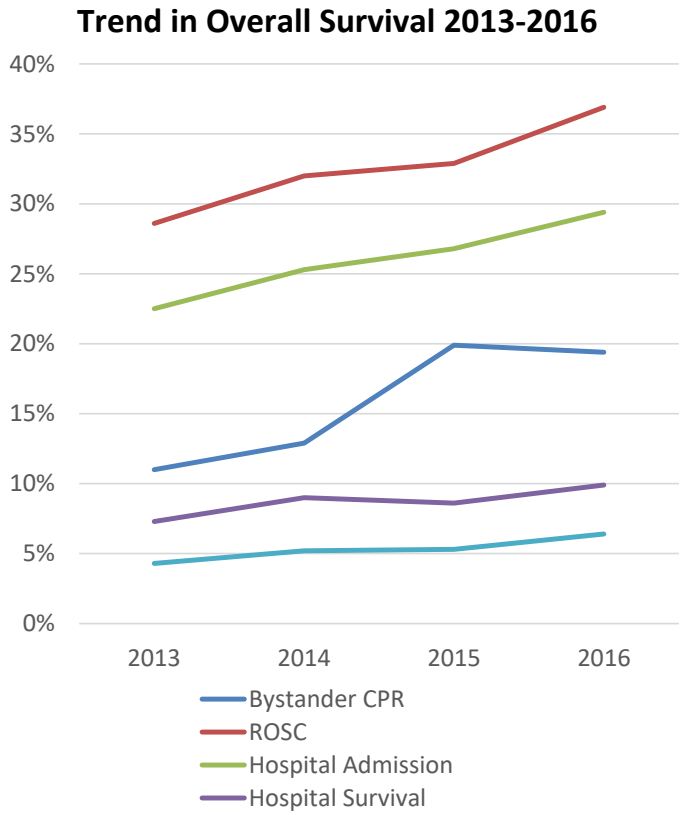
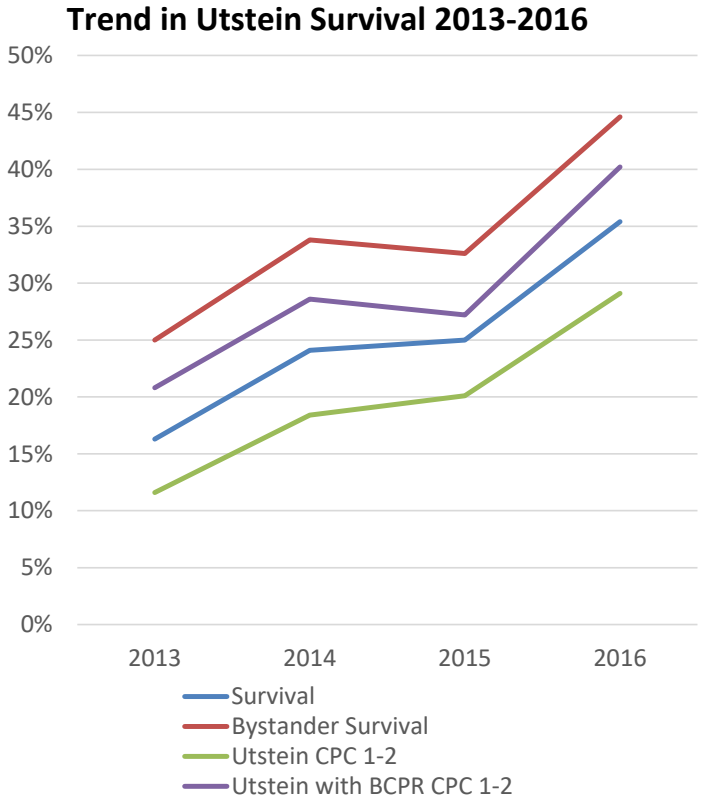
Chicago Fire Department





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State of Michigan

- In parallel with joining CARES, formed non-profit *SaveMiHeart*
  - Purpose to unite the community, dispatchers, First Responders, EMS and hospital system to improve OHCA survival
- To date, 89% population coverage in state
- Used CARES to identify areas of improvement
  - Identified areas of high incidence and low bystander intervention
  - Project focused on Hands Only CPR
- Partnered with U of Michigan athletics program
  - Provide CPR & AED training
  - PSA video in stadium to 100,000 spectators
- Resulted in exceeding national bystander CPR rate and increases in AED application rates throughout the state

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State of North Carolina

	2010	2013
Bystander CPR	39.3%	49.4%
Survival to discharge for patients with bCPR	9%	14%
Favorable Neurological Outcome for patients with bCPR	7.7%	12.9%

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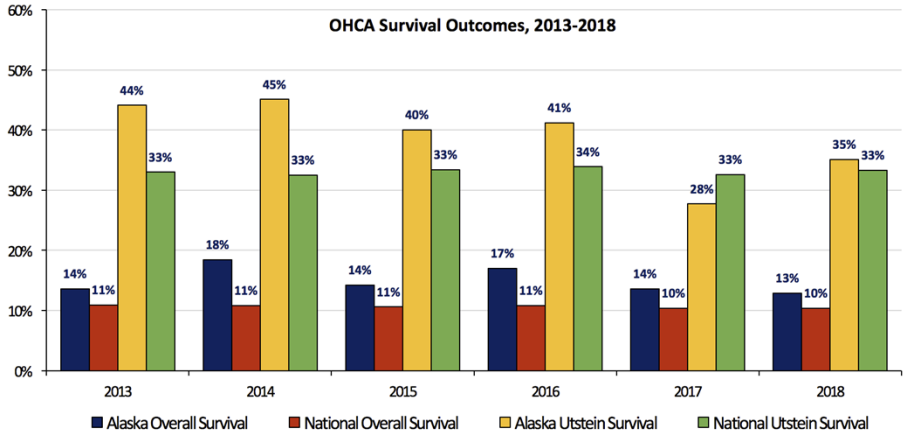
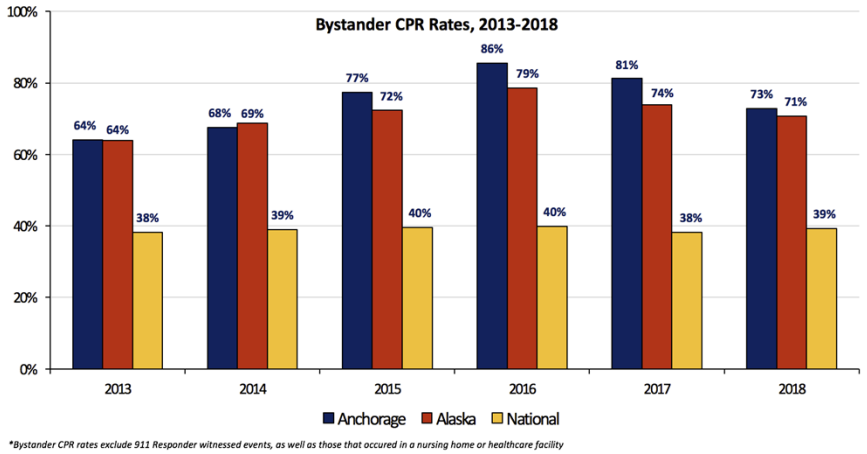
JAMA. 2015;314(3):255-264. doi:10.1001/jama.2015.7938

State of Alaska





*Bystander CPR rates exclude 911 Responder witnessed events, as well as those that occured in a nursing home or healthcare facility

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Other State-Level Improvement Activities

- Illinois HeartRescue bCPR PSA videos
  - *https://youtu.be/O6SANxdODGU*
  - *https://youtu.be/N0LLw3bFvC0*
- Resuscitation Academies
  - Seattle, Maryland, Ohio, Atlanta
- Texas Two Step CPR initiative

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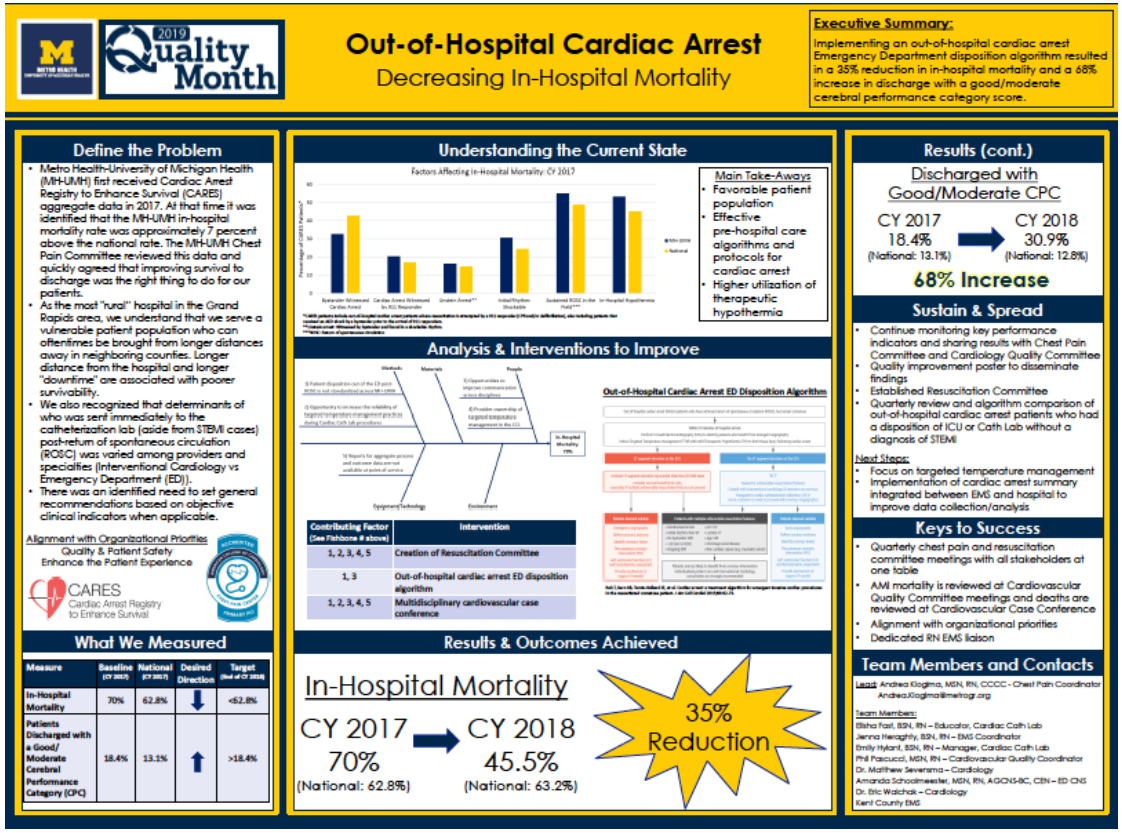
“CARES in Action” in the Hospital



2019 Quality Month

Out-of-Hospital Cardiac Arrest
Decreasing In-Hospital Mortality

Executive Summary:
Implementing an out-of-hospital cardiac arrest Emergency Department disposition algorithm resulted in a 35% reduction in in-hospital mortality and a 68% increase in discharge with a good/moderate cerebral performance category score.

Define the Problem
- Metro Health-University of Michigan Health (MH-UMH) first received Cardiac Arrest Registry to Enhance Survival (CARES) aggregate data in 2017. At that time it was identified that the MH-UMH in-hospital mortality rate was approximately 7 percent above the national rate. The MH-UMH Chest Pain Committee reviewed this data and quickly agreed that improving survival to discharge was the right thing to do for our patients.
- As the most "rural" hospital in the Grand Rapids area, we understand that we serve a vulnerable patient population who can oftentimes be brought from longer distances away in neighboring counties. Longer distance from the hospital and longer "downtime" are associated with poorer survivability.
- We also recognized that determinants of who was sent immediately to the catheterization lab (aside from STEMI cases) post-return of spontaneous circulation (ROSC) was varied among providers and specialties (Interventional Cardiology vs Emergency Department (ED)).
- There was an identified need to set general recommendations based on objective clinical indicators when applicable.

Alignment with Organizational Priorities
Quality & Patient Safety
Enhance the Patient Experience

CARES Cardiac Arrest Registry to Enhance Survival

What We Measured

Measure	Baseline (CY 2017)	National (CY 2017)	Desired Direction	Target (End of CY 2018)
In-Hospital Mortality	70%	62.8%	↓	<62.8%
Patients Discharged with a Good/ Moderate Cerebral Performance Category (CPC)	18.4%	13.1%	↑	>18.4%

Understanding the Current State

Main Take-Aways
- Favorable patient population
- Effective pre-hospital care algorithms and protocols for cardiac arrest
- Higher utilization of therapeutic hypothermia

Analysis & Interventions to Improve

Contributing Factor (See Fishbone # above)	Intervention
1, 2, 3, 4, 5	Creation of Resuscitation Committee
1, 3	Out-of-hospital cardiac arrest ED disposition algorithm
1, 2, 3, 4, 5	Multidisciplinary cardiovascular case conference

Results & Outcomes Achieved
In-Hospital Mortality

CY 2017 70% (National: 62.8%) → CY 2018 45.5% (National: 63.2%)

35% Reduction

Results (cont.)
Discharged with Good/Moderate CPC

CY 2017 18.4% (National: 13.1%) → CY 2018 30.9% (National: 12.8%)

68% Increase

Sustain & Spread
- Continue monitoring key performance indicators and sharing results with Chest Pain Committee and Cardiology Quality Committee
- Quality improvement poster to disseminate findings
- Established Resuscitation Committee
- Quarterly review and algorithm comparison of out-of-hospital cardiac arrest patients who had a disposition of ICU or Cath Lab without a diagnosis of STEMI

Next Steps:
- Focus on targeted temperature management
- Implementation of cardiac arrest summary integrated between EMS and hospital to improve data collection/analysis

Keys to Success
- Quarterly chest pain and resuscitation committee meetings with all stakeholders at one table
- AMI mortality is reviewed at Cardiovascular Quality Committee meetings and deaths are reviewed at Cardiovascular Case Conference
- Alignment with organizational priorities
- Dedicated RN EMS liaison

Team Members and Contacts
Lead: Andrea Kloglma, MSN, RN, CCCC - Chest Pain Coordinator
Andrea.Kloglma@metrohrg.org

Team Members:
Elisha Fast, BSN, RN – Educator, Cardiac Cath Lab
Jenna Heraghty, BSN, RN – EMS Coordinator
Emily Hylant, BSN, RN – Manager, Cardiac Cath Lab
Phil Pascucci, MSN, RN – Cardiovascular Quality Coordinator
Dr. Matthew Severamna – Cardiology
Amanda Schoolmeester, MSN, RN, AGCNS-BC, CEN – ED CNS
Dr. Eric Walchak – Cardiology
Kent County EMS

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SURVEILLANCE

QUALITY IMPROVEMENT

RESEARCH

National Data Sharing Projects

- OHCA in the United States during the Covid-19 pandemic
- MMWR –HP 2020 Outcomes
- CARES- CDC- Medicare Linkage
- Association of sex/gender with OHCA characteristics, hospital interventions, and survival outcomes
- Relationship between field ROSC and rate of field termination
- Analysis of cooling after non-shockable OHCA
- OHCA and STEMI Predictive Risk Model
- Loss of labor productivity following adult OHCA
- Public health impact of drug related OHCA
- Left heart catheterization trends
- Predictive modeling of elderly OHCA survivors to guide clinical care and facilitate effective communication
- Comparison of OHCA characteristics by urban/rural status
- Association of ambient air pollution with risk of OHCA
- Disparities in TTM following OHCA
- Pediatric studies:
  - Conventional vs Compression Only CPR
  - Airway management after OHCA
  - Risk of Cardiac Arrest in Children by Race and Ethnicity

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State Data Sharing Projects

- **Michigan**
  - Enhancing pre-hospital outcomes for cardiac arrest
  - Association of hands-only CPR knowledge and bCPR rates
  - Evaluating post-arrest hospital care for resuscitated patients
  - Bystander CPR and survival rates in Southeastern Michigan
  - Intraosseous Route of Drug Administration is Associated with Lower Survival in OHCA
- **North Carolina**
  - Time intervals and survival outcomes after OHCA in North Carolina
  - Care and outcomes of urban and non-urban OHCA patients
  - Association of variations in care and survival outcomes after out-of-hospital cardiac arrest across counties in North Carolina
  - Comparisons of Emergency Systems of Care, Socioeconomic Characteristics and Racial Distribution and Their Relations to Outcomes after Cardiac Arrest: (NC & WA & Denmark)
- **Pennsylvania**
  - Association of community characteristics with bCPR provision
- **Texas**
  - Community Variations in Out of Hospital Cardiac Arrest Care and Outcomes in Texas
  - Disparities in Out of Hospital Cardiac Arrest Care and Outcomes in Texas
  - A Standardized Template for Evaluating Telecommunicator Cardiopulmonary Resuscitation in Pediatric OHCA

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NIH Funded CARES Studies

- **University of Michigan**

  "Enhancing Pre-Hospital Outcomes for Cardiac Arrest (EPOC)"

- **Duke University**

  "Regional Approaches to Cardiovascular Emergencies-Cardiac ARreSt (RACE-CARS)"

- **Mt. Sinai School of Medicine**

  "CARES-Medicare Machine Learning Modeling"

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State Participation

Benefits of State Participation

- Helps you improve your system of care for OHCA by allowing you to more efficiently track your patients and their outcomes
- Ability to aggregate data for the entire state as well identify high and low performers within the state in order to target interventions that help improve outcomes
- Can measure the impact of resources to show benefit for sustained QI
- Leverage statewide data to obtain funding for strategic allocation of resources
- Ability to pull local and national data from current and previous years to educate stakeholders and benchmark performance
- Access to tools and resources for implementing Dispatcher-Assisted CPR and tracking targeted temperature management in the hospital

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North Dakota CARES

Interested in participation?

- Contact ND State Coordinator
  Christine Greff
  cgreff@nd.gov

- Complete “Interest in CARES Questionnaire” on CARES website
  https://mycares.net/sitepages/enrollment.jsp

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Questions?