



# EMS Agencies Impact Bystander Interventions During Out-of-Hospital Cardiac Arrest



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## Background

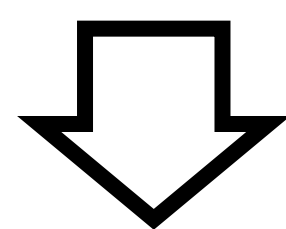
Bystander CPR rates and AED use in out-of-hospital cardiac arrest (OHCA) vary widely across EMS service areas in Missouri. EMS agencies report the number and outcome of OHCA in their service area annually, in addition to other data points; this data is compiled into the Cardiac Arrest Registry to Enhance Survival (CARES) database. Both CPR and AED use by the public in OHCA are associated with increased survival to discharge.

## Objective

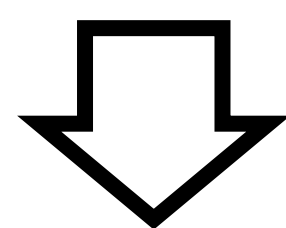
1. Characterize themes shared among EMS agencies that service areas with high rates of bystander CPR and AED use, with the goal of influencing program development in lower-performing service areas.
2. Understand how bystander CPR and AED use, both separately and simultaneously, affect patient outcomes.

## Methods

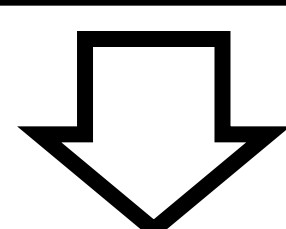
“Measure and Improve” reports, sourced from Missouri’s CARES, were used to identify the top five EMS agencies in Missouri for bystander CPR and AED use rates (ten total agencies)



Population and funding data were accessed for each agency, and a phone interview was utilized to identify themes in agency practices and community AED accessibility



Descriptive statistics were used to characterize agencies with frequency analyses



CARES data was analyzed, focusing on the interventions and outcomes of OHCA in Missouri between 2013-2021

## Results

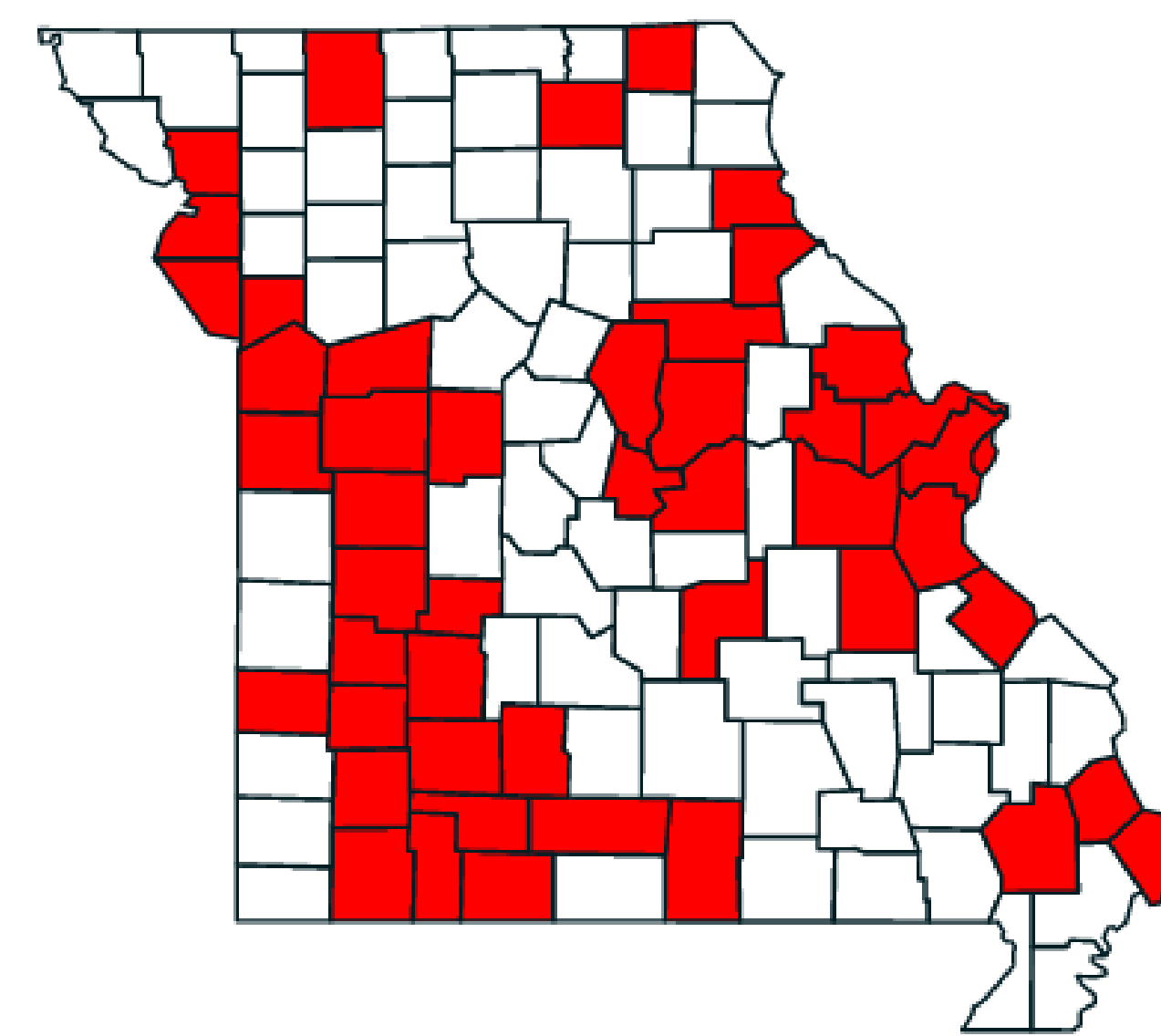
58 EMS agencies participate in MO CARES.  
10168 patients are in the CARES database.

### Primary outcome measures include:

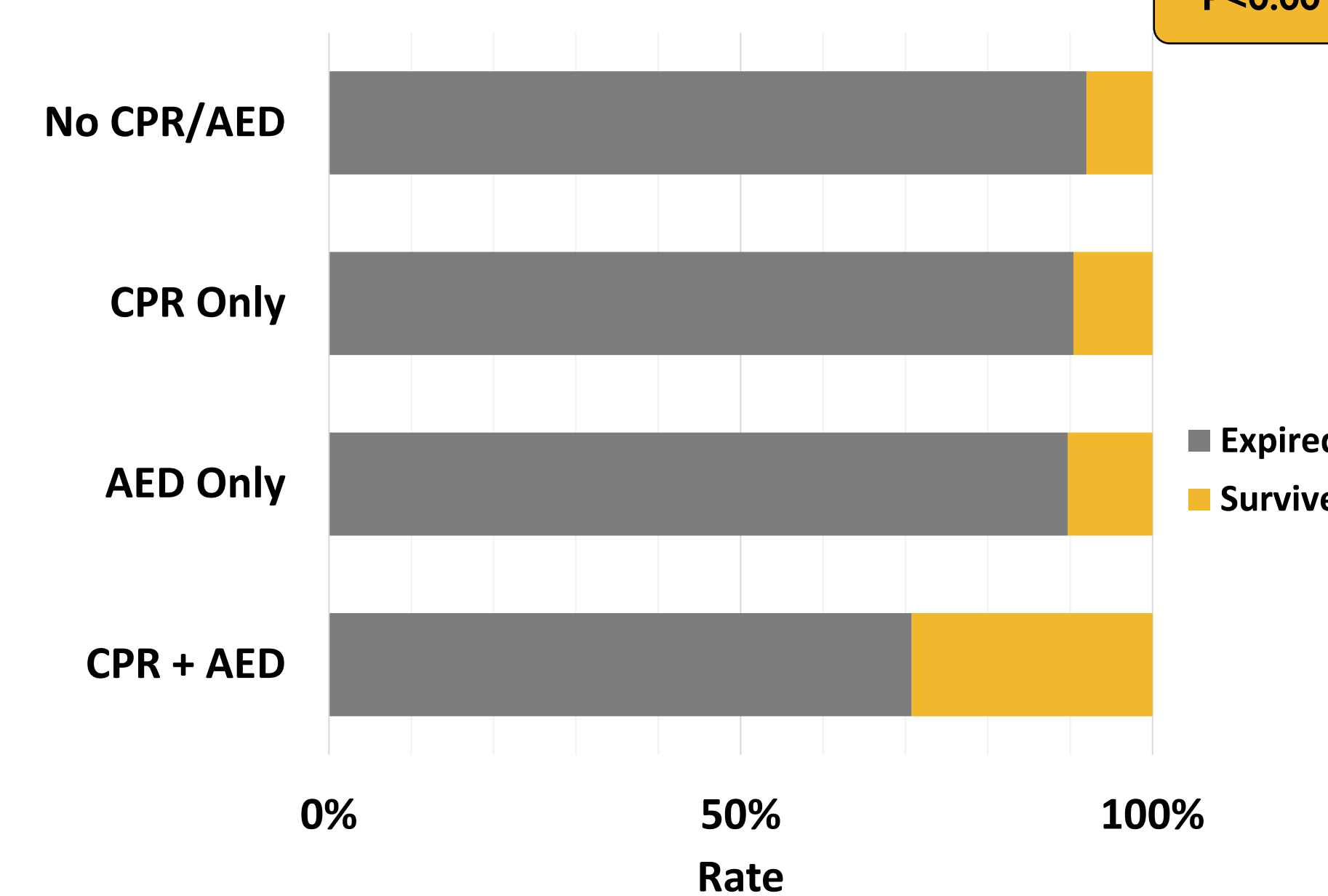
- Identification of replicable themes shared among the top five EMS agencies in each category
- MO CARES data endpoints
  - Sustained ROSC
  - Survived to hospital admission
  - Survived to discharge
  - Received bystander CPR
  - Received bystander AED application

MO CARES Demographics				
Age	< 18	18-39	40-65	65+
	3%	11%	44%	42%
Race	White	Black or African American	Hispanic/Latino	Other
	58%	36%	2%	4%
	Female		Male	
	39%		61%	
Arrest Witness Status	Unwitnessed	Witnessed by Bystander	Witnessed by 911 Responder	
	30%	39%	31%	
	Location Type	Public	Home/Residence	Nursing Home/Healthcare Facility
14%		71%	15%	

Missouri Counties Participating in CARES



Effect of Bystander Interventions on Patient Discharge Following OHCA



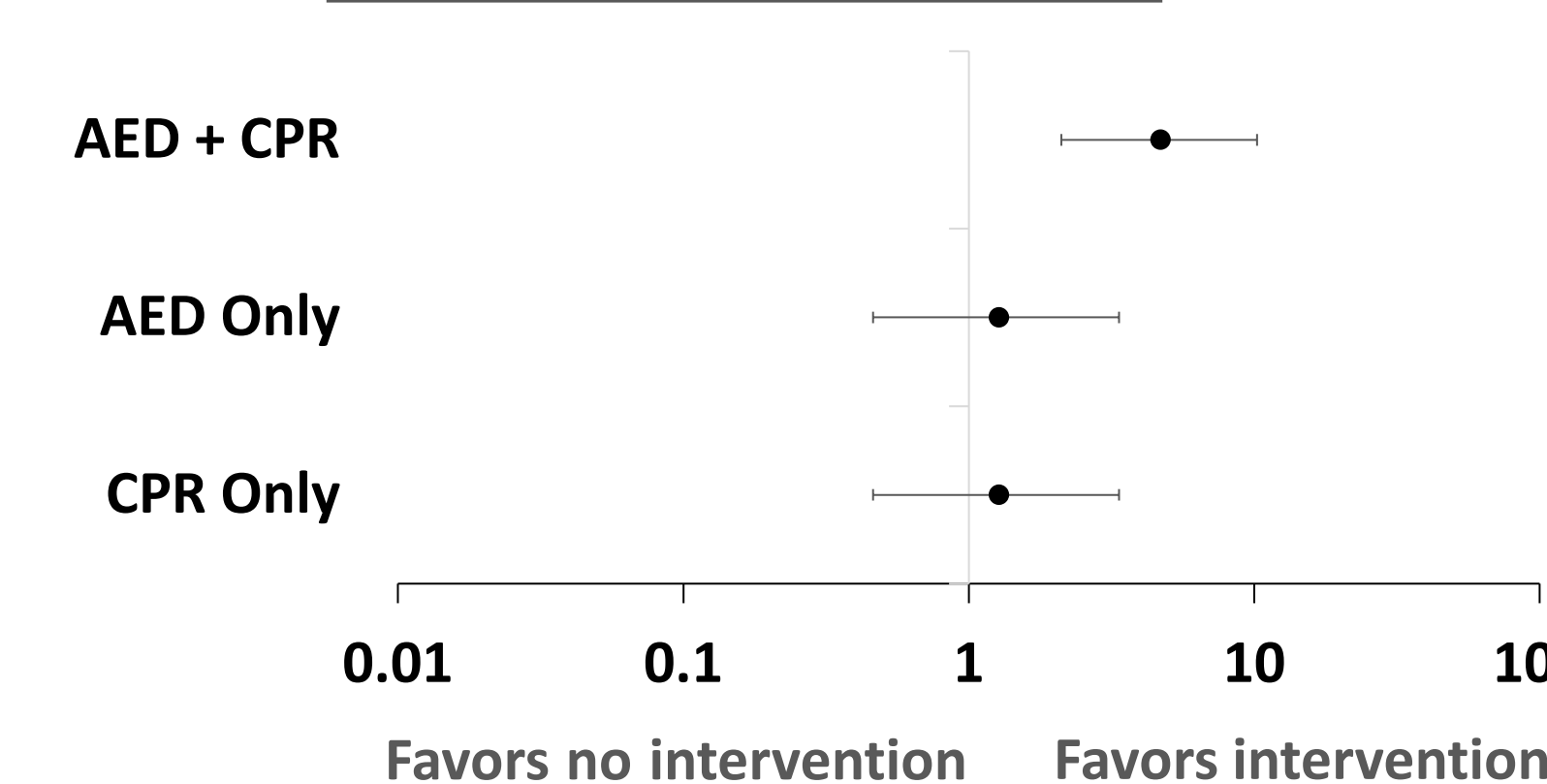
### Agency-Specific Results:

- All top-performing agencies reported frequent bystander early-intervention training programs
- 3/10 agencies mentioned the COVID-19 pandemic as having a negative impact on training, but were able to persist with virtual events
- 6/10 agencies retained the same number of training staff through the pandemic
- All agencies reported strong public interest in CPR and AED training opportunities
  - Schools, nursing homes, hotels, and local businesses were common entities to request training
  - One district reported increased instructor recruitment to meet area demand
- Telecommunicator CPR use, or an equivalent program, was ubiquitous
- 3/10 communities recently received new grants to purchase additional AEDs for public spaces
- No agencies had a unified method to track AEDs in their community

### Bystander Intervention Effects on ROSC, Hospital Admission, and Discharge

	No CPR/AED	CPR Only	AED Only	CPR + AED
Sustained ROSC	25%	28%	29%	45%
Survived to hospital admission	25%	25%	24%	42%
Survived to discharge	8%	10%	10%	29%

### Odds Ratios for Bystander Intervention Effects on Patient Outcomes



## Discussion

### Recommendations:

1. Report findings to facilitate policy change in mandatory AED reporting within Missouri through administration and recommendation to government entities.
2. Investigate disparities in EMS response times within rural Missouri.
3. Continue to provide high-quality bystander CPR trainings to the Columbia and surrounding community.
4. Provide additional resources to EMS/fire agencies to support community interest and conduct evidence-based trainings.
5. Present compelling data demonstrating the impact of simultaneous bystander CPR and AED use to support statewide initiatives funding additional CPR training and community AED placement.

### Limitations:

- Data used to generate the top agencies for bystander CPR and AED use were self-reported by each agency
  - QI controls within CARES ensure as accurate data reporting as possible
- Findings are observational; they cannot be used to show causation
- Data are from one state and only characterize those agencies participating in CARES.



## Conclusion

EMS agencies with high rates of bystander CPR and AED use share these themes:

- Frequent public trainings
- Utilize TCPR
- Sustained or increasing staffing through COVID-19
- High community interest in early-intervention trainings

### On Public Interest:

• “We go to every PR event we can, and people that walk by can work with a live feedback mannequin.”  
• “Funding is the biggest issue we’ve run into. Our classes fill quickly and we turn people away each class just because we don’t have enough funding to certify everyone.”

### On QA/QI:

• “After every cardiac arrest call where an AED was used, we’ll go back to that location and pull the data from that AED. We can look at what rhythm the patient was in at the beginning, and what happened from there.”  
• “QA/QI is a massive priority for us. Every week, we hold a QA/QI meeting where we break down cardiac arrest calls, piece by piece. We go back to the second that call came into dispatch and analyze every piece of data we have.”

Patients that received both bystander CPR and AED application were 3.5 times more likely to survive, neurologically intact, to discharge.

Our goal is that this research will ultimately inform recommendations for EMS agencies’ training programs and policies.

## Acknowledgements

Thank you to the CARES team & all participating EMS agencies!

