

### EMS Agencies with High Rates of Field Termination of Cardiac Arrest Care Also Have High Rates of Survival

John Summers, DO; Douglas Kupas, MD;  
Christopher Berry, MD; Mark Olaf, DO  
Geisinger Medical Center – Danville, PA



---

---

---

---

---

---

---

---

### Disclosures

- Douglas Kupas, MD - CARES Oversight Board and CARES Advisory Board member



---

---

---

---

---

---

---

---

### Background

- survival to hospital discharge following out-of-hospital cardiac arrest (OHCA) is low
- survival to hospital discharge rare (<1%) for OHCA patients without return of spontaneous circulation (ROSC) on scene
- transport of OHCA patients without ROSC impacts EMS and ED resource utilization, may limit family presence at end of life
- clinical decision rules for field termination of resuscitation (FTOR) exist and have been validated



---

---

---

---

---

---

---

---

### Study Aim / Hypotheses

- Study aimed to determine if EMS agencies with high rates of FTOR are leaving potential survivors behind
- We hypothesized that EMS agencies with more frequent FTOR would have better patient outcomes, including:
  - higher rates of ROSC
  - higher rates of survival to hospital discharge
  - more favorable neurologic outcome

Geisinger

---

---

---

---

---

---

---

---

### Methods



- Inclusion Criteria:
  - all CARES-participating ALS EMS agencies
  - 80 or more OHCA cases 2013-2016
- EMS agencies divided into quartiles by FTOR:
  - top quartile, highest rate FTOR (HiTOR)
  - bottom quartile, lowest rate FTOR (LoTOR)



Geisinger

---

---

---

---

---

---

---

---

### Methods

- HiTOR:LoTOR comparison via generalized estimating equation models
- Primary Measures of Interest
  - ROSC
  - survival to hospital discharge
  - neurologic outcome by Cerebral Performance Category (CPC)
- Secondary Measures of Interest
  - response time, on scene time, transport time
  - medication administration
  - advanced airway
  - mechanical CPR

Geisinger

---

---

---

---

---

---

---

---

## Results

Sample Descriptive Statistics			
Characteristic p-value (HITOR v LoTOR)	All Cases n = 122,834	LoTOR (<18.4%) n = 27,314	HITOR (>45.5%) n = 31,486
Age - Mean (SD) p < 0.001	62.5 (19.3)	62.5 (19.2)	61.8 (19.6)
Sex - Male (%) p < 0.001	61.2%	58.5%	62.6%
Race - White (%)	51.1%	53.5%	53.8%
Race - Black (%) p = 0.048	18.1%	24.3%	13.3%
Race - Other/Unknown (%) p = 0.785	30.8%	22.2%	32.9%

Geisinger

---

---

---

---

---

---

---

---

---

---

## Results

Case Characteristic Comparison HITOR v LoTOR				
	LoTOR	HITOR	$\beta$ / Odds Ratio	p - value
Response Time (minutes, median)	7.9 min	7.4 min	----	0.133
On Scene Time (minutes, median, transported only)	16 min	25 min	$\beta$ = 7.63	<0.001
Transport Time (minutes, median)	8 min	10 min	$\beta$ = 3.94	<0.001
Medications Administered	86.7%	92.0%	OR = 1.50	0.035
Advanced Airway	77.9%	75.7%	----	0.922
Mechanical CPR	26.0%	19.7%	----	0.086

Geisinger

---

---

---

---

---

---

---

---

---

---

## Results

Case Characteristic Comparison HITOR v LoTOR				
	LoTOR	HITOR	$\beta$ / Odds Ratio	p - value
Witnessed Arrest	48.0%	49.6%	----	0.56
Bystander CPR	36.5%	46.7%	OR = 1.52	<0.001
Shockable Rhythm	18.9%	21.7%	OR = 1.16	0.003

  

Primary Measures - Adjusted Statistics					
	LoTOR	HITOR	Adjusted OR	95% CI	p - value
ROSC	26.4%	35.4%	OR = 1.20	(1.13-1.28)	<0.001
Survival to Discharge	8.5%	12.5%	OR = 1.95	(1.52-2.51)	<0.001
Favorable Neurologic Outcome (CPC 1-2)	77.9%	86.7%	OR = 1.60	(1.23-2.08)	<0.001

Geisinger

---

---

---

---

---

---

---

---

---

---

### Discussion

- Results suggest that EMS agencies with high rates of FTOR do not have lower rates of survival because of this practice.
- In fact, these agencies appear to have higher rates of survival.
- This finding may be due in part to higher performing EMS agencies spending more time on scene to obtain ROSC.

Geisinger

---

---

---

---

---

---

---

---

### Limitations

- retrospective
- CARES data elements limitations:
  - designed for quality improvement
  - data does not include all elements of FTOR decision making
  - quality of CPR not a documented variable
- study does not analyze individual patients to assess individual survival to transport, associated possible correlated factors

Geisinger

---

---

---

---

---

---

---

---

### Conclusion

- EMS agencies with the highest rates of FTOR also have higher rates of ROSC, survival, and good neurologic outcome. These agencies spend more time on scene prior to patient transport, suggesting they may not have a culture of 'scoop and swoop' for OHCA care.

Geisinger

---

---

---

---

---

---

---

---

**Acknowledgements**

- Cardiac Arrest Registry to Enhance Survival
- Anne Knorr – Geisinger EM Research Coordinator
- Andrea Berger – Statistician

Geisinger

---

---

---

---

---

---

---

---