

# *Adrenaline Rush*

*Does sooner mean better?*



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# Disclosure

Vidacare<sup>®</sup> Corporation provided support for a portion of this study to include administrative support and supplies. Additionally, they have provided permission to utilize some of the graphics shown in this presentation.



# Issues

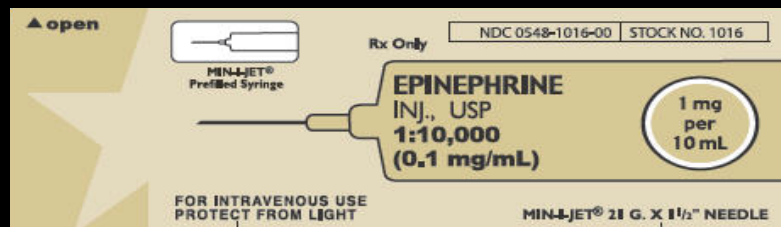
- Epinephrine has not demonstrated a decrease in mortality
- Previous studies do not measure time to epinephrine delivery
- Historically epinephrine delivery is delayed until after IV establishment

# Resuscitation Goals

- Restore Circulation
- Deliver more perfusing/hypothermic patients to the ED
- Discharge home neurologically intact patients

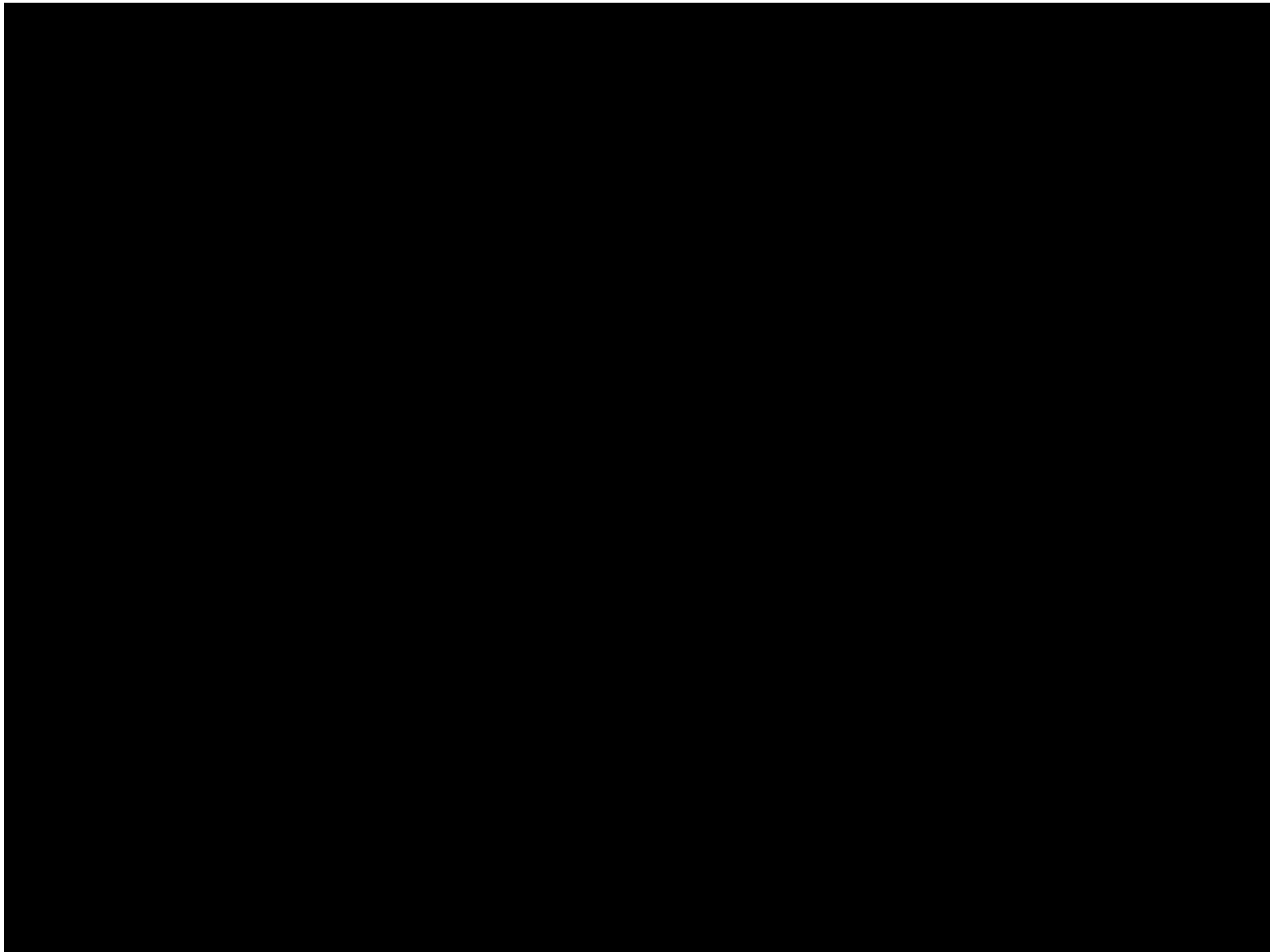
## Concern

- Epinephrine increases occurrences of ROSC
- Epinephrine does not increase improved neurologic outcomes



# Hypotheses

1. Reducing the delay to epinephrine delivery will increase the rate of ROSC
2. Improved rates of ROSC in conjunction with Therapeutic Hypothermia will improve neurological outcomes.



- Setting –

- City of San Antonio – 7<sup>th</sup> largest US city
- Dual Paramedic System (Fire based)
- Fire First Responders--Mixed ALS (40%)/ BLS (60%)
- Typical Cardiac Arrest Response :
  - 2 Medic Units, 1 Fire Crew (4),
  - Medical Officer

- Training –

- Uninterrupted Compressions
- Humeral IO insertion
- Rapid Epi Delivery (Goal – 90 seconds after arrival)
- Delayed Advanced Airway Management
- Post ROSC Hypothermia



# Training

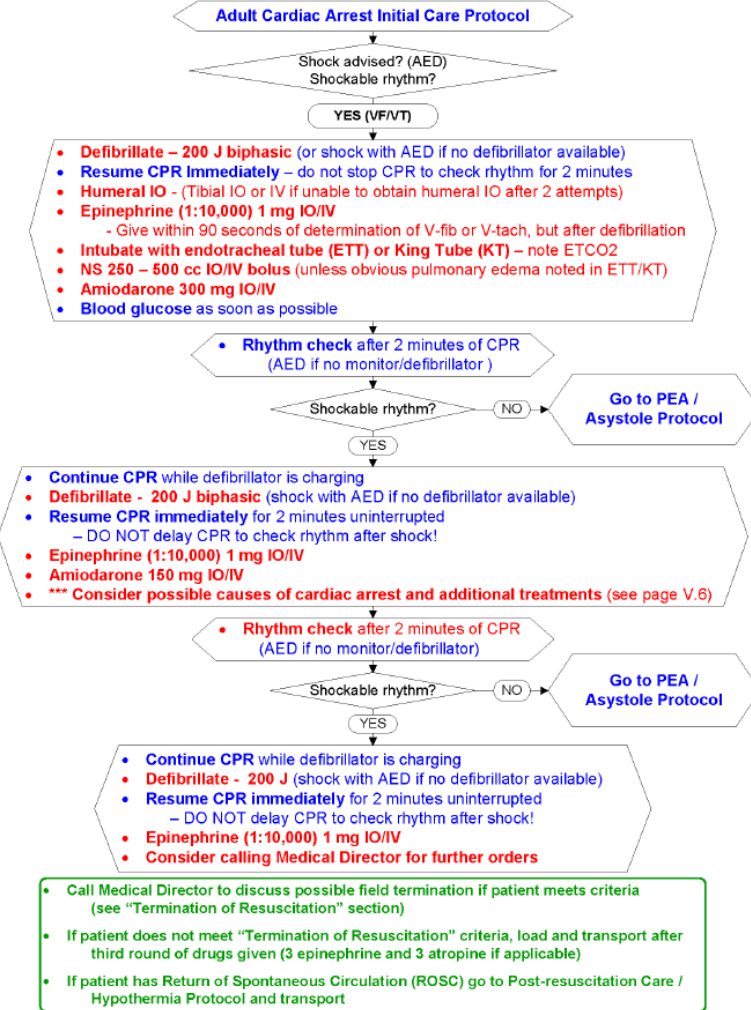
- Classroom (1.5 hrs)
  - Didactic and Hands on Humeral access
  - Previously trained on IO
- Cadaver lab dependent upon availability
- Specific SAFD Cardiac Arrest Management Video
- Continuous Feedback
  - Immediate mandatory post incident consultation with online medical control



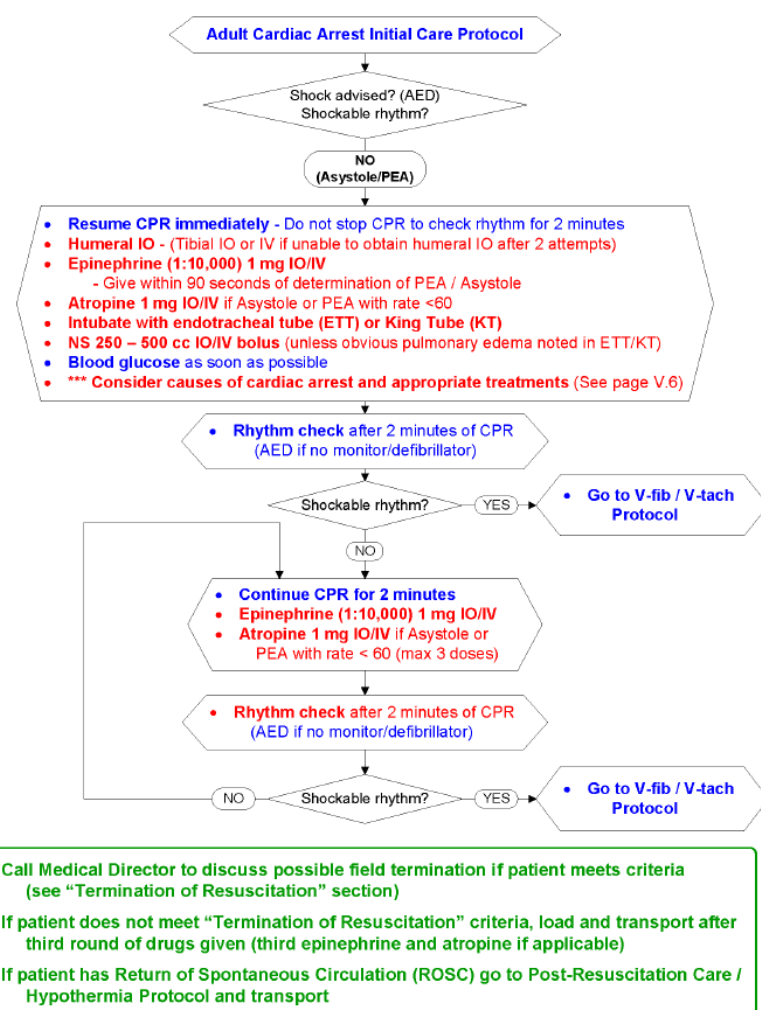


# Protocol

## Adult Cardiac Arrest – V-fib / V-tach



## Adult Cardiac Arrest – PEA / Asystole



# Results

851 Resuscitation Attempts

305 patients with ROSC

60 VFib patients with full data set

# COMPARISON OF FIRST-ATTEMPT SUCCESS BETWEEN TIBIAL AND HUMERAL INTRAOSSEOUS INSERTIONS DURING OUT-OF-HOSPITAL CARDIAC ARREST

- Rosalyn Reades, MD, Jonathan R. Studnek, PhD, NREMT-P, John S. Garrett, MD, Steven Vandeventer, EMT-P, Tom Blackwell, MD
- ABSTRACT

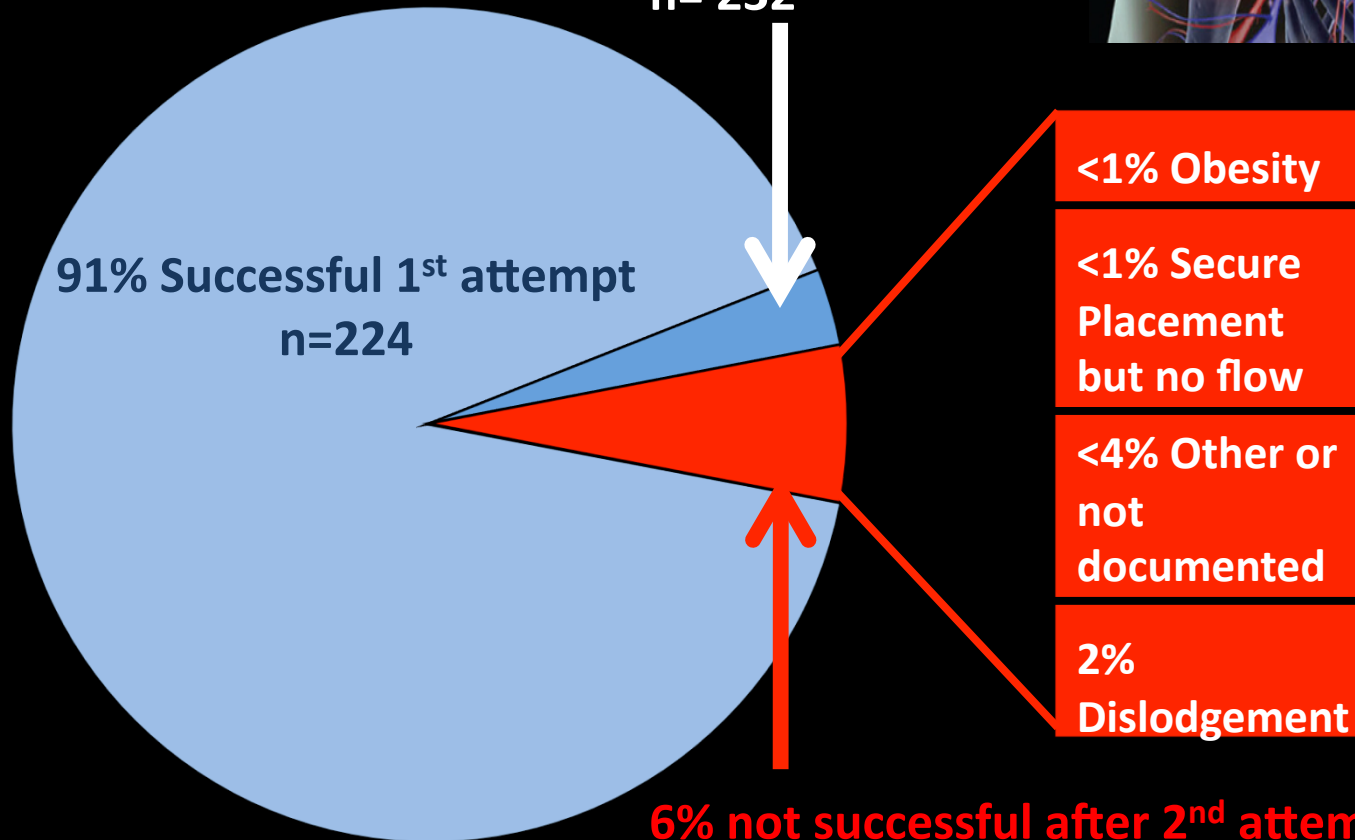
- **Background.** Intraosseous (IO) needle insertion is often utilized in the adult population for critical resuscitation purposes. Standard insertion sites include the proximal humerus and proximal tibia, for which limited comparison data are available. **Objective.** This study compared the frequencies of IO first-attempt success between humeral and tibial sites in out-of-hospital cardiac arrest. **Methods.** This observational study was conducted in an urban setting between August 28, 2009, and October 31, 2009, and included all medical cardiac arrest patients for whom resuscitative efforts were performed. Cardiac arrest protocols stipulate that paramedics insert an IO line for initial vascular access. During the first month of the study, the proximal humerus was the preferred primary insertion site, whereas the tibia was preferred throughout the second month. The primary outcome was first-attempt success, defined as secure IO needle position in the marrow cavity and normal fluid flow. Any needle dislodgment during resuscitation was also recorded. The association between first-attempt IO success and initial IO insertion location was analyzed using a test of independent proportions and 95% confidence intervals (CIs) for the difference in proportions. **Results.** There were 88 cardiac arrest patients receiving IO placement, with 58 (65.9%) patients receiving their initial IO attempt in the tibia. The rate of first-time IO success at the tibia was significantly higher than that observed at the humerus (89.7% vs. 60.0%;  $p < 0.01$ ). There were 18 initial successes at the humerus; for six (33.3%) of these, the needle became dislodged during resuscitation, compared with 52 initial successes at the tibia, with three (5.8%) dislodgments. The rate of **total success for initial IO placements was significantly lower for the humerus (40.0%) compared with that for the tibia (84.5%;  $p < 0.01$ ) during resuscitation efforts.** **Conclusions.** In this subset of patients, tibial IO needle placement appeared to be a more effective insertion site than the proximal humerus. Success rates were higher with a lower incidence of needle dislodgments. Further randomized studies are required in order to validate these results. **Key words:** intraosseous infusion; emergency medical services; sudden cardiac death; needle insertion sites

- PREHOSPITAL EMERGENCY CARE 2011;Early Online:1–4Received August 10, 2010, from the Department of Emergency Medicine (RR, JSG) and the Center for Prehospital Medicine and Mecklenburg EMS Agency (a joint agency of Mecklenburg County, Carolinas Health Care System and Presbyterian Health Care System) (JRS, TB), Carolinas Medical Center (JRS), Charlotte, North Carolina; and Mecklenburg EMS Agency (SV), Charlotte, North Carolina. Revision received September 9, 2010; accepted for publication September 14, 2010.
- Presented at the Society for Academic Emergency Medicine annual meeting, Phoenix, Arizona, June 2010.
- The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.
- Address correspondence and reprint requests to: Jonathan R. Studnek, PhD, NREMT-P, Carolinas Medical Center, The Center for Prehospital Medicine, PO Box 32861, Charlotte, NC 28232. e-mail: jonst@medic911.com
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# Humeral IO Insertion



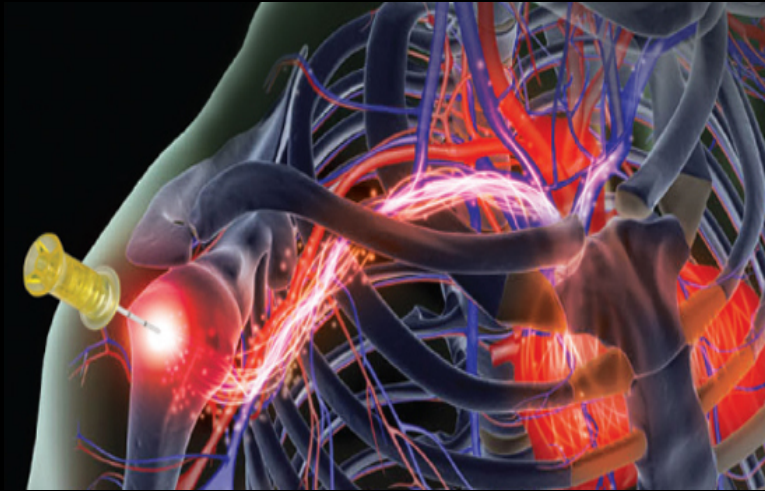
94% Successful after 2<sup>nd</sup> attempt  
n= 232



6% not successful after 2<sup>nd</sup> attempt  
n=15

405 cardiac arrests evaluated. average age of 63 (+/-16), 58% male, Humeral access attempted in 61% (n=247)

## Minutes to Epinephrine versus ROSC in the V-fib/V-Tach Patient

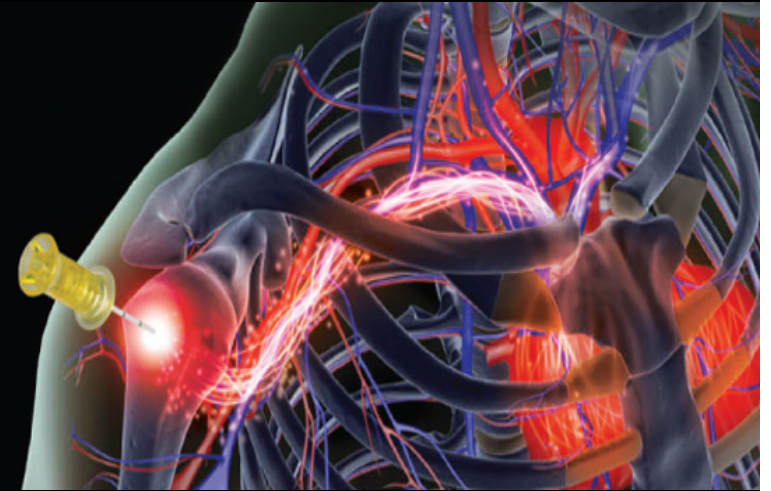


ROSC, N (%)	Minutes to Epinephrine		Total	Relative Risk ( 95% CI )	P-value
	> 2	≤ 2			
No	21 (50)	8 (44.4)	29 (48.3)		.78
Yes	21 (50)	10 (55.6)	31 (51.7)	0.9 ( 0.54, 1.5 )	
Total	37	18	60		

# Greater than 2 minutes compared to less than 2 minutes

- Improvement from 50% to 55% of patients have ROSC

## Minutes to Epinephrine versus ROSC in the V-fib/V-Tach patient



	Minutes to Epinephrine				
ROSC, N (%)	> 3	≤ 3	Total	Relative Risk ( 95% CI )	P-value
No	<b>16 (51.6)</b>	<b>13 (44.8)</b>	<b>29 (48.3)</b>		<b>.62</b>
Yes	<b>15 (48.4)</b>	<b>16 (55.2)</b>	<b>30 (51.7)</b>	<b>0.88 ( 0.54, 1.43 )</b>	
Total	<b>26</b>	<b>29</b>	<b>60</b>		

# Greater than 3 minutes compared to less than 3 minutes

- Improvement from 48% to 55% of patients have ROSC



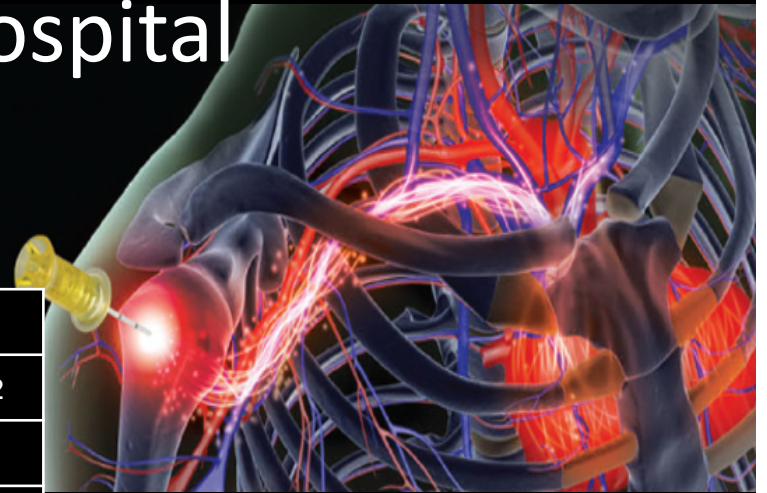
# Limitations

- Numbers of patients meeting study goal are limited
- No other rhythm demonstrated improvement
- Documentation of time intervals subject to variation

# Discharge home from the hospital

## Dead versus ROSC (Before 07/01/2009)

Dead, N (%)	ROSC		Total	P-value <sup>2</sup>
	No	Yes		
No	0 (0)	<b>51 (14.6)</b>	<b>51 (5.5)</b>	<0.001
Yes	580 (100)	298 (85.4)	878 (94.5)	
Total	580	349	929	



## Dead versus ROSC (After 07/01/2009)

Dead, N (%)	ROSC		Total	P-value <sup>2</sup>
	No	Yes		
No	0 (0)	<b>54 (17.7)</b>	<b>54 (6.3)</b>	<0.001
Yes	546 (100)	251 (82.3)	797 (93.7)	
Total	546	305	851	

# Current issues

- ~ 50% Epinephrine within the 90 second goal
  - Protocol compliance
    - Trying to identify the obstacles
    - Difficult to automate time documentation
  - Training all EMT-B's in use of Humeral EZIO for adult cardiac arrest

# Acknowledgements

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- Men and Women of the San Antonio Fire Department
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- Vidacare Inc.

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Questions?

