

**Effecting Neurologically-Intact Survival for Children with Out-of-Hospital Cardiac Arrest**



Paul E. Pepe, MD, MPH; Paul R. Banerjee DO;  
Amninder Singh, MD, MPH; Raf Vittone, EMT-P & Latha Ganti, MD, MBA

*From: The University of Texas Southwestern Medical Center, Dallas, TX;  
Polk County Fire Rescue, Polk County FL; University of Central Florida, Orlando FL*

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***Dr. Paul Banerjee and EMS Chief, Raf Vittone  
Polk County (FL) Fire Rescue Department***



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***Dr. Amninder Singh (EM R2)  
and EM Vice Chair, Dr. Latha Ganti  
University of Central Florida (UCF) --  
Osceola Medical Center Emergency Medicine Program***



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## The 4 Inevitabilities of Life

- Death
- Taxes
- Kale
- Disclosures



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*Very Early Interest in Mouth-to-Mouth ...*



*As an Infant, Paul Pepe Conducted Oral Explorations of the Universe...*

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## Introduction

**Pediatric Out-of-Hospital Cardiac Arrest (POHCA) :**

- Grim Survival Chances Nationwide
- POHCA Intimidating for Most Rescuers:  
*Infrequent Use of Pedi ALS Skills, Volatile Setting,  
Psychological Challenge, Kids Often Easy to Carry ...*

• **As a Result:**

***Scoop & Run Practices Have Evolved***

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## In Addition ...

- Conventional Wisdom: “Don’t Intubate”
- “Respiratory” Cause -- Focus on Breathing
- So Routinely See R.R. >> 6 / minute
- First Dose of Epinephrine Delayed
- Some Observational Studies (e.g. NIH ROC)  
Now Indicate Better Outcomes  
Associated with Increased Scene Time



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## What Would Happen If We Now Focus on On-Scene Care ?



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## Hypothesis

- Neurologically-Intact Survival for Children  
Could Be Improved by Deferring Transport  
and Prioritizing On-Scene Care ...  
... By Using Strategies That Expedite  
On-Scene Drug Delivery and Intubation  
with Tightly-Controlled Ventilation ...  
.... And Training with Supportive Psychological  
Components and Strategies for Family Interactions

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# Methods



**Setting:** > County-Wide Fire-Based EMS System  
> Residential Population: 642,000 (87<sup>th</sup> most populous)

(18% ≤ 14 yo; 72% White, 21% Hispanic, 15% Black; Median Income \$43K;  
>50% College/Graduate School; 70% in Homes vs. Multi-Unit Residence)

**Tools:** > Utstein-Registry – Prospective Collection  
(January 1, 2012 through April 30, 2017 = 5.33 years)

\*\* Throughout All Phases of Study, Protocols Adhered to the 2010 American Heart Association Guidelines

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# What Did We Do ?

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## Methods (cont.)



### Interventions:

- 2012: Traditional POHCA Care (i.e. very limited scene time)
- 2014: Prioritized On-Scene Resuscitation (phase I Δ's) that Expedited Drug Delivery via Direct I-O & Intubation (controlled ventilation rates ~6/min)

*The modified training included psychological and skills-enhancing tools to provide greater confidence in providing on-scene care.*

- 2016: Began Techniques to Dose/Prepare Drugs Before Arriving On-Scene (phase II Δ's)

..... No other relevant modifications were made system-wise.

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## Primary Outcomes Studied ...

### Neuro-Intact Survival Rates



in 2012-2013 (Phase 0, Traditional Approach, Pre-Δ's)

...Were Compared to Phase I (2014-2015)

...Then Compared to Phase II (2016-2017)

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## Results ?

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## RESULTS

- EMS Crews Managed 143 Consecutive POHCA Cases Over the 5.33-Year Study with Majority Presenting in Asystole. Including Those Eventually Resuscitated.
  - Among Those Resuscitated Patients, the Time Interval from Medic Arrival On-Scene to the 1<sup>st</sup> Epi Dose Contracted From 16.5 min (2012-2013) to 7.3 min (2014-2015) to 5.0 min (2016-2017)
  - Successful Intubation and I-O Insertions Were Regularly Performed In Much Greater Frequency On-Scene in Phase I & II
- But No Other Significant Differences in Terms of Age, Sex, Etiology, Response Times or Sequence of Drug Infusions.*

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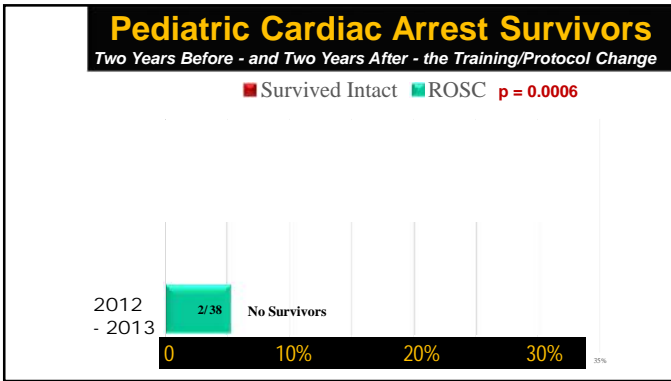
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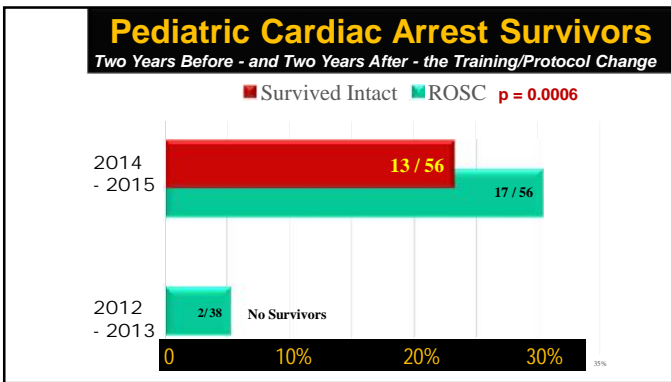
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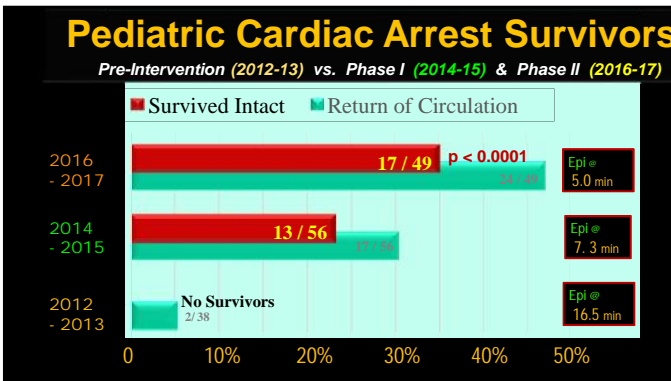
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## Conclusions

*Although a historically-controlled study...*

**The Sudden and Sustained Appearance of  
Neuro-Intact PEDI Cardiac Arrest Survivors ...  
...Was Profound, Immediate & Rewarding**

*Much of this Appeared to be Attributable to:*

**Techniques That Expedited Care and a Disciplined Focus  
on Physiologically-Sound Respiratory Management  
and System-1 Thinking for Rapid Medication Dosing**

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## Conclusions (cont.)

• *We Also Believe That Major Contributors Were:*

- 1) Supportive Encouragement from Leadership
- 2) Training with Specialized Psychological Tools
- 3) Reinforced Encouragement from Successes



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## Thank You !!



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## Bystander CPR

- 2012-2013: 18 of 38 cases
- 2014-2015: 30 of 56 cases
- 2016-2017: 25 of 39 cases

( $p = NS$ )

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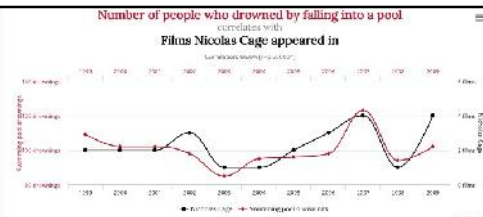
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Data Source: Centers for Disease Control and Prevention and Internet Movie Database

**(OBVIOUS) CONCLUSION:**  
 "With the exception of 'Moonstruck', Nicholas Cage movies were apparently so bad that many people drowned themselves (by falling into a pool) ....  
 ... Further study is needed"

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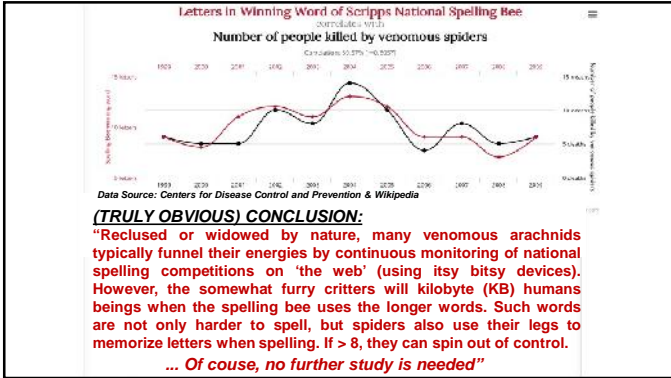
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