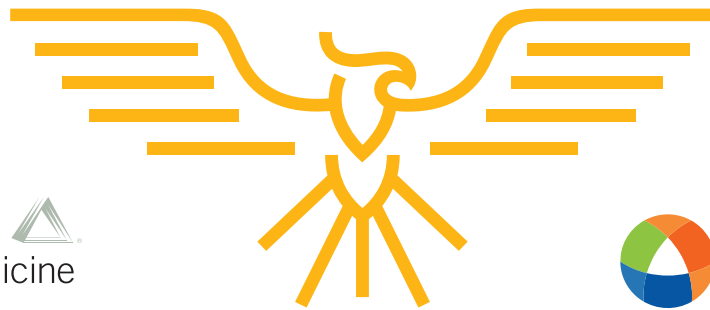




CRITICAL CARE CONGRESS



Society of
Critical Care Medicine
The Intensive Care Professionals



CRITICAL CARE
CONGRESS.

Amplifying Functional Survival Chances for Patients Presenting with Unwitnessed Cardiac Arrests & Asystole

Using Non-Invasive Circulatory Adjuncts Coupled with Gradual Elevation of the Head / Thorax During Chest Compressions to Lower ICP and Improve Preload



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DISCLOSURES

> [ClinicalTrials.gov](https://clinicaltrials.gov/ct2/show/NCT05588024); Identifier # NCT05588024

URL: <https://clinicaltrials.gov/ct2/show/NCT05588024>

> WCG IRB (Study #1281307)



**** All FDA-Cleared Devices ****

NO DISCLOSURES / CONFLICTS



LATE BREAKER ARTICLES

Survival for Nonshockable Cardiac Arrests Treated With Noninvasive Circulatory Adjuncts and Head/Thorax Elevation*

OBJECTIVES: Cardiac arrests remain a leading cause of death worldwide. Most patients have nonshockable electrocardiographic presentations (asystole/pulseless electrical activity). Despite well-performed basic and advanced cardiopulmonary resuscitation (CPR) interventions, patients with these presentations have always faced unlikely chances of survival. The primary objective was to determine if, in addition to conventional CPR (C-CPR), expeditious application of noninvasive circulation-enhancing adjuncts, and then gradual elevation of head and

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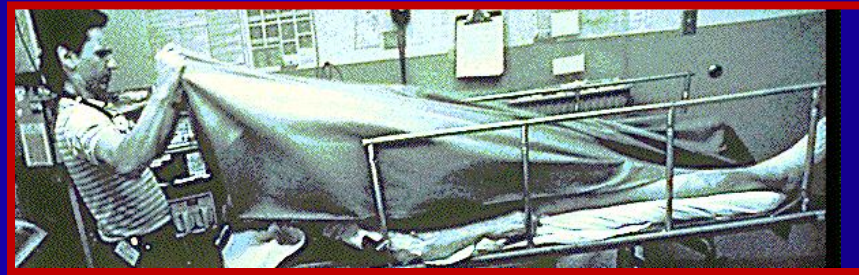
Introduction



Sudden Out-of-Hospital Cardiac Arrest (OHCA)



- ~1,000 Cases Each Day in the U.S. Alone...
... *just in the Out-Hospital Setting* (& many Additional In-Hospital Cases)
- Half (~500) = Asystole (and 70% of Those Cases Are Unwitnessed)
- **So >1 out of 3 OHCA (~370 daily) are Unwitnessed Asystole**



→→ Survival to Hospital Discharge Negligible for Past 6 Decades
Despite Aggressive Advanced Cardiac Life Support Attempts



And It's Not Just Lengthier Responses ...



Less Appreciated Have Been the ...
**Physiological Limitations
of Conventional Supine CPR**



*Even if Performed Early & Optimally... **Cardiac Output is 15-20% nl***

...Supine/Flat Chest Compressions (C-CPR)
Not Only Send Out Forward-Flowing Arterial Pressure Waves ...

But Also Significant Retrograde Venous Back-Pressure

So What's a Potential Resolution ?

Impedance Threshold Device (ITD) and Active Compression-Decompression (ACD)



+

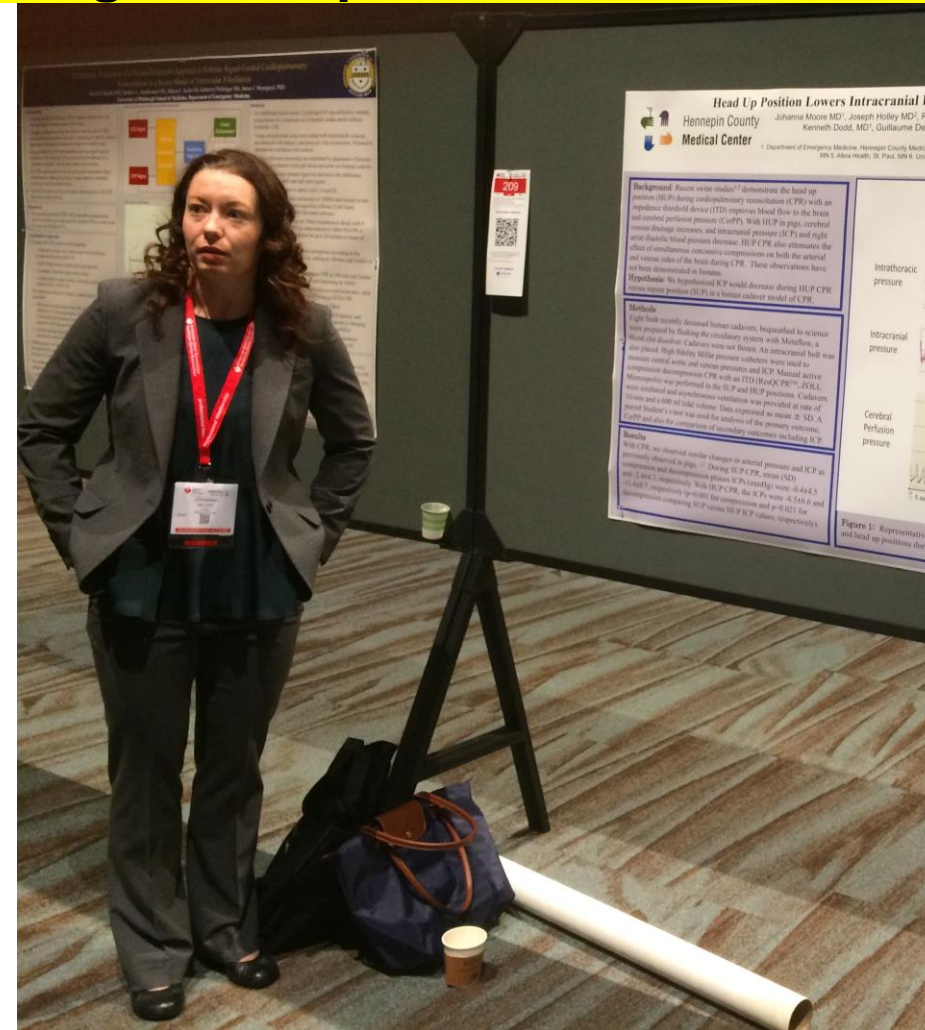
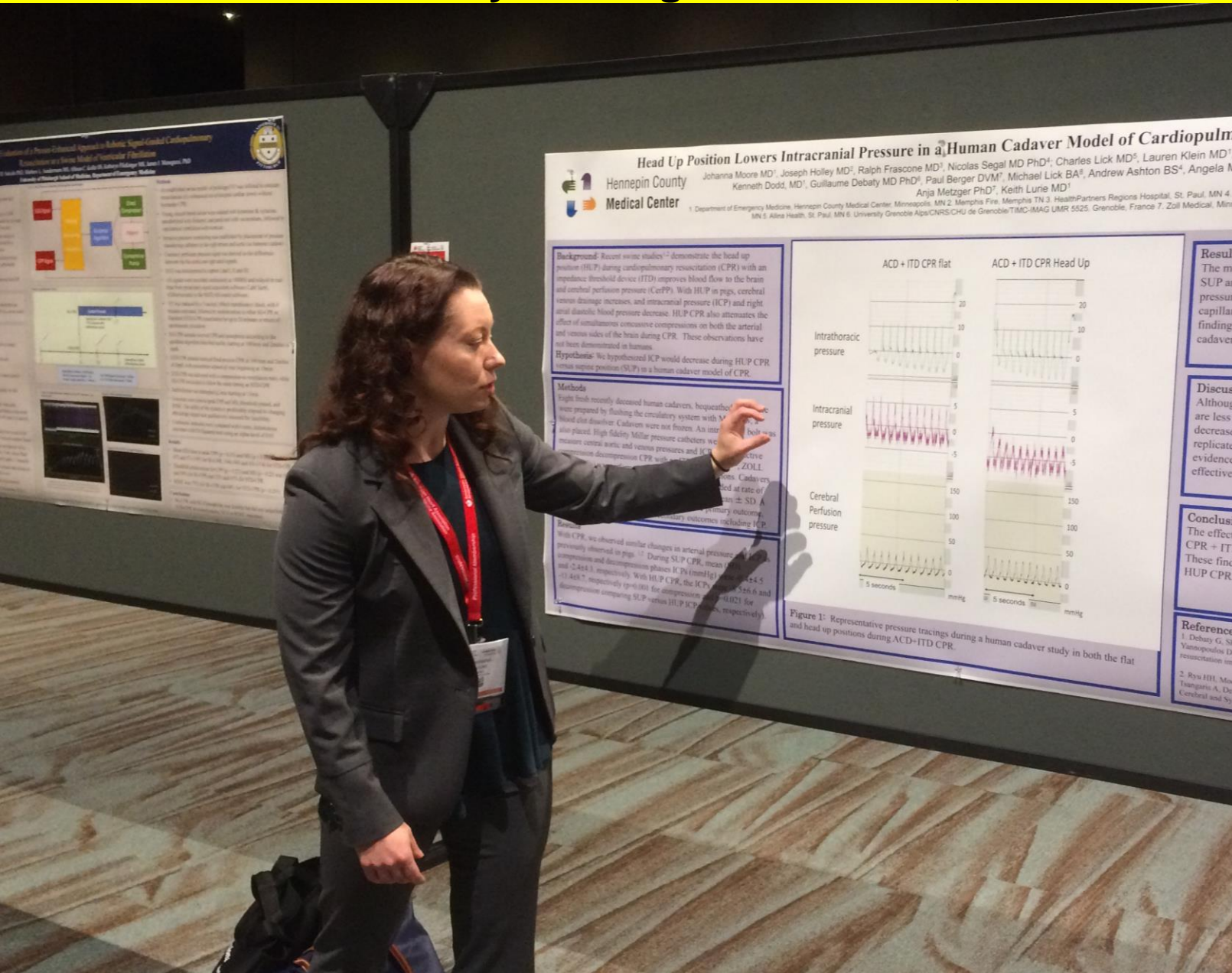


NIH-Funded / Supervised ---->
Clinical Trial

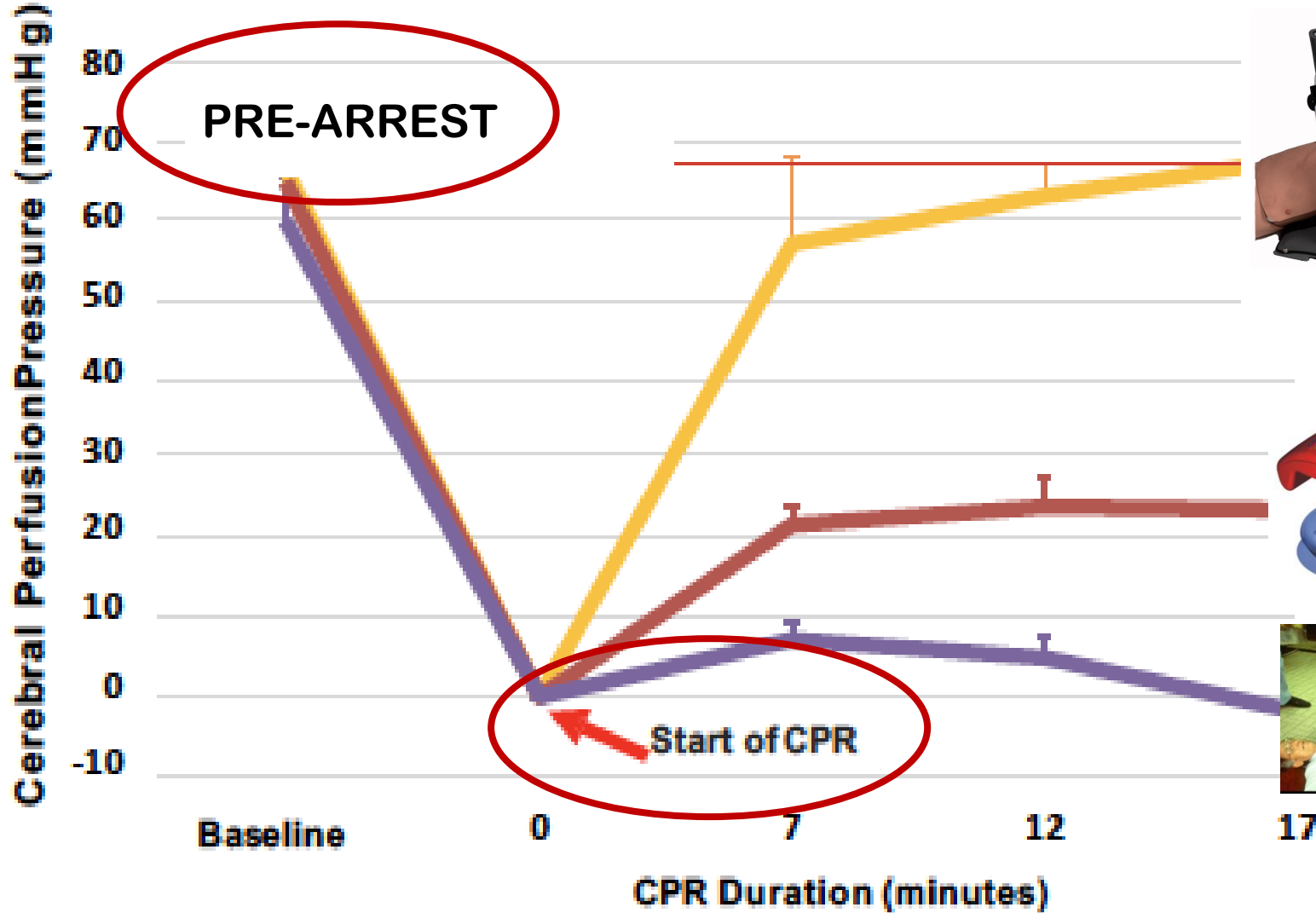
50% improvement
in Neuro-Intact Survival

Aufderheide, et al. *Lancet* 2011; 377 (9762):301-311

Meticulous, Methodical Experimental Work over the past Decade to Determine Optimal Timing, Duration of Circulatory Priming with ACD/ITD, and the Rate & Degree of Optimal Elevation



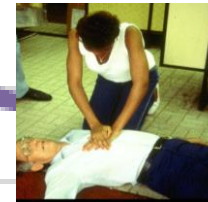
Cerebral Perfusion Pressures (further verified by microsphere flow studies)



2 min Prime &
2 min Elevation =
Near Normal Restored



Supine = 40 - 45% nl

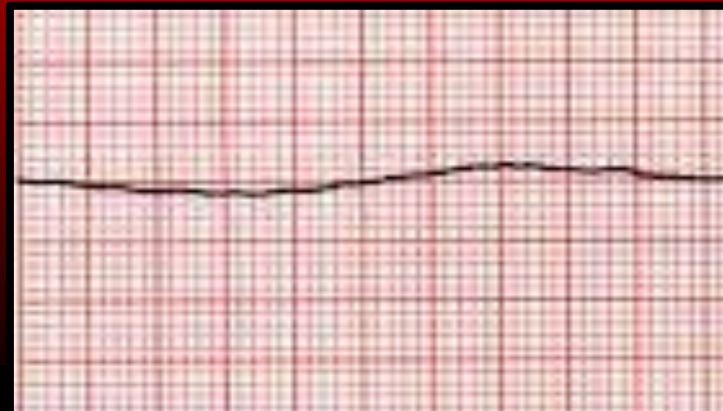


Standard CPR = 15-20% nl

So What Was the Current Study Purpose ?

**Primarily To See if Such Robust Outcomes...
... Are Also Applicable for Patients with**

Unwitnessed / Asystole ***Presentations***



METHODS:

Comparison of Neuro Intact Survival for Patients Presenting with Unwitnessed Arrests and then Asystole on Initial ECG using:

- Unwitnessed/Asystole Pts in the **Head-Up CPR Registry** (prospective data collection; 2020-2021)
St. John's County FL, Anoka, MN, Peoria IL, Edina MN, Lucas County, OH;

VS.

- Unwitnessed Asystole Pts. **Receiving Conventional CPR (C-CPR)**
- Using the Control Groups from the 2-NIH OHCA Trials (*ROC PRIMED*, *ResQTrial*)...

That **REQUIRED DOCUMENTATION of QUALITY CPR PERFORMANCE**

METHODS (cont.)

In addition, to better address the concept of non-contemporaneous comparisons,
the "Heads-Up" Registry "Unwitnessed/Asystole" Patient Data Were Compared to:



During the Same Period Used for the Head-Up Registry Data (2020-2023)

*** NOTE:** C.A.R.E.S. Covers ~40% of all U.S. Out-of-Hospital Arrests
And Likely Represents the More Progressive EMS Systems That Monitor These Data

Results ?



AHUP-CPR

vs.

C-CPR (NIH Studies)

FYI: Asystole was the Presenting Rhythm in 61% & 62%, respectively,
of all Patients with Non-Shockable Presentations (or about half of all OHCA)

% Unwitnessed Cardiac Arrests Presenting with Asystole...

- **AHUP-CPR 73%** of Asystole Cases were Unwitnessed
- **C-CPR (N.I.H.): 67%** were Unwitnessed * p=0.07

Also: **C.A.R.E.S. 69%** were Unwitnessed

AHUP-CPR vs. C-CPR (N.I.H.)

Similar Demographics, Frequency of Bystander CPR, etc, and ...

- **Median Time 9-1-1 Call to EMS-Initiated CPR:**
8 min (IQR 6-10) ...for AHUP-CPR, C-CPR & C.A.R.E.S.
- **Median Time 9-1-1 Call to AHUP Application:**
11 mins (IQR 9-15)
- **80% AHUP applied in <16 mins**

Unwitnessed Arrest / Asystolic Presentation

Survival with Good Neurological Function (SURV_{GNF})

AHUP-CPR Had a Much Higher Odds of
Achieving Neurologically-Favorable Survival

SURV_{GNF} = **1.5%** [7 / 480] vs **0.3%** [2 / 766]
p = 0.015

C.A.R.E.S. = **0.5%** [608 / 101,421] p = 0.0097

Time Dependency of AHUP

Many of the Total Cases Had >>20 min Response

**Unwitnessed
Asystole Patients**

Good Neuro Outcome

**C-CPR: -- Any EMS Response >8 min (9-1-1 to EMS CPR Start)
had ZERO Additional Survivors (even to Hospital D/C)**

AHUP-CPR <11 Mins
Median T_{CPR} = 11 mins

2.6%

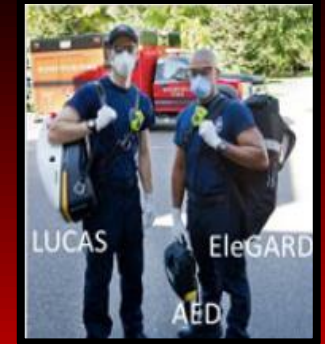
AHUP-CPR <16 Mins
80% of Pts. T_{CPR} = 16 mins

2.2%

LIMITATIONS / DISCUSSION

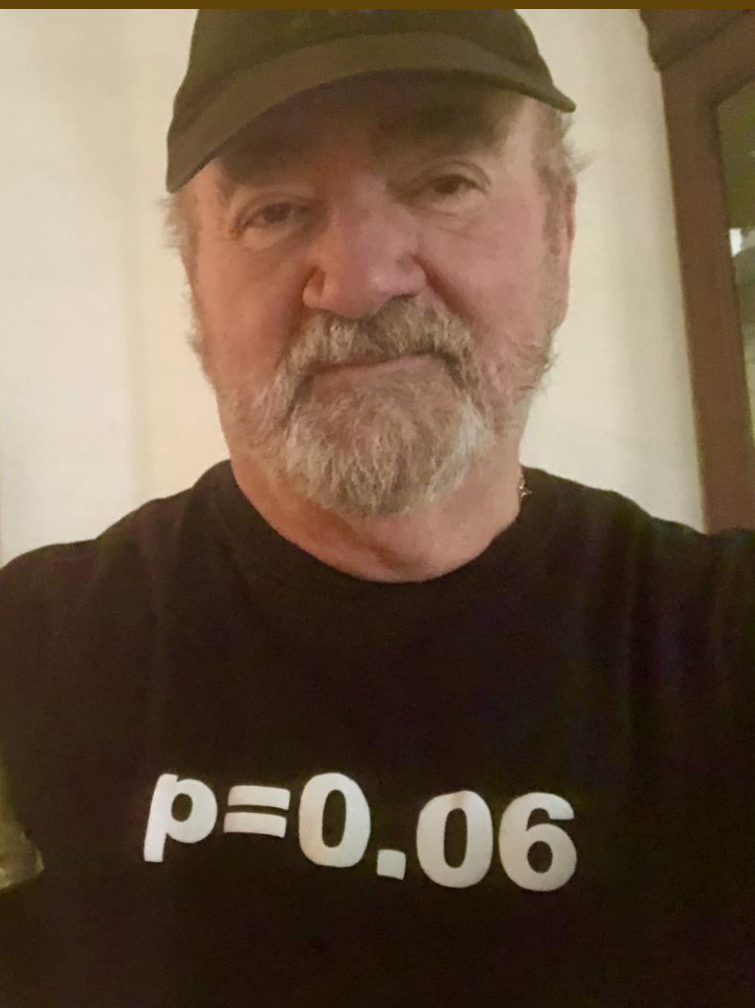
- *Relatively Small Sample Sizes*
- But the Statistics Are Already Compelling ...
*esp., when Compared to the High-Performance EMS Agencies
that Closely Scrutinized CPR Quality/Outcomes*
- ALSO -- Registry Data Were **Collected During COVID** when
Asystole Cases Sky-Rocketed with Consistently Futile Efforts
- These Raw Data for **Unwitnessed /Asystole**, Speak for Themselves
- While Survival Rates Still Relatively Low ----> **Many 1,000's Saved**

CONCLUSIONS



- **Rapid AHUP-CPR Application is Associated with Markedly-Improved Outcomes, incl. Unwitnessed / Asystole**
- **AED-Equivalent for Asystole *but with Much Wider Window***
- *If it Can Be Implemented Correctly...*
STRONGLY Recommended for all First-In Responders
(FF, EMS, Lifeguard, ICU, Emerg Dept, Cath Lab)





Edmond Fire Department Annual CPC Breakdown, All Survivors 2017-2023

