



# *Prehospital Endotracheal Intubation: Elemental or Detrimental ?*

( The Definitive Airway Talk ! )



**Paul E. Pepe, MD, MPH, FAEMS, MCCM, FACEP, MACP**  
*Chair, Metropolitan EMS Medical Directors Global Coalition  
and Global Emergency Medical Support,  
Fort Lauderdale, Florida (USA)*



**THE  
INDEX**





**Tip of the Day ...**

*If You're Gonna Run a Prehospital Protocol ...  
You Need to Have Daily ACLS Experience !*

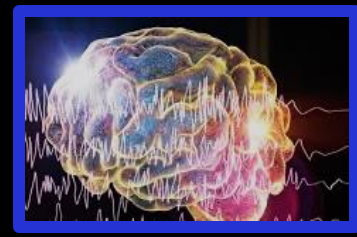


= **“Alternate Clinical Life Style”**

# *Like Most Veterinary Students...*



*...Doreen Breezes Thru Chapter 9*



**So Let's Start Breezing  
Through This!**

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# Prehospital Resuscitation with Low Titer O+ Whole Blood by Civilian EMS Teams: Rationale and Evolving Strategies for Use

# 29

P. E. Pepe, J. P. Roach, and C. J. Winckler

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## 29.1 Introduction: Civilian Setting Resuscitation Strategies for Bleeding over the Past Half Century

*For the Life of all flesh, is the blood thereof. (Leviticus 17:14, the Bible)*

Most modern out-of-hospital emergency medical services (EMS) systems, as we have come to recognize them today, were established in the 1960s and 1970s when a cadre of intrepid physicians ventured into the streets and later published their successful experiences with lifesaving approaches to managing acute coronary syndromes, trauma care, and cardiopulmonary arrest on-scene [1–3]. These lifesaving



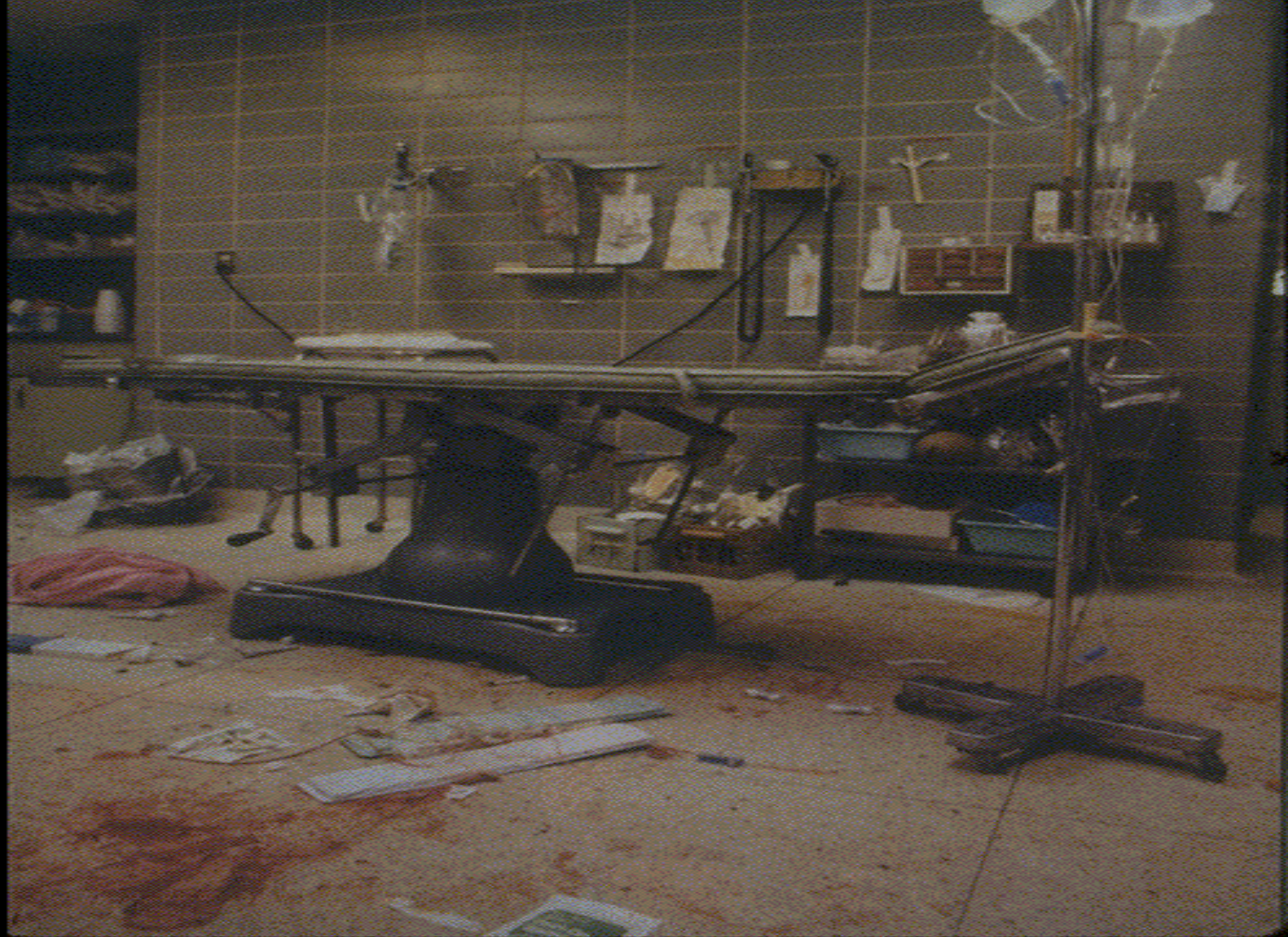


Texas Medical Center

**+** Emergency

Trauma Center

# *Is the Surgical Theater All We Need?*



# *Does Pre-Operative Care Change Outcome?*



*the A-B-C's!*



*...Starting with the A “Gold Standard”*

# Likely (Traditional) Scenarios for Endotracheal Intubation...

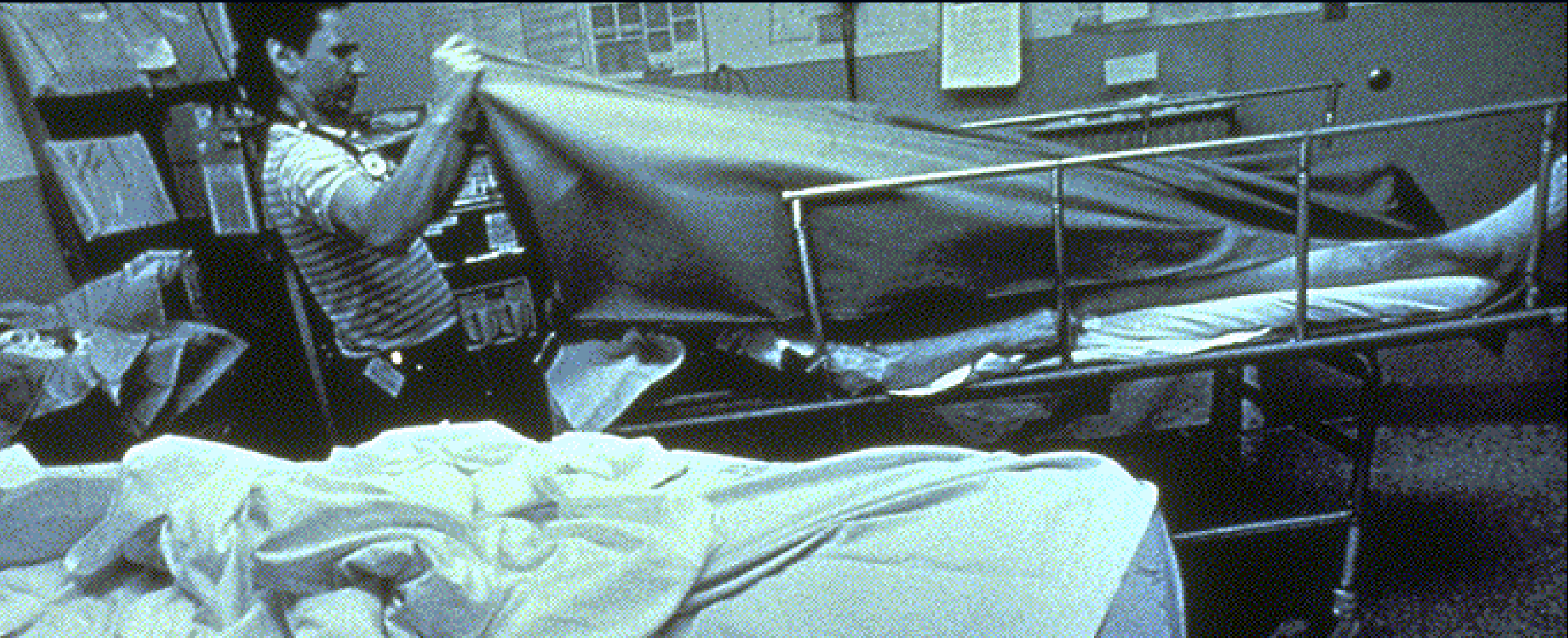


- **Circulatory Arrest**
- **Severe Hemorrhage**
- **Severe Head Injury**

**Circulatory  
Arrest  
after  
Trauma...**



***Post-Traumatic Arrest in Most Venues...***



***...Correlated with a Bad Outcome***

# *Pedi Endotracheal Intubation...*



**...Correlated with a Bad Outcome**

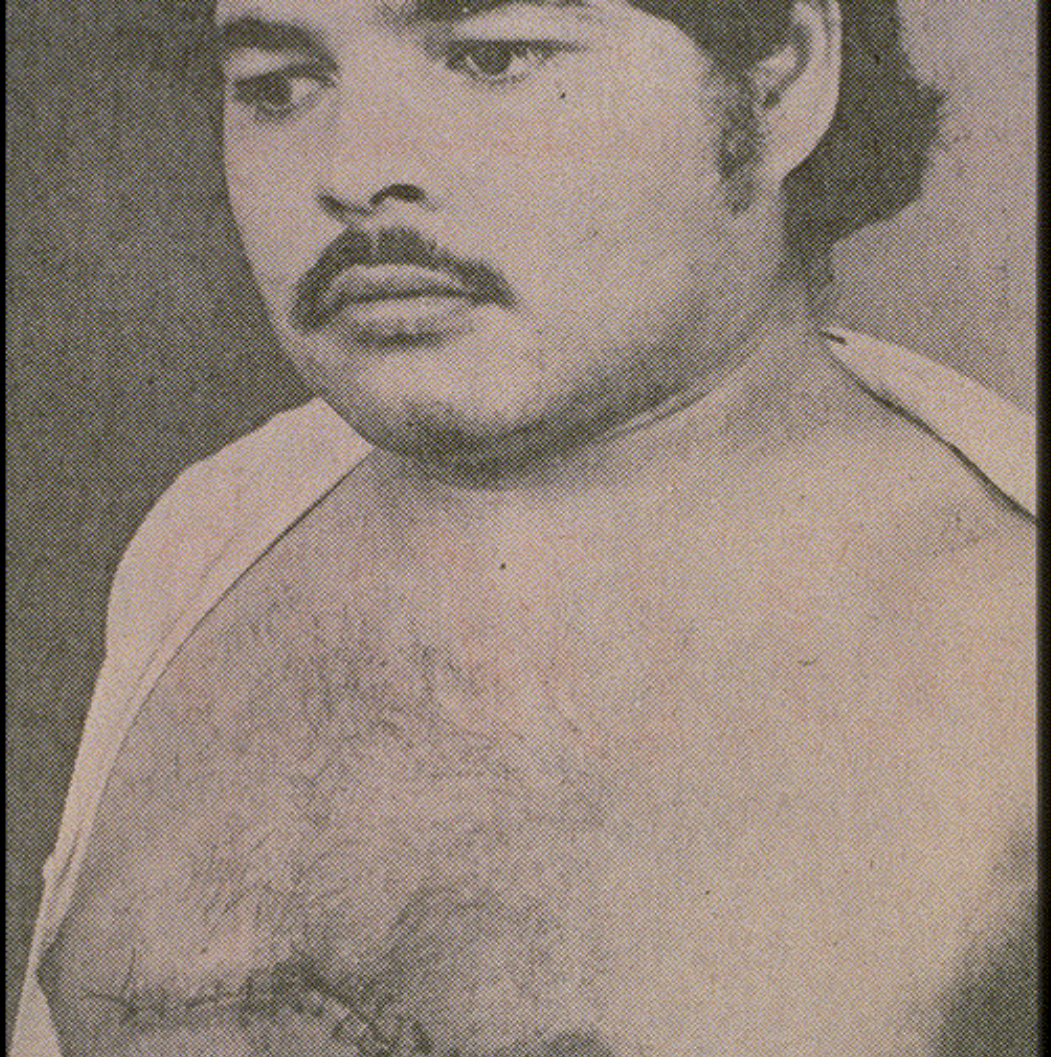


# RSI Intubation Studies...



*ETI Quite Feasible ...*

*But Correlated with Bad Outcome*



***ETI Correlated  
with Survival !***

# RSI Intubation Studies...



*“Hyperventilation” (low PaCO<sub>2</sub>)  
Correlated with Bad Outcome*

***BUT...***



# A Contra-*“Casablanca”* Philosophy:



*Culprit is Assisted Breathing with PPV*

**We Only Gave 5 Breaths per Minute...**

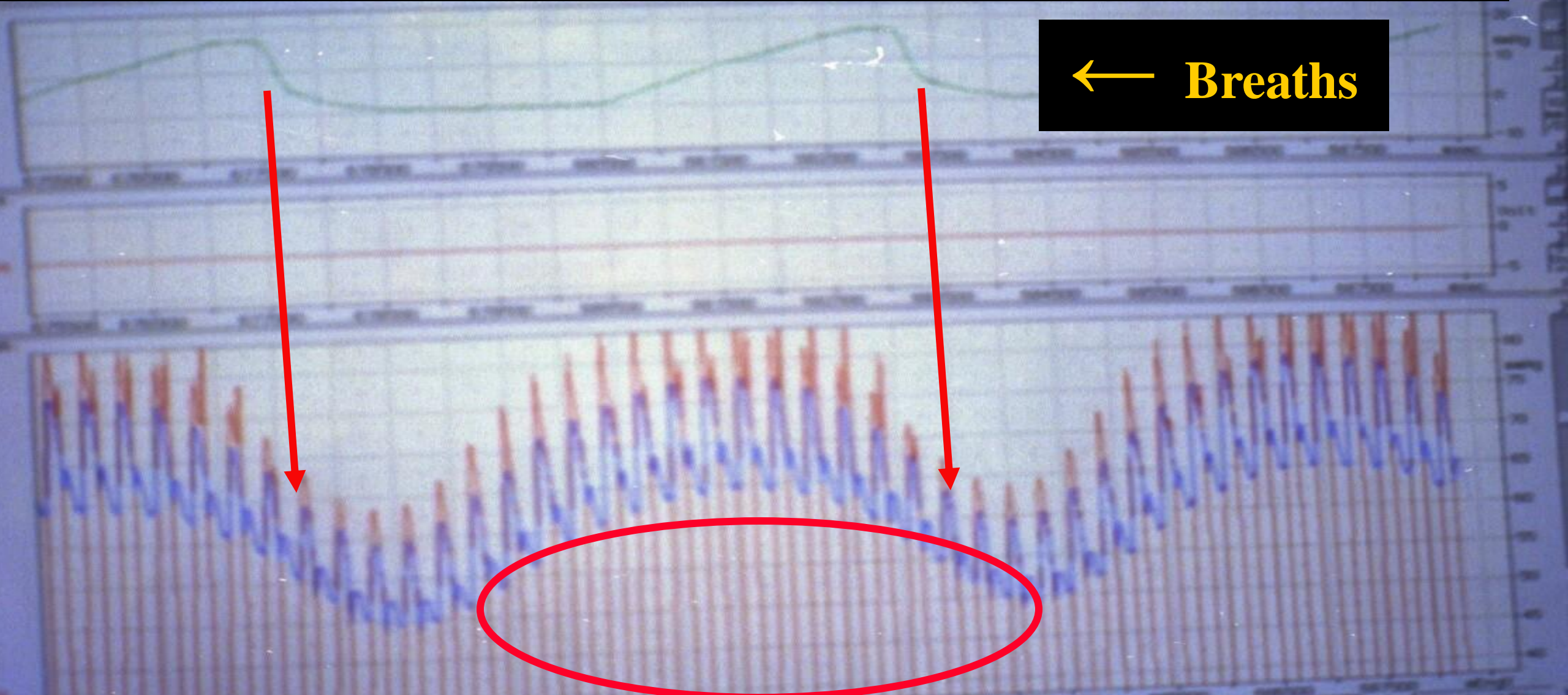


# ***Positive Pressure Ventilation (PPV)***

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- **Generates Positive Intrathoracic Pressure (ITP)**
- **Diminishes Venous Return & Cardiac Preload**
- **Will Push Lungs Open in a Maldistributive Manner into Areas of Less Resistance**  
*i.e., Does Not Open Dependent Lung Zones*
- **Increases Intracranial Pressure**
- **(worsens chest compression effect & inhibits cerebral blood flow)**
- **Need to Diminish Mean Intrathoracic Pressure**  
***By Lessening the Need for PPV & Giving Efficient Breathing***

# Ventilated Pigs with Moderate Hemorrhage

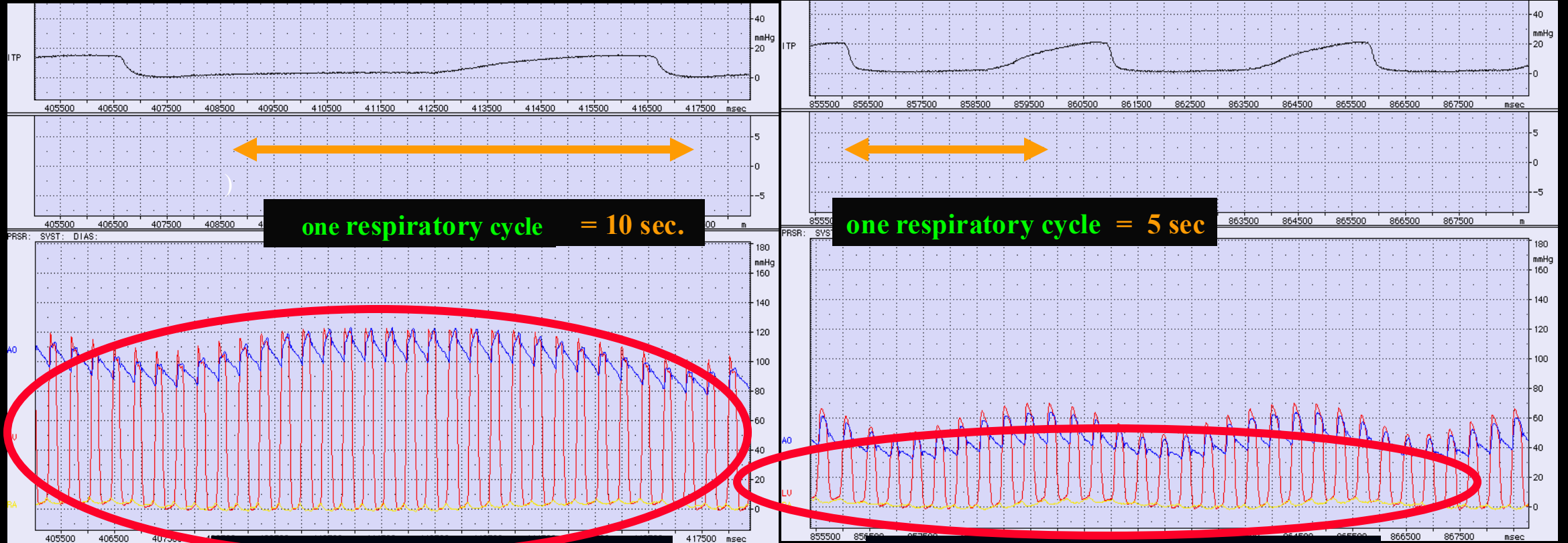


← Breaths

↑ Coronary Perfusion Pressure ↑



# Time-Averaged Coronary Perfusion Pressure = Area Under the Curve (in Pink)



**RR = 6 / min**

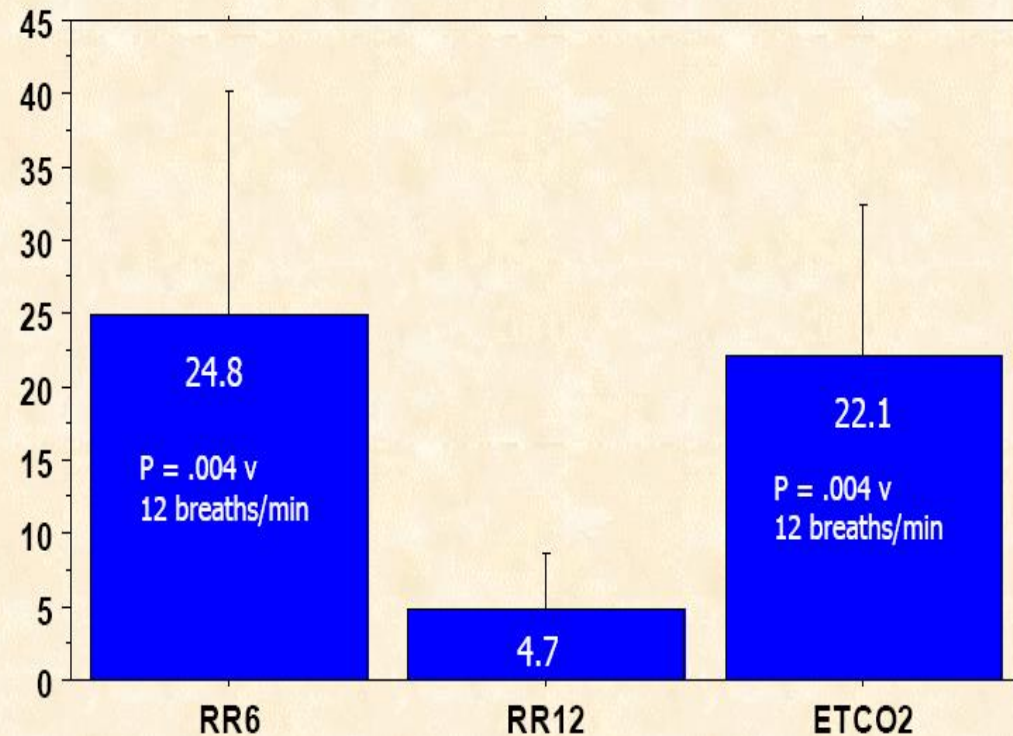
S

**RR = 12 / min**

# *Brain Tissue Perfusion*

## Brain Tissue Perfusion After 40 Minutes of Shock

mL/min/100 gm



# ***What's an Adequate Tidal Volume?***



***...especially during CPR conditions?***

# *'Larger' Tidal Volume vs. 'Smaller' Tidal Volume*

5 L/min ---> 500 x 10 breaths/min or 1000 x 5 / min

## **Tidal Volume Minus Dead Space....**

- **500 ml minus 150 ml = 350 ml x 10 = 3,500**
- **1000 ml minus 150 ml = 850 ml x 5 = 4,250**
- **x 4 = 3,400**

**8 - 10 ml *per kg* ?**

***(Intubated, No PEEP, No Diffuse Lung Injury)***



***or Pronounce Chest Wall Rise With  
Quick Steady Squeeze & Quick Release***

*May Account for Study Outcomes...*



*...and Even Day to Day Poor Outcomes*



Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

# Resuscitation

journal homepage: [www.elsevier.com/locate/resuscitation](http://www.elsevier.com/locate/resuscitation)



## Early On-Scene Management of Pediatric Out-of-Hospital Cardiac Arrest Can Result in Improved Likelihood for Neurologically-Intact Survival



*Paul R. Banerjee<sup>a,b</sup>, Latha Ganti<sup>b</sup>, Paul E. Pepe<sup>a,c,\*</sup>,  
Amninder Singh<sup>b</sup>, Abhishek Roka<sup>b</sup>, Raf A. Vittone<sup>a</sup>*

<sup>a</sup> Polk County Fire Rescue, 2470 Clower Lane, Bartow FL 33830 USA

<sup>b</sup> Osceola Regional Medical Center - University of Central Florida Emergency Medicine Residency Program of Greater Orlando and University of Central Florida College of Medicine, 700 W. Oak Street, Kissimmee, FL, 34741, USA

<sup>c</sup> Departments of Emergency Medicine, Pediatrics, Internal Medicine, School of Public Health and Office of Health System Affairs, University of Texas Southwestern Medical Center, 5323 Harry Hines Boulevard, Mail Code 8579, Dallas, TX, 75390-8579, USA

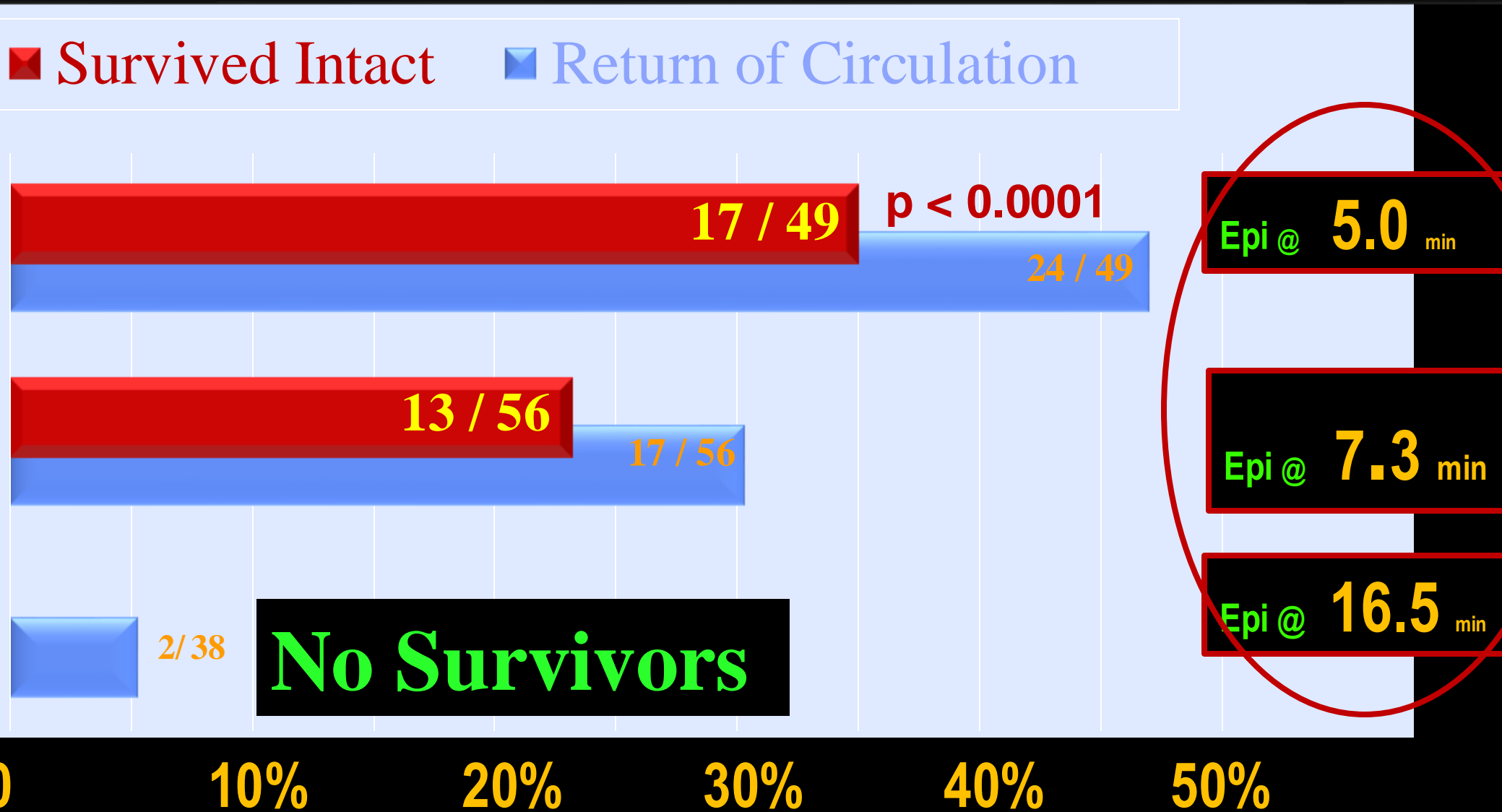
### Abstract

**Aim:** To evaluate the frequency of neurologically-intact survival (SURV) following pediatric out-of-hospital cardiac arrest (POHCA) when comparing traditional early evacuation strategies to those emphasizing resuscitation efforts being performed immediately on-scene.

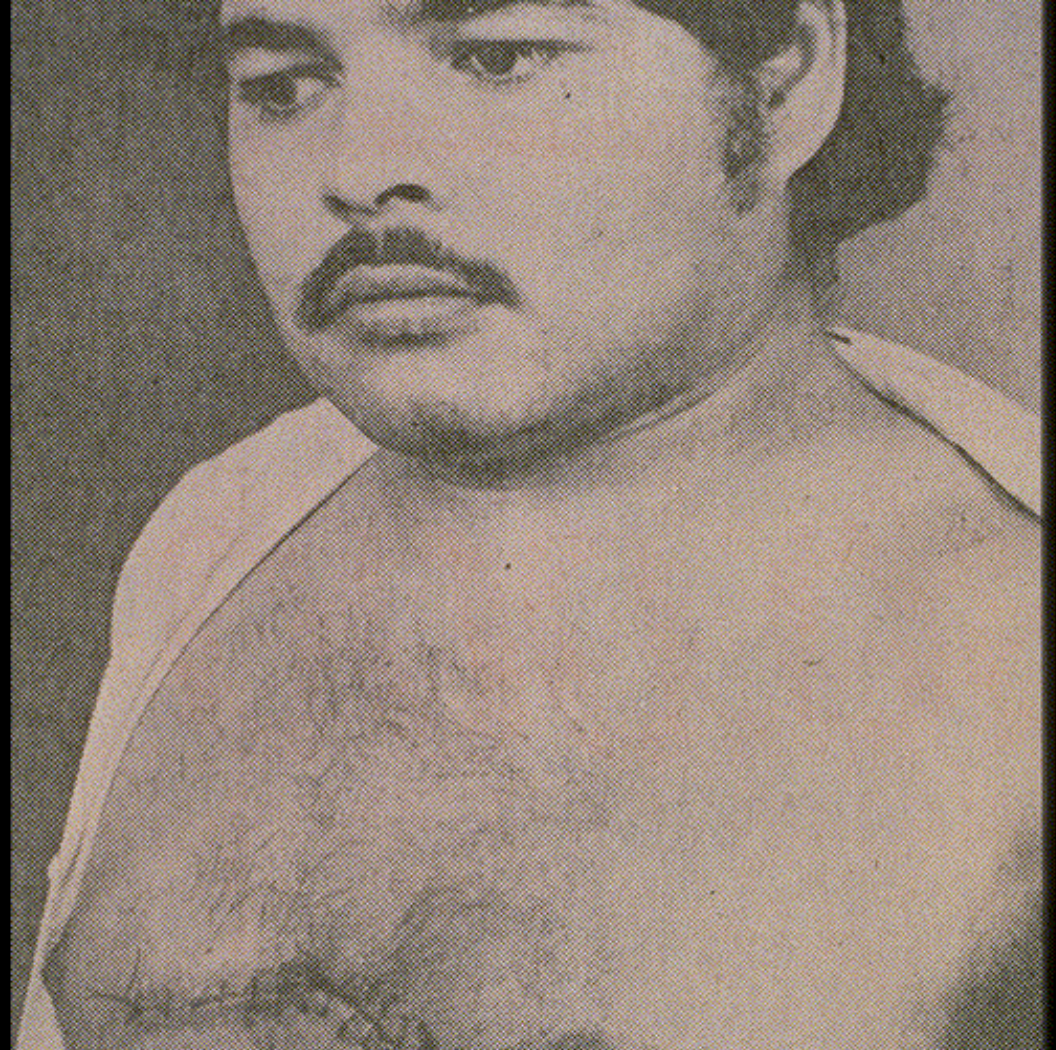
**Methods:** Before 2014, emergency medical services (EMS) crews in a county-wide EMS agency provided limited treatment for POHCA on-scene and

# Pediatric Cardiac Arrest Survivors

Pre-Intervention (2012-13) vs. Phase I (2014-15) & Phase II (2016-17)







***ETI Correlated  
with Survival !***

*But:*

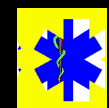
**Before Can We Even  
Get to All That ....**

*What Are the  
Determinants of  
Paramedic Success  
in Intubation.....*

# Caveats

- **Appropriate Initial Training**

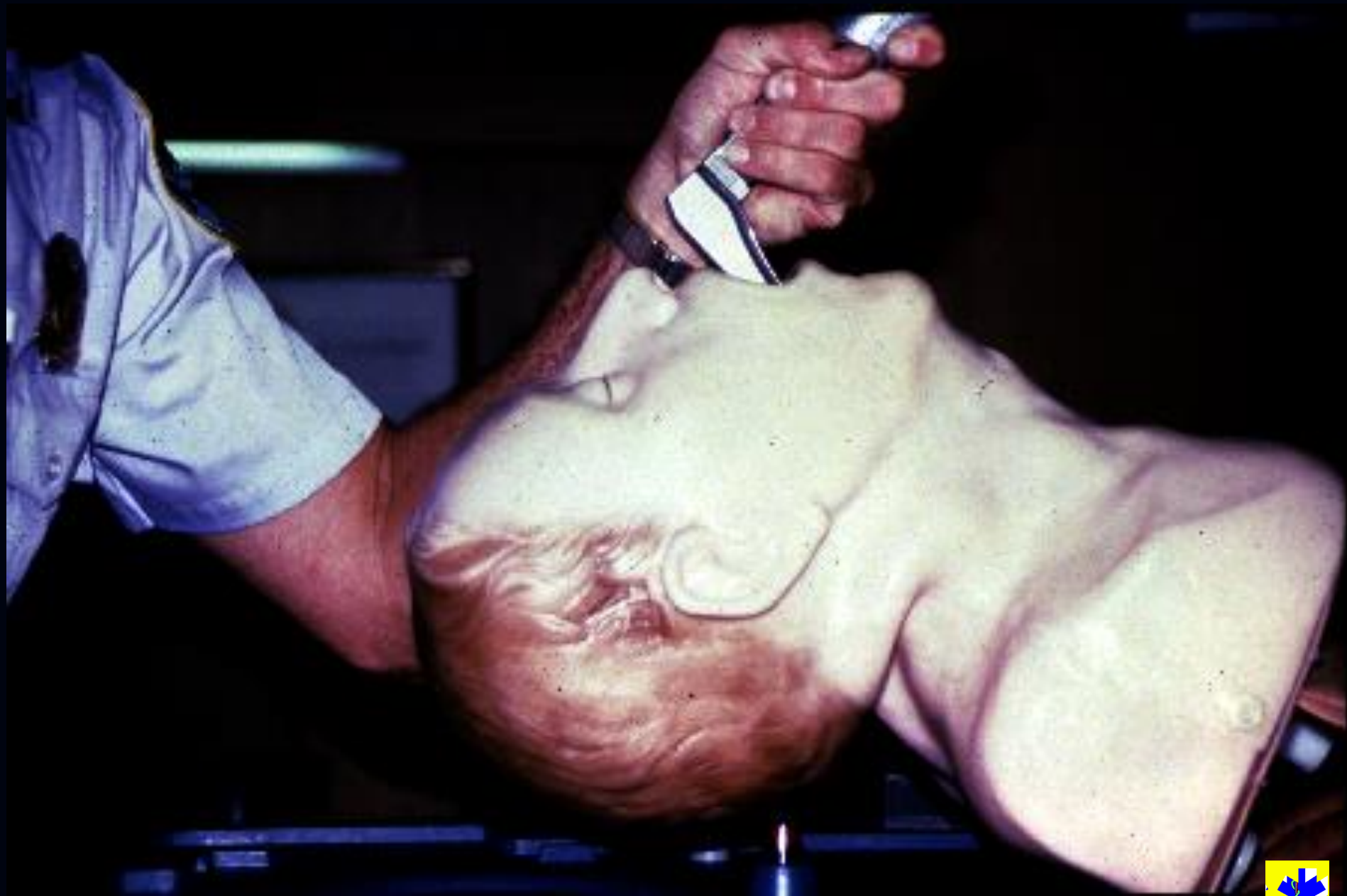




# Caveats

- On-Scene Expert Oversight









# Caveats

- Frequency of Performance



# EBM

**“Experienced  
Based Medicine”**

*Need 100 to Ride the Bike !*

# Frequency per Paramedic (pop. 1 Million)

- **< 2000 Intubations Needed (per year)**
- **Staffing just 50 ALS Units = 500 Medics**
- **Each Medic Gets < 4 Tubes per year  
(or < one every three months)**
- **Or 1 Pedi Tube Every Year or Two ?**
- *And Less Opportunity to Tube in Slower Territories of the City*

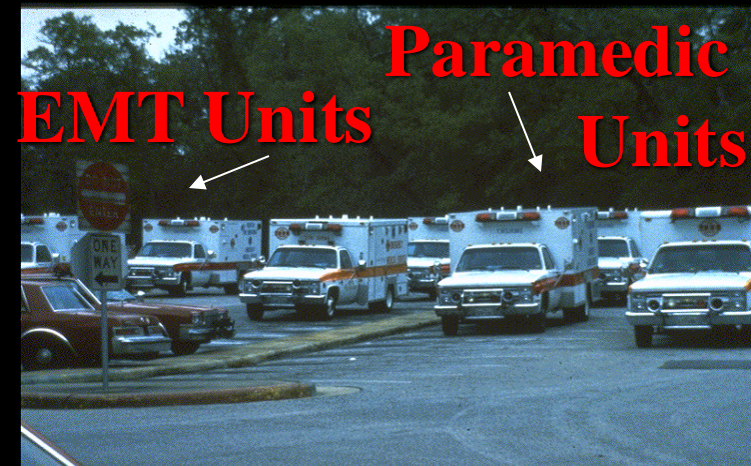
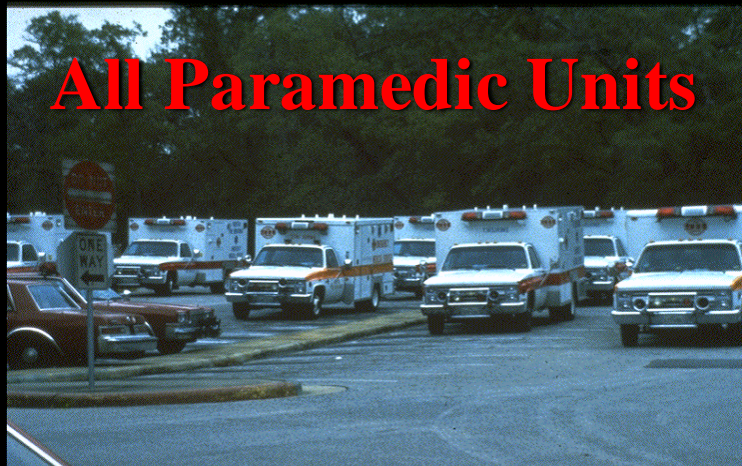
*Frequency  
Issue...*

# *Really is a System Issue...*

Paramedics on All Ambulances (all ALS)

vs.

Both EMT & ALS Ambulances (tiered)



# Seattle *99.9% Success Rate* (since 1970's)





**Only 4 Medic Units for a Half Million Population**

# Tiered System Frequency

(pop. 1.0 Million)

- 2000 Intubations Needed ( per year )
- Staffing 8 ALS Units = 80 Medics
- Each Medic Gets 25 Tubes per year  
(or twice a month)
- A Pedi Tube Several Times a Year
- Success Rate Liberalized Use of Paralytics  
= More Opportunities to Intubate
- Veterans Let Rookies Tube (“vetted” sooner)



Texas Medical  
Center  
NEXT RIGHT



# Convert to “Tiered” ALS-BLS Ambulances

- Paramedic Ambulances:  
*from 35 to 12*
- Rest Staffed by EMTs



**Success Rates Went from 90% in Three Tries...**



***...to 99.8% in Two Tries***

**Frequency Issue...**

*May Be Worse in  
Smaller  
Communities...*

# What Are Some Solutions?

- **SGAs, etc**
- **Deferred ETI in ACLS till Supervisor arrives**
- **Re-Focus on Basic Airway --- But ???**
- **Use PulseOx and Suction in the Head Injured**
- **Move Medics Around**
- **Supervisor System or “Super Medic” Responder**

**But Even if the Tube Goes into the Right Spot...**



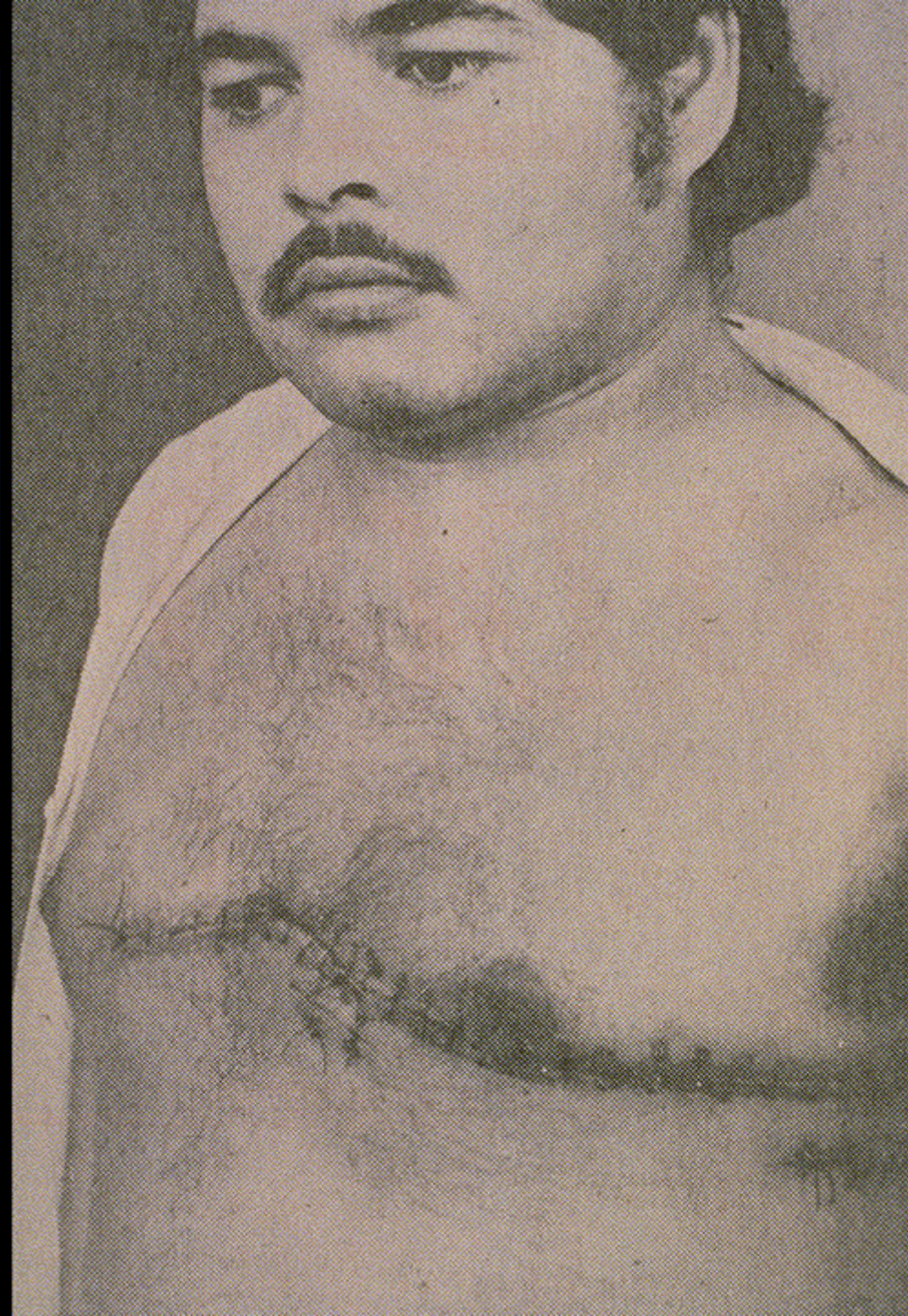
*“Death by  
Hyperventilation”*



*In Summary*



*ETI can  
Correlate  
with  
Survival !*



*But Only If....*

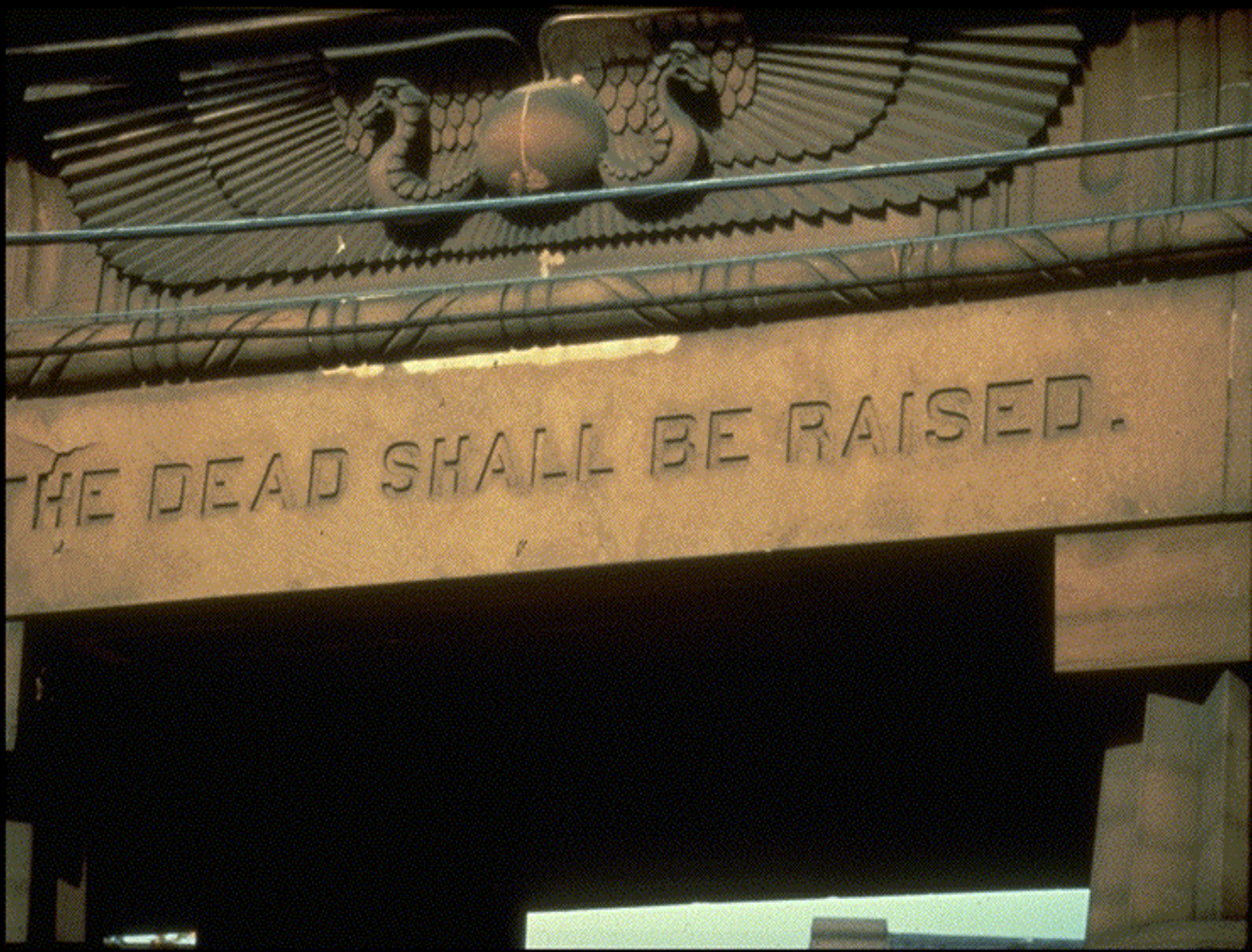
**(And There Are Many “Ifs” ! )**



*You mean you're still*  
**ALIVE !?**



*And on the Road to  
the 22nd Century...*



THE DEAD SHALL BE RAISED.

**We'll Make Life Better  
for Future Generations ....**





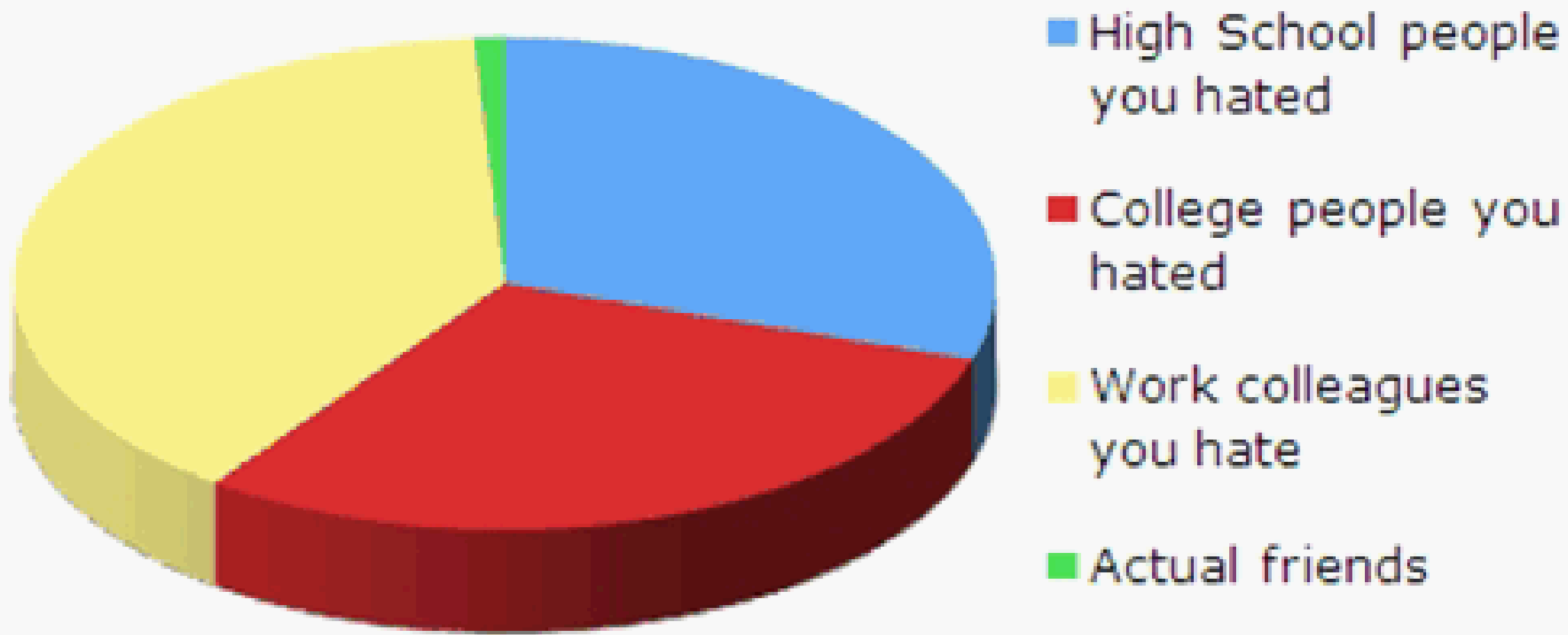


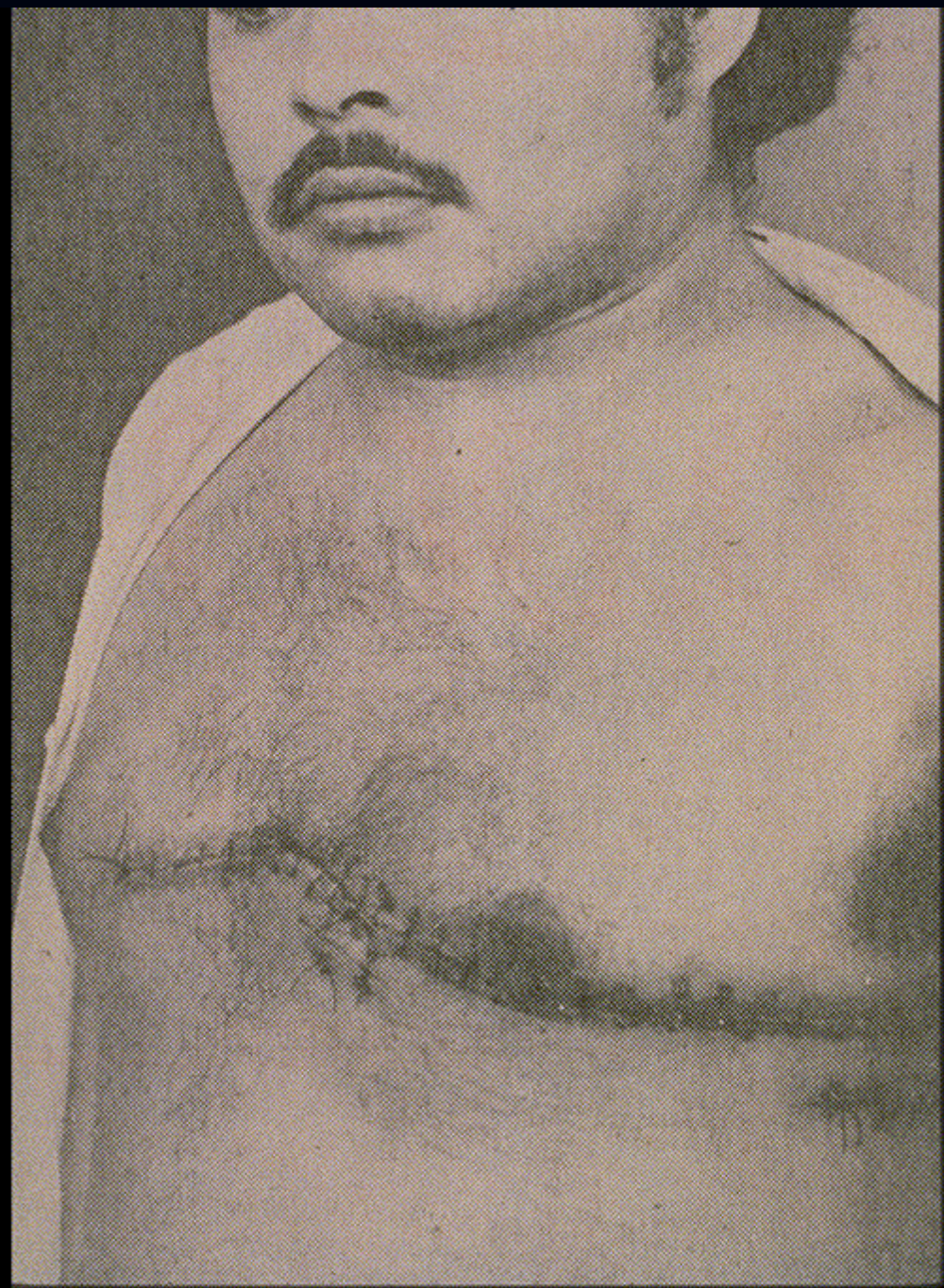
**I'm Paul Pepe ...**  
**... and I approved this Message**

***Thank You !***



# People who find you on Facebook





# **German Coast Guard Dispatcher:** **1<sup>st</sup> Day on the Job !**







# *PPV...*

---

- **Generates Positive Intrathoracic Pressure**
- **Pushes Lungs Open in a Maldistributive Manner**
- **Diminishes Venous Return and Cardiac Preload**

*Essentially No Chance of Survival ?*



# People who find you on Facebook



■ High School people you hated

■ College people you hated

■ Work colleagues you hate

■ Actual friends

