

# **It Ain't Over Till It's Over: 2012 Ways to End Resuscitative Efforts Eagles XIV**

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A blurred background image showing the flashing red, white, and blue lights of an emergency vehicle, likely an ambulance or fire truck, at night. The lights are out of focus, creating a bokeh effect against a dark background.

**EMS Termination of  
Resuscitation:  
When We Know  
That We Know  
When It's When  
To Say When  
(or Do We?)**

# EMS System for Metropolitan Oklahoma City & Tulsa



1,100 square miles

Population

– 1.6 million day

– 1.2 million night

180,791 calls (2011)

134,503 transports (2011)

74% transports



# Cardiac Arrests OKC & Tulsa Typical Year

- 1100 attempted resuscitations
- 650 (approx 60%) primary cardiac etiology
- 550 (approx 85%) NOT witnessed by EMS
- 170 (approx 30%) in VF on EMS arrival
- 120 (approx 70%) admitted to hospital
- 45 (approx 38%) patients discharged alive

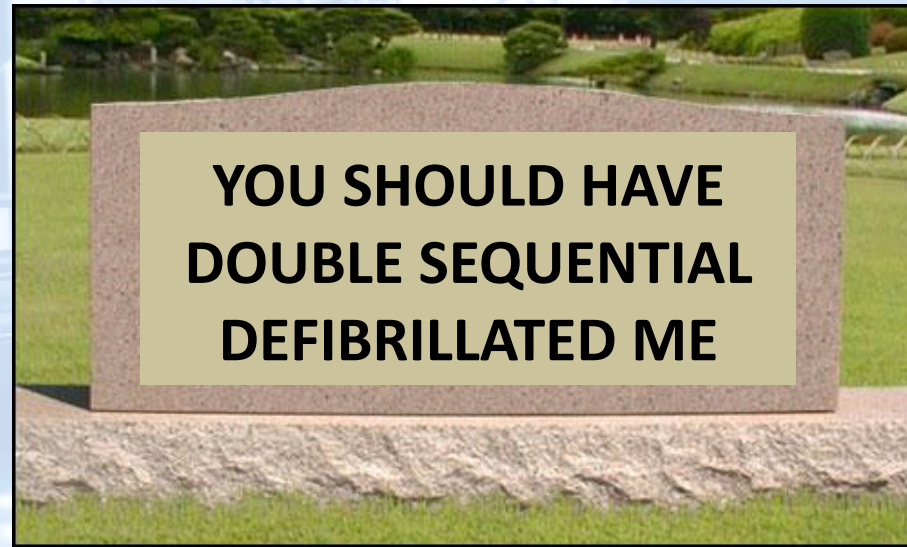
**Bystander witnessed with CPR & VF on EMS  
arrival: 38% survival (85%+ CPC 1 or 2)**



# What's the Scope of the Issue?

## Where are we?

- 295,000 Out of Hospital Cardiac Arrests/Yr in US
  - 60% EMS attempts resuscitation (every 3 mins!)
  - Over 90% do not survive to hospital discharge



# Here's happiness already at 0Dark:30.....

## San Antonio Express-News

A San Antonio paramedic who responded to the scene of a head-on collision last month failed to check for the pulse of a victim trapped inside a car with a severe head injury, city officials revealed Tuesday.

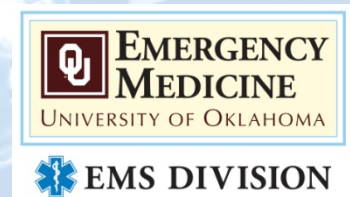
Instead, Mike Gardner, a paramedic with five years' experience in the Fire Department, deemed merely by looking that Erica Nicole Smith, 23, was dead — a violation of the Fire Department's standard operating procedures.

Checking for vital signs "is part of the protocol, and it's part of the protocol for a reason: To save lives," City Attorney Michael Bernard said.

Smith's life was not saved.

Gardner told someone to place a tarp over her body, and Smith remained inside the smashed Honda Accord for more than an hour in near-freezing temperatures before a medical examiner called to the scene noticed that she was breathing.

Paramedics again were called, and Smith was taken to a hospital, about two hours after the 4 a.m. crash. She died there the next day.



# It's not just a Texas EMS "thang"

## Local News

### County Officials Seek Answers After 'Dead' Franklin Man Found Alive In Morgue

Posted: Jan 26, 2005

**LOUISBURG, N.C.** — Four paramedics and a volunteer EMS are suspended with pay after a medical examiner studying a body in a morgue discovered the person was still alive.

Larry Donnell Green, 29, was removed from the morgue at the Franklin County Sheriff's Department and taken to Duke University Medical Center in Durham, where he is listed in critical condition.

Medical examiner J.B. Perdue was documenting Green's injuries to certify a cause a death when he noticed Green breathing. Green had been declared dead by paramedics at the accident scene Monday after being hit by a car driven by 36-year-old Tamuel Jackson almost two hours earlier at the U.S. 401-N.C. 39 split.



# When should we stop CPR?

First, when should we NOT even start?





# Futility of Resuscitation – OKC/Tulsa

*No pulse AND*

*No spontaneous respirations AND*

*Pupils fixed (unreactive to light) AND*

*One or more of the following:*

*Rigor mortis.*

*Decapitation.*

*Decomposition*

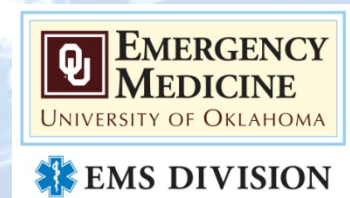
*Dependent lividity.*



# ToR Criteria – OKC/Tulsa

*An adult patient who has a **non-traumatic cardiac arrest** and is found in **asystole or PEA** upon **ALS arrival** may be considered a candidate for field termination of resuscitation if they do not respond to full resuscitation efforts AND:*

- 1) Location of cardiac arrest is a **private residence or healthcare facility (e.g. nursing home).***



# Public ToR

## Beta Testing Body Disposition



# ToR Criteria – OKC/Tulsa

An adult patient who has a **non-traumatic cardiac arrest** and is **found in asystole or PEA upon ALS arrival** may be considered a candidate for field termination of resuscitation if they do not respond to full resuscitation efforts AND:

- 2) ALS resuscitative efforts (CPR, successful placement of advanced airway, successful vascular access – IV or IO, and medication administration) have been continuously performed for **20 (twenty) minutes without return of spontaneous circulation (ROSC) or conversion of asystole or PEA to Ventricular Fibrillation/Ventricular Tachycardia** at any time during the 20 minutes of advanced life support.
- 3) The cardiac arrest did **NOT occur in absolute or relative hypothermia**.
- 4) The cardiac arrest did **NOT occur due to apparent toxic agent exposure**.
- 5) The **end-tidal CO2 level at the time of termination is less than 20mmHg**.



# Additional ToR Considerations

*Family expectations & support resources*

*Safety of crew and public if halted*

*Factors inhibiting safe patient movement*

*Language/cultural barriers*

*Physician order to continue resuscitation*

*Correctable causes of cardiac arrest yet untreated.*



# OLMCP Contact

*Field termination of cardiac arrest resuscitation may be based on an attending or on-line medical control physician's order, either by direct voice communication or in writing. The order is based upon the physician's decision that the patient's condition is terminal, cardiovascular unresponsiveness has been established despite optimal out-of-hospital ALS emergency medical care, and biologic death has occurred. The paramedic's decision to stop the resuscitation shall be based on this physician's order.*



# How did we get here?

## EMS ToR Literature - 1980s

Retrospective – “So death looking back looks like...”

1989 – Bonnin & Swor

244 OOH non-traumatic cardiac arrests

12 Excluded etiology, family, or records

21/51 with field ROSC discharged (41%)

1/181 without field ROSC discharged (0.55%)

neuro intact, PEA, no field definitive airway

*If full ACLS & definitive airway & no ROSC, ToR*

Editorial indicates 1st EBM for EMS ToR

Bonnin MJ, Swor RA. Outcomes in unsuccessful field resuscitation attempts. *Ann Emerg Med.* 1989;18:507-12.

Frank M. Should we terminate futile resuscitations in the field? Can we afford not to? [editorial]. *Ann Emerg Med.* 1989;18:594-6.



# Houston FD Outcomes – Early 1990s

Prospective study for non EMS ROSC outcomes

1,322 pts; 952 non EMS ROSC; 6 (0.6%) dc home

All 6 dc to home had refractory VF

*Survival predictors for unwitnessed OOH CA:*

*“Full ACLS with definitive airway management”*

*5 mins of ROSC at 60+ bpm*

*Refractory VF/VT*

*ROSC within 25 mins (30 mins if VF/VT)*

Bonnin MJ, Pepe PE, Kimball KT, Clark PS Jr. Distinct criteria for termination of resuscitation in the out-of-hospital setting. JAMA. 1993;270:1457–62.





# Any recent literature?

- Validating a termination rule set
- Barriers to implementing termination
- Utility of focused training
- Use of etCO<sub>2</sub> to predict safe termination
- Recent NAEMSP Position Paper (late 2011)





Contents lists available at ScienceDirect

## Resuscitation

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



Clinical paper

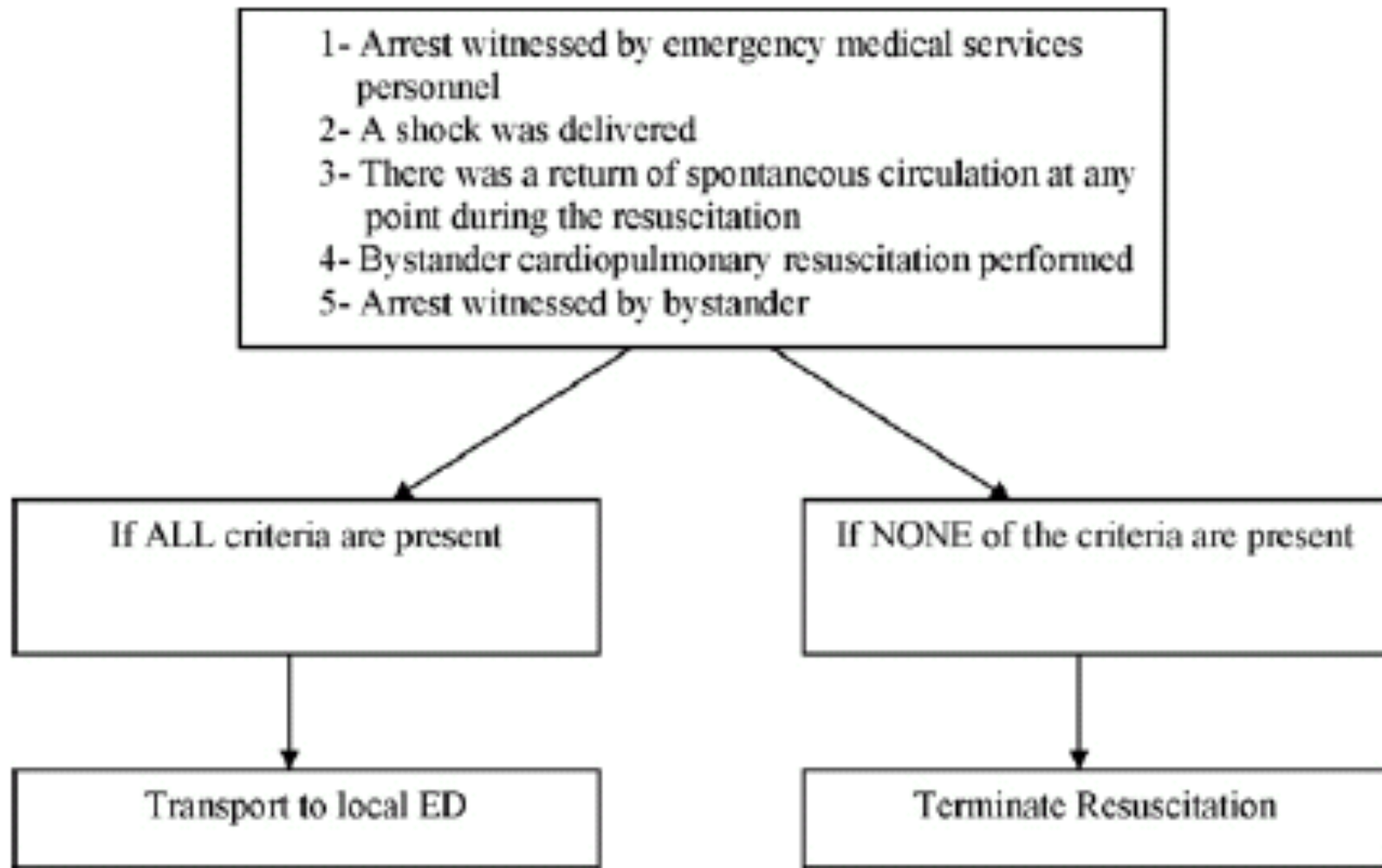
### Validation of a universal prehospital termination of resuscitation clinical prediction rule for advanced and basic life support providers<sup>☆</sup>

Laurie J. Morrison<sup>a,b,d,\*</sup>, P. Richard Verbeek<sup>b,c</sup>, Cathy Zhan<sup>a</sup>, Alex Kiss<sup>e</sup>, Katherine S. Allan<sup>a,f</sup>

**Results:** Of the 2415 patients with cardiac arrest of presumed cardiac etiology, the advanced life support rule recommended termination of resuscitation for 743 patients. No survivors were identified in this group. It had a specificity of 100% for recommending transport of potential survivors, a positive predictive value of 100% for death and a predicted transport rate of 69%. The basic life support rule recommended termination of resuscitation for 1302 patients, with no survivors. This rule had a specificity of 100%, a positive predictive value of 100% and a predicted transport rate of 46%.



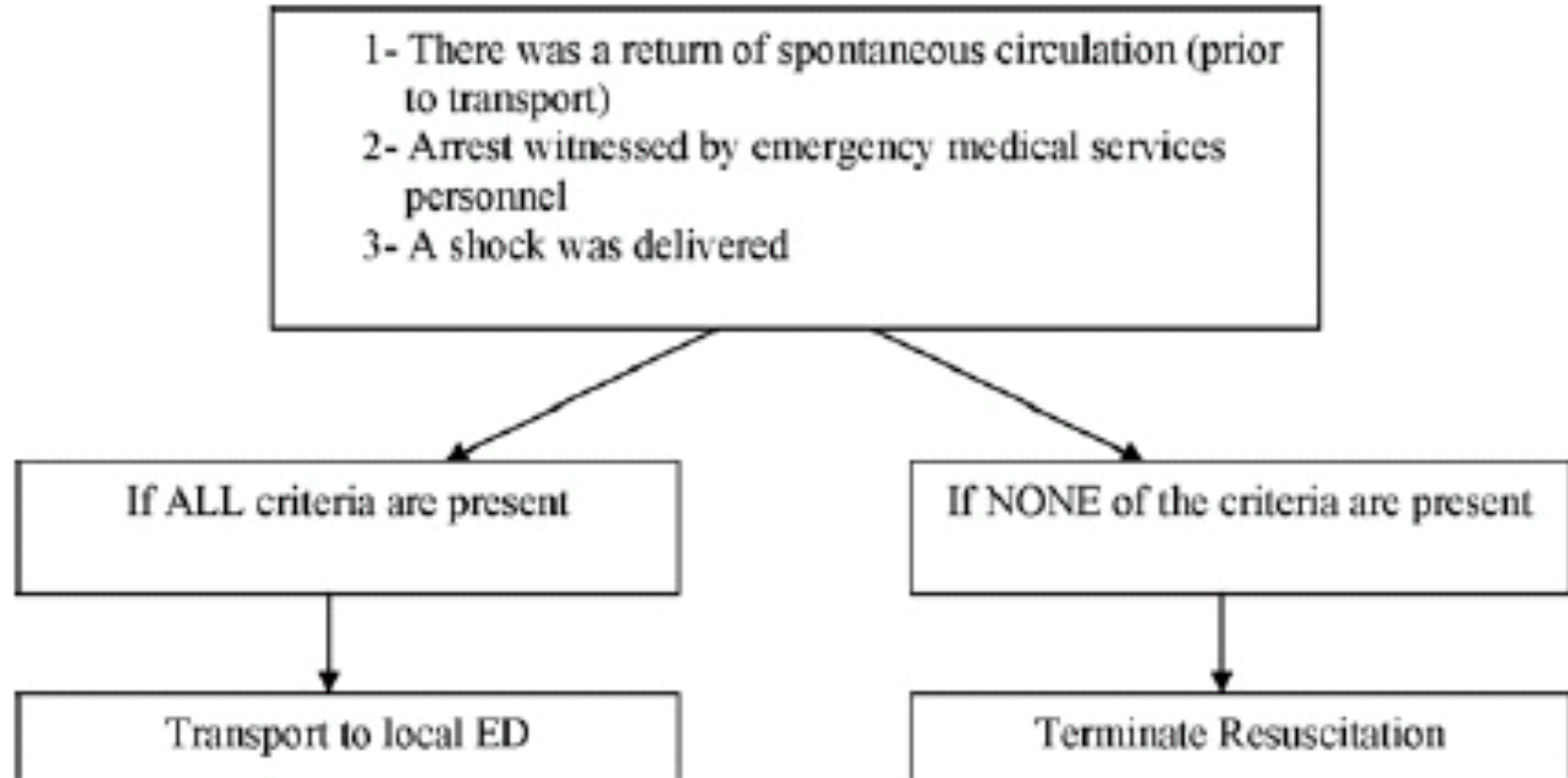
# Morrison et al ALS Rule



Predicted to reduce transports by 31%



# Morrison et al BLS Rule



Predicted to reduce transports by 54%



# Circulation

## Cardiovascular Quality and Outcomes

American Heart Association   
*Learn and Live*

JOURNAL OF THE AMERICAN HEART ASSOCIATION

### A Qualitative Study to Identify Barriers to Local Implementation of Prehospital Termination of Resuscitation Protocols

Comilla Sasson, Jane Forman, David Krass, Michelle Macy, Arthur L. Kellermann  
and Bryan F. McNally

*Circ Cardiovasc Qual Outcomes* 2009;2;361-368; originally published online Jun 30, 2009;



# NAEMSP 2008 Attendee Focus Groups

## 3 Basic Themes Resulted

- Pay incentivizes transport
- State mandates transport
  - Very limited ToR allowed
- Local “norms” preclude easy implementation



# EMS ToR Training

- Ponce et al. PEC Oct-Dec 2010 14(4) 537-42
- Focused training does improve EMS professionals' comfort with ToR in presence of family



# Role for capnography in ToR

Mid 1990s....EtCO<sub>2</sub> ≤ 10mmHg assoc poor outcome

Promising

No clear recommendation

Have we been able to get more definitive than that?

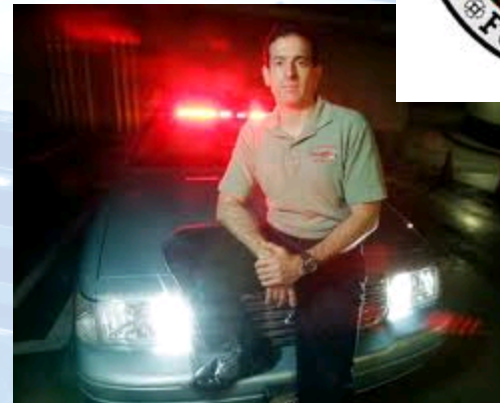
- 5. Levine RI, Wayne MA, Miller CC. End-tidal carbon dioxide and outcome of out-of-hospital cardiac arrest. *N Engl J Med.* 1997;337:301-5.
- 6. White RD, Asplin BR. Out-of-hospital quantitative monitoring of end-tidal carbon dioxide pressure during CPR. *Ann Emerg Med.* 1994;23:25-30.





# Los Angeles EtCO2 Survival Prediction

- Adult, nontraumatic OOHCA 2006-2007 in LA
- What predicts failure to get ROSC? (97% PPV)
- Male
- Unwitnessed arrest
- No bystander CPR
- Non-VF
- **Initial EtCO2  $\leq$  10 mmHg**
- **EtCO2 falling  $>$  25%**



*Prehosp Disaster Med. 2011 Jun; 26(3): 148-50*



 EMS DIVISION



# Eagles EtCO<sub>2</sub> Criteria in ToR

Effect of mechanical CPR devices

Likely raise criterion from <10mmHg to <20mmHg?

“We have a number of systems that use very divergent criteria, or none at all... we will look back at this time in future years and many of us will smile at our ignorance... until then, I think we should describe who does what, without naming the specific systems... 20 minutes for little to no CO<sub>2</sub> is common but not universal.”

– Corey Slovis, March 2009



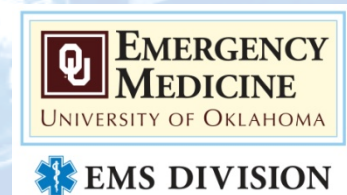
*Prehosp Emerg Care. 2011 Oct-Dec;15(4):547-554.*



# RESOURCE DOCUMENTS TO THE NAEMSP POSITION STATEMENTS

**TERMINATION OF RESUSCITATION OF NONTRAUMATIC CARDIOPULMONARY  
ARREST: RESOURCE DOCUMENT FOR THE NATIONAL ASSOCIATION OF EMS  
PHYSICIANS POSITION STATEMENT**

Michael G. Millin, MD, MPH, Samiur R. Khandker, MD, Alisa Malki, BA



# Take Home Points

## Where do we still need to go?

- Validated EMS ToR models do exist
  - See? Shock? ROSC? If no, no transport (Morrison BLS)
- 2010 AHA/ILCOR standards advocate EMS ToR
- We have obligations that support EMS ToR:
  - Safety for EMS professionals & traveling public
  - Advancing the “science” of EMS medical practice
  - Fiduciary stewardship
- Future investigations:
  - Effects of mechanical CPR, better CPR, more precise EtCO<sub>2</sub> prediction models, additional arrest variables to predict safe/reliable termination?



# A parting thought...

- **“In cardiac cessation the odds in favor of resuscitation decrease with each minute that passes before proper measures are applied. The stakes are high – a human life. The half-hearted attempts at resuscitation should be replaced by early and bold attempts at resuscitation...The feeling that once the heart has stopped the patient is gone and nothing will help should be replaced by the knowledge that a human life can and may be saved, and any attempt is justifiable.”**

***JAMA August 29, 1942***





**TULSA**  
OKLAHOMA



**OKLAHOMA CITY**



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