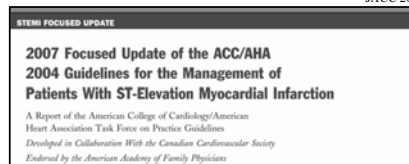


The Most Important Articles in 2009 for EMS Physicians and Paramedics

Corey M. Slovis, M.D.
 Vanderbilt University School of Medicine
 Metro Nashville Fire Department and
 Nashville International Airport



JACC 2008;51:210-247

- Multiple changes from the prior 2004 update
- Is a focused update from 2004 rather than total rewrite
- Major changes for Beta Blockers
- Morphine has a caution; remains Class I in AMI
- Beta Blockers no longer indicated by EMS

Morphine Use in AMI Increases Mortality

Am Heart J 2005;149:1043-1049

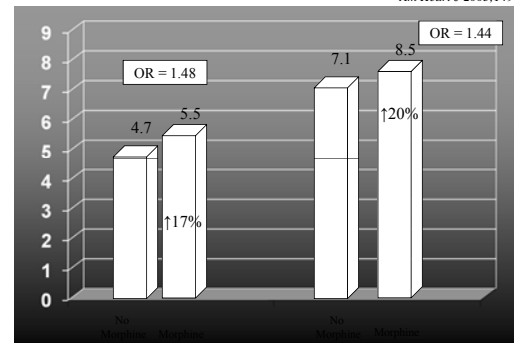
Association of intravenous morphine use and outcomes in acute coronary syndromes: Results from the CRUSADE Quality Improvement Initiative

Trip J. Meine, MD,* Matthew T. Roe, MD, MHS,* Anita Y. Chen, MS,* Manesh R. Patel, MD,* Jeffrey B. Washam, PharmD,* E. Magnus Ohlman, MD,* W. Frank Peacock, MD,* Charles V. Pollack, Jr., MD, MA,* W. Brian Gibler, MD,* Eric D. Peterson, MD, MPH,* for the CRUSADE Investigators Durham and Chapel Hill, NC, Cleveland and Cincinnati, Ohio, and Philadelphia, Pa

- 57,039 pts. from 443 U.S. hospitals
- 29.8% (17,003) received morphine

Morphine Use in AMI Increases Mortality

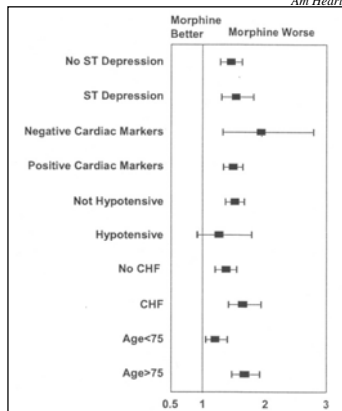
Am Heart J 2005;149:1043-1049



Death

Death or AMI

Am Heart J 2005;149:1043-1049



Be Careful with Morphine.

**May not be as benign as we
once thought.**

► Early intravenous then oral metoprolol in 45 852 patients with acute myocardial infarction: randomised placebo-controlled trial

COMPELL (Oral and Metoprolol in Myocardial Infarction Trial) Collaborative group
Summary

- Chinese study of 45,852 patients
- 5 mg of metoprolol Q 5 min then 200 PO QD
- Placebo controlled
- Decreased Re-AMI and VF – almost all from day 2 on
- 30% increase Cardiogenic Shock- almost all on day 1
Especially if: Older (age 70)
BP < 120 mm Hg
HR > 110
HF (Killip Class > I)

Beta Blockers should not be given until LV function is known.

No longer an EMS drug in STEMI.

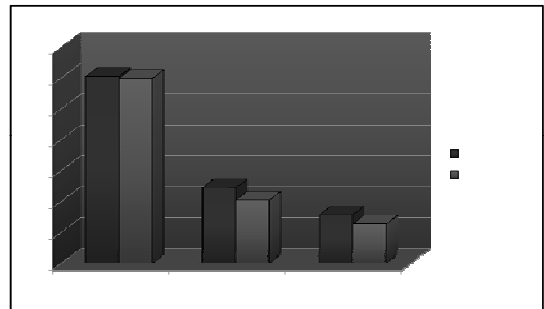
ORIGINAL CONTRIBUTIONS

BIPHASIC DEFIBRILLATION DOES NOT IMPROVE OUTCOMES COMPARED TO MONOPHASIC DEFIBRILLATION IN OUT-OF-HOSPITAL CARDIAC ARREST
Kimberly Freeman, MD, Gregory W. Hensley, MD, Marc Shalit, MD, Geoff Stroh, MD

ABSTRACT
Study Objective: To compare the outcomes of out-of-hospital. Electrical defibrillation is one of the most important

- Compared Monophasic vs. Biphasic Defibrillation
- 485 pts; 2 years of Monophasic vs. 2 years Biphasic
- Evaluated ROSC, Survival, Discharge to home
- Less shocks required with Biphasic (p = 0.001)
- But...

Monophasic vs. Biphasic



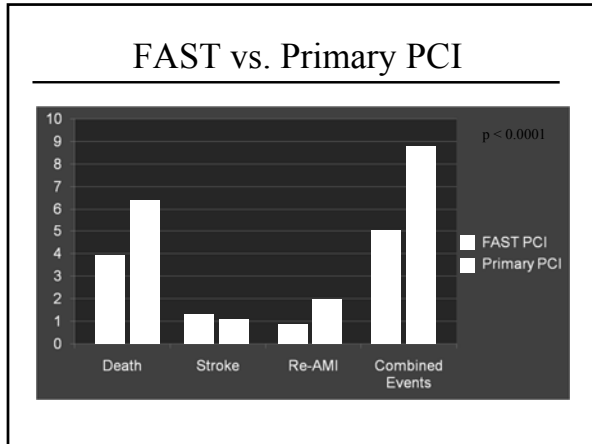
Reduced-Dose Fibrinolytic Acceleration of ST-Segment Elevation Myocardial Infarction Treatment Coupled With Urgent Percutaneous Coronary Intervention Compared to Primary Percutaneous Coronary Intervention Alone

Results of the AMICO (Alliance for Myocardial Infarction Care Optimization) Registry
Ali E. Denktas, MD, FACC,* Haris Arhar, MD, FACC,* Timothy D. Henry, MD, FACC,†

- 2,869 STEMI patients from 5 PCI centers
- Compared FAST-PCI vs 1° PCI
- Used half dose RPA or TNK by EMS
- Patients also received clopidogrel

Results

- 1° PCI group had shorter D₂B than FAST-PCI
- 168 min vs 196 min; p=0.012
- Yet FAST-PCI group had better TIMI score and less CHF
- TIMI 2.1 vs 1.1; p < 0.0001
- 5.6% Killip Class IV vs. 10.9%; p < 0.0001



JAMA 2007;298:2754-2760

"False-Positive" Cardiac Catheterization Laboratory Activation Among Patients With Suspected ST-Segment Elevation Myocardial Infarction

David M. Eason, MD
Context: Allowing the emergency department physician to activate the cardiac catheterization laboratory...
Objective: To investigate whether the survival of patients with out-of-hospital cardiac arrest could improve with consistently standardized resuscitation (MERC).

- 1,335 R/O STEMI patients from 30 referral hospitals
- 86% of patients had obvious culprit lesion(s)
- 14% did NOT have an obvious thrombus or ruptured plaque
- **9.5% had no significant coronary dx** (though about 1/3 were biomarker positive)

D2B < 90 min results in about a 1 in 10 false positive error rate.

JACC 2009;53:161-166

Utilization and Impact of Pre-Hospital Electrocardiograms for Patients With Acute ST-Segment Elevation Myocardial Infarction

Data From the NCDR (National Cardiovascular Data Registry) ACTION (Acute Coronary Treatment and Intervention Outcomes Network) Registry
Deborah R. Diercks, MD, MSc,* Michael C. Kontos, MD,† Anita Y. Chen, MS,‡ Charles V. Pollack, Jr, MD, MS,§ Stephen D. Wisson, MD,|| John S. Rumfeld, MD, PhD,¶ David J. Magid, MD, MPH,||* W. Brian Gillier, MD,†† Christopher P. Cannon, MD,‡‡ Eric D. Peterson, MD, MPH,|| Marilee T. Roe, MD, MHS,|| on behalf of the NCDR ACTION

- 7,098 EMS Chest Pain Patients (Nat'l Cardiac Data Registry and ACTION Network)
- Only 27.4% (1,941 pts) had pre-hospital ECGs
- Pre-hospital ECGs decreased D₂B by 14 min (p = 0.003)
- **¾ of EMS patients do not get pre-hospital ECGs**

Are TASERS® Safe: Multiple Views

Cardiac Monitoring of Human Subjects Exposed to the Taser®
The Physiologic Effects of a Conducted Electrical Weapon in Swine
The Physiologic Effects of a Conducted Electrical Weapon on Humans
TASER X26 Discharges in Swine Produce Potentially Fatal Ventricular Arrhythmias

- 5 second TASER exposure does not result in significant physiological stress
- Taser caused immediate HR↑ to 300 bpm in pigs (2 episodes VF, 1 VT, 1 death)
- Acad Emerg Med 2008;15:838-844
 - 34 humans, tasered for 10 sec (usual is 5 sec)
 - Continuous Echo; interrupted ECG during shock
 - No tachyarrhythmias, No malignant ECG changes

Strong evidence that Tasers are safe in **normal volunteers**.

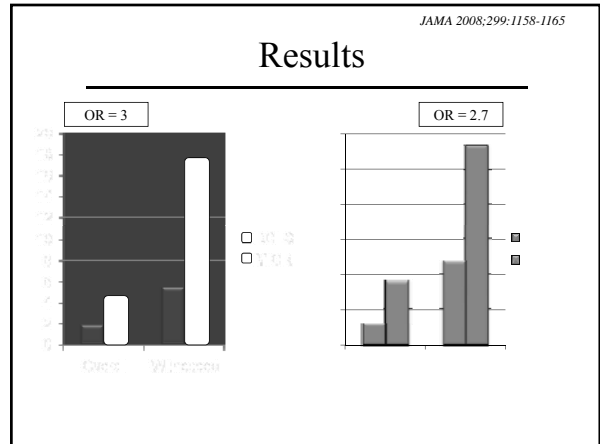
JAMA 2008;299:1158-1165

Minimally Interrupted Cardiac Resuscitation by Emergency Medical Services for Out-of-Hospital Cardiac Arrest

Bradley J. Bales, MD
Lani L. Clark, BS
Gordon L. Faux, MD

Context: Out-of-hospital cardiac arrest is a major public health problem.
Objective: To investigate whether the survival of patients with out-of-hospital cardiac arrest could improve with consistently standardized resuscitation (MERC).

- Evaluated Compression Only CPR
- 886 patients, 62 Fire Depts, Phoenix and Tucson
- 200 uninterrupted chest compressions over 2 min
- No active ventilation: O₂ mask affixed only
- 1 mg epinephrine each 200 compressions cycles



Hands-On Defibrillation
 An Analysis of Electrical Current Flow Through Rescuers in Direct Contact With Patients During Biphasic External Defibrillation

Michael S. Lloyd, MD, Brian Hecke, BS, Paul F. Walter, MD, Jonathan J. Langberg, MD

Background—Brief interruptions in chest compressions reduce the efficacy of resuscitation from cardiac arrest. Interruptions of this type are inevitable during hands-off periods for shock delivery to treat ventricular tachyarrhythmias. The safety of a rescuer remaining in contact with a patient being shocked with modern defibrillation equipment has not been investigated.

- Does CPR need to stop when defibrillating?
- 43 events studied during cardioversion
- Rescuers wore gloves
- Use biphasic Lifepack 12 (truncated exponential wave form)
- One extra pad on patient linked to one pad on MD doing compressions

Current leakage from patient to physician was less than that of a home body fat scale.

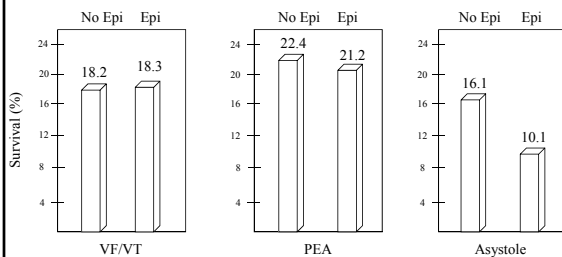
Uninterrupted Chest Compressions During Defibrillation are Coming!!!!

EMERGENCY MEDICAL SERVICES/ORIGINAL RESEARCH
Survival Outcomes With the Introduction of Intravenous Epinephrine in the Management of Out-of-Hospital Cardiac Arrest

Marcus Eng Hock Ong, MBBS, MPH From the Department of Emergency Medicine, Singapore General Hospital (M&H) Ong, Shi Lin, Yap, Venkatasubramanian, the Medical Department, Singapore Civil Defence Force (SF), the Clinical Trials and Epidemiology Research Unit (EP&U) Ng, Panchalingam; the Emergency Medicine Department, National University Hospital (Manning), the Department of Emergency Medicine, Alexandra Hospital (YKH Ong); the Department of Emergency Medicine, Chang General Hospital (SGC Lim), the Children's Emergency, KK Women's and Children's Hospital (Tham); and the Department of Cardiology, Tan Tock Seng Hospital (Shi Lin, MBBS, FRCC, Ed.
Eng Shee Tan, MBBS, MSc
Faith Swan Pung Ng, MApp Stat
Anusha Panchalingam, RN
Shi Lin, MBBS, FRCC, Ed.

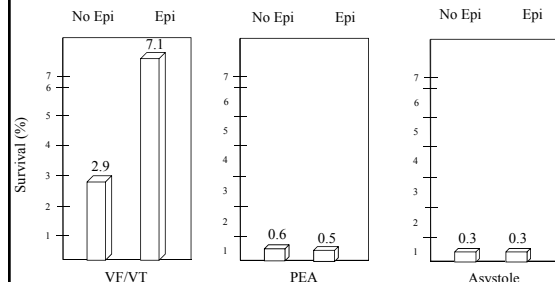
- Evaluated Epinephrine's effects on survival from cardiac arrest
- Before and after implementation study of 1,296 pts in Singapore

ROSC



All p values = NS

Discharge



All p values = NS

Ann Emerg Med 2007;50:635-642

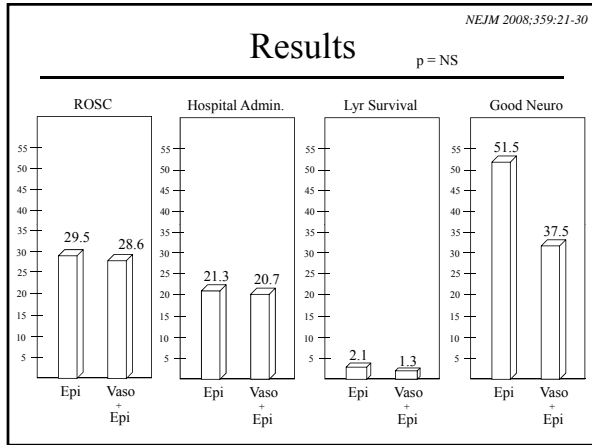
EMERGENCY MEDICAL SERVICES/ORIGINAL RESEARCH
Survival Outcomes With the Introduction of Intravenous Epinephrine in the Management of Out-of-Hospital Cardiac Arrest

- No differences found if Arrest Witnessed
- No difference found if Bystander CPR
- No difference found if Response time < 8 min (though no Epi 0.8% vs. 2.1% with Epi)
- Subgroup analysis did show trend favoring Epi it:
 - Ventricular Fibrillation
 - Shorter Response Times (< 8 min)

NEJM 2008;359:21-30

THE NEW ENGLAND JOURNAL OF MEDICINE
ORIGINAL ARTICLE
Vasopressin and Epinephrine vs. Epinephrine Alone in Cardiopulmonary Resuscitation
Pierre-Yves Gueugnot, M.D., Ph.D., Jean-Stéphane David, M.D., Ph.D.

- 2,894 pts randomized to Vasopressin and Epi vs. Epi alone
- Study done in France with MDs on EMS units
- Double Blind, placebo controlled
- Two doses, 3 min apart of Epi + Vaso vs. Epi + Saline
- VFib pts enrolled after three shocks
- After the two rounds of study drugs epi given open label



NEJM 2008;359:21-30

THE NEW ENGLAND JOURNAL OF MEDICINE
ORIGINAL ARTICLE
Vasopressin and Epinephrine vs. Epinephrine Alone in Cardiopulmonary Resuscitation
Pierre-Yves Gueugnot, M.D., Ph.D., Jean-Stéphane David, M.D., Ph.D.

There is no proven or suggested benefit from using Vasopressin in cardiac arrest.

Ann Emerg Med 2008;51:25-34

CARDIOLOGY/ORIGINAL RESEARCH
Bronchodilator Therapy in Acute Decompensated Heart Failure Patients Without a History of Chronic Obstructive Pulmonary Disease
Adam J. Singer, MD
From Stony Brook University and Medical Center, Stony Brook, NY (Singer, Leck, the Cleveland)

- 10,978 pts from ADHERE CHF Registry
- 76 academic and community EDs
- Bronchodilators associated with negative outcomes in patients with no history of COPD
- Bronchodilators in non COPD patients:
 - Increased IV vasodilators need and increased need for intubation
- No Change in mortality

Bronchodilator use for CHF

Do not routinely use bronchodilator in HF if:

- No wheeze
- No hx COPD

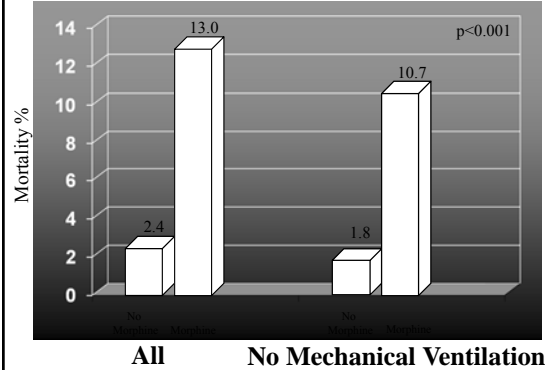
Original article

Morphine and outcomes in acute decompensated heart failure: an ADHERE analysis

W F Peacock,¹ J E Hollander,² D B Diercks,³ M Lopatin,⁴ G Fonarow,⁵ C L Emerman¹

- 147,362 patients from ADHERE Registry
- All patients had acute CHF
- 14.1% received morphine
- Attempted to match severity of illness
- Is a retrospective study

Morphine vs. No-Morphine in HF



EMERGENCY MEDICAL SERVICES/ORIGINAL RESEARCH

Out-of-Hospital Continuous Positive Airway Pressure Ventilation Versus Usual Care in Acute Respiratory Failure: A Randomized Controlled Trial

James Thompson, MD, FRCP
David A. Peirce, MD, FRCP
Mona Arshad/Author, PhD (in)

From the Department of Emergency Medicine, St. Paul's Hospital, Vancouver, British Columbia, Canada (Thompson); Department of Emergency Medicine, Dalhousie University, Halifax, Nova Scotia, Canada (Peirce); Auckland District Emergency Health Services, Auckland, New Zealand (Arshad).

- CPAP decreased intubation from 50% to 20% (17/34 vs. 7/35)
- CPAP decreased mortality 35.3% to 14.3% (12/34 vs. 5/35)

CPAP reduced intubation rates by 30% and mortality by 21% in this EMS study.

Needle thoracostomy may not be indicated in the trauma patient¹

Daniel C. Cullinane*, John A. Morris Jr, John G. Bass, Edmund J. Rutherford

Yale-New Haven Medical Center, New Haven, Connecticut, USA
Accepted 20 May 2001

- 25 needle decompressions in 19 pts
- EMS Paramedics and Fight RNs
- ≥ 4/19 had no pleural penetration
- 2/19 had proven tension pneumothorax
- Only 1/19 had proven benefit

Needle Decompression Over Used and Often Not Indicated by Patient's Stability

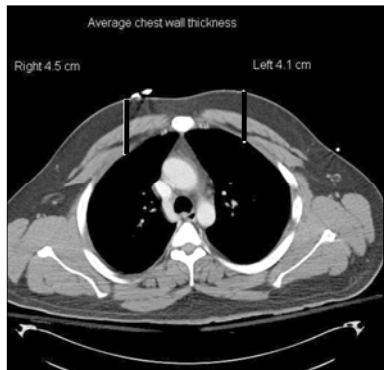
NEEDLE THORACOSTOMY FOR TENSION PNEUMOTHORAX: FAILURE PREDICTED BY CHEST COMPUTED TOMOGRAPHY

Robert L. Stevens, MD, Angel A. Rochester, MD, Jonathan Busko, MD, Thomas Blackwell, MD, Daniel Schwartz, MD, Anne Argenita, BS, Ronald F. Sing, DO

Abstract: Objective. Tension pneumothorax can lead to cardiovascular collapse and death. In the prehospital setting, needle thoracostomy are caused by motor vehicle collisions. If pneumothoraces are left untreated, an unknown percentage can progress to tension physiology requiring prehospital personnel to perform needle thoracostomy. Although

- 110 Level 1 Trauma Patients
- Measured Chest Wall Depth by CT
- RT Side = 4.5 cm, LF Side = 4.1 cm
- Most Needles are 4.0 cm

EMS Decompression Likely to be Unsuccessful 50% of the Time



Two Paramedics or One?

Does the Number of System Paramedics Affect Clinical Benchmark Threshold?
Prehosp Emerg Care 2008;12:360-368

Impact of Ambulance Crew Configuration on Simulated Cardiac Arrest
Prehosp Emerg Care 2008;12:62-68

- Do more paramedics make patient care better?
- More paramedics in a system ↓ critical skill performance
- May result in meeting less benchmark numbers
- In simulated ACLS scenarios:
 - 2 paramedics NOT superior to 1 EMT-P + EMT-B
 - Were not faster or more accurate

Prehosp Emerg Care 2008;12:87-89

PRELIMINARY REPORT

PROSPECTIVE EVALUATION OF ONDANSETRON FOR UNDIFFERENTIATED NAUSEA AND VOMITING IN THE PREHOSPITAL SETTING
Craig R. Warden, MD, MPH, Raymond Moreno, MD, Mohamad Daya, MD, MS

- Zofran formerly expensive and for cancer patients
- Now generic and very inexpensive (\$70 → \$0.67)
- 952 patients received it:
 - 40% “a little better”
 - 25% “a lot better”
- 50% decrease in vomiting

EMS Airways

Alternate Airways in the Out of Hospital Setting Position Statement of the National Association of EMS Physicians
Prehosp Emerg Care 2007;11:55

Alternate Airways in the Prehospital Setting
Prehosp Emerg Care 2007;11:56-61

A Comparison of the King-LT to Endotracheal Intubation and Combitube in a Simulated Difficult Airway
Prehosp Emerg Care 2007;11:35-41

Endotracheal Intubation Increases Out-of-Hospital Time in Trauma Patients
Prehosp Emerg Care 2007;11:224-229

Paramedic Rapid Sequence Intubation for Severe Traumatic Brain Injury
Prehosp Emerg Care 2007;11:1-8

Unrecognized Misplacement of Endotracheal Tubes by Ground Prehospital Providers
Prehosp Emerg Care 2007;11:218-219

Paramedic Perceptions of Challenges in Out-of-Hospital Endotracheal Intubation
Prehosp Emerg Care 2007;11:219-223

- Gold Standard Paramedic = ETT being challenged
- All EMS services must have a back-up “blind” device
- King LT seems most accepted and successful
- RSI not proven benefit in EMS-even in head injury
- Unless ET_{CO}₂ determined – unrecognized esophageal intubations = 10-25%

Am J Med 2008;121:s2-s23

Overconfidence as a Cause of Diagnostic Error in Medicine
Ita S. Berner, EDD,* and Mark L. Graber, MD[†]

*Department of Health Services Administration, School of Health Professions, University of Alabama at Birmingham, Birmingham, Alabama, USA; and [†]VA Medical Center, Westport, New York and Department of Medicine, State University of New York at Stony Brook, Stony Brook, New York, USA.

ABSTRACT

- Diagnostic errors are fairly consistent in frequency:
 - 10-15% in most fields
- We often feel overconfident
- We use premature closure
- We use confirmation bias
- We are complacent

Summary₁

Acute Beta Blocker use no longer recommended for most STEMI's

Use Less Morphine

Up to 1 in 10 STEMI Alerts may not have a STEMI at cath

TASERS appear safe in most cases

Less ventilation in CPR – maybe none

Summary₂

We may be able to Pump and Shock at the same time

Vasopressin shows no incremental benefits over Epi

No Wheeze = No Bronchodilator in CHF

CPAP Works in the Field- but maybe doesn't ultimately prevent intubations

One Paramedic might be better than Two

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