EAGLES 2013
Most Important EMS Articles 2013

Corey M. Slovis, M.D.
Vanderbilt University Medical Center
Metro Nashville Fire Department
Nashville International Airport
Nashville, TN

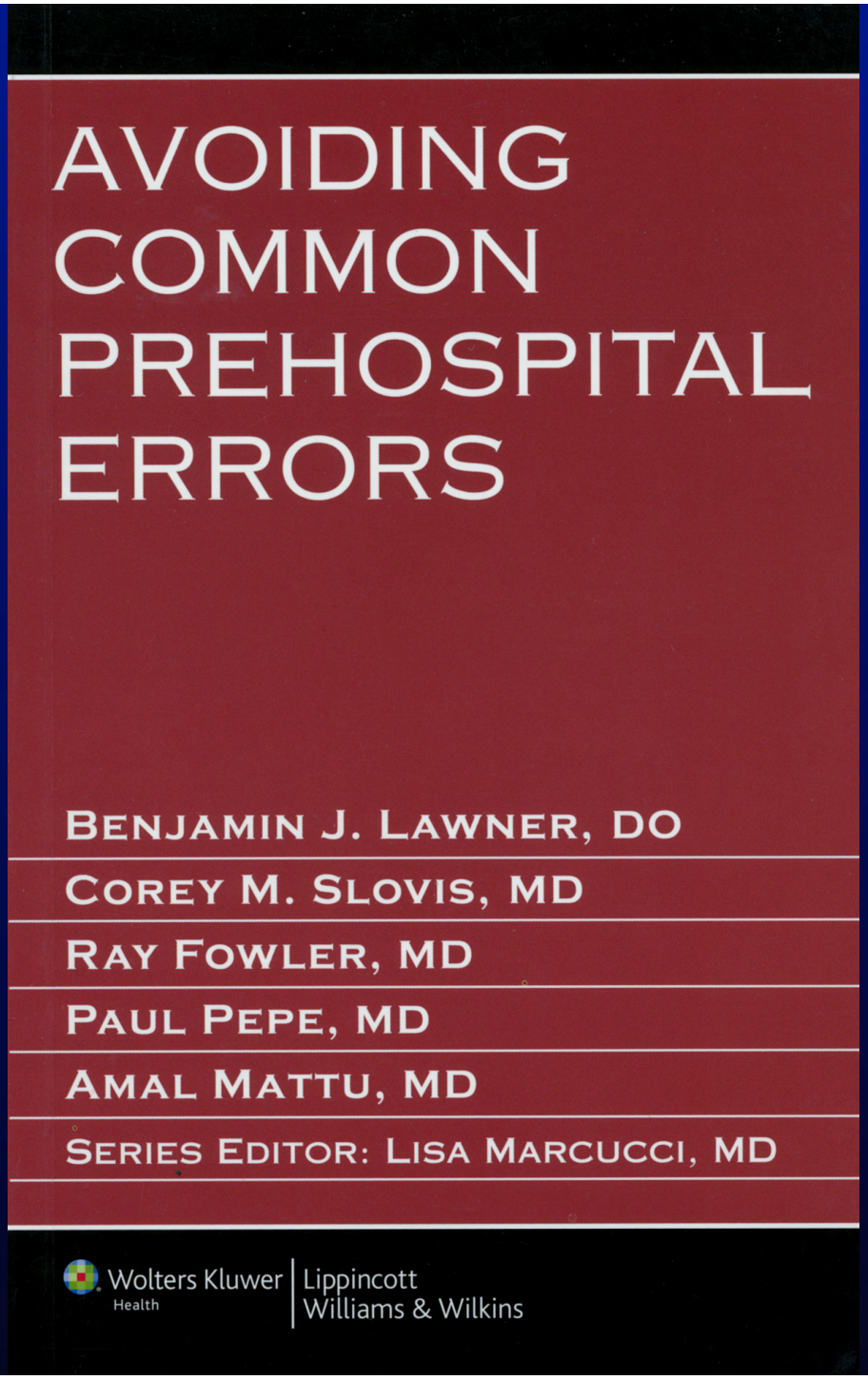
CPR 2013

EMS Airways

ACC/AHA STEMI 2013

TXA

Anaphylaxis


AVOIDING COMMON PREHOSPITAL ERRORS
BENJAMIN J. LAWNER, DO
COREY M. SLOVIS, MD
RAY FOWLER, MD
PAUL PEPE, MD
AMAL MATTU, MD
SERIES EDITOR: LISA MARCUCCI, MD
Wolters Kluwer Health
Lippincott Williams & Wilkins

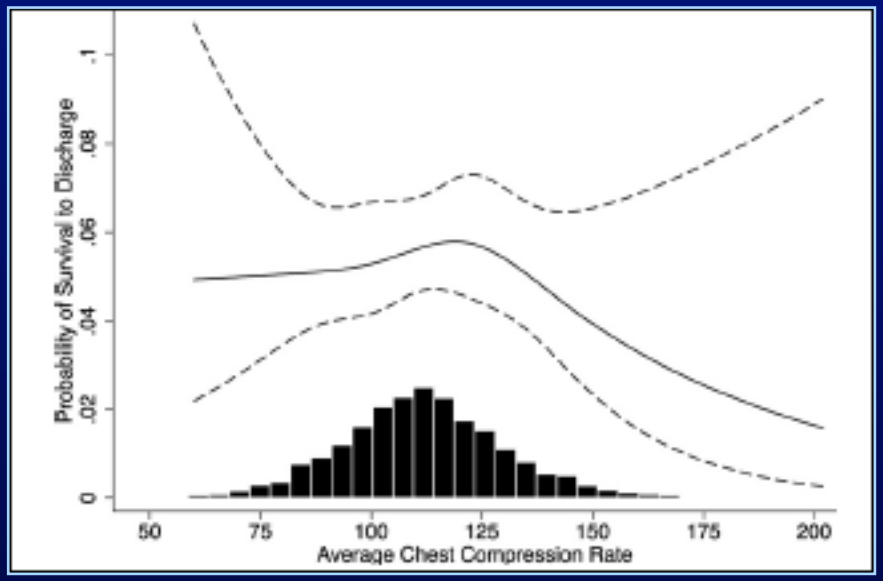
CPR 2013

Compression Rate

Circulation 2012 ;125: 3004- 3012

Relationship Between Chest Compression Rates and Outcomes From Cardiac Arrest

Ahamed H. Idris, MD; Danielle Guffey, BS; Tom P. Aufderheide, MD; Siobhan Brown, PhD;



- Mean compression rate 112 (± 19) min
- ROSC peaked at 125
- < 80/min or > 140/min significantly decreased survival

BCLS/ACLS 2013
New, Changed, Modified

- Atropine gone in AS and PEA
- Epi's role continues to decline
- Compression Fraction ≥ 80%
- Rate at 100 -120
- Not faster or slower

BCLS/ACLS 2013
New, Changed, Modified

- Switch compressors Q 1-2 min
- Depress 2 inches in adults
- Survival ↑ by 10%/0.2 inch ↑
- No ↑ if above 2 inches
- Metronome or light works

BCLS/ACLS 2013
New, Changed, Modified

- Interruptions cost 5 -10 compressions
- Perishock pauses must be < 20 seconds
- Mechanical CPR benefits stay controversial
- ITD still controversial too
- Compression – decompression + ITD works

BCLS/ACLS 2013
New, Changed, Modified

- SGAs may be better than ETT
- SGAs may impair carotid blood flow
- Take all VF/VT arrests to lab
- TH for all VF/VT comatose pts
- No ST ↑ VF/VT = PCI too!!

The impact of increased chest compression fraction on return of spontaneous circulation for out-of-hospital cardiac arrest patients not in ventricular fibrillation☆

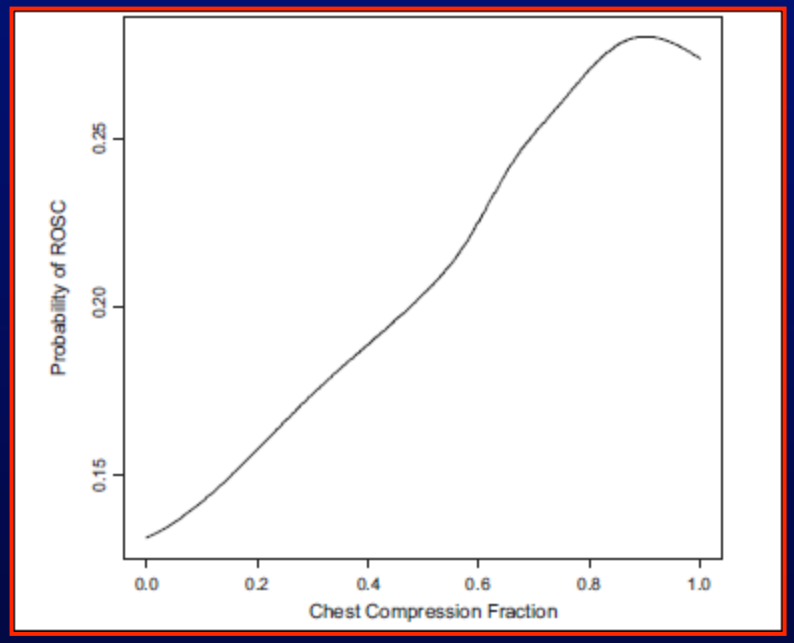
Christian Vaillancourt[a,*], Siobhan Everson-Stewart[b], Jim Christenson[c], Douglas Andrusiek[c], Judy Powell[b], Graham Nichol[b], Sheldon Cheskes[d], Tom P. Aufderheide[e], Robert Berg[f], Ian G. Stiell[a], the Resuscitation Outcomes Consortium Investigators

Resuscitation 2011;82:1501-1507

- 2013 Non-VF patients from ROC
- 64% Asystole, 28% PEA
- Median Compression Rate: 110/min
- ROSC 24.2%
- 2% Survival to D/C

The impact of increased chest compression fraction on return of spontaneous circulation for out-of-hospital cardiac arrest patients not in ventricular fibrillation☆

Resuscitation 2011;82:1501-1507



- Increasing CCP = Increased ROSC
- Target a CCP of 80%

Compression should be
100-120 / minute
Not faster, Not slower

Compression Depth

What is the role of chest compression depth during out-of-hospital cardiac arrest resuscitation?*

Ian G. Stiell, MD; Siobhan P. Brown; James Christenson; Sheldon Cheskes; Graham Nichol; Judy Powell; Blair Bigham; Laurie J. Morrison; Jonathan Larsen; Erik Hess; Christian Vaillancourt; Daniel P. Davis; Clifton W. Callaway; the Resuscitation Outcomes Consortium (ROC) Investigators

Crit Care Med 2012;40:1192-1198

- Does Depth of Compression affect outcomes from cardiac arrest?
- 1,029 patients from 7 ROC sites
- 2006 – 2009 Data

ACLS Depth of Compression Recommendations

- 2005: 1.5-2 inches (38-50 mm)
- 2010: 2 inches (at least 50mm)

As Rate of CPR Increased,

Depth of Compression Decreased

For each 0.2 inches of increased depth, survival was increased by almost 10% (up to 2 inches total depth).

No increased survival for > 2.0 inches of compressions vs. prior recommendations of 1.5-2.0 inches.

What is the role of chest compression depth during out-of-hospital cardiac arrest resuscitation?*

Ian G. Stiell, MD; Siobhan P. Brown; James Christenson; Sheldon Cheskes; Graham Nichol; Judy Powell; Blair Bigham; Laurie J. Morrison; Jonathan Larsen; Erik Hess; Christian Vaillancourt; Daniel P. Davis; Clifton W. Callaway; the Resuscitation Outcomes Consortium (ROC) Investigators

Crit Care Med 2012;40:1192-1198

If Compression 1.5-2.0 Inches

- ROSC Improved by 24%
- 1 Day Survival Improved by 52%
- Survival to Discharge Improved by 91%

CPR Compressions Take Homes

- 1.5-2.0 inches is essential for effective CPR
- Depth may fall as rate goes up (especially above 120)
- We must be vigilant on CPR compression depth
- Need objective measure of depth
- Current Recommendations of > 2 inches may not be based on objective data

Induction of a shorter compression phase is correlated with a deeper chest compression during metronome-guided cardiopulmonary resuscitation: a manikin study

Tae Nyoung Chung,[1] Jinkun Bae,[1] Eui Chung Kim,[1] Yun Kyung Cho,[2] Je Sung You,[3] Sung Wook Choi,[1] Ok Jun Kim[1]

ABSTRACT

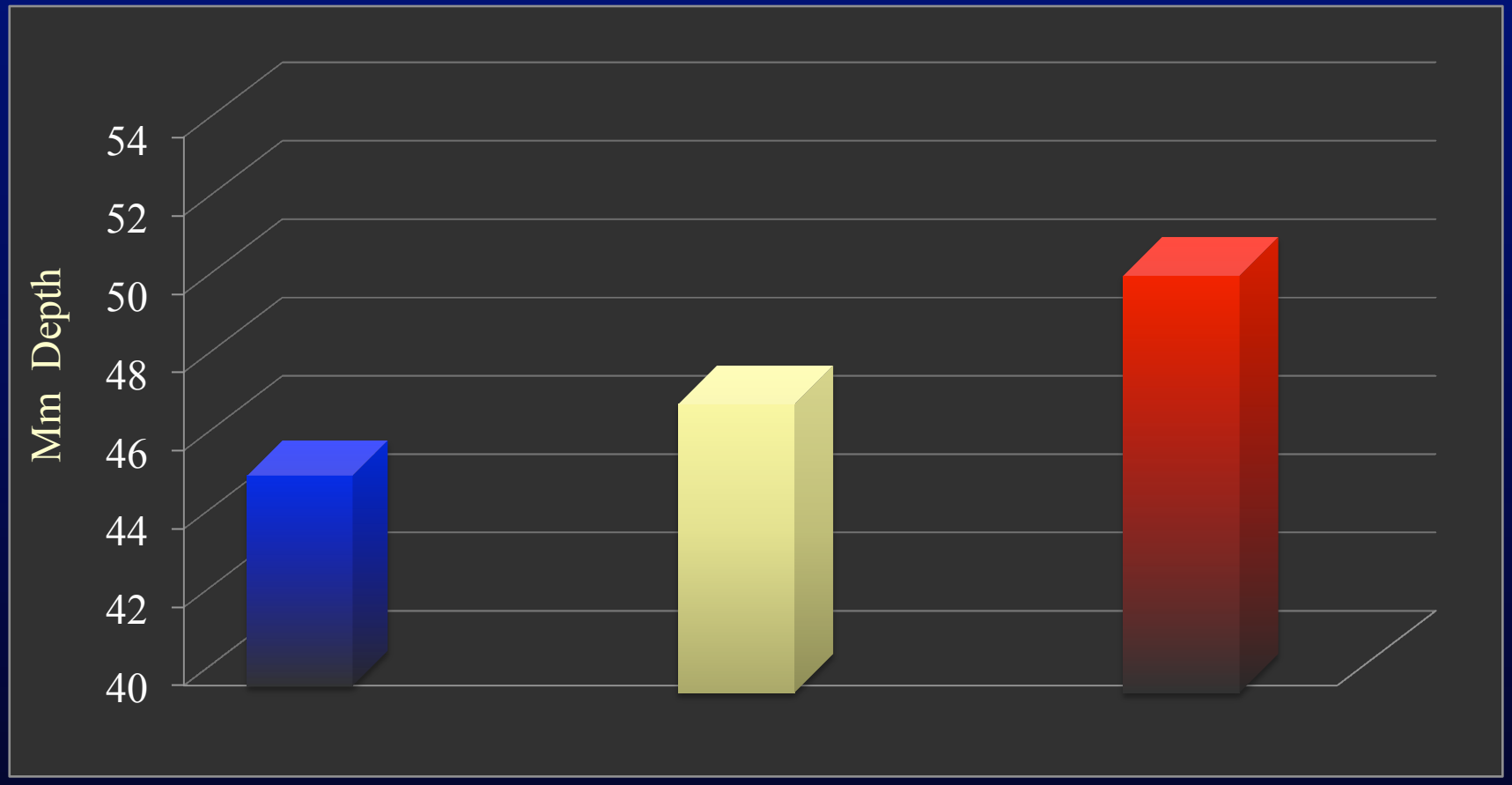
Objectives Recent studies have shown that there may be an interaction between duty cycle and other factors depth, based on a comparison of the patterns of chest compression between CPR experts and non-experts.[15] Deducing from the results of the

Emerg Med J ;2012 :in press

Can a two tone metronome Result in deeper compression?

Compression Depth
120 BPM

Emerg Med J ;2012 :in press



Metronomes in CPR Take Homes

- Use of a light or tone is essential for correct rate
- Two tone may even be better to determine cycle time to maximize depth

Rescuer fatigue under the 2010 ERC guidelines, and its effect on cardiopulmonary resuscitation (CPR) performance

Catherine H McDonald,[1] James Heggie,[1] Christopher M Jones,[1]
Christopher J Thorne,[1] Jonathan Hulme[2]

ABSTRACT

Background Updated life-support guidelines were published by the European Resuscitation Council (ERC) in 2010, increasing the required depth and rate of chest compression delivery. This study sought to determine the

Updated life-support guidelines issued by the European Resuscitation Council (ERC) in 2010 both increased the required depth of chest compressions (from 4–5 cm to >5 cm) and narrowed the accepted range for the rate of their

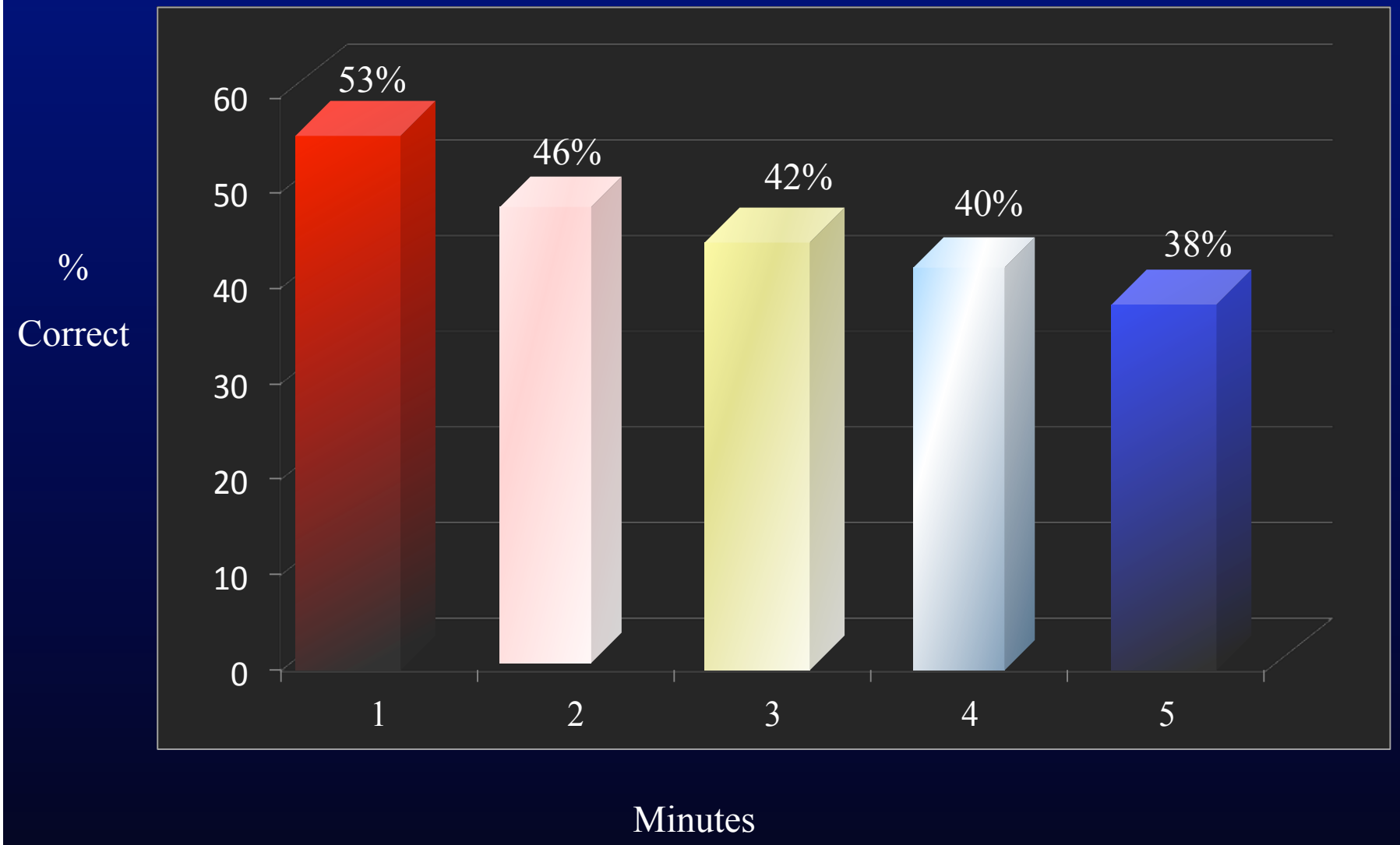
J Emerg Med 2012; 1-5 in press

- Do we quickly tire doing CPR?
- Manikin Study 62 students
- 5 minutes CPR recorded
- Participants knew CPR quickly was being monitored

Rescuer Fatigue Results

- 7% decline in depth at 1-2 minutes
- Fatigue subsequently reported at 167 seconds
- No significant change in rate over 5 minutes

Rescuer Fatigue



Rotating CPR Members Take Homes

Rotate every 1-2 minutes

Every 1 minute may be best

Airway

AIRWAY/REVIEW ARTICLE

Preoxygenation and Prevention of Desaturation During Emergency Airway Management

Scott D. Weingart, MD, Richard M. Levitan, MD

om the Division of Emergency Critical Care, Department of Emergency Medicine, Mount Sinai School of Medicine, New York, NY (Weingart); and the Department of Emergency Medicine, Thomas Jefferson University Hospital, Philadelphia, PA (Levitan).

Patients requiring emergency airway management are at great risk of hypoxemic hypoxia because of primary lung pathology, high metabolic demands, anemia, insufficient respiratory drive, and inability to protect their airway against aspiration. Tracheal intubation is often required before the complete information needed to assess the risk of periprocedural hypoxia is acquired, such as an arterial blood gas level, hemoglobin value, or even a chest radiograph. This article reviews preoxygenation and peri-intubation oxygenation techniques to minimize the risk of

Ann Emerg Med 2012;59:165-175

- Great Review
- Authors are two EM Airway Experts
- A must read kind of article

EMS Preoxygenation Aids

- CPAP
- Head Elevation 20º- 30º
- Reverse Trendelenburg
- Jaw Thrust / Nasal Trumpet
- Nasal Cannula at 15 L/min

Focus on Cardiac Arrest

Assessing the Impact of Prehospital Intubation on Survival in Out-of-Hospital Cardiac Arrest

Joshua Egly, MD, Don Custodio, MD, Nathan Bishop, DO, Michael Prescott, MD, Victoria Lucia, PhD, Raymond E. Jackson, MD, Robert A. Swor, DO

Abstract

cases. All survivors to hospital admission were reviev

Prehosp Emerg Care 2011;15:44-49

- Does ETI benefit patients?
- 1,414 pts, William Beaumont, Michigan
- 1,220 intubated
- 613 VF/VT; 742 non VF/VT
- Retrospective study

Assessing the Impact of Prehospital Intubation on Survival in Out-of-Hospital Cardiac Arrest

Joshua Egly, MD, Don Custodio, MD, Nathan Bishop, DO, Michael Prescott, MD, Victoria Lucia, PhD, Raymond E. Jackson, MD, Robert A. Swor, DO

Prehosp Emerg Care 2011;15:44-49

- Endotracheal intubation significantly decreased survival to discharge in VF/VT patients by about 50% (OR = 0.52)
- Intubation increased survival to hospital but not discharge alive in AS and PEA

Clinical paper

Endotracheal intubation versus supraglottic airway insertion in out-of-hospital cardiac arrest☆

Henry E. Wang[a,*], Daniel Szydlo[b], John A. Stouffer[c], Steve Lin[d,e], Jestin N. Carlson[f], Christian Vaillancourt[g], Gena Sears[b], Richard P. Verbeek[e], Raymond Fowler[h], Ahamed H. Idris[h], Karl Koenig[i], James Christenson[j], Anushirvan Minokadeh[k], Joseph Brandt[l], Thomas Rea[m,n], The ROC Investigators

Resuscitation 2012: In press

- Is ETT better or worse than a SGA?
- 10,455 adult OHCA from ROC PRIMED
- 81.2% ETI vs. 18.8% King, Combitube or LMA
- ROSC, 24 hr survival, survival to discharge

Clinical paper

Endotracheal intubation versus supraglottic airway insertion in out-of-hospital cardiac arrest☆

Resuscitation 2012: In press

Results

- Age, sex, bystander CPR, witnessed, initial rhythm all controlled for in multivariate analysis.
- ETT increased probability of ROSC by 1.78 (95% CI: 1.54 – 2.04)
- ETT increased of 24 hr survival by 1.74 (95% CI: 1.49 – 1.89)

Impairment of carotid artery blood flow by supraglottic airway use in a swine model of cardiac arrest☆

Nicolas Segal[a], Demetris Yannopoulos[b,*], Brian D. Mahoney[c], Ralph J. Frascone[d], Timothy Matsuura[e], Colin G. Cowles[e], Scott H. McKnite[e], David G. Chase[f]

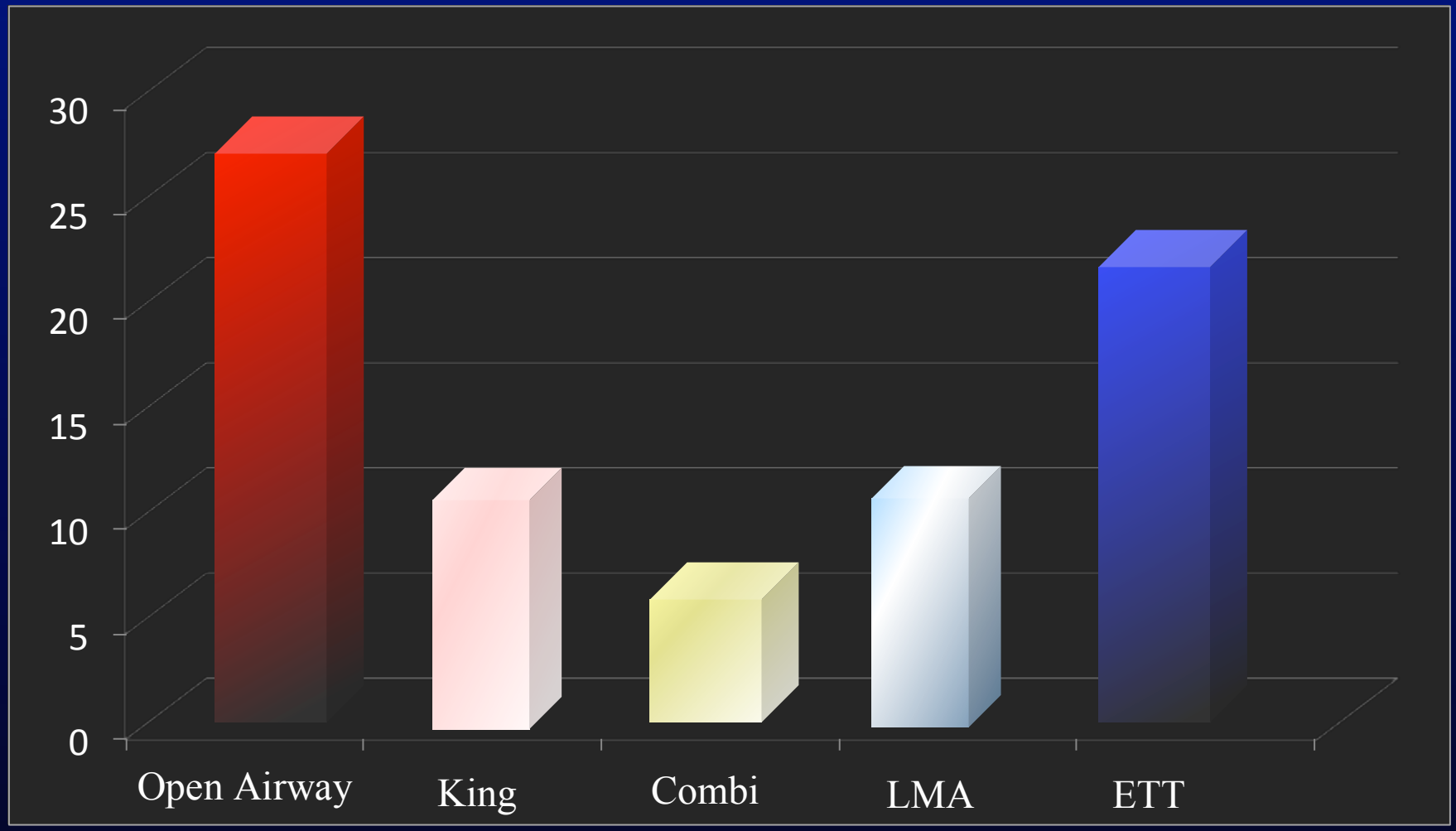
[a] Department of Emergency Medicine, University of Minnesota Medical Center, Minneapolis, MN, USA
[b] Department of Medicine-Cardiovascular Division, University of Minnesota Medical Center, University of Minnesota, Minneapolis, MN, USA
[c] Department of Emergency Medicine, Hennepin County Medical Center, Minneapolis, MN, USA

Resuscitation 2012;83:1025-1030

- Do SGA's impair carotid blood flow?
- Is large balloon in retropharyngeal space deleterious ?
- Animal study: pigs in VF with CPR
- ETT vs. King LTD vs. LMA vs. Combitube

Mean Carotid Blood Flow ml/min

Resuscitation 2012;83:1025-1030



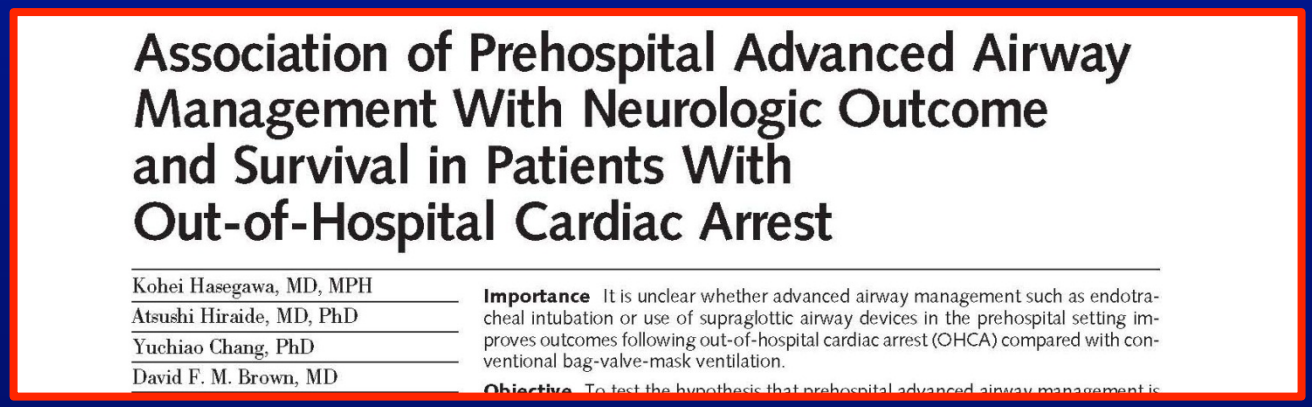
SGA's vs. ETT
Results and Conclusions

Resuscitation 2012;83:1025-1030

- SGA's significantly decreased carotid blood flow ($p < 0.05$)
- SGA's appear to have potential deleterious effects
- An animal model study

- Imperative that human studies occur

We need a prospective multicenter trial before deciding whether ETI or SGA is better



Association of Prehospital Advanced Airway Management With Neurologic Outcome and Survival in Patients With Out-of-Hospital Cardiac Arrest

Kohei Hasegawa, MD, MPH
Atsushi Hiraide, MD, PhD
Yuchiao Chang, PhD
David F. M. Brown, MD

Importance It is unclear whether advanced airway management such as endotracheal intubation or use of supraglottic airway devices in the prehospital setting improves outcomes following out-of-hospital cardiac arrest (OHCA) compared with conventional bag-valve-mask ventilation.

Objective To test the hypothesis that prehospital advanced airway management is

JAMA 2013;309:257-266

- 649,359 prehospital cardiac arrests
- Prospective nationwide Japanese Study
- 57% bag valve mask ventilation
- 43% advanced airway (6% ETT, 37% SGA)
- Evaluated which airway “best”

Association of Prehospital Advanced Airway Management With Neurologic Outcome and Survival in Patients With Out-of-Hospital Cardiac Arrest

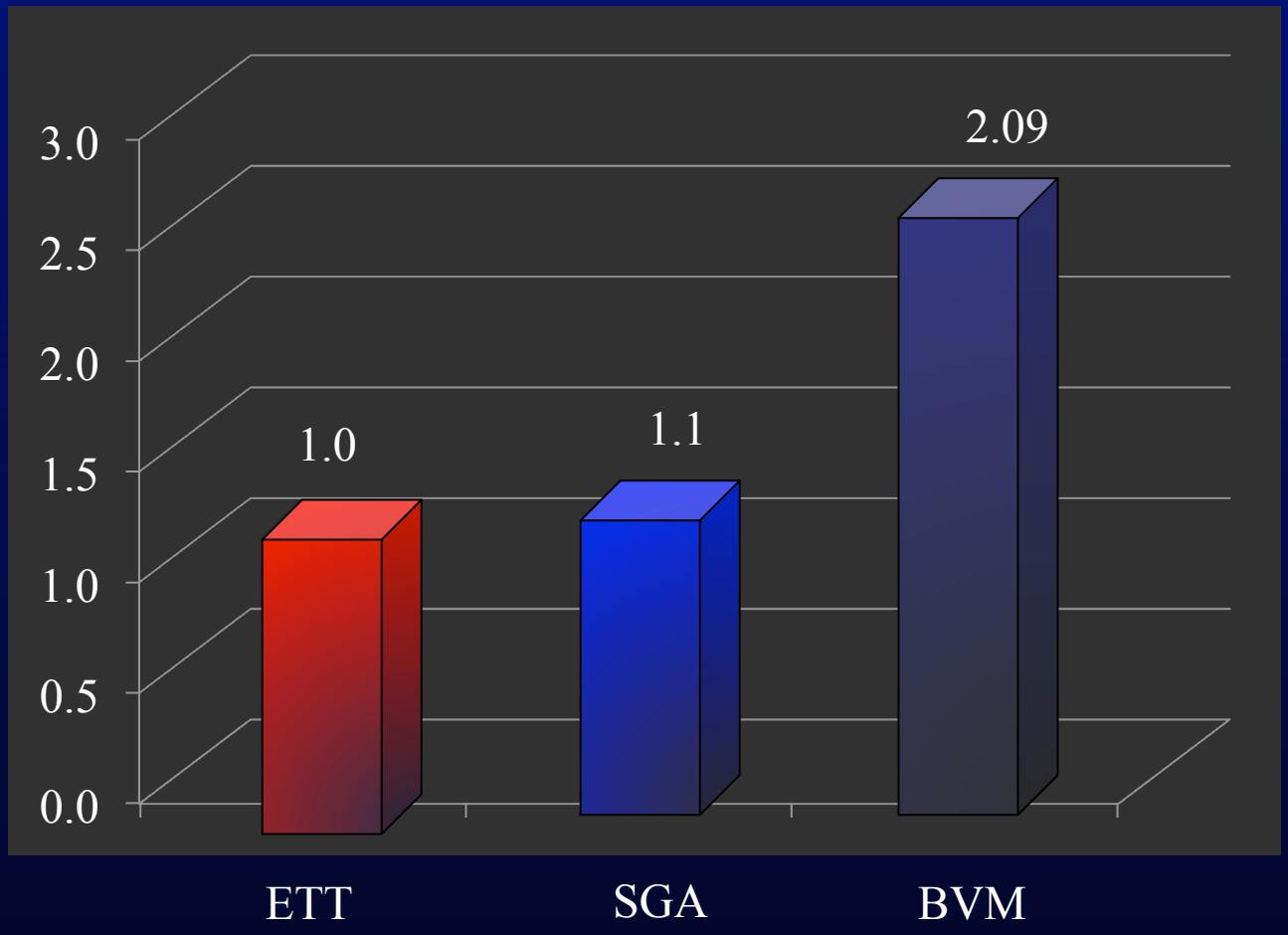
JAMA 2013;309:257-266

Overall Results

- 6.5% ROSC
- 4.7% 1 month survival
- 2.2% Neurologically good

Neurologically Favorable at 1 Month

JAMA 2013;309:257-266



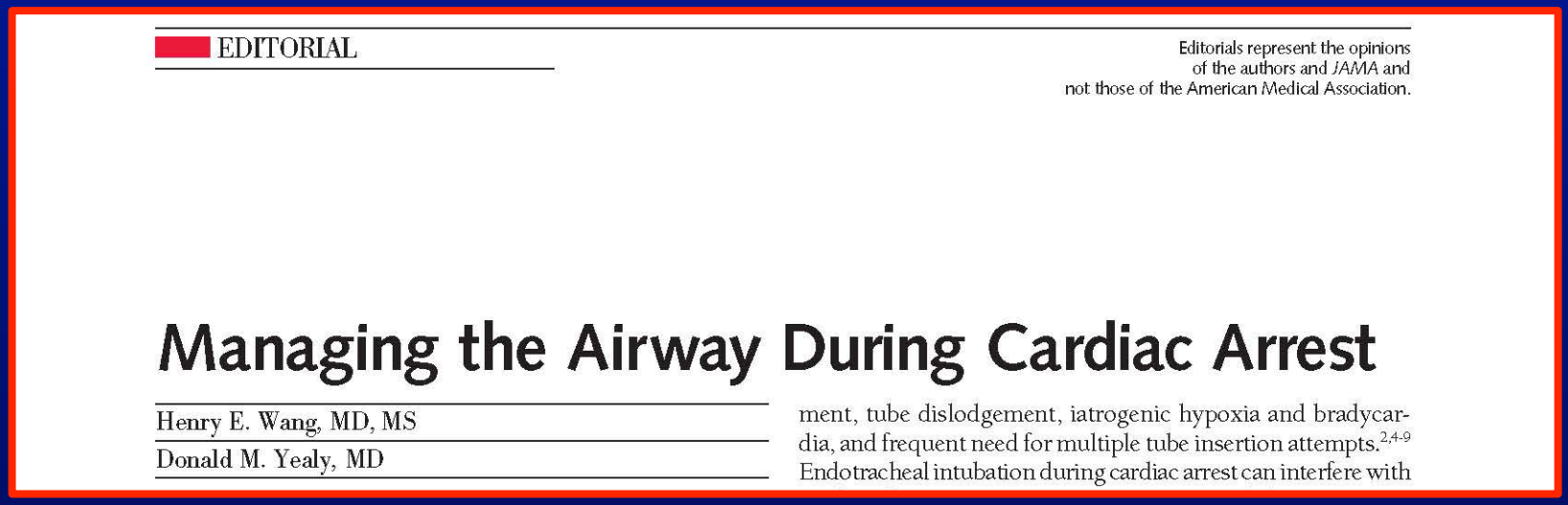
Association of Prehospital Advanced Airway Management With Neurologic Outcome and Survival in Patients With Out-of-Hospital Cardiac Arrest

JAMA 2013;309:257-266

Summary

- Multivarient analysis with all possible arrest variables shows advanced airway techniques decrease likelihood for a neurologically intact pt by 55% for ETT and 63% for SGA.

- Bag valve mask ventilation appeared more than twice as likely to give favorable neurologic outcomes



EDITORIAL

Editorials represent the opinions of the authors and *JAMA* and not those of the American Medical Association.

Managing the Airway During Cardiac Arrest

Henry E. Wang, MD, MS
Donald M. Yealy, MD

ment, tube dislodgement, iatrogenic hypoxia and bradycardia, and frequent need for multiple tube insertion attempts.[2,4-9] Endotracheal intubation during cardiac arrest can interfere with

JAMA 2013;309:285-286

- Authors state we need a well done randomized US trial on out of hospital arrest patients

"Patients with cardiac arrest and the out-of-hospital rescuers who care for them deserve to know what is best"

STEMI
2013

ACCF/AHA Guideline

2013 ACCF/AHA Guideline for the Management of ST-Elevation Myocardial Infarction: Executive Summary

A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines

Developed in Collaboration With the American College of Emergency Physicians and Society for Cardiovascular Angiography and Interventions

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Circulation 2013;127:529-555

Update to 2004, 2007, 2009 Guidelines

2013 ACC/AHA Guidelines D_2B

- D_2B of $\leq$ 90 minutes now reads "an ideal of FMC* -to-device time. System goal of $\leq$ 90 minutes" (1B)
- FMC of 120 minutes or less is new target for patients who arrive at a non-PCI center (1B)

** (FMC = First Medical Contact)*

2013 ACC/AHA Guidelines EMS

- FMC = Paramedic at patient
- 12 Lead performed by EMS (1B)
- EMS should transport to PCI hospital (1B)

EMS is now officially the

Beginning of "D_2B"…E_2B

2013 ACC/AHA Guidelines PCI and Hypothermia

- Therapeutic hypothermia should be started ASAP for all comatose STEMI patients and out of hospital arrests due to VF or VT (1B)

- Immediate PCI is indicated in all STEMI arrest patients including those who are receiving therapeutic hypothermia (1B)

E2B < 90 min!!

TXA

Effects of tranexamic acid on death, vascular occlusive events, and blood transfusion in trauma patients with significant haemorrhage (CRASH-2): a randomised, placebo-controlled trial

*CRASH-2 trial collaborators**

Summary

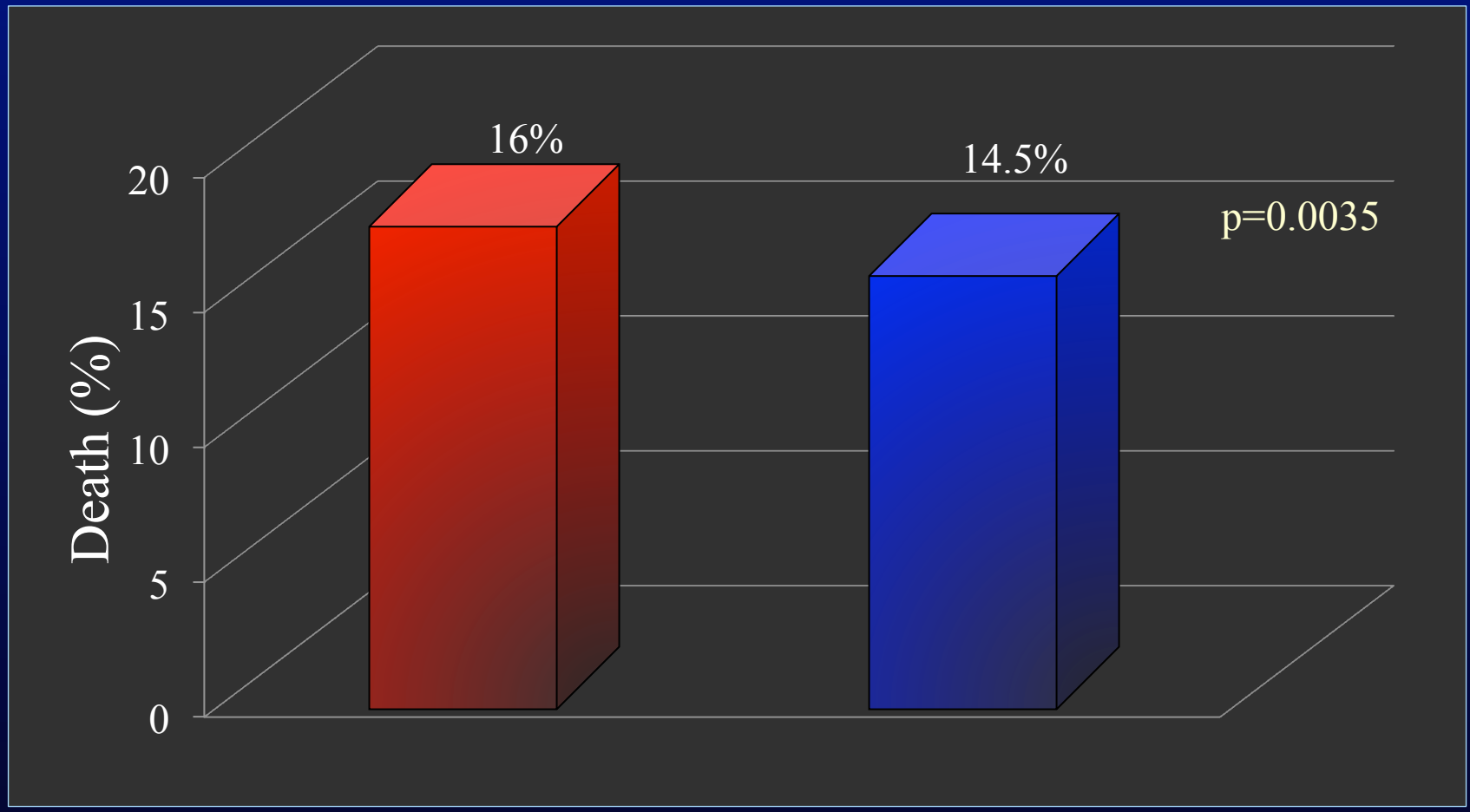
Background Tranexamic acid can reduce bleeding in patients undergoing elective surgery. We assessed the effects of early administration of a short course of tranexamic acid on death, vascular occlusive events, and the receipt of blood

Lancet 2010;376-23-32

- Does TXA work in severe hemorrhage?
- 20,211 patients with major trauma
- 10,046 patients got TXA within 8 hours
- Hospitals in Africa, Asia, Eastern Europe

30d All Cause Mortality Crash-2

Lancet 2010;376:23-32



Effects of tranexamic acid on death, vascular occlusive events, and blood transfusion in trauma patients with significant haemorrhage (CRASH-2): a randomised, placebo-controlled trial

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Summary

Background Tranexamic acid can reduce bleeding in patients undergoing elective surgery. We assessed the effects of early administration of a short course of tranexamic acid on death, vascular occlusive events, and the receipt of blood

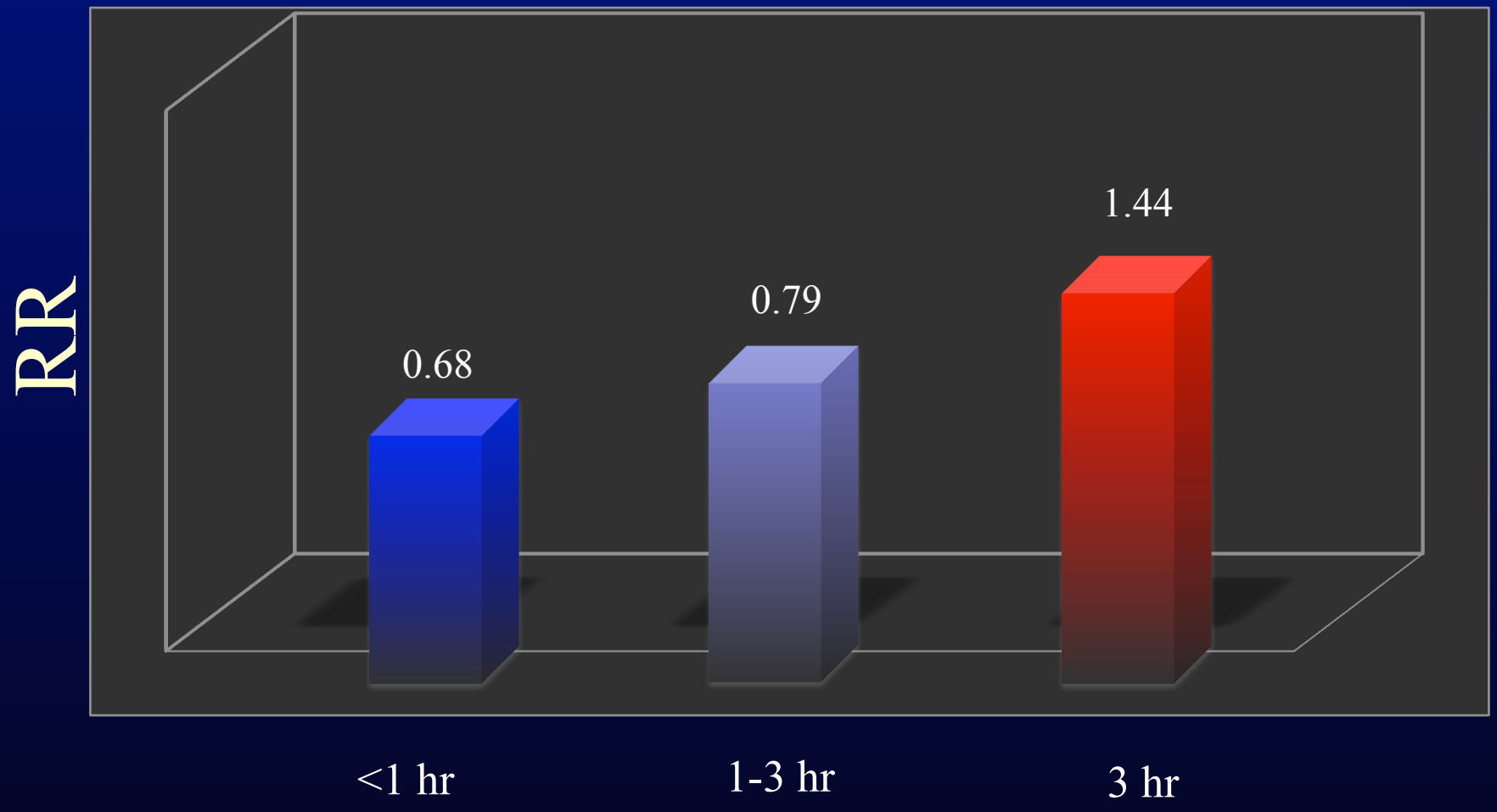
Lancet 2011;377:1096-1101

- Reanalyzes prior CRASH-2 data
- 20,211 trauma patients
- Randomized to TXA or placebo
- Administered up to 8 hours post trauma

Does time to TXA matter?

Bleeding Death with TXA vs Placebo

Lancet 2011;377:1096-1101



Avoidable mortality from giving tranexamic acid to bleeding trauma patients: an estimation based on WHO mortality data, a systematic literature review and data from the CRASH-2 trial

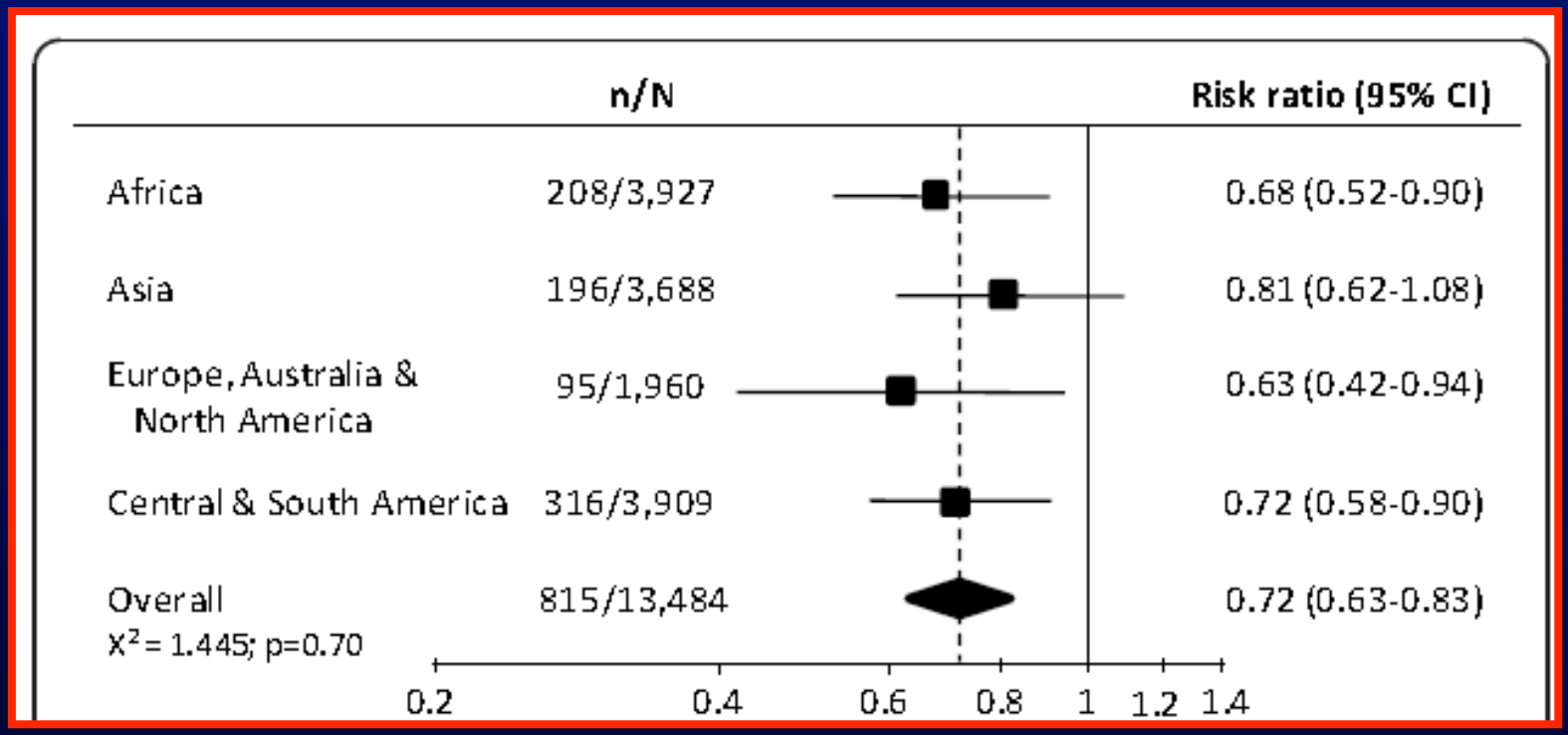
Katharine Ker*, Junko Kiriya, Pablo Perel, Phil Edwards, Haleema Shakur and Ian Roberts

BMC Emerg Med 2012;12: 1-7

- Crash-2 showed early TXA reduced mortality from traumatic bleeding
- Could it really affect worldwide mortality?
- Should TXA only be used in third world countries?

TXA Potential Benefits
(if given within 3 hours)

BMC Emerg Med 2012;12: 1-7



Crash- 2

TXA reduces trauma mortality from bleeding by about 1/3 if given within 3 hours

Current TXA Use

- At the present time both the US and British Armies include TXA in trauma protocol
- UK National Health Service recommends TXA for all major trauma victims
- TXA is now a WHO " Essential Medication"

Authors Conclude

BMC Emerg Med 2012;12: 1-7

TXA has the potential to save between 112,000-128,000 lives per year worldwide if given within 1-3 hours of trauma

ONLINE FIRST

Military Application of Tranexamic Acid in Trauma Emergency Resuscitation (MATTERs) Study

Jonathan J. Morrison, MB ChB, MRCS; Joseph J. Dubose, MD; Todd E. Rasmussen, MD; Mark J. Midwinter, BMedSci, MD, FRCS

Objectives: To characterize contemporary use of tranexamic acid (TXA) in combat injury and to assess the effect of its administration on total blood product use, thromboembolic complications, and mortality.

ministration on postoperative coagulopathy and the rate of thromboembolic complications.

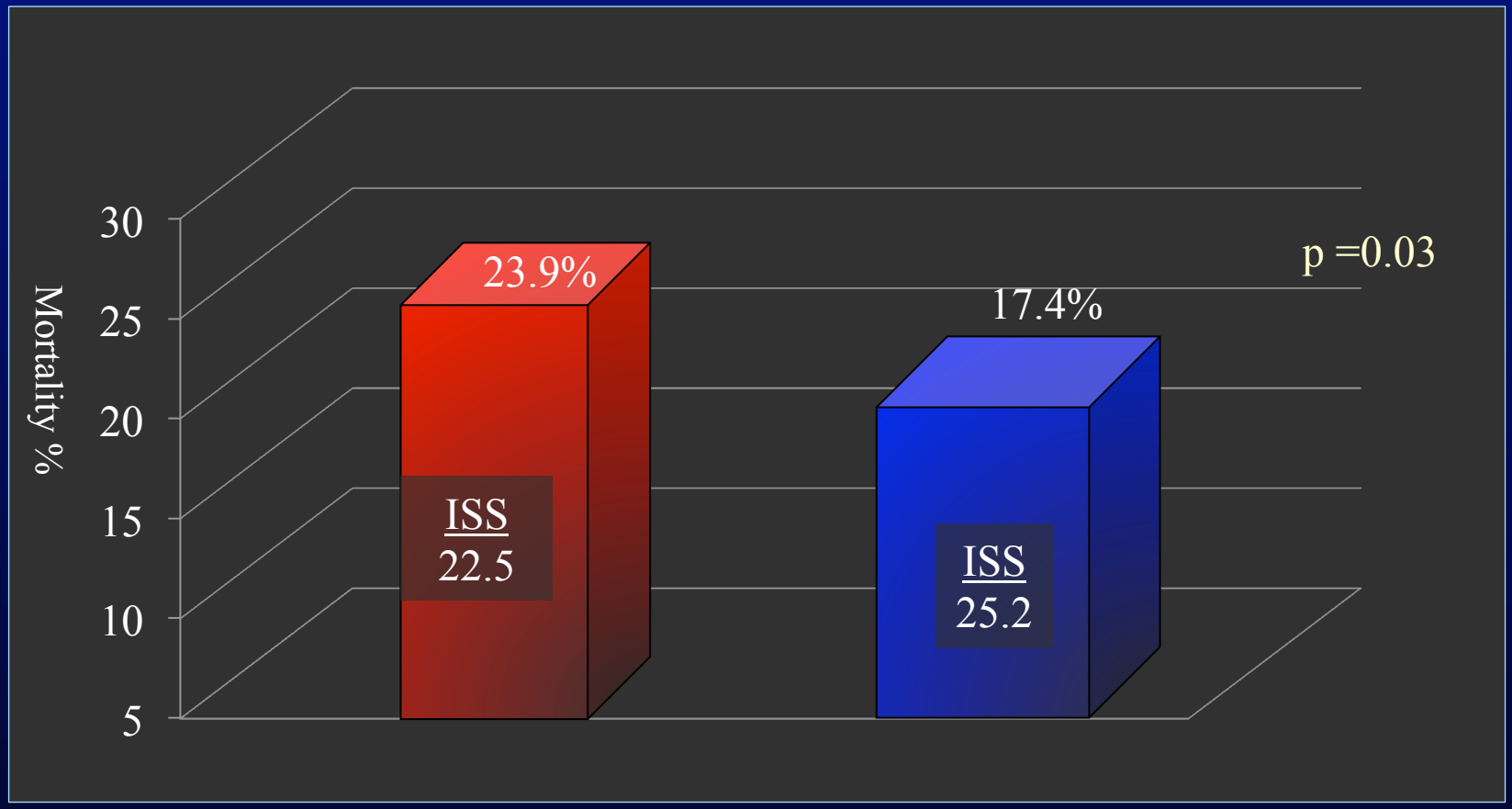
Results: The TXA group had lower unadjusted mortal-

Arch Surg 2012;147:113-114

- TXA vs. no-TXA
- US Troops in Afghanistan
- All pts required ≥1 unit blood
- Subgroup got ≥ 10 units PRBC
- Retrospective study, 896 pts

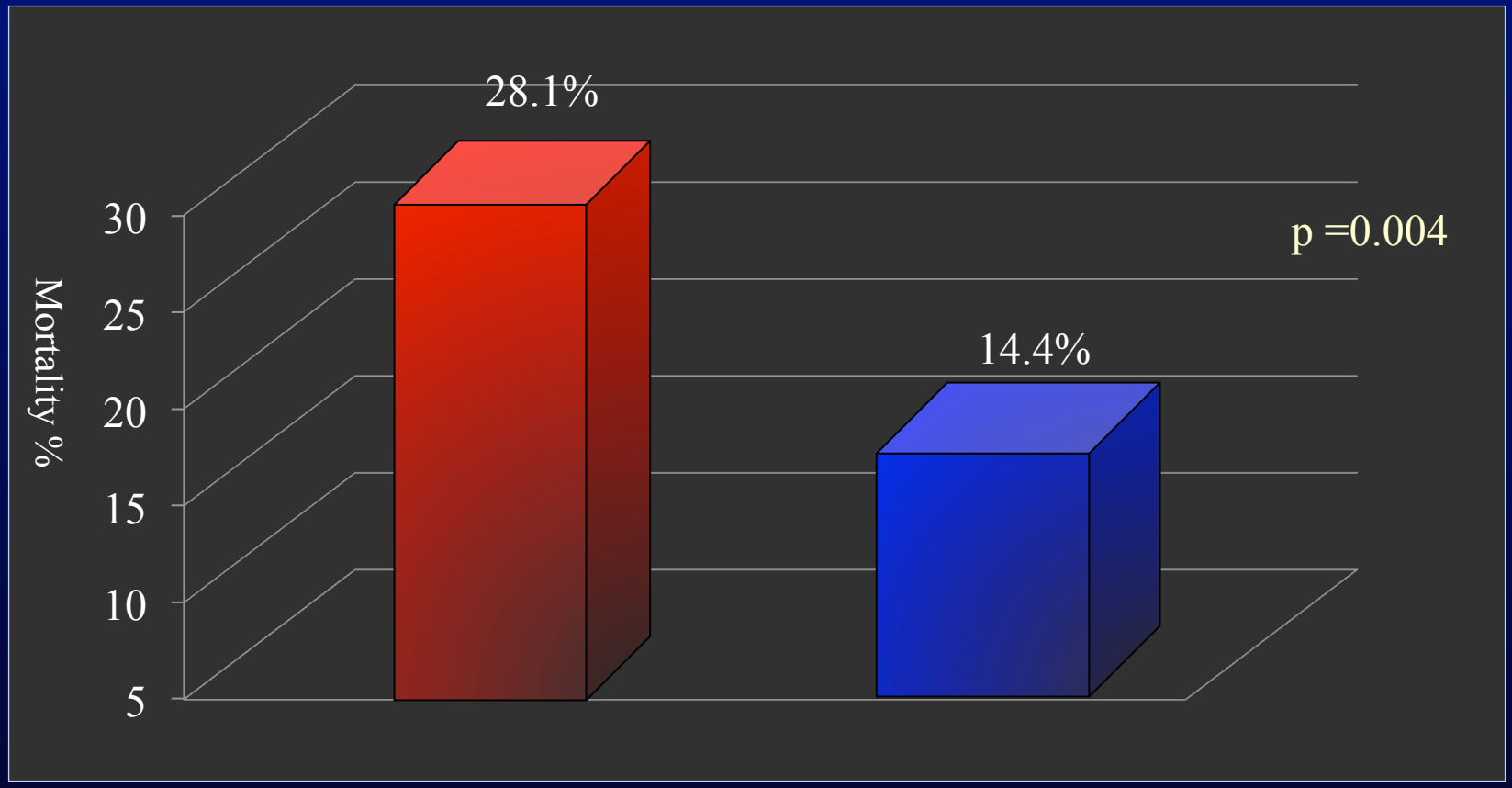
TXA in US Military

Arch Surg 2012;147:113-1141



TXA in Massive Transfusion

Arch Surg 2012;147:113-114



Conclusions
TXA in the Military

- TXA dramatically decreased mortality
- Benefits greatest in those requiring massive transfusion
- TXA increased survival by factor of 7.228 for those requiring massive transfusion
- TXA decreased coagulopathy

TXA 2013
Take Homes

- Seems to decrease bleeding deaths acutely
- Need to give within 3 hours of event
- Has potential to save 100,000 + lives
- Role in Level 1 Trauma unclear

Anaphylaxis

Anaphylaxis Knowledge among Paramedics: Results of a National Survey

Ryan C. Jacobsen, MD, EMT-P, Serkan Toy, PhD, Aaron J. Bonham, MS,
J.A. Salomone III, MD, Jacob Ruthstrom, MD, Matthew Gratton, MD

Abstract

Background. Very little is known about prehospital administration, and 60.5% identified the deltoid as the preferred location (11.6% thigh). Of the respondents, 98.0% were confident they could recognize anaphylaxis; 97.1%

Prehosp Emerg Care 2012; 16(4):527-34

- Online survey, 3357 NREMTs
- 98.9 recognized classic case
- Evaluated Epi use
- Evaluated routes of admin

ANAPHYLAXIS KNOWLEDGE AMONG PARAMEDICS: RESULTS OF A NATIONAL SURVEY

Ryan C. Jacobsen, MD, EMT-P, Serkan Toy, PhD, Aaron J. Bonham, MS,
J.A. Salomone III, MD, Jacob Ruthstrom, MD, Matthew Gratton, MD

Prehosp Emerg Care 2012; 16(4):527-34

Epinephrine in Anaphylaxis

Only 46.2% said Epi was initial drug in a classic case of a hypotensive, wheezing, tachycardia patient with tingling in his throat & hands, and hives on his chest.

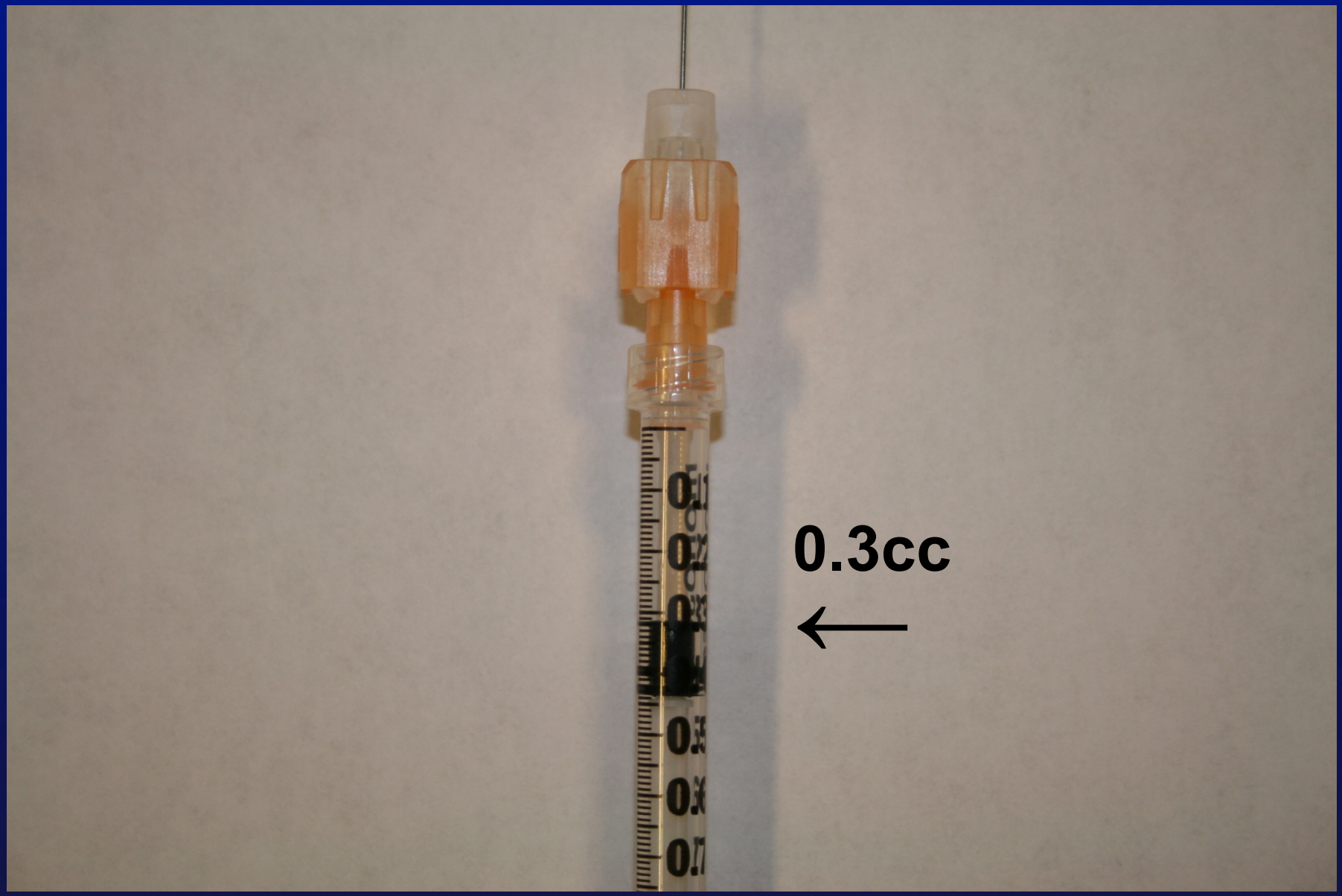
ANAPHYLAXIS KNOWLEDGE AMONG PARAMEDICS: RESULTS OF A NATIONAL SURVEY

Ryan C. Jacobsen, MD, EMT-P, Serkan Toy, PhD, Aaron J. Bonham, MS,
J.A. Salomone III, MD, Jacob Ruthstrom, MD, Matthew Gratton, MD

Prehosp Emerg Care 2012; 16(4):527-34

Epinephrine in Anaphylaxis

- An almost equal number (40%) started with Benadryl as started with Epi (46.2%)
- More gave Epi SQ (58.4%) than IM (38.9%)
- 1.7% gave Epi IV!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Anaphylaxis Care Take Home Points

- One of the most important EMS emergencies
- Half of our paramedics may not give Epi when they should
- More than half of our paramedics give Epi SQ rather than IM
- Too many in EMS (and Medicine) think Benadryl is the first line drug for anaphylaxis

TISSUE PLASMINOGEN ACTIVATOR AND STROKE: REVIEW OF THE LITERATURE FOR THE CLINICIAN

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☐ **Abstract—Background: Alteplase (tPA) is a United States (US) Food and Drug Administration-approved treat-**

INTRODUCTION

J Emerg Med 2012 in press

- Excellent literature review
- 407 articles screened; 15 evaluated
- TPA is safe and effective
- Use 3-4.5 hrs post stroke improves outcome without increasing morbidity

In Summary

Pump hard, deep, fast, perfect

SGA's may decrease cerebral flow and survival

Bag valve mask must be best

Pre-hospital ECG begins D_2B

Anaphylaxis needs more teaching


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