The 5 Most Important EMS Articles
EAGLES 2014

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Conference Handouts

AAEM 2013 | Corey Slovis

AAEM Resuscitation
Handout for a Presentation by Corey Slovis, MD
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AAEM Atrial Fibrillation
Handout for a Presentation by Corey Slovis, MD
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ACEP 2012 | Corey Slovis

Acid Base Made Easy
Handout for a Presentation by Corey Slovis, MD at ACEP 2012
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Most Important Non-EMS Articles
Handout for a Presentation by Corey Slovis, MD at ACEP 2012
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Most Important EMS Articles
Handout for a Presentation by Corey Slovis, MD at ACEP 2012
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Most Important CPR Articles
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Epinephrine in CPR
Does Epi have benefit during CPR?

Retrospective Japanese cohort study

Used pairs of OOH arrest patients

Matched for Epi vs No-Epi therapy
VF/VT (1990 Pairs)
Epi vs No-Epi

BMJ 2013;347:f6829

OR = 1.34
OR = 1

Survival
Neuro Intact
Survival
Neuro Intact

No Epi
Epi
AS/PEA (9058 Pairs)

Epi vs No-Epi

BMJ 2013;347:f6829

Survival  
No Epi  |  Epi
---|---
Survival  |
2.4 | 4.0

Neuro Intact  
No Epi  |  Epi
---|---
4.0 | 0.7

P = NS
Epi vs No-Epi
Take Homes

Authors conclude: “Our study showed some favorable effects of pre-hospital epinephrine … The absolute increase in neurologically intact survival, however, was minimal.”

I agree – This study does not show real benefits in the vast majority of patients.
Does Vasopressin + Epi + Steroids have benefit over Epi alone in cardiac arrest?

• Randomized, double blind, placebo controlled
• 268 consecutive cardiac arrests
• 3 Greek tertiary care hospitals
• 5 cycles, Q 3 minutes
• Compared Epi 1mg Q3 to:
  • Epinephrine 1mg Q 3 minutes
  • Vasopressin 20 IU Q 3 minutes
  • Solumedrol 40mg once only
ROSC ≥ 20 min
Epi vs VSE in Cardiac Arrest

JAMA 2013;310:270-279

OR = 2.98
P = 0.05
Survival to Discharge CPC 1 or 2
Epi vs VSE in Cardiac Arrest

JAMA 2013;310:270-279

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<tr>
<th></th>
<th>Epi</th>
<th>VSE</th>
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<tr>
<td>Rate</td>
<td>5.1%</td>
<td>13.9%</td>
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OR = 3.28
P = 0.02
Authors suggest:

Vasopressin + Epinephrine helps CNS microcirculation during CPR and that steroids enhance vasopressin’s beneficial effects
• What’s the importance of the peri-shock pause?

• 2,006 patients with pre/post shock times

• Evaluated $\Delta T$ pre-shock and post shock

• Compared survival to discharge
Clinical paper
The impact of peri-shock pause on survival from out-of-hospital shockable cardiac arrest during the Resuscitation Outcomes Consortium PRIMED trial

- 29% of pts had pre-shock pause > 20 seconds
- Median ΔT to shock was 15 seconds
- 6.5% had a post-shock pause > 20 seconds
- Median ΔT to resume CPR was 6 seconds
Optimal pre-shock pause is < 10 seconds

< 10 sec vs > 20 sec increases survival
(OR = 1.5)
Peri-shock Pauses
Take Homes

• Be ready to shock before stopping CPR
• Stop CPR and shock near simultaneously
• Hands on CPR?
• Post shock interval is not as important
Prehospital ECGs

- Prehospital ECGs save 20 – 30 min
- AHA – ACC Class I recommendation
- D₂B in now E₂B
- Establishes EMS as the vital first link in chain of survival
A Prospective Evaluation of the Utility of the Prehospital 12-Lead Electrocardiogram to Change Patient Management in the Emergency Department

Matthew Davis, MD, MSc, Michael Lewell, MD, Shelley McLeod, MSc, Adam Dukelow, MD

ABSTRACT

Objective. Retrospective research has shown that 19% of 12-lead prehospital electrocardiograms (prehospital ECGs) had clinically significant abnormalities that were not captured on the initial emergency department (ED) ECG and had the potential to change medical management. The purpose of this study was to prospectively determine how many prehospital ECGs had clinically significant abnormalities not present on the initial ED ECG and determine how many prehospital ECGs changed physician management. Methods. We conducted a prospective study of 281 patients presenting to the emergency department of a western Ontario urban hospital. Of these patients, 35 were transferred and excluded. The remaining 246 patients were included in the analysis. Results. A total of 26 (10.5%) prehospital ECGs were abnormal and had abnormalities that were not present on the initial ED ECG. Of these 26 prehospital ECGs, 19 (73.0%) resulted in a change of management. Conclusion. The implementation of prehospital ECGs may result in significant changes in patient management. Further research is needed to determine if these changes are clinically meaningful.

INTRODUCTION

The 2010 American Heart Association guidelines recommend the implementation of 12-lead electrocardiograms to identify patients at risk for acute coronary syndrome. The use of prehospital ECGs may be particularly beneficial in this population. However, the clinical utility of prehospital ECGs is not well understood. The purpose of this study was to determine the frequency and impact of prehospital ECG abnormalities that are not present on the initial ED ECG and to identify factors that may influence the frequency of these abnormalities.

How often does the EMS ECG change ED management?

How often are EMS ECG abnormalities gone by ED arrival?

Prospective study, 281 patients, western Ontario
Abnormal EMS ECGs vs WNL ED ECGs

Prehosp Emerg Care 2014;18:9-14
EMS ECG Changes Gone By Arrival
(n = 35)

ST Depression (11)
T Wave Inversion (4)
ST Elevation (2)

EMS ECG Changed Management in
2/3 of These Patients
THERAPEUTIC HYPOTHERMIA
• What temperature for Therapeutic Hypothermia?
• 939 patients in randomized trial
• 36 ICUs in Europe and Australia
• Evaluated: mortality & neuro outcome at 180d
• 80% VF/VT; 20% AS and PEA (12%/7%)
Targeted Temperature Management at 33°C versus 36°C after Cardiac Arrest

Niklas Nielsen, M.D., Ph.D., Jørn Wetterslev, M.D., Ph.D., Tobias Cronberg, M.D., Ph.D., David Erlinge, M.D., Ph.D., Yvan Gasche, M.D., Christian Hassager, M.D., D.M.Sc., Janneke Horn, M.D., Ph.D., Jan Hovdenes, M.D., Ph.D.,

- Compares 32°-33° to 35°-36° TH
- No unwitnessed Asystole patients
- 24% intravascular; 76% surface cooled
- 28 hours of cooling
- Rewarmed at 0.5°C/hour

Hypothermia vs Normal Temp
Survival and Neuro Outcomes


Survival  Poor Neuro  Survival  Poor Neuro
36°  52  54  33°  53  52

P = NS
Therapeutic Hypothermia
Take Homes

• The future of deep TH is unclear
• Preventing Hyperthermia appears crucial
• Future studies will determine optimal TH temp
• Well done study, but likely not the final study
• 35° – 36° looks like the new 32° – 34°
Does Prehospital TH have benefits?

1.359 patients; Randomized trial

King County Washington Medic 1

583 with VF; 776 without VF

Almost all patients cooled on hospital arrival
• EMS cooling: up to 2L of 4°C LR
• Mean core temp ↓ by 1.20°C to ED
• EMS patients took 1 hr less to get to 34°
• Study evaluated mortality and neuro status
• EMS pts: 7-10mg pavulon + 1-2mg valium
Survival to Discharge

JAMA 2013, in press

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<tr>
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<th>No EMS TH</th>
<th>EMS TH</th>
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<tr>
<td>VF</td>
<td>64.3%</td>
<td>62.7%</td>
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<tr>
<td>Non-VF</td>
<td>16.3%</td>
<td>19.2%</td>
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P = NS
• No improvement in neuro status in any group

• EMS TH group had more re-arrests  
  (26% vs 21%; p = 0.008)

• EMS TH group had more pulmonary edema  
  (41% vs 30%; p < 0.001)

• No difference in pressor use (9%)
Prehospital TH Induction Take Homes

- TH by EMS offers no benefits
- Lots of EMS training, resources and expense, yet no benefits shown
- In my opinion: this is a large and definitive study
Is oxygen dangerous?
Does increased oxygen tension affect mortality in patients treated with TH s/p cardiac arrest

- 170 consecutive patients
- Retrospectively evaluated PaO₂
- Evaluated mortality and neuro status
- Used highest PaO₂ in first 24 hours
Does hyperoxia affect stroke mortality?

Multicenter study of 8,554 pts; in 84 US ICUs

Ischemic strokes, SAH, hemorrhagic strokes

Three groups: Hypoxic, WNL, Hyperoxia

Hyperoxia defines as PaO₂ > 300
Potential Deleterious Effects of Hyperoxia

- **CVA**: Cerebral vasoconstriction
- **AMI**: coronary vasoconstriction
- **COPD**: increased risk for intubation
- **s/p CPR**: decreased neurological recovery
- **Sepsis**: impaired $O_2$ delivery
- **Hem shock**: compromised hemodynamics
An easy to read up to date article with 61 references that helps to teach us that an $O_2$ Sat of about 92-94% is what to aim for. There is no evidence that aiming for 98-100% is beneficial and lots of evidence that hyperoxia has significant potential deleterious effects.
Oxygen and Hyperoxia
Take Homes

92 – 94% O₂ Sat is the new normal

89 – 92% in COPD!!
Intubate, Oxygenate and Hyperventilate
Consider VSE

One ECG Begets Another

Perishock Pause < 10 sec

TH May Be Warmer: 35° - 36°

89-92 and 94-95