Medications on Trucks/Not on Directives

Presented by:
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Dwayne Cottel (ACP)

Date: Monday February 22, 2016
Objectives

• Describe the pathophysiology of acute pulmonary edema
• Describe the current evidence for pre-hospital furosemide administration
• Appropriately apply the use of pre-hospital furosemide based on patient assessment and current evidence.
• List the 3 primary indications for sodium bicarbonate administration.
• Describe the current evidence for pre-hospital sodium bicarbonate administration.
• Appropriately apply the use of pre-hospital sodium bicarbonate based on patient assessment and current evidence
Furosemide (Lasix)
Heart Failure

- What is Heart Failure
  - EPI
    - 5% of pre-hospital calls
  - Pathophys
Heart Failure

• How Does it Present?
  • Heterogenous
    1. Acute Pulmonary Edema (APE)
    2. Cardiogenic Shock
    3. HTN Crisis
    4. Chronic Heart Failure

• Difficult to Dx
Acute Pulmonary Edema

- **Cardiogenic**
  - ^ Back Pressure
    - Lt heart failure

- **Non-Cardiogenic**
  - ^ leakiness
    - Heroin
    - Drowning
    - Aspiration
    - Unk cause

- **End Result = excessive fluid in lungs**
POLL Question

• What is the medication of choice for Acute Pulmonary Edema Pre-hospital

• A) Lasix
• B) Nitro
• C) Ventolin
• D) Morphine
Heart Failure: Treatment

• In hospital:
  • LMNOP
    • Lasix
    • Morphine
    • Nitrates
    • Oxygen
    • Positive Pressure (Bipap/CPAP)

• Pre-hospital
  • Directive
    • Nitro
    • Oxygen
    • CPAP
POLL Question

• Which of the following is a contraindication to CPAP

• A) Crackles on auscultation
• B) Tripod position
• C) COPD Patient
• D) Asthma Exacerbation Suspected
Heart Failure: Treatment

- In hospital:
  - LMNOP
  - Lasix
  - Morphine
  - Nitrates
  - Oxygen
  - Positive Pressure (Bipap/CPAP)

- Pre-hospital
  - Directive
    - Nitro ✓
    - Oxygen ✓
    - CPAP ✓
Furosemide (Lasix)

- What is it (Loop Diuretic)
  - Peak: 5min
  - Symptoms effect 15-20min
  - Duration: 2h
Prehospital Furosemide (Lasix): Benefits

• Hemodynamic benefit
  • *Dec pulmonary pressure + Rt atrial Pressures (unloading the LV)*
• Outcome benefits when combined with other meds
Prehospital Furosemide (Lasix): Adverse Outcomes

• Prehospital Lasix
  • Adverse Outcomes
    • Electrolyte Abnormalities
      • Dec K,
    • Hypotension
    • Hypovolemia
    • Death
Pre-hospital Furosemide (Lasix): Most Current Evidence

• Stiell et al 2015

  • No difference in Serious Adverse Events

  1. Death in hospital
  2. Acute Kidney Injury
  3. Need for pressors
  4. Need for intubation

• DIFFERENCE in Secondary Adverse Events
### Table 3: Incidence of serious adverse events and other outcomes in the three study groups

<table>
<thead>
<tr>
<th>Event</th>
<th>No furosemide-heart failure (N=162)</th>
<th>Furosemide-heart failure (N=110)</th>
<th>Furosemide-no heart failure (N=58)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serious adverse events</td>
<td>14.8</td>
<td>23.6</td>
<td>19.0</td>
<td>0.18</td>
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<tr>
<td>Vasopressor</td>
<td>1.2</td>
<td>3.6</td>
<td>3.5</td>
<td>0.38</td>
</tr>
<tr>
<td>Intubation</td>
<td>1.9</td>
<td>5.5</td>
<td>6.9</td>
<td>0.14</td>
</tr>
<tr>
<td>Acute kidney injury</td>
<td>4.9</td>
<td>8.2</td>
<td>3.5</td>
<td>0.38</td>
</tr>
<tr>
<td>Mortality</td>
<td>8.6</td>
<td>13.6</td>
<td>10.3</td>
<td>0.52</td>
</tr>
<tr>
<td>Other adverse outcomes</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Prehospital hypotension*</td>
<td>12.4</td>
<td>9.1</td>
<td>25.9</td>
<td>&lt;0.01</td>
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<td>ED hypotension*</td>
<td>17.3</td>
<td>20.0</td>
<td>19.0</td>
<td>0.85</td>
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<tr>
<td>Need for bolus therapy†</td>
<td>1.9</td>
<td>3.6</td>
<td>10.3</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Serious arrhythmia‡</td>
<td>0</td>
<td>0</td>
<td>1.8</td>
<td>0.13</td>
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<tr>
<td>Electrolyte abnormalities§</td>
<td>4.9</td>
<td>4.6</td>
<td>3.5</td>
<td>0.90</td>
</tr>
<tr>
<td>BiPAP</td>
<td>16.1</td>
<td>31.8</td>
<td>15.5</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>TnT ≥0.10¶</td>
<td>16.7</td>
<td>39.1</td>
<td>31.0</td>
<td>&lt;0.001</td>
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<tr>
<td>Overall adverse outcome</td>
<td>50.6</td>
<td>70.9</td>
<td>67.2</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

*Hypotension defined as a systolic BP of less than 100 mm Hg. Prehospital hypotension is defined as any documented hypotension by EMS from initial vitals to final vitals on arrival to the ED. ED hypotension is defined as hypotension within 2 h of arrival to hospital.
†Bolus therapy defined as need for ≥250 ml rapid bolus.
‡Serious arrhythmia defined as ventricular tachycardia, ventricular fibrillation, third degree AV block and bradycardia with an HR <50 beats/min.
§Potassium <3.5 mEq/L or need for potassium replacement.
¶Within 24 h of arrival to hospital.
ED, emergency department.
Furosemide (Lasix)

- Evidence??
  - Heterogenous population
- Mimics
  - Pneumonia
  - COPD
  - ACS
- Pre-hospital Envt
  - Additional Hx
  - Limited physical assessment
  - Lack of rads/labs

Figure 3. Categorization of prehospital furosemide administration based upon emergency department and hospital diagnosis.
Bottom Line

• Lasix: not for pre-hospital
  • Timing is the question: Is prehospital the place???
    • Is in EMERG even the right place???
Sodium Bicarbonate (NaHCO₃)
Indications

• Indications (12) ACP School
  • Phenobarb/Tegretol/TCA OD (Na donor)
  • Benadryl OD (Na donor)
  • ASA OD (Na donor)
  • HyperK/K OD/Compartment/Crushing Injury (HyperK)
  • Metabolic Acidosis (Buffer)
  • ASA OD (Buffer)
  • Prolonged arrest (Buffer)
Indications: Simplified

• 1) Sodium Donor
• 2) Acidosis – Buffer
• 3) Management of HyperK
1) Sodium Donor

- Tricyclic Antidepressants
  - Na channel blocker
  - Rx for
    - Depression
    - Anxiety
    - Chronic Pain, Fibromyalgia

- There are studies showing some evidence in-hospital – but not out of hospital
  - Can be considered for life-threatening hypoTN and cardiac conduction disturbances evident on ECG
Na Channel Blocker Physiology
Clinical Toxicology (2007) 45, 203–233
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PRACTICE GUIDELINE

Tricyclic antidepressant poisoning: an evidence-based consensus guideline for out-of-hospital management

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Dose

- TCA OD 1–2mEq/kg
  - Amp = 50mEq
2) Acidosis – Buffer

- Evidence is poor
  - No evidence in hospital
  - No evidence OOH

- Last ditch effort

- Don’t be surprised if you don’t get the order in an arrest
Prehospital resuscitation of a man with excited delirium and cardiopulmonary arrest

Patrick Joseph Maher, MD*; Mimi Walsh, PhD†; Thomas Burns, BA‡; Jared Strote, MD, MS*

ABSTRACT

Features consistent with the syndrome known as excited delirium (ExDS) have been associated with law enforcement restraint-related death. The pathophysiology and exact causative factors of restraint-related death associated with ExDS remain unclear. We present a case of successful field resuscitation of a man with ExDS who experienced cardiopulmonary arrest while being restrained by law enforcement officers. Despite the presence of a severe lactic acidosis on emergency department admission, the patient recovered following prehospital treatment with advanced cardiac life support measures and intravenous sodium bicarbonate, likely in part due to early recognition of the disease process. Law enforcement restraint-related death. The syndrome comprises many behaviours and typically involves agitation, delirium, paranoia, seeming imperviousness to pain, and abnormal strength. For a number of reasons, ExDS in-custody deaths have led to controversy in both the media and medical literature. Very little is known about the epidemiology, pathophysiology, and causative factors of such deaths; cases frequently involve patients with recreational drug use and/or psychiatric disease; and often deaths involving restraint lead to questions of excessive force. Research on ExDS in-custody deaths is challenging.
3) Hyperkalemia

- End Stage Renal Disease
- Compartment Syndrome/Crush Injury
- Rhabdomyolysis
- K OD
POLL Question

• True of False:

Sodium Bicarb is the drug of choice for the treatment for Hyperkalemia
Pharmacological interventions for the acute management of hyperkalaemia in adults (Review)

Batterink J, Cessford TA, Taylor RAI
NaHCO3 Dosing

1. Na donor: approx 3amp
2. Buffer: ??
3. HyperK: Ca/Ventolin
   • FLUSH – Precipitates with Ca
Bottom Line

- Adjunct to Evidence Based Treatment
  1) Na donor
  2) Acidosis – Buffer
  3) HyperK
SUMMARY

- Evidence based = our protocols
  - Lasix – no supported role
  - NHC03 – potential benefit

- Patch Point
  - May be given order
  - Dose case dependent
Objectives (Recap)

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- Describe the current evidence for pre-hospital furosemide administration
- Appropriately apply the use of pre-hospital furosemide based on patient assessment and current evidence.
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- Describe the current evidence for pre-hospital sodium bicarbonate administration.
- Appropriately apply the use of pre-hospital sodium bicarbonate based on patient assessment and current evidence.
Thank you!

If any questions, don’t hesitate to contact your friendly Regional Prehospital Care Specialist:

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References (1)


References (2)


