Timing of Epinephrine Administration In Cardiac Arrest

Kimberly Pruett, MD
University of New Mexico
Albuquerque Fire Rescue
Drug Shortage
Epinephrine Physiology

**Alpha adrenergic:**
- Increases diastolic pressure
  - Increases coronary blood flow
- Causes platelet activation
- Impairs microvascular blood flow

**Beta adrenergic:**
- Increases cardiac contractility
- Increases myocardial O2 demand
- Increases risk of arrythmias
Epinephrine Literature

- Early epi is beneficial for ROSC
- Epi is not great for neuro outcomes
- High dose epi does not increase survival
- More epi associated with worse outcome
Unanswered questions

What Rhythm?

What Route?

How Often?

How Much?
• Retrospective review of 20,000 IHCA patients

• Time between first epi and endpoint of resuscitation
  Total doses of epi

• Longer dosing intervals improved survival
  – True for both shockable and non-shockable rhythms
Longer Epi Dosing Intervals Correlated With Increased Survival

<table>
<thead>
<tr>
<th>Epinephrine average dosing period</th>
<th>No. of patients</th>
<th>Unadjusted survival to discharge No. (%)</th>
<th>Unadjusted Odds Ratio for Survival (95% CI)</th>
<th>Adjusted Odds Ratio for Survival (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9-10 min/dose</td>
<td>796</td>
<td>87 (10.9)</td>
<td>1.27 (0.98, 1.65)</td>
<td>2.10 (1.50, 2.93)</td>
</tr>
<tr>
<td>8-9 min/dose</td>
<td>1052</td>
<td>119 (11.3)</td>
<td>1.33 (1.04, 1.69)</td>
<td>1.96 (1.47, 2.62)</td>
</tr>
<tr>
<td>4-5 min/dose</td>
<td>2665</td>
<td>233 (8.7)</td>
<td>1 (ref.)</td>
<td>1 (ref.)</td>
</tr>
<tr>
<td>3-4 min/dose</td>
<td>1905</td>
<td>198 (10.4)</td>
<td>1.20 (0.99, 1.45)</td>
<td>0.95 (0.76, 1.19)</td>
</tr>
<tr>
<td>1-3 min/dose</td>
<td>989</td>
<td>155 (15.7)</td>
<td>1.91 (1.53, 2.38)</td>
<td>0.72 (0.55, 0.95)</td>
</tr>
<tr>
<td>Total</td>
<td>13,589</td>
<td>1,301 (9.6)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fig. 5. Survival to discharge by category of epinephrine average dosing period for in-hospital cardiac arrests of duration less than 20 min.
WHAT IF...?
January - June

Epi Administered Every 3-5 Minutes

June - December

Epi Administered Every 10 Minutes
2017 Aggregate OOHCA Data

- **Resuscitation Started**
  - Medical Cardiac Arrests: 461
  - No Epinephrine: 369
  - No Epinephrine: 92
  - Transported to the hospital: 173
  - Discharged from the Hospital: 36

- **No Resuscitation (Obviously Deceased)**
  - Received Epinephrine: 446
2017 Cardiac Arrest Data

- **Cardiac Arrests**
  - January-June: 455
  - July-December: 452

- **Resuscitation**
  - January-June: 229
  - July-December: 232

- **ROSC**
  - January-June: 88
  - July-December: 85

- **Discharge**
  - January-June: 18
  - July-December: 18
3 Minute Vs. 10 Minute Epi

6 Month Epi Admin Breakdown

- Started Resuscitation: 190 (Jan-Jun), 179 (Jul-Dec)
- Average dose received: 5 (Jan-Jun), 2.68 (Jul-Dec)
- Transported to ED: 73 (Jan-Jun), 64 (Jul-Dec)
- Discharged From Hospital: 13 (Jan-Jun), 8 (Jul-Dec)
Are We Saving Lives, or Prolonging Death?

The BIG Question
Cerebral Performance Category

• CPC 1 = Normal or only mild deficits
• CPC 2 = Moderate disability, independent ADLs
• CPC 3 = Severe disability, dependent on others
• CPC 4 = Vegetative state
CPC Scores For Discharged Patients

- CPC1: 64%
- CPC2: 22%
- CPC3: 8%
- CPC4: 6%

CPC1 accounts for the majority (64%) of discharged patients, with CPC2 following at 22%, CPC3 at 8%, and CPC4 at 6%.
2017 CPC Scores of 1 or 2

EPI Every 3 minutes
January – June 2017

16
16/229 OHCA patients = 8%
16/88 ROSC patients = 18%

EPI Every 10 minutes
July – December 2017

15
15/232 OHCA patients = 6.5%
15/85 ROSC patients = 18%
Initial Rhythm vs. CPC 1&2

- Asystole
- PEA
- V-Fib
- V-Tach
- Unknown

Jan-Jun vs. Jul-Dec
52% of our patients discharged with a CPC1 did not receive epinephrine at all.
48% of patients discharged with a CPC1 received an average of 2 doses of epinephrine
SO WHAT?
Conclusion

Giving epinephrine every 10 minutes did not cause harm.
Thank you

Data collected and analyzed by:

• Capt. Nathaniel Meisner, AFR Paramedic
• Lt. Chuck Dimas, AFR Paramedic
• Dorothy Habrat, MD
• Graham Smith, MD
• Andrew Harrell, MD
• Kimberly Pruett, MD