Syringe Administration of Epinephrine by Emergency Medical Technicians for Anaphylaxis

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DISCLOSURES

• None

BACKGROUND

• Intramuscular epinephrine is the cornerstone of therapy for anaphylaxis and severe allergic reaction in the pre-hospital environment

THE USE OF EPINEPHRINE FOR OUT-OF-HOSPITAL TREATMENT OF ANAPHYLAXIS
National Association of EMS Physicians
Prehospital Emergency Care 18:1, 2014
BACKGROUND

• In 2014, in response to rising epinephrine autoinjector (EAI) costs, "Check and Inject Program" was implemented in King County, WA

STUDY AIM

• Our investigation into the King County experience over the first 2 ½ years of the "Check and Inject Program" sought to determine if EMTs can implement a protocol utilizing syringe administration epinephrine for patients experiencing presumed prehospital anaphylaxis and/or severe allergic reaction
METHODS

• Cases collected prospectively as patients were treated by EMTs with IM epinephrine as part of the “Check and Inject Program”

• Cases from the ~2,700 EMTs in the County were collected from July 2014 through December 2016

• Cases from the ~800 EMTs in the Seattle Fire Department were collected from January 2016 through December 2016
METHODS

- Cases identified through a phone log, the replacement kit process, and an electronic database search
- Data was abstracted from the EMS medical record and "Check and Inject" QI forms collected from the EMT units
- Each EMS medical record was independently reviewed by two Emergency Physicians

RESULTS

- 422 cases of EMT administered epinephrine during the study period
- 11 cases excluded for irrecoverable incident report forms
- 411 cases included in the analysis
  
  (~ 8 / 100,000 person years)
**Characteristic** | **N (%)**
---|---
**Gender** |  |
Male | 182 (44.3)  
Female | 239 (55.7)  
**Age** |  |
<5 yo | 33 (8.0)  
5-14 yo | 40 (9.7)  
15-64 yo | 299 (72.7)  
>65 yo | 39 (9.5)  
**Epi was administered prior to EMS arrival** |  |
| 33 (8.0)  
**Patient/Family** | 25 (6.1)  
**Healthcare Provider** | 6 (1.5)  
**Other** | 2 (0.5)  

**Putative Allergic Triggers**

<table>
<thead>
<tr>
<th>Category</th>
<th>N (%)</th>
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</table>
| Food – Nuts | 92 (22.4)  
Food – Shellfish | 28 (6.8)  
Food – Other | 83 (20.2)  
Drug – NSAIDs | 8 (1.9)  
Drug – Antibiotics | 26 (6.3)  
Drug – Other | 35 (8.5)  
Insect Sting – Bee | 59 (14.4)  
Insect Sting – Other | 13 (3.2)  
Other/Environmental | 24 (5.8)  
Not documented/Unknown | 43 (10.5) |
Vital Signs (Prior to administration of IM epi)

<table>
<thead>
<tr>
<th>Vital Sign</th>
<th>Mean (SD)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory Rate, mean per minute</td>
<td>22 (7.5)</td>
<td>*</td>
</tr>
<tr>
<td>Respiratory Rate, ≥ 20 respirations/min</td>
<td>223 (67.2)</td>
<td></td>
</tr>
<tr>
<td>Pulse Rate, mean per minute (SD)</td>
<td>104 (23.1)</td>
<td>†</td>
</tr>
<tr>
<td>Pulse Rate, ≥ 100 bpm</td>
<td>226 (63.5)</td>
<td>†</td>
</tr>
<tr>
<td>Pulse Rate, ≤ 60 bpm</td>
<td>54 (4.0)</td>
<td>†</td>
</tr>
<tr>
<td>Any abnormal vital sign prior to epinephrine administration</td>
<td>180 (62.5)</td>
<td>°</td>
</tr>
</tbody>
</table>

* Based on 332 cases where a respiratory rate was documented prior to epi administration.
† Based on 356 cases where a pulse rate was documented prior to epi administration.
° BP < 90, or pulse ≥ 100 bpm, or respiratory rate ≥ 20 respirations/min, or SpO₂ < 90%. Out of 411 cases.

Symptoms/Signs

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Count (Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypotension (BP &lt; 90)</td>
<td>106 (25.8)</td>
</tr>
<tr>
<td>Hives</td>
<td>241 (58.6)</td>
</tr>
<tr>
<td>Respiratory Distress</td>
<td>188 (45.7)</td>
</tr>
<tr>
<td>Swelling of the face, lips, or oropharynx</td>
<td>189 (46.0)</td>
</tr>
</tbody>
</table>

Number of symptoms:

<table>
<thead>
<tr>
<th>Number of symptoms</th>
<th>Count (Percentage)</th>
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</thead>
<tbody>
<tr>
<td>Patients with only 1 symptom</td>
<td>63 (15.3)</td>
</tr>
<tr>
<td>Patients with 2 or more symptoms</td>
<td>355 (74.6)</td>
</tr>
</tbody>
</table>

• 9.5% of patients received a second dose of epinephrine

• There were 2 cases of cardiac arrest from clear anaphylaxis that received IM epinephrine during the study period
  – Both patients were successfully resuscitated to hospital admission
  – One patient died in the hospital
  – One patient survived neurologically intact
DISCUSSION

• In our cohort, EMTs identified appropriate patients meeting the criteria of the “Check and Inject” standing order

• No documented adverse outcomes related to epinephrine administration based on review of prehospital care

• No provider injuries
LIMITATIONS

• Unable to obtain follow-up information and patient outcomes from hospital records

• Complications to EMT Epi that were not observed in the prehospital setting may have been missed

• The physician assessment relied on the EMS report forms and did not independently verify the history or exam

CONCLUSIONS

• We found that EMTs in King County successfully implemented the “Check and Inject” protocol for IM epinephrine administration in a manner that typically agreed with physician review and without any overt identified safety issues.

• Our findings support the potential for effective manual aspiration and IM administration of epinephrine by EMTs in a mature system that undertakes ongoing training and continuous quality review.

Questions?

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