Preventing Medication Errors in EMS

2008 - 2015

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- Population 1.5 million (6th largest in USA)
- 520 square miles (364 days of sunshine)
- 70 ALS Engines (2 PMs/2 EMTs)
- 30 ALS Rescues/Ambulances (1 PM/1 EMT)
- 14 BLS Ladders (4 EMTs)
- 693 Paramedics
- 995 EMTs
Phoenix Fire Dept. 2015 Responses

- ALS  89,196
- BLS  63,887
- Fire 13,178
- Sp/OPS 1,526
- Other  5,637
- Total 173,234
Phoenix Fire (EMS) Dept.
2015 Responses

- Total EMS Responses 153,083 (88%)
- Total EMS Transports 57,312 (37%)
5 RIGHTS

Right patient
Right medication
Right dose
Right indication
Right route
(Right documentation)
Medication Error

- Defined as any preventable error involving medication that may cause injury or harm to the patient.
- Wrong medication, wrong dose etc.
<table>
<thead>
<tr>
<th>Year</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error Rate</td>
<td>10%</td>
<td>4.6%</td>
<td>5%</td>
<td>4.8%</td>
<td>3%</td>
<td>2%</td>
<td>2%</td>
</tr>
</tbody>
</table>
2015
3%
The good news is that all 7 reported errors involved wrong drug dosages.

There were no errors involving the wrong medication (Epi. v. MS or vice versa).

Pediatric dosing errors decreased from 60% to 28% of the reported errors.

None of the pediatric errors involved Epi.
2015

Pediatric EMS incidents were about 8% of EMS calls (153,000 v 13,000 in 2015). Yet pediatric medication errors occur at a much higher rate than with adult patients, even though a very small number (<5%) of pediatric patients received medications.
Medication Dosing Errors in Pediatric Patients Treated by Emergency Medical Services

Pediatric Dosing Errors

- Study of 8 EMS agencies in Michigan
- 5,547 children < 12 treated by paramedics
- 230 (4.1%) received medications and had a documented weight or BLT color.
- 360 medications were given (multiple medications in 73 cases).
- Medication error defined as > 20% deviation from the weight-appropriate dose (reported weight or BLT use).
Pediatric Dosing Errors

- Medication dosing errors occurred in 125 of 360 drug administrations. (34.7%)
- Epinephrine had the highest percentage of incorrect doses.

JD Hoyle et al. Medication Errors in Pediatric Patients Treated by EMS. PEC 2012;16:59-66
Study Limitations

- Hospital records were not reviewed.
- No determination of patient harm was made.
- Some medication errors were not likely to be clinically significant.
- No determination was made on why the errors occurred.
Conclusions

- Medications delivered to children in the prehospital setting by paramedics were frequently outside the proper range when compared to documented patient weights.
- EMS systems should develop strategies to reduce pediatric medication dosing errors.
Root Causes of Errors In Pediatric Patients

- Underlying causes of dosing errors were found in four areas (cognitive, procedural, affective, and teamwork).

- The error rate for diazepam dosing was 47%; for midazolam it was 60%.

Root Causes of Errors In Pediatric Patients

- Incorrect estimates of weight
- Incorrect use of the Broselow-Luten tape
- Faulty recollection of doses
- Difficulty with mental calculations (stress)
- mg/kg to ml conversion errors
- Inaccurate measurement of volumes
- Failure to crosscheck doses with partners
# PEDS CODE CARD

Phoenix Fire Department PEDS CARD

<table>
<thead>
<tr>
<th>AGE</th>
<th>WT(KG)</th>
<th>ET TUBE</th>
<th>DEFIB (2J/KG)</th>
<th>EPI DOSE (ML) 1:10,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn</td>
<td>3.0</td>
<td>3.5</td>
<td>6</td>
<td>0.35 ml</td>
</tr>
<tr>
<td>6 mo.</td>
<td>7.0</td>
<td>3.5</td>
<td>14</td>
<td>0.7 ml</td>
</tr>
<tr>
<td>1 yr.</td>
<td>10</td>
<td>4.0</td>
<td>20</td>
<td>1.0 ml</td>
</tr>
<tr>
<td>2 yr.</td>
<td>12</td>
<td>4.5</td>
<td>24</td>
<td>1.3 ml</td>
</tr>
<tr>
<td>3 yr.</td>
<td>15</td>
<td>4.5</td>
<td>30</td>
<td>1.5 ml</td>
</tr>
<tr>
<td>4 yr.</td>
<td>17</td>
<td>5.0</td>
<td>34</td>
<td>1.7 ml</td>
</tr>
<tr>
<td>5 yr.</td>
<td>20</td>
<td>5.0</td>
<td>40</td>
<td>2.0 ml</td>
</tr>
<tr>
<td>6 yr.</td>
<td>22</td>
<td>5.5</td>
<td>44</td>
<td>2.2 ml</td>
</tr>
<tr>
<td>7 yr.</td>
<td>25</td>
<td>6.0</td>
<td>50</td>
<td>2.5 ml</td>
</tr>
<tr>
<td>8 yr.</td>
<td>28</td>
<td>6.0</td>
<td>56</td>
<td>2.8 ml</td>
</tr>
<tr>
<td>9 yr.</td>
<td>30</td>
<td>6.5</td>
<td>60</td>
<td>3.0 ml</td>
</tr>
<tr>
<td>10 yr.</td>
<td>33</td>
<td>6.5</td>
<td>66</td>
<td>3.3 ml</td>
</tr>
<tr>
<td>11 yr.</td>
<td>45</td>
<td>6.5</td>
<td>90</td>
<td>4.5 ml</td>
</tr>
<tr>
<td>12 yr.</td>
<td>50</td>
<td>7.0</td>
<td>100</td>
<td>5.0 ml</td>
</tr>
</tbody>
</table>
2015

- 3 Ketamine (under) dosing errors – 2mg/kg IM instead of 4mg/kg IM.
- Ketamine was added to our paramedic drug box in November 2015.
- Ketamine on-line CE is available for 1 hr. credit. Ketamine ppt is being repeated at our CE meetings for the next 3 months.
5 points to remember!

- Always double check the drug/dose.
- Put narcotics in separate container/tamper resistant plastic bags with serial numbers.
- There is no need to be in a hurry...to give a patient the wrong medication!
- For kids, use the BLT, a PEDS Code Card, or Handtevy ™ card or system.
- Mistaeks Happen! Report them appropriately.
Comments on last year’s survey

- Always double check
- Slow down
- Most of the resources, references in place are excellent
- Communicate with partner and don’t let BLS guys touch your stuff
- PFD CEs are F***ing pointless. If you want to prevent med. errors, the CEs need to train us...on protocols, standing orders etc.
Everyone makes mistakes...
my last mistake (that I know of)
happened on October 12, 2015.
October 2015
Lemke Expedition
Grand Canyon

Upset Rapid
Colorado River
Upset Rapid
(rated 8-10)

- According to the most recent river guide books, there is a left run and a right run.
- The center run is “NOT RECOMMENDED!”
Upset Rapid
Thanks to Dr. Tim Wolfe and his wife Susan...

- Tim: for saving my ass and pulling me out of 50 degree water (in < 60 seconds).
- Susan: for trying to and who ended up “taking the plunge” with me.
References

Coping with medical mistakes and errors in judgment.
Paramedic self-reported errors.
Eliminating errors in EMS: Realities and recommendations.
Brain Cramp: The emergency physician’s worst nightmare.
Medication calculation skills of practicing paramedics.
Dealing with failure: The aftermath of errors and adverse events.
Medication dosing errors in pediatric patients treated by EMS.
Simulation-based assess. of paramedic pediatric resuscitation skills.
Root causes of errors in a simulated prehosp. pediatric emergency.
The End

Questions?

Google: DR Party Expedition Grand Canyon Highlights 2013
(you-tube 10 min video)