Preventing Medication Errors in EMS

Examples and Case Reports

John Gallagher MD
Phoenix Fire Dept.
Six R’s

Right Medication
Right Dose
Right Time
Right Route
Right Patient
Right Documentation

Bryan Bledsoe DO, Paramedic Care
Medication Error

Any preventable event that may cause or lead to inappropriate medication use or patient harm. Wrong drug, wrong dose etc.
Beware of Misinformation!

Local Children’s Hospital gave away a pediatric medication card at every EMS conference.

Under the title “Code Medications” it listed
Age/Kg  Epi.1:10,000/Bicarb/Atropine/CaCl
         (0.1mg/ml) (1mEq/ml) (0.1mg/ml) (100mg/ml)
NB    3  0.3ml    3ml    1ml   0.6ml
3m    5  0.5ml    5ml    1ml   1ml
6m    7  0.7ml    7ml    1.4ml 1.4ml
1yr   10 1ml     10ml  2ml   2ml
Etc.
Guess what happened?

While the card makes it easier to figure out the correct dose using milliliters (ml)

We started seeing pediatric cardiac arrest patients (2) who were given epinephrine and atropine (wrong drug per AHA PALS).
The peds card had another error.

The endotracheal dose of epinephrine was listed as “ETT Epi 10x the IV dose”

For ETT, the correct concentration is Epi. 1:1000. The dose is 0.1mg/kg but the ml dose is the SAME—0.1ml/kg.
Pediatric drug doses in mls

It does help paramedics if their protocols reflect both the mg/kg and the ml/kg dose of a drug for pediatric patients.

Broselow tapes do help for peds.
Glass Vials

Are they a problem in your system?
Name the drugs.
Epi. Verapamil MS
3 Drugs

Epinephrine 1:1000 1mg/1ml

Verapamil 5mg/2ml

Morphine Sulfate 10mg/1ml
Case one

56 y.o. female with chest pain 8/10. Treated with oxygen, ASA, NTG x3 with no relief. Paramedic wanted to give MS 2mg IV. Instead gave Epi. 0.2mg 1:1000.

Noted mistake at hospital—reported to ED physician. Patient had increase in HR/BP without increase in chest pain.
Outcome?

The patient had a complete cardiac work up with normal cardiac enzymes and normal 12 lead EKGs. DC’d home next day.

Paramedic also contacted on-line medical direction physician to report incident.
Case two

14 y.o. male with isolated femur fx due to car/bike. Paramedic wanted to treat pain with morphine 2mg IV. Instead gave verapamil 0.5mg (0.2ml). Paramedic noted mistake immediately and contacted on-line medical direction. No change in HR or BP.
Outcome?

Patient had no adverse effects of verapamil. Paramedic was advised to have CaCl or Glucagon available if hypotension occurred. Patient did receive MS for pain on way to ED.
Case three

1 y.o. (10 kg) male code found at home in asystole. After intubation, paramedic attempted to give Epi.1:1000 1ml down the ET tube. Instead gave Verapamil 2.5mg (1ml). Noted error immediately, then gave correct Epi. dose. Reported error to ED physician who gave patient CaCl.
Patient remained in asystole after further resuscitation in ED and was pronounced.

Paramedic reported this incident to his medical director same day of event. He was emotionally shaken up afterward and felt devastated by his mistake.
Remember that the paramedic is a secondary victim in these incidents.

Just making a critical error and then having the courage to admit it may bring with it a lot of emotional turmoil.

Encourage the self-reporting of medication errors.

“EMS personnel must be allowed to report medication errors without fear of reprisal.”

“Thirty-two (9%) of paramedics reported committing a medication error in the last 12 months.”

“In this study, 4% of errors made by paramedics were not reported before this anonymous survey.”

Paramedic Self-Reported Medication Errors
Prevention is the best medicine

Continuing education for paramedics to review incidents and to learn how to prevent them.
Change the location of error prone drugs in the paramedic drug box.
Change the drug packaging to make the drugs look different.
Develop a CQI process to log, investigate and review incidents. Take corrective action prn.

Change the packaging.
Change the packaging.
Change the supplier.
Change the location in the box.
Change the location.
Why do msiteaks happen?

Answer: (Two words)
Brain Cramp!

(brain fart)

Medical Legal Case

3 week old male (4 kg) sustained 2\textsuperscript{nd} and 3\textsuperscript{rd} degree burns on L arm and L cheek from hot gravy from a TV dinner that his 6 y.o. sibling spilled on him. Paramedic wanted to give 0.5mg of Morphine. Instead gave 0.5ml (5 mg) of Morphine IM. HR dropped from 212 to 160. RR stayed at 80. Oxygen saturation remained at 95-99%. Med. error was documented and reported to the mom in the ambulance and to the burn unit staff (MD and RN).
Narcan 0.4mg was given in burn unit when respirations fell to 16 approx. 40 minutes after arrival.

The next 3 doses of naloxone ordered by the surgery resident were 0.125ml of 0.4 mg/ml. The correct dose of naloxone is 0.1mg/kg or 0.4mg (1 ml). 3 subsequent doses were at 0.4mg amount. These medication errors were noted by the attending in the patient’s chart.
Eight days later the child was taken to the OR for skin grafting.

The night after surgery, the infant started having grossly bloody stools x 3.

Two months later the infant had a 6 cm colon stricture removed at surgery (from ischemia).
What do you think the mom thought caused the colon stricture?

As noted in the chart “Mother with many questions about how and why the bowel stricture occurred and asks if overdose of MSO4 caused it”
Pediatric Critical Care Specialist

It is my opinion that there is a reasonable degree of medical probability that the necrotizing entero-colitis episode and ischemia of the bowel was more likely than not due to hypoxic ischemic insult precipitated by the administration of morphine at a toxic dose of 5.0 mg instead of 0.5 mg, together with the failure to properly respond to said administration.
Are you freaking kidding me?

Some medical experts just don’t read the medical records as carefully as they should. (There were 4 volumes of records.)
After further review...

During the first skin grafting procedure in the OR, the infant had general anesthesia with N2O, Propofol and Fentanyl. Blood pressures during the 2.5 hr operation were in the 75/40 range but for a 30 min. period dropped to 50/20. That night the infant had his first bloody stool (8 days after the MS).
So...when did the ischemic insult to the bowel probably occur?

This case was settled by the Fire/EMS agency for a "nominal amount"... it's just business, folks.
Full Disclosure

Even though the lawyers will advise you not to admit mistakes, it is unethical not to disclose medical errors to patients that may cause them harm. In fact, it is required by the Amer. College of Physicians and JCAHO.
Patients have a right to know.

Admit the mistake.

Apologize for it.

Tell them what is being done to prevent further harm to them and to prevent further errors in the future.
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.
The End

Questions?
Fully loaded!

Including a computer.
ACTIVE INCIDENTS 02/18/09 15:19
A9  #044918 72
FDAMB ASSAULT
26700 S SR 85 , BUC
     R321 +

A6  #044942 48
ALS-A INJURED PERSON
21606 N 152ND DR , SCW
     M102 -

A14 #044945 44
ALSACH INTERNAL BLEEDING
100 W NOPAL PL , CHA
     P-282

A7  #044949 39
ALS-A SEIZURE
All Message Packets Received

MDTG4633
CF-29
I never even have to ask for directions!