Medication Errors in Pediatric Patients After Implementation of a Field Guide With Volume Based Dosing

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WHAT WE LEARNED

Implementation of a prehospital field guide with volume-based dosing for pediatric patients led to significantly fewer medication dosing errors.

BACKGROUND

- Pediatric medication error rates by paramedics > 30%
  - Epinephrine error rate 56%
  - Diphenhydramine error rate 61%
- Handtevy™ Field Guide System
  - Precalculated mL doses by age/length
  - Superior to Broselow LBT in simulation
  - Customized to each EMS system

HYPOTHESIS

- Implementation of a field guild would reduce pediatric medication errors to less than 15%.

METHODS

- Introduced Field Guide system – 2015
- Baseline data – 2014 (weight/age-based)
- Single center retrospective cohort study
  - EMS records July 2017 – June 2019
  - Medications administered ≤ 13 years old
- Primary outcome – medication error rate
  - Error: A dose that differed from the predetermined dose by age by > 20%
- Reviewed by 2 investigators
- Excluded online medical direction cases

EMS STUDY				IDEAL WEIGHT 25 KG	
DRUG	CONC	VOL	RT	DOSE/KG	AMNT
Adenosine [1st]	6 mg/2mL	0.83 mL	IV/IO	0.1 mg/kg	2.5 mg
Adenosine [2nd]	6 mg/2mL	1.7 mL	IV/IO	0.2 mg/kg	5 mg
Albuterol	2.5 mg/3mL	3 mL	Neb	Dose =	2.5 mg
Atrovent	0.5 mg/2.5mL	1.25 mL	Neb	Dose =	0.25 mg

RESULTS

- ***Baseline error rate 48.9%*** *(134/274 doses)*
- 483 drug administrations to 375 patients
- Overall appropriate administration - 89.4%
- **10.6% error rate**
  - 4.3% overdoses
  - 6.2% underdoses
- Largest overdose
  - Solumedrol – 3x accepted dose
- Largest underdose
  - Epinephrine 1:1 – 10-fold underdose
- Perfect dosing (0 errors)
  - Adenosine
  - Dextrose 10%
  - Glucagon
  - Epinephrine 1:10,000
  - Diphenhydramine IM
  - Ondansetron ODT
- Most frequent errors:
  - Midazolam IN > Fentanyl IN > Fentanyl IV

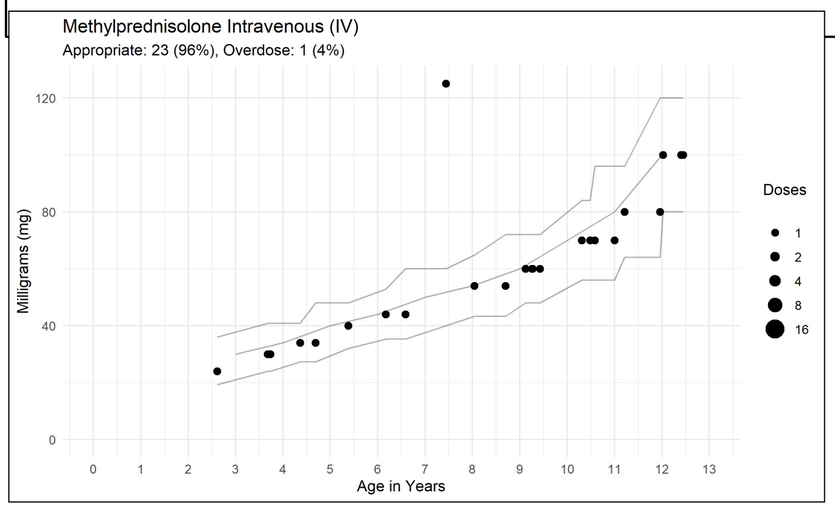

Figure 1: Methylprednisolone IV Dosing

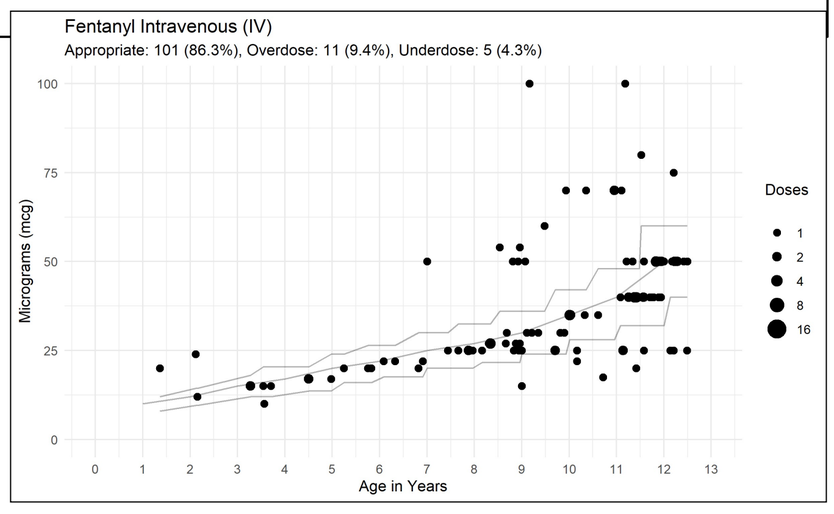

Figure 2: Fentanyl IV Dosing

LIMITATIONS

- Retrospective cohort study
- Baseline error rate determined based on provider-documented weight (or age)

DISCLOSURES – NONE

CONCLUSIONS

- Implementation of a field guide resulted in a significantly lower medication error rate for pediatric patients compared to system baseline
- Strategies to reduce pediatric medication errors by EMS providers are essential to improving the care of critically ill and injured children.