

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 guide 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

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

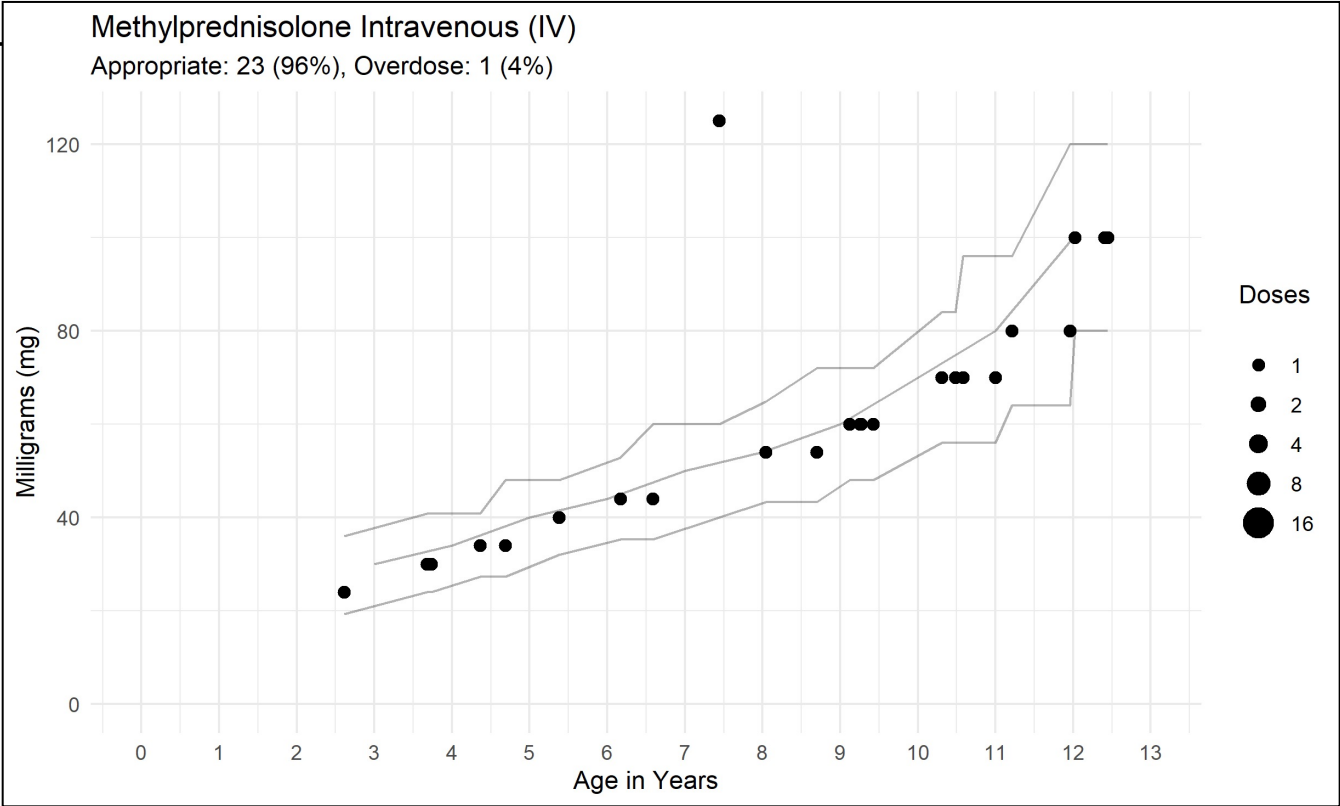


Figure 1: Methylprednisolone IV Dosing

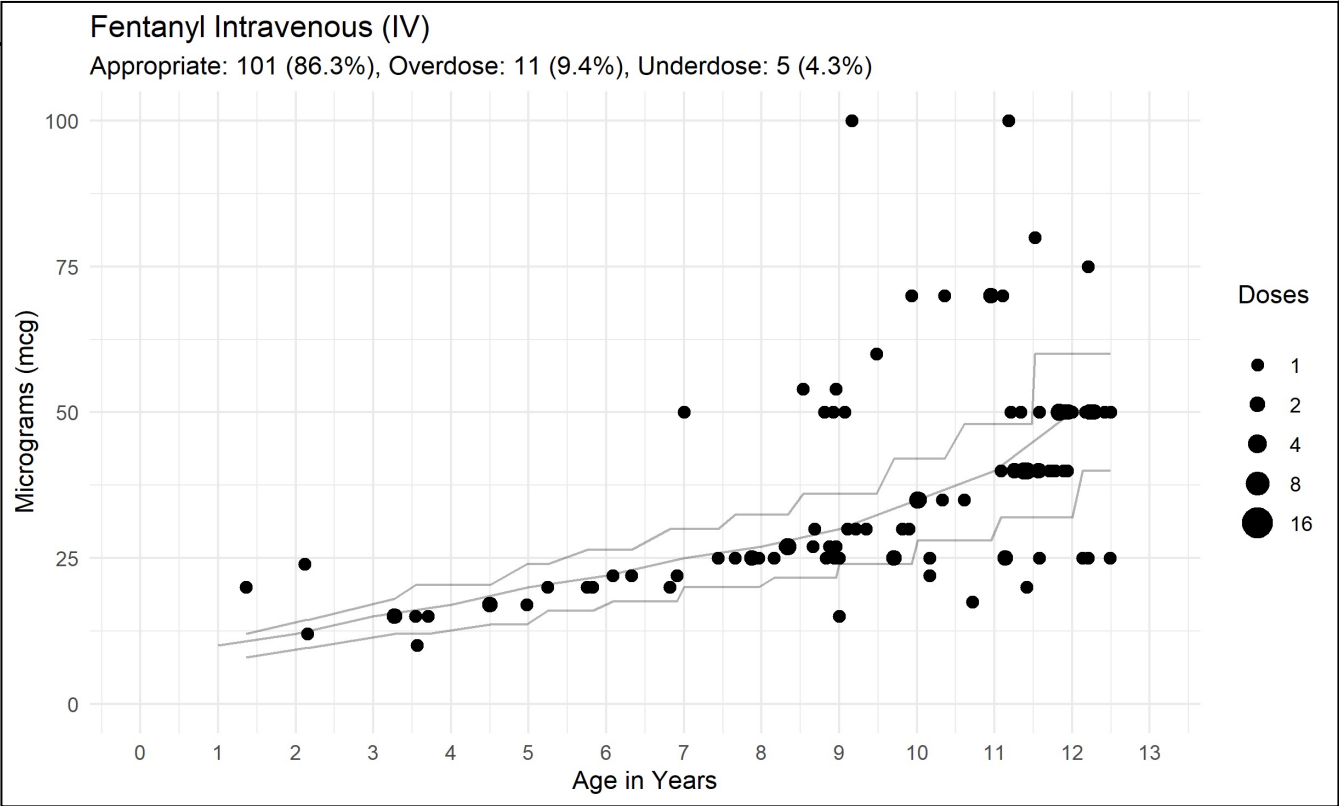


Figure 2: Fentanyl IV Dosing

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.

OPTION 1 - ESTIMATE AGE USING LENGTH (PREFERRED)
-USE PROVIDED TAPE MEASURE (HEAD TO HEEL)
OPTION 2 - USE ACTUAL AGE (IF STANDARD SIZED CHILD)

7 YR

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

NEWBORN
3 KG | 4 KG | 5 KG

4 MO

6 MO

1 YR

2 YR

3 YR

4 YR

5 YR

6 YR

7 YR

8 YR

9 YR

10 YR

11 YR