Pediatric Dose Optimization for Seizures in EMS

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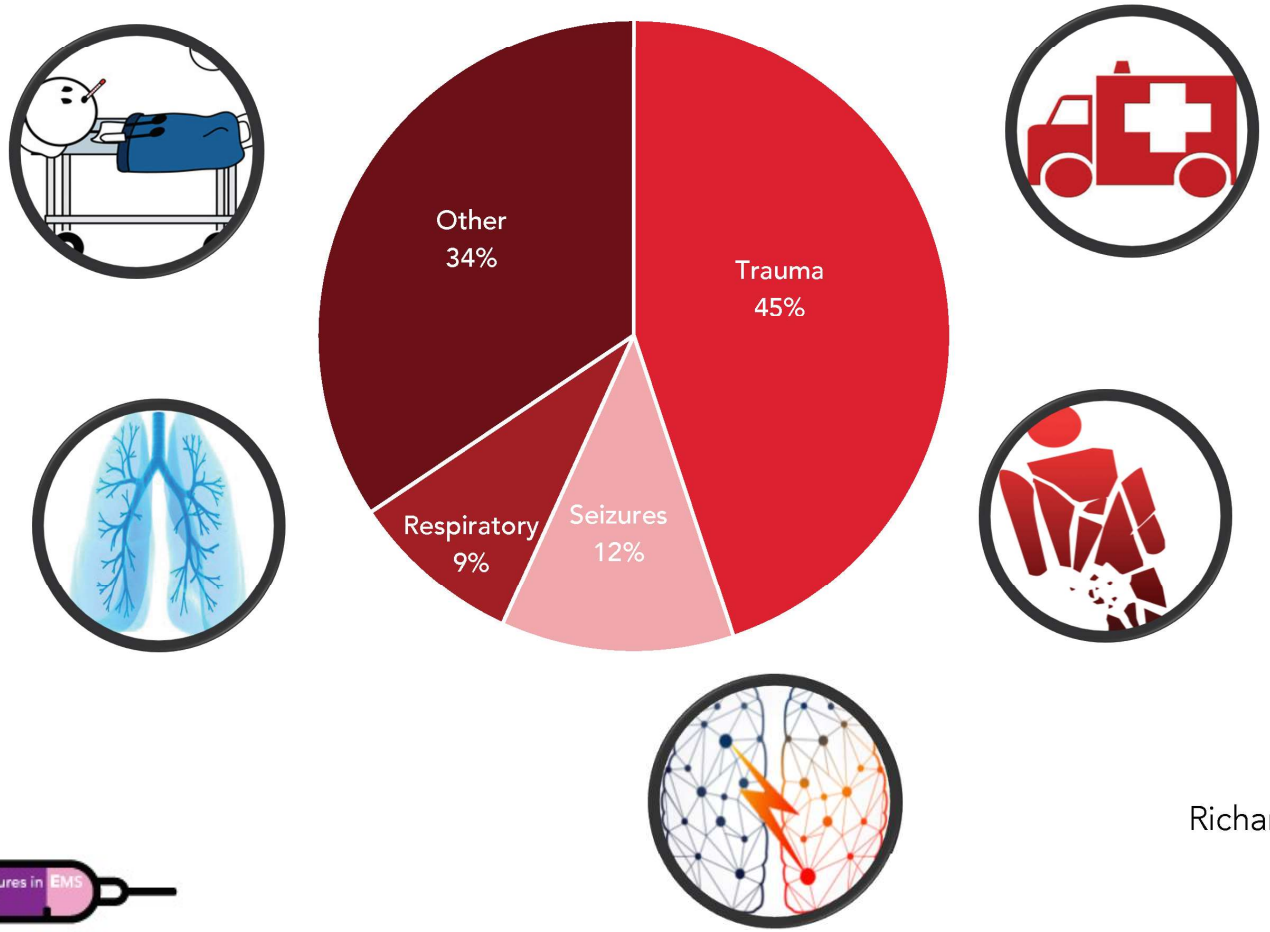
Funding and Approval

- Funding: National Institute of Neurological Disorders and Stroke (NINDS), U01NS114042 (08/2021-07/2026)
- Registered with ClinicalTrials.gov: NCT05121324
- Exception from Informed Consent (EFIC) → Investigational New Drug (IND) 156119 approved by the Food and Drug Administration (FDA)
- Human subjects' protection institutional review board (IRB) ethical approval from the University of Utah to conduct community consultation prior to patient enrollment

Pediatric EMS Transports

Delays in seizure treatment can cause brain damage, respiratory failure, and death



Richard J. *CJEM.* 2006; 8(1)

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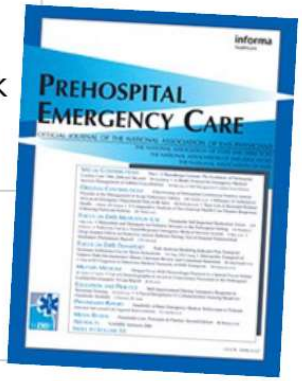
Evidence-Based Seizure Guidelines

DO	DON'T
Check blood glucose	Give rectal medication
Give dextrose IV/IO (D10, 5ml/kg) or glucagon IM for hypoglycemia (<60 mg/dL)	Place an IV/IO initially
Give IM/IN benzodiazepines as first line treatment (midazolam 0.2 mg/kg)	Require medical control for the 1st two doses of medication (apnea risk after two doses)
IV/IO benzodiazepines (0.1 mg/kg) can be given for subsequent doses	



Shah MI. *Prehospital Emerg Care.* 2014; 18(1)

Multi-Site Need for Improvement

Paramedic Adherence After a Pediatric Seizure Protocol Change

50% → 70%	61% → 71%	61% ~ 56%
		
Preferred Routes	Received Midazolam	Correct Dose Given

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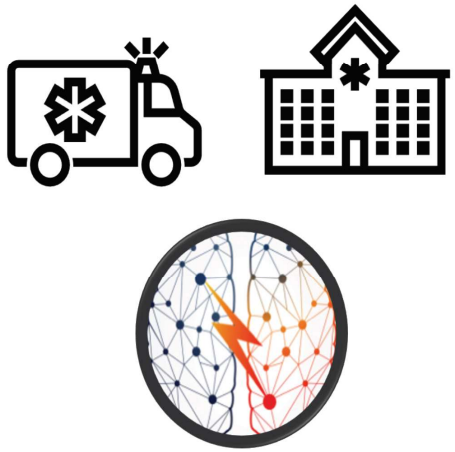
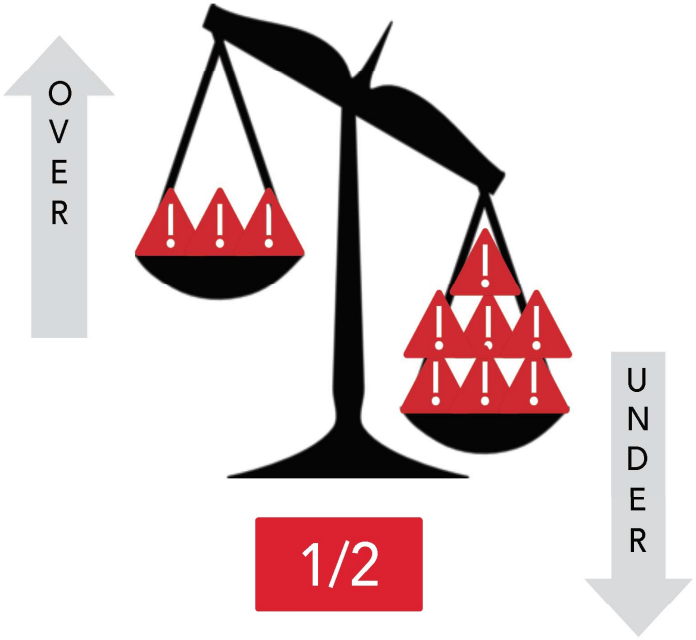
Shah MI. *Prehospital Emergency Care*. 2020

Multi-Site Need for Improvement

Opportunities to Optimize Pediatric Seizure Management



1/3



1/2

14 min

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Shah MI. *Prehospital Emergency Care.* 2020

SLOW

Dosing Problem

STEP 1

EMS arrives on scene

STEP 2

Determine patient's weight

STEP 3

Calculate the dose of medication to deliver to the patient

STEP 1

What is the route?

Lbs → kg conversion?

X kg

STEP 2

What is the dose in mg for that route?

X mg

mg/kg

STEP 3

What is the quantity in mL to administer?

X ml

mg/ml conversion

System Changes are Required

Paramedic Identified Barriers and Enablers for Seizure Management

System Enablers

System Barriers

Paramedic Solutions

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Carey JM. *Prehospital Emergency Care*. 2019

Standardized Dosing

-Midazolam is already used by the Houston Fire Department and all EMS agencies in the PediDOSE study
-The study is focused on improving effectiveness and maintaining safety by standardizing the protocol to deliver the right dose in a timely manner

Save time by using the chart below. Paramedics **should not** calculate the dosage.

STEP 1
EMS arrives on scene

STEP 2
Determine patient's age

STEP 3
Administer the dose to give in mL via the IN or IM route

AGE	0–5 mo	6–16 mo	17 mo–5 yrs	6–11 yrs	12–13 yrs
QUANTITY	Exclude	0.25 mL	0.5 mL	1 mL	2 mL
DOSE	Exclude	1.25 mg	2.5 mg	5 mg	10 mg

These doses have been shown to be safe for sedation in pediatric emergency medicine and dentistry

Study Outcomes

Primary

- Seizing on ED arrival

Secondary

- Respiratory failure
- Time to first midazolam administration

Exploratory

- Time to seizure cessation in the ED
- Dose/route adherence

Safety

- Life-threatening hypotension
- Life-threatening cardiac arrhythmia
- Depressed level of consciousness

Inclusion Criteria + Age De-Escalation

- 6 month - 13 year old patients who are actively seizing while in the care of a paramedic (regardless of seizure type/duration)
- Transported by a participating EMS agency to any ED in the area

Age	De-Escalation	When Added
2-13 years	No	All Years
17-23 months	Yes	In Year 2
12-16 months	Yes	In Year 3
6-11 months	Yes	In Year 4

Study Setting

PECARN
Pediatric Emergency Care Applied Research Network

- = SPARC Node
- = GLEMSCRN Node
- = PEM-NEWS Node
- = WPEMR Node
- = CHaMP Node (or affiliate)
- = Other
- = PRIME Node
- = HOMERUN Node

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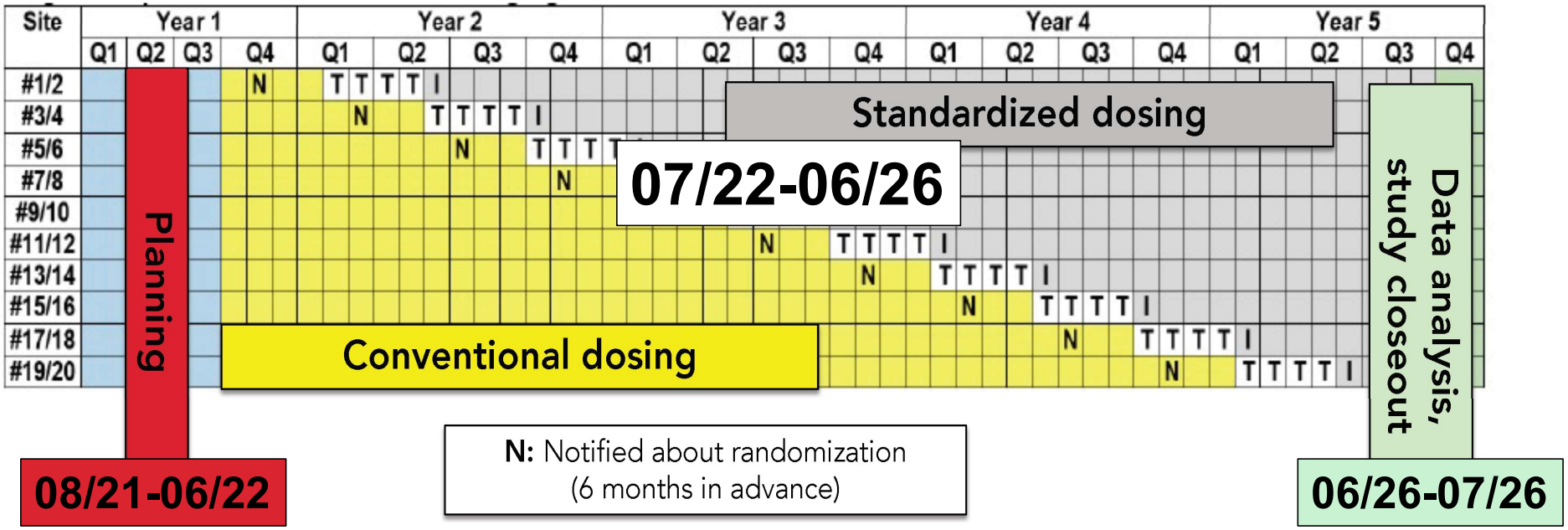
Stepped-wedge Design



N: Notified about randomization (6 months in advance)

T: Training prior to standardized dosing (up to 4 months in advance)

I: Implementation go-live for standardized dosing protocol for the EMS system

Protection of Human Subjects

Emergency exception from informed consent (EFIC)

- Community consultation may vary based on site, but will include interactive components to solicit feedback
- Hospital-based research coordinator will notify the patient's legally authorized representative about enrollment as soon as feasible after arrival to the hospital

Single IRB through the University of Utah

Food and Drug Administration (FDA)

- Investigational New Drug (IND) application for midazolam, since this is an EFIC study

Criteria that Qualifies PediDOSE for EFIC

Criteria	How the Condition is Met
Life threatening condition	• **Seizures must be treated within 5 minutes to prevent respiratory failure, brain damage, and death**

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The investigation could not be carried out without the waiver	• **Without EFIC, it would be impracticable to do this study since paramedics cannot obtain consent during the therapeutic window**

Provide Feedback About the Study in English or Spanish

www.texaschildrens.org/pedidose

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