

Assessment of an ideal Weight for Age Based Dosing Education for EMS using Simulated Encounter

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ABSTRACT

Background: In pediatric resuscitation medication dosage is weight based. During pediatric EMS calls requiring rescue medications, the patient's weight is often unknown which leads to challenges in calculating dose and longer time to administration (TTA).

Objectives: To assess the impact of an ideal weight for age dosing education tool on the accuracy and ease of dosage calculation and TTA of resuscitation medications during simulation.

Design/Method: 35 EMS providers consented to participate in our study. All subjects underwent a refresher course on PALS Pharmacology and took a written pre-test. In their current practice to estimate weight, they utilize length based weight tape (Braselow tape) and calculate dosing as illustrated on it. Subjects were block randomized into pre-assessment and post-assessment groups. The pre-assessment group went through a short simulation where each arrived at the side of a 5 year old in status epilepticus. Subjects announced any medications, doses and route they were using, and deliver the medications to a mannequin. An assessor watched each subject, recorded the medication information announced by the subject and recorded the TTA for each medication. Simultaneously, the post-assessment group underwent training on ideal weight for age education tool for drug dosages. The groups switched and the post-assessment group went through an identical simulation while the pre-assessment group received the new training. Doses were assessed by the PI, who was blinded to the group of each subject. Pre-test scores were compared by Mann Whitney U test, years of experience and TTA were compared by t-test, and correct doses were compared by chi-squared test.

Results: 18 providers were in the pre-assessment group and 17 were in the post-assessment group. Years of experience was greater in the pre group (18.5 years vs. 12.1 years, $p=0.09$) though this difference was not statistically significant. The average TTA compared between pre and post-assessment decreased by 69.4 seconds ($p = 0.001$) for benzodiazepine administration, decreased by 53.9 seconds ($p = 0.002$) for dextrose administration and decreased by 28.0 seconds ($p = 0.048$) for epinephrine administration. Dose accuracy was higher in the post group for benzodiazepines (88.2% vs. 72.2%, $p = 0.15$) and dextrose (91.1% vs. 70.6%, $p = 0.03$). Accuracy of epinephrine was 100% in both groups, though the Braselow tape gives the dosage without calculation.

Conclusion: During simulation exercises, dosing from an age approximated weight significantly reduced TTA for all three rescue medication. Accuracy of dose improved for benzodiazepines and dextrose, the latter was statistically significant.

BACKGROUND

Administration of pediatric drug dosages in the field by EMS providers remains a challenge. Difficulty with calculating the weight based dose in pediatric patients may result in dosing errors or delays. A study (Hoyle JD, Pre-Hospital Emergency Care, 2012) conducted across 8 Michigan EMS agencies, showed medication dosing errors in 34.7% of cases

- 5,547 children ≤ 11 years old
- Drug dosing errors included:
 - Epinephrine –60.9%
 - Diphenhydramine –53.8%
 - Atropine –48.8

EMS provider-directed education using length-based tape has shown reduction in epinephrine dosing errors. Paramedic education and empowering them with tools to calculate pediatric drug dosages will improve care of pediatric patients.

OBJECTIVES

To assess the impact of an ideal weight-for-age dosing education tool on the accuracy, ease of dosage calculation and time to administration (TTA) of resuscitation medications during simulated patient encounter, when compared to standard length-based tape dosing tool.

STUDY DESIGN & METHODOLOGY

Study was IRB approved and conducted as a randomized trial.

EMS providers provided consent and were randomized by block into two groups-Pre-training and Post-training All subjects reviewed PALS pharmacology video lecture All subjects took a pre-test and filled a demographic questionnaire.

Pre-training group underwent simulation first and utilized usual tools (Broselow Tape, pocket drug cards etc.) for calculating drug dosage and announced the dose, drew the medication and administered it to the manikin. Thereafter, they were given the new training with "Ideal weight for age based drug dosage calculation" teaching as a video and then interactive session to practice calculation.

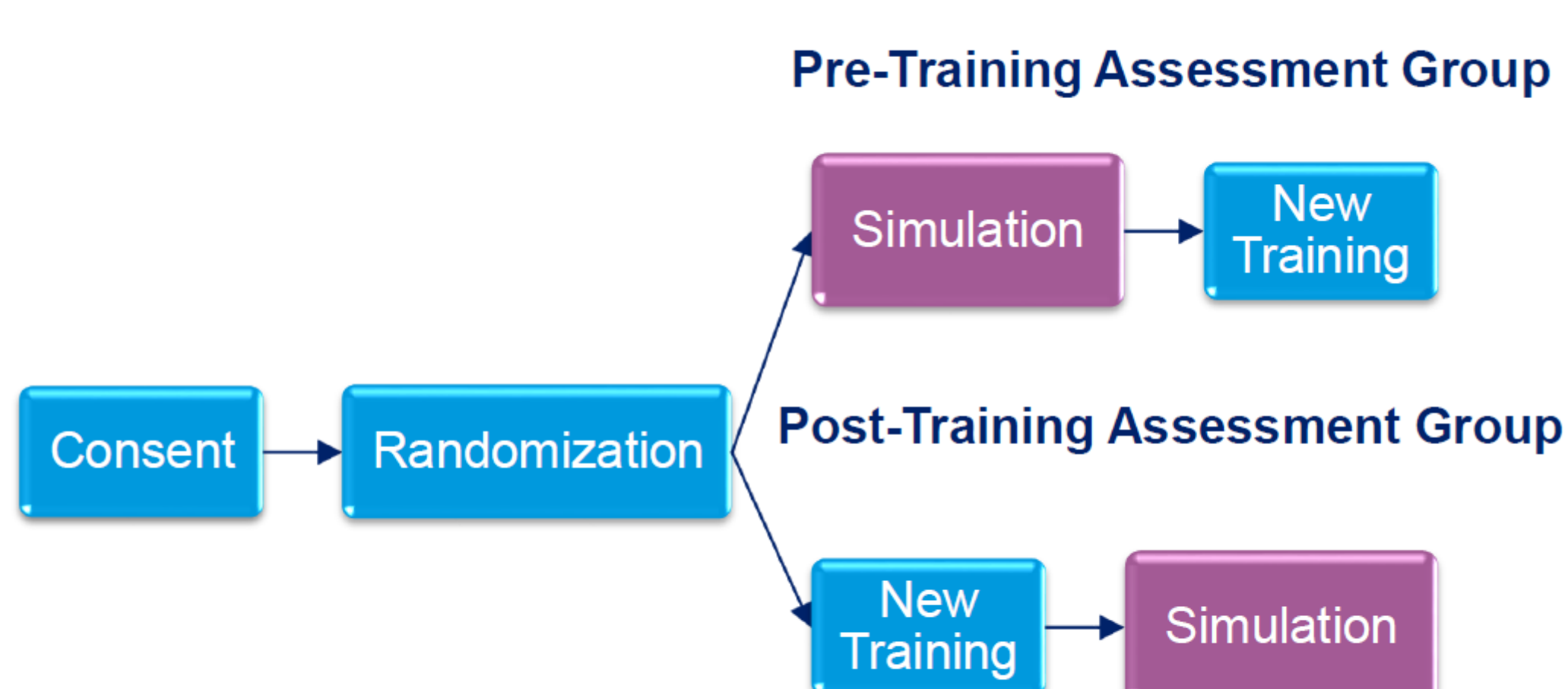
Post-training group underwent new training session first and then simulation.

35/66 EMS providers (53%) at a sub-urban EMS service consented to participate in our study:

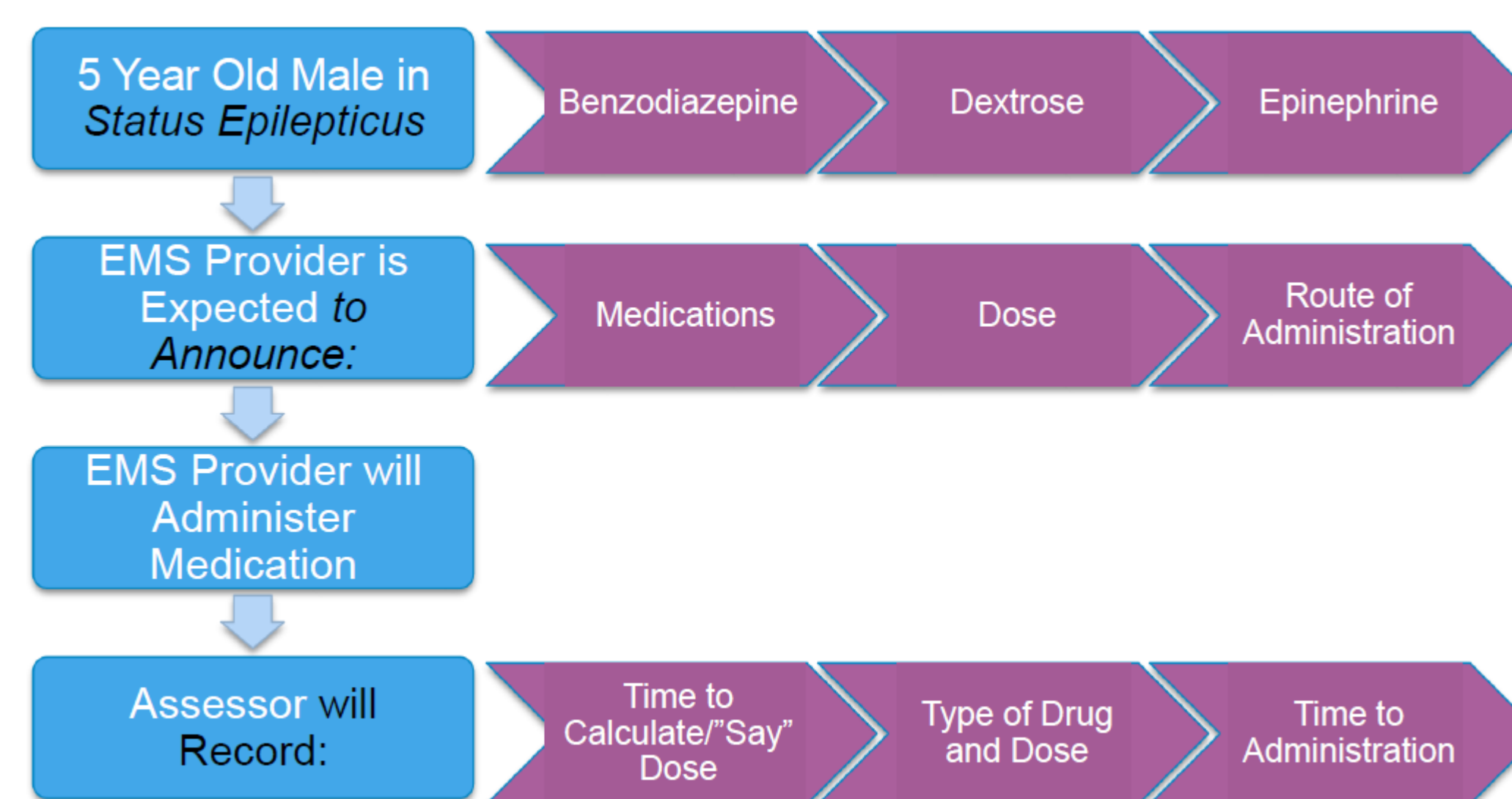
49 Full-time and 17 Part-time

3.7% of calls < 8 years of age

6.5% of call < 14 years of age



SIMULATION



EMS providers announced drug dose that was recorded by simulation facilitator.

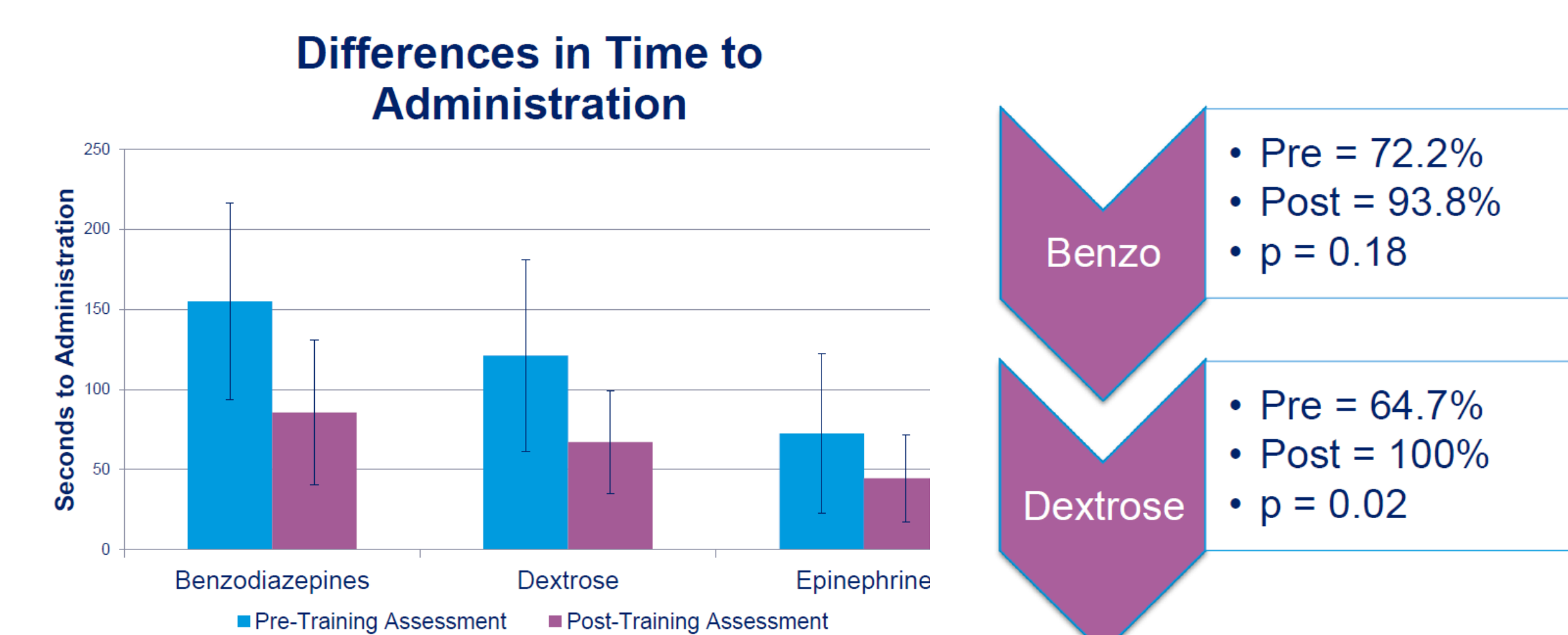
Time to administration (TTA) was recorded by Simulation facilitator as time from announcing the drug to be given to actual administration.

Dose was based on Weight for age and corresponded to length based tape weight.

Dose accuracy was assessed by Primary Investigator who was blinded to randomization

ANALYSIS & RESULTS

- Pre-test scores were compared by Mann Whitney scores
- Years of experience and TTA were compared by T-test
- Correct doses were compared by Chi-square test.
- 18 providers were in the pre-assessment group and 17 were in the post-assessment group.
- Years of experience was greater in the pre group (18.5 years vs. 12.1 years, $p=0.09$), not statistically significant.
- The average TTA compared between pre and post-assessment decreased by 69.4 seconds ($p = 0.001$) for benzodiazepine administration, decreased by 53.9 seconds ($p = 0.002$) for dextrose administration and decreased by 28.0 seconds ($p = 0.048$) for epinephrine administration.
- Dose accuracy was higher in the post group for benzodiazepines (88.2% vs. 72.2%, $p = 0.15$) and dextrose (91.1% vs. 70.6%, $p = 0.03$).
- Accuracy of epinephrine was 100% in both groups, (Broselow tape gives dosage without calculation)



CONCLUSION

During simulation exercises, dosing from an age approximated weight significantly reduced TTA for all three rescue medications. Accuracy of dose improved for benzodiazepines and dextrose, the latter was statistically significant. This difference is observed despite any learning curve that may accompany the approximate weight dosing method.

ACKNOWLEDGEMENTS

The study team would like to thank Ridgeview Medical Center paramedics, EMS education team, Dr. Kevin Sipprell, MD, EMS medical director and Dr. Meghan Ronning MD and Dr. Ashish Shah from Children's Minnesota for helping with the study.