A System to De-Systemize System 2 Solecisms and Slips

New Data on a Simpler Pediatric Dosing Method

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Davie Fire Rescue, Medical Director

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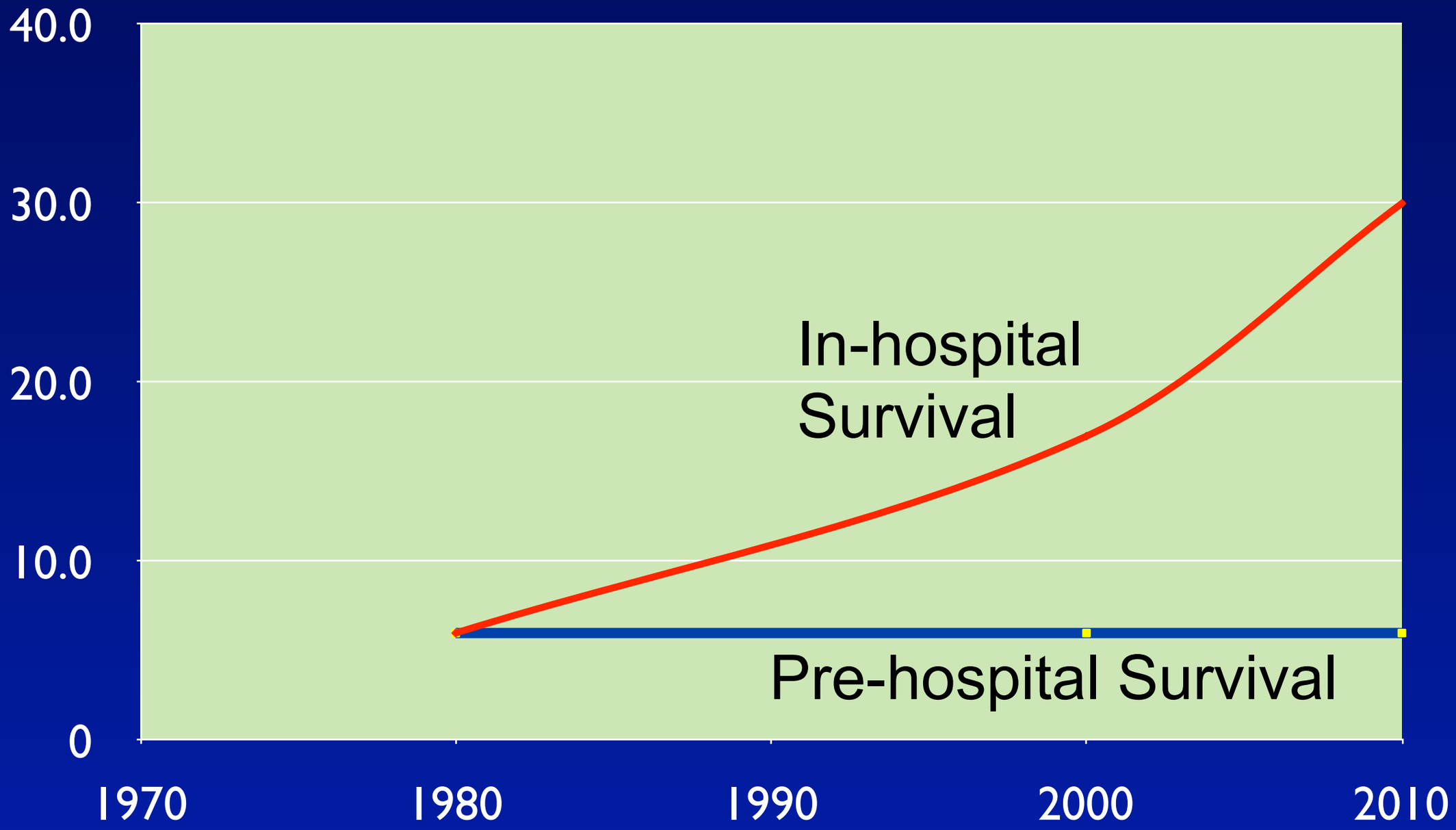
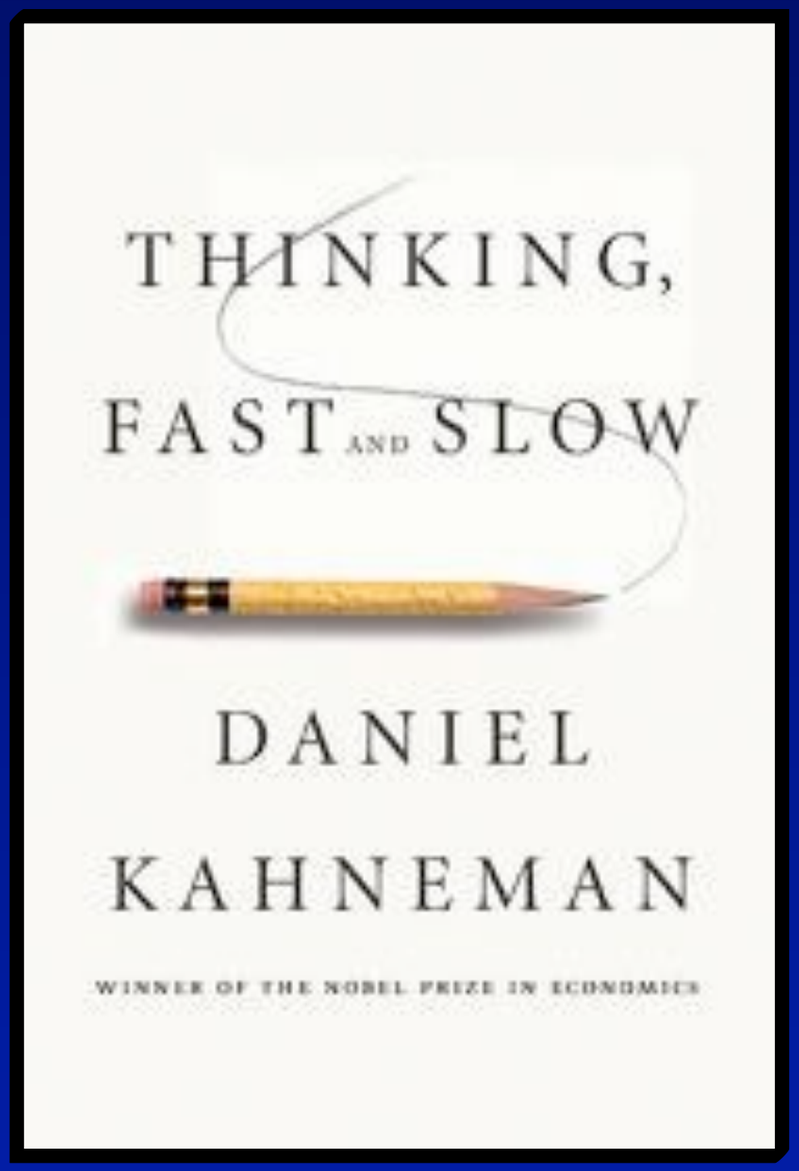
Perspective

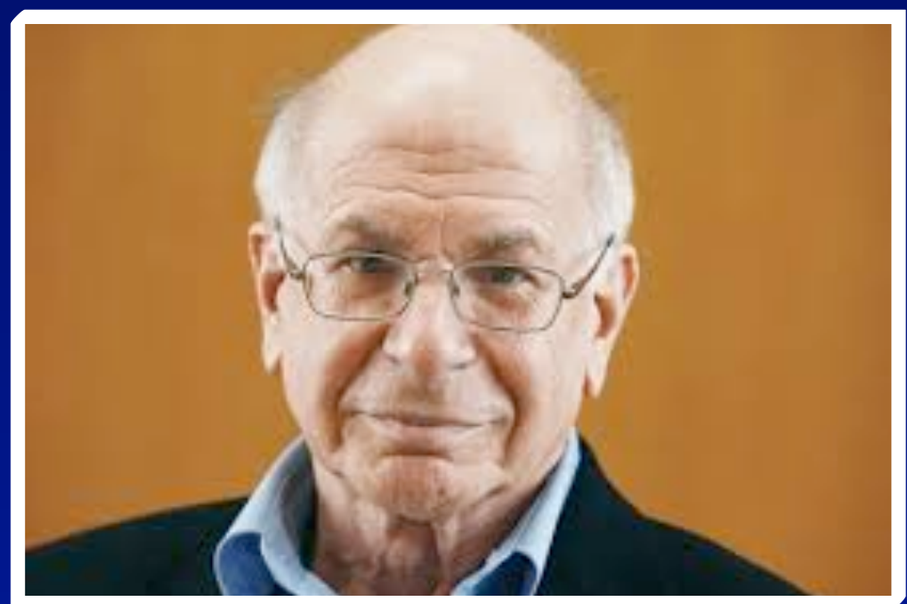
Pediatric Cardiac Arrest Statistics



Part 14: Pediatric Advanced Life Support: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation 2010;122:S876-S908

Resuscitation Psychology





Social Psychologist
Nobel Prize Winner

Your Brain

Thinking

Fast + **Slow**

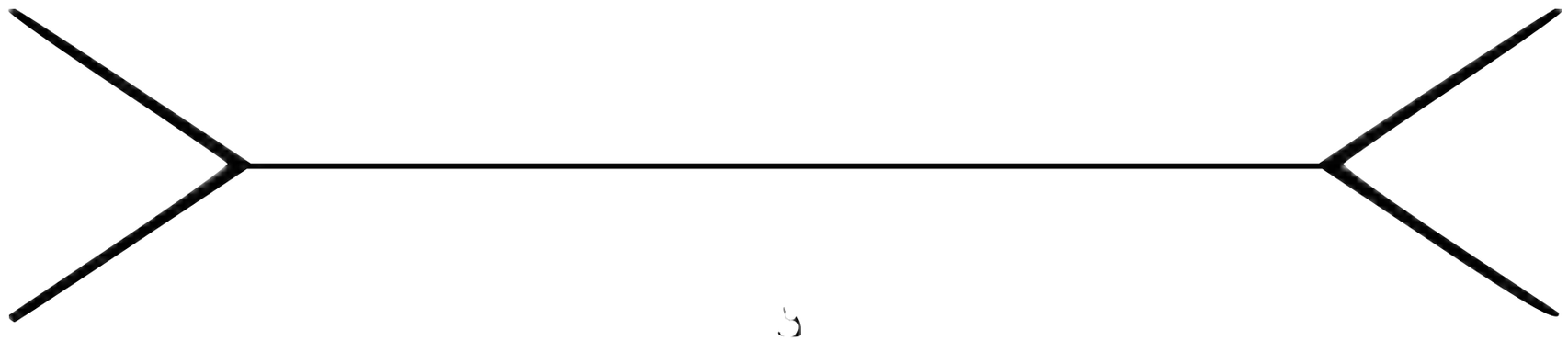
System 1:

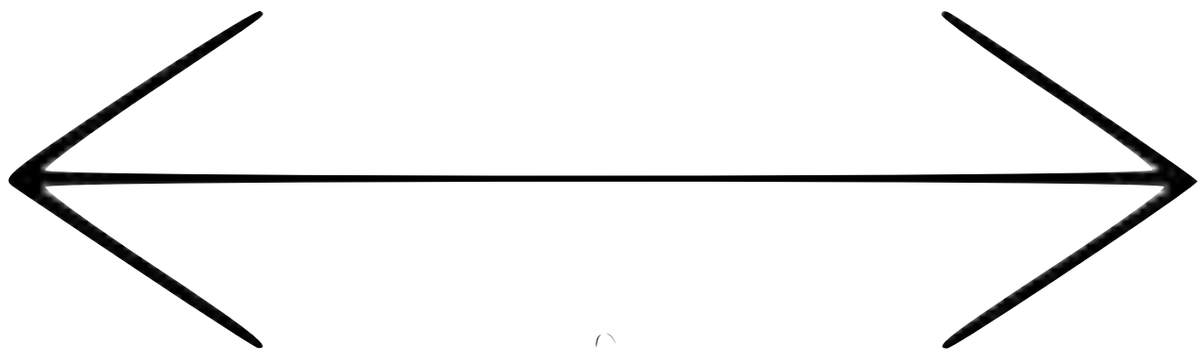
- Automatic
- Intuitive
- Instinctive
- Primary
- Rapid
- Blind
- "WYSIATI"

System 2:

- Considered
- Effortful
- Focused
- Secondary
- Slower
- Lazy

Quiz Question #1





Testing System 1

How many animals of each kind did Moses take on the ark?

Moses Illusion

Resuscitation Psychology

System 2

24 x 13

“Pay Attention”

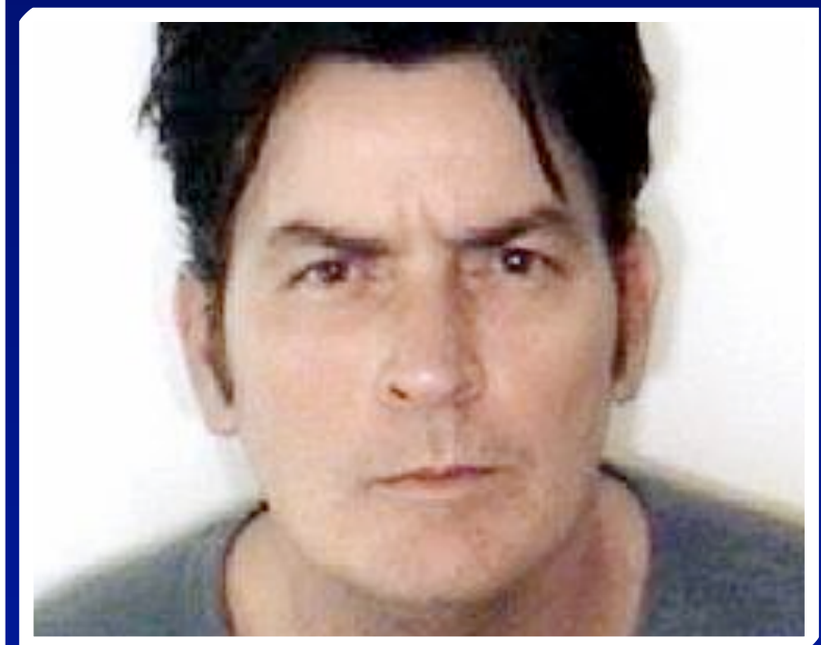
System 2 Has a Cost

System 2

Show Confidence to Parents
Use Length Based Tape
Mathematical Calculations
Making D25 from D50

System 1

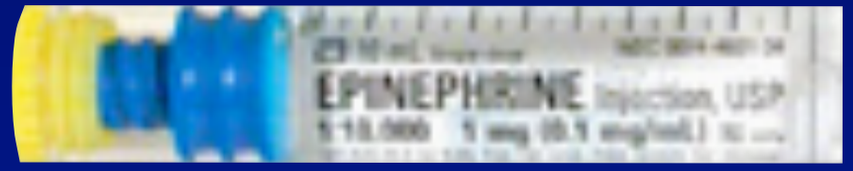
Rapid Assessment



60 Year Old Male

- Hypoglycemia

- Asystole



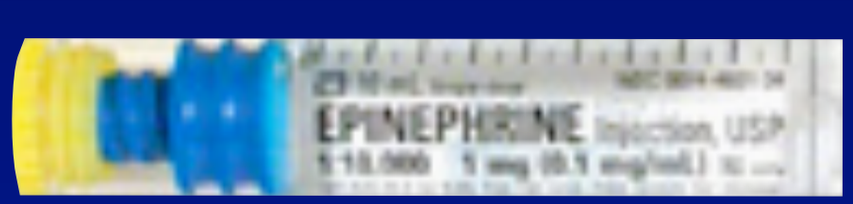
- Allergic Reaction

System 1

5 Year Old Male

- Hypoglycemia

- Asystole



- Allergic Reaction

System 2

Try This at Home

Epi 1:1000 IM

Fentanyl IN

Midazolam IN

Academic Emergency Medicine
Official Journal of the Society for Academic Emergency Medicine

ORIGINAL RESEARCH CONTRIBUTION

Root Causes of Errors in a Simulated Prehospital Pediatric Emergency

Richard Lammers, MD, Maria Byrwa, EMT-P, and William Fales, MD

ACADEMIC EMERGENCY MEDICINE 2012; 19:37–47

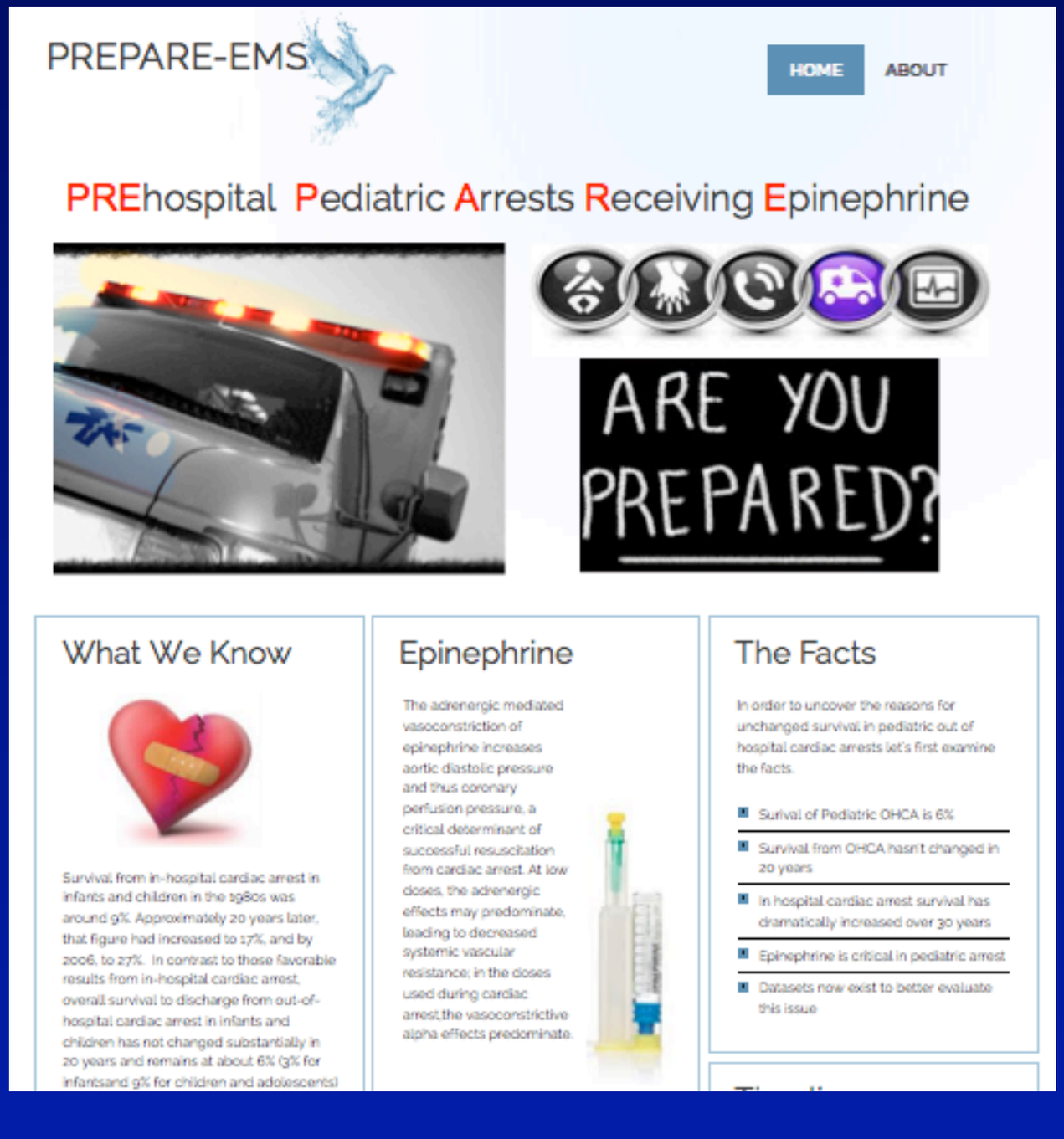
- Incorrect Weight Estimates
- Incorrect Broselow Use
- Drug Calcu…ors
  - mg to m…
  - Wrong mg/kg dose …
  - Math difficult under stress
- IV/IM/IN doses of same drug different depending on route

System 2

Is Epinephrine 1:10,000 IV being given to pediatric patients during out of hospital cardiac arrest?

PREPARE-EMS

Epinephrine in Arrest?



Watch for results soon

Prelim data shows 35% of infants in arrest receive epinephrine

Restart The Heart

Before You Depart

A	RRIVE
B	VM
C	OMPRESS
D	RILL
E	PINEPHRINE

On Scene

5 STEPS

2 Minutes

If a 7 Year Old Can Do It

To see the video search youtube for “Handtevy”

Age + Length

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

1 YR

ORANGE COUNTY EMS — 10 KG IDEAL WEIGHT

DRUG	CONC	VOL	RT	DOSE/KG	AMNT
Adenosine [1st]	3 mg/ml	0.33 ml	IV/IO	0.1 mg/kg	1 mg
Adenosine [2nd]	3 mg/ml	0.67 ml	IV/IO	0.2 mg/kg	2 mg
Alb+Atrovent	2.5+0.5mg/5.5ml	5.5 ml	Neb	Dose =	2.5+0.5 mg
Amiodarone	50 mg/ml	1 ml	IV/IO	5 mg/kg	50 mg
Atropine	1 mg/10ml	2 ml	IV/IO/ET	0.02 mg/kg	0.2 mg
Benadryl	50 mg/ml	0.2 ml	IV/IO/IM	1 mg/kg	10 mg
Bicarb 8.4%	1 mEq/ml	10 ml	IV/IO	1 mEq/kg	10 mEq
Calcium Chloride	100mg/ml	2 ml	IV/IO	20 mg/kg	200 mg
$D_{25}W$	($D_{50}W$ - 25 ml) + 25 ml NS	20 ml	IV/IO	0.5 g/kg	5 g
Epi 1:1,000 ET	Add 5ml NS	1 ml	ET	0.1 mg/kg	1 mg
Epi 1:1,000 IM	1 mg/ml	0.1 ml	IM	0.01 mg/kg	0.1 mg
Epi 1:10,000 IV	0.1 mg/ml	1 ml	IV/IO	0.01 mg/kg	0.1 mg
Fentanyl IN	50 mcg/ml	0.3 ml	IN	1.5 mcg/kg	15 mcg
Fentanyl IV	50 mcg/ml	0.1 ml	IV/IO	0.5 mcg/kg	5 mcg
Glucagon	1 mg/ml	0.5 ml	IV/IM	Dose =	0.5 mg
Glutose	15 g/tube	N/A	PO	2 years and over	
Magnesium Sulfate	1 g/2ml	1 ml	IV/IO	50 mg/kg	500 mg
Narcan	1 mg/ml	1 ml	IV/IN/ET	0.1 mg/kg	1 mg
Normal Saline Bolus	0.9%	200 ml	IV/IO	20 ml/kg	200 ml
Solumedrol	125 mg/2ml	0.32 ml	IV/IO/IM	2 mg/kg	20 mg
Versed IM/IN	5 mg/ml	0.4 ml	IM/IN	0.2 mg/kg	2 mg
Versed IV	5 mg/ml	0.2 ml	IV/IO	0.1 mg/kg	1 mg
Zofran	4 mg tab	0.5 tab	PO	Dose =	2 mg

LIFEPAK	JOULES/KG	1ST	2ND	3RD	4TH
Defibrillation	2 → 4 → 10 → 10	20	50	100	100
Cardioversion	0.5 → 1 → 2 → 2	5	10	20	20

ET TUBE	DISTANCE AT LIP
4.0 Uncuffed	11 - 12 cm

VITALS	SBP	75-105	HR	90-150	RR	22-30

Drowning 6 Months Ago

Run Report

Sequence Chart

Date	Time	Event	By	Description
03-09-2013	13:56:00	Received		
03-09-2013	13:57:51	Dispatched		
03-09-2013	13:58:13	Enroute		
03-09-2013	14:01:21	On Location		
03-09-2013	14:02:00	Patient Contact		
03-09-2013	14:02:45	IV/IO	RT	A IO was attempted in the Tibia Right IO by Torres, Raphael with success. NS 500cc Bag run at WO with a 10 gtt. Blood was not drawn. The Patient's condition was Unchanged.
03-09-2013	14:03:00	Drug Administration	RT	0.20MG Epi 1:10,000 administered Intraosseous by Torres, Raphael per Protocol (Standing Order). The Patient's condition was Unchanged.
03-09-2013	14:03:10	Drug Administration	RT	350.00ML Normal Saline administered Intraosseous by Torres, Raphael. The Patient's condition was Unchanged.
03-09-2013	14:04:00	EKG	KF	Paddles A Other ekg was obtained by Frie, Kelly. Asystole.
03-09-2013	14:04:00	CPR Stop	JP	
03-09-2013	14:04:01	Vitals	JP	Pulse 0, Respirations 0 taken by Posner, Justin.
03-09-2013	14:04:05	CPR	JP	
03-09-2013	14:04:10	Oxygen	KF	BVM 15.00 LPM via Other/miscellaneous per Protocol (Standing Order). The Patient's condition was Unchanged.
03-09-2013	14:04:20	Airway	KF	OPA
03-09-2013	14:06:00	Drug Administration	RT	0.20MG Epi 1:10,000 administered Intraosseous by Torres, Raphael per Protocol (Standing Order). The Patient's condition was Unchanged.
03-09-2013	14:06:00	CPR Stop	JP	
03-09-2013	14:06:01	EKG	RT	A 4 lead ekg was obtained by Torres, Raphael. Asystole.
03-09-2013	14:06:06	CPR	JP	
03-09-2013	14:07:30	Drug Administration	RT	0.20MG Epi 1:10,000 administered Intraosseous by Torres, Raphael per Protocol (Standing Order). The Patient's condition was Unchanged.
03-09-2013	14:07:51	Departed Location		
03-09-2013	14:08:00	CPR Stop	JP	
03-09-2013	14:08:07	EKG	RT	A 4 lead ekg was obtained by Torres, Raphael. Asystole.
03-09-2013	14:08:09	CPR	JP	

Ongoing Research

- Children’s Hospital Los Angeles
- Children’s Hospital Colorado
- Children’s Hospital of Minnesota
- Yale-New Haven Children’s Hospital

Comparison of Two Length Based Systems For Pediatric Resuscitation

Lara D. Rappaport MD MPH, Maria Mandt MD,
Tim Givens MD, Ashley Balakas RN
Kelley Roswell MD, Roxanna Lefort, MD MPH,
Kevin Waters EMT-P, Kathleen Adelgais MD MPH

DENVER HEALTH
Level One Care For ALL

Children's Hospital Colorado

Scenario Preparation

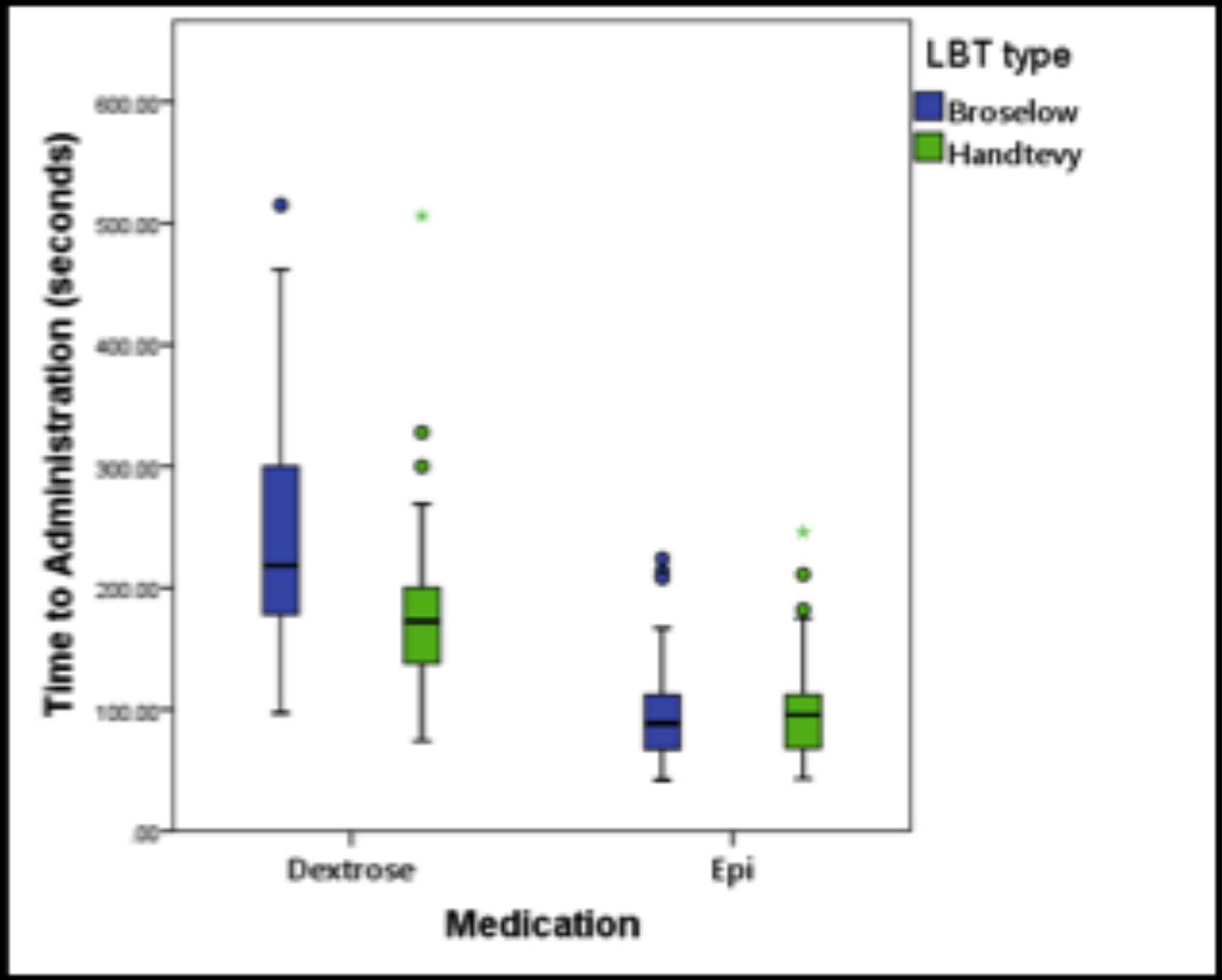
1 year-old with Epinephrine

5 year-old with Dextrose

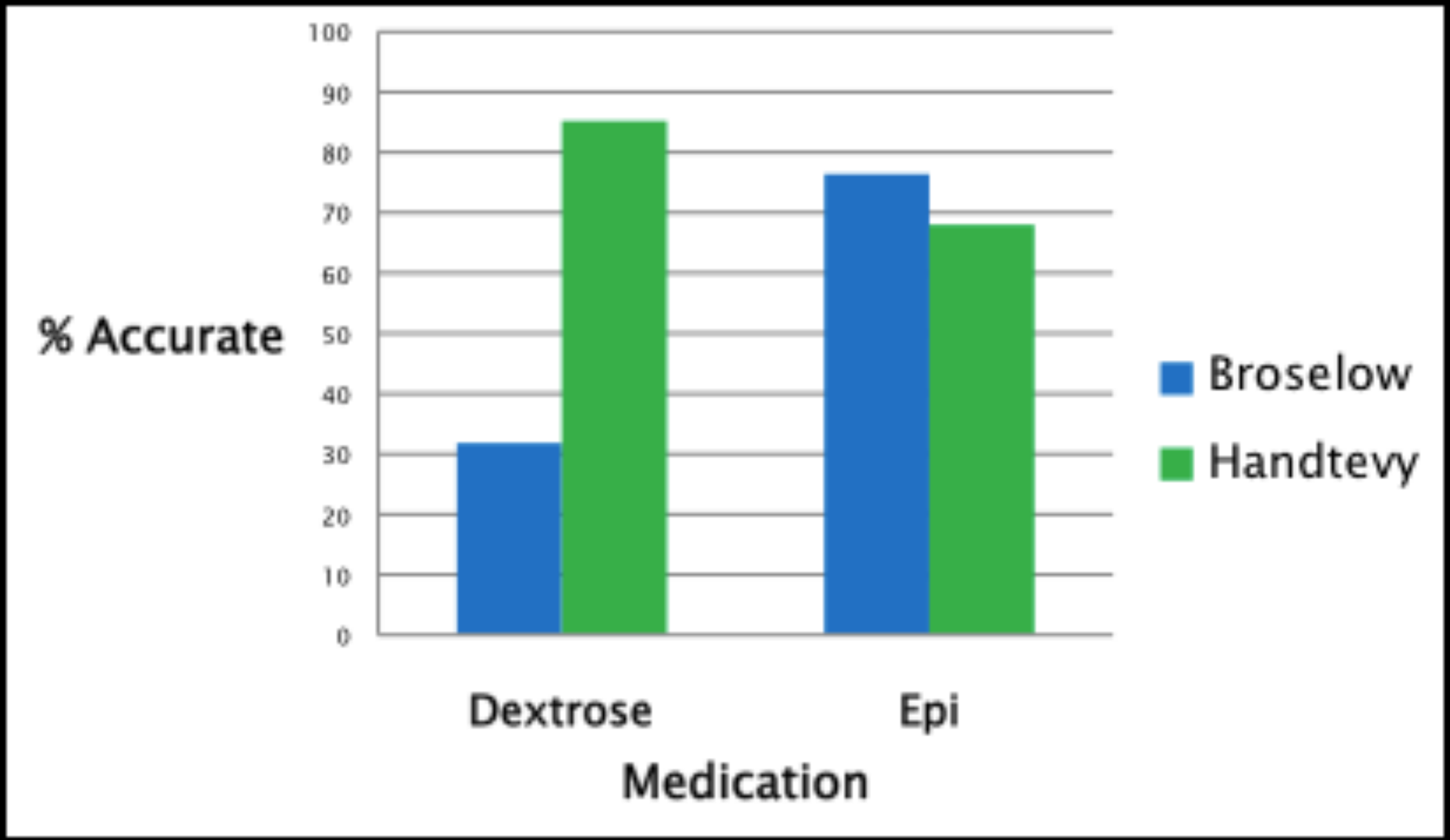
Results: Pediatric Comfort

Characteristics (n=68)		% / median
Number of peds resus per year	0	79.4%
	1 or more	20.5%
Last Peds refresher course	Within last year	64.9%
	1-5 y	23.5%
	> 5 years	5.8%
Last used LBT	Within last year	52.9%
	1-5 y	25%
	>5 years	5.8%
Baseline Comfort with LBT (med)	Broselow	3 (Comfortable)
	Handtevy	1 (Not at All)

Time To Administration



Results: Accuracy of Dosing



Results: Types of Errors

Type of Error	Broselow (N=136)	Handtevy (N= 137)	RR (95% CI)
Procedural	n (%)	n (%)	
Pushed wrong dose	22 (16.1)	22 (16)	1.2 (0.7, 2.2)
Incorrect use of tape	16 (11.8)	11 (8.0)	1.5 (0.7, 3.4)
Diluted incorrectly#	14 (10.2)	6 (4.3)	**2.6 (1.01, 7.1)**
Cognitive			
Unaided calculatio		6 (4.3)	**6.4 (2.5, 15.8)**
Faulty recall of dose#			**14.3 (1.8, 111)**
Wrong concentration#	19 (13.		**4.8 (2.1, 11.3)**
Affective	6 (4.3)	2 (	**4.7 (1.01, 22.2)**

*P<0.05

System 2

Post Simulation Survey

Survey Question:	Broselow	Handtevy
Faster	8.8%	91.1%
More accurate	8.8%	88.2%
Preferred	8.8%	91.1%
Ease of Use	Neutral	Strongly agree agree (98%)

Take Home Points

Time to Pull the Tube on Pre-Hospital Pediatric Care

Remove System 2

Let’s Improve Outcomes!

Contact Dr. Antevy

Peter@Handtevy.com

www.Handtevy.com

(954) 617-8809

A System to De-Systemize System 2 Solecisms and Slips

New Data on a Simpler Pediatric Dosing Method

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