Resuscitating the Child: Disrupting the Status Quo to Save our Future

Peter Antevy, MD

Founder & CMO, Pediatric Emergency Standards Inc.

@HandtevyMD


100 Deaths Per Year

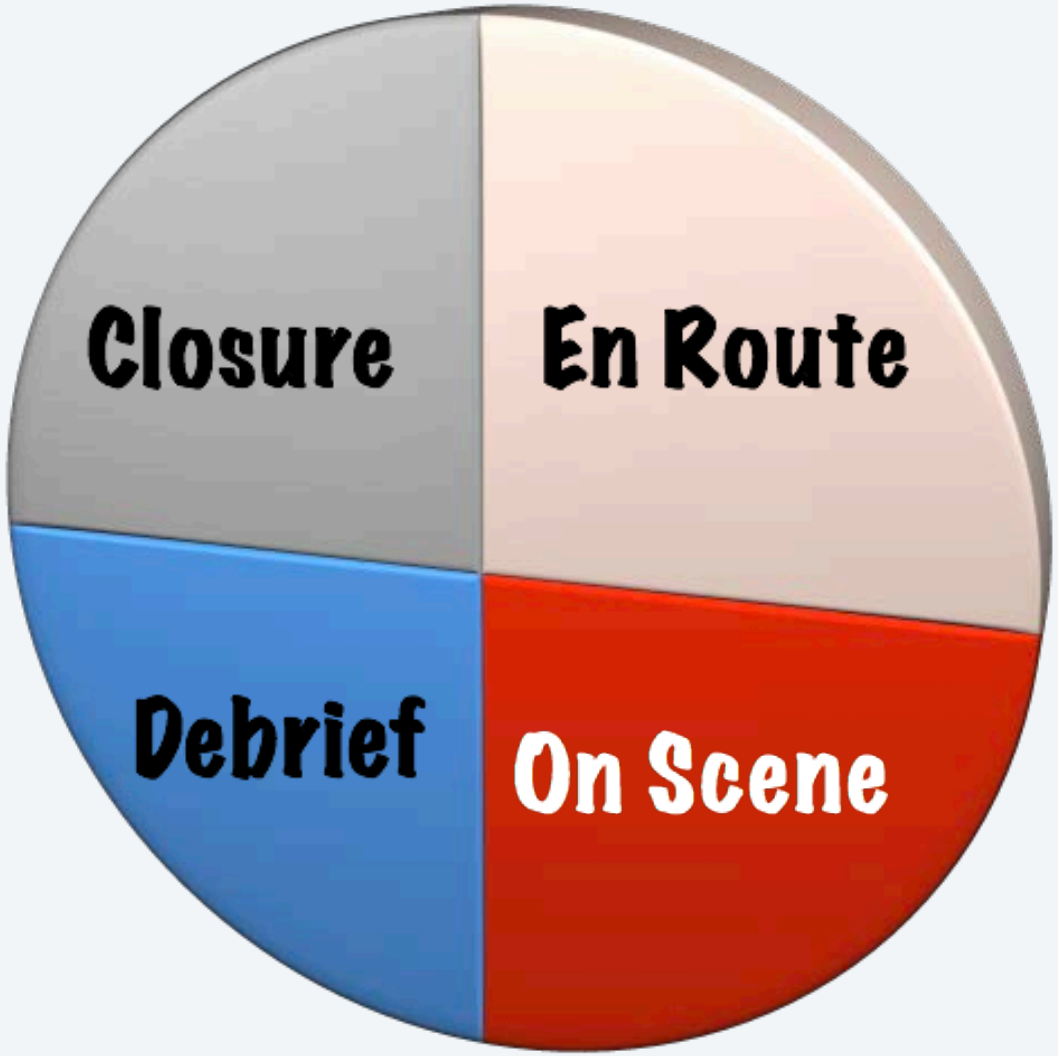
Feel What Happens

65 Year old cardiac arrest
65 Year old anaphylaxis

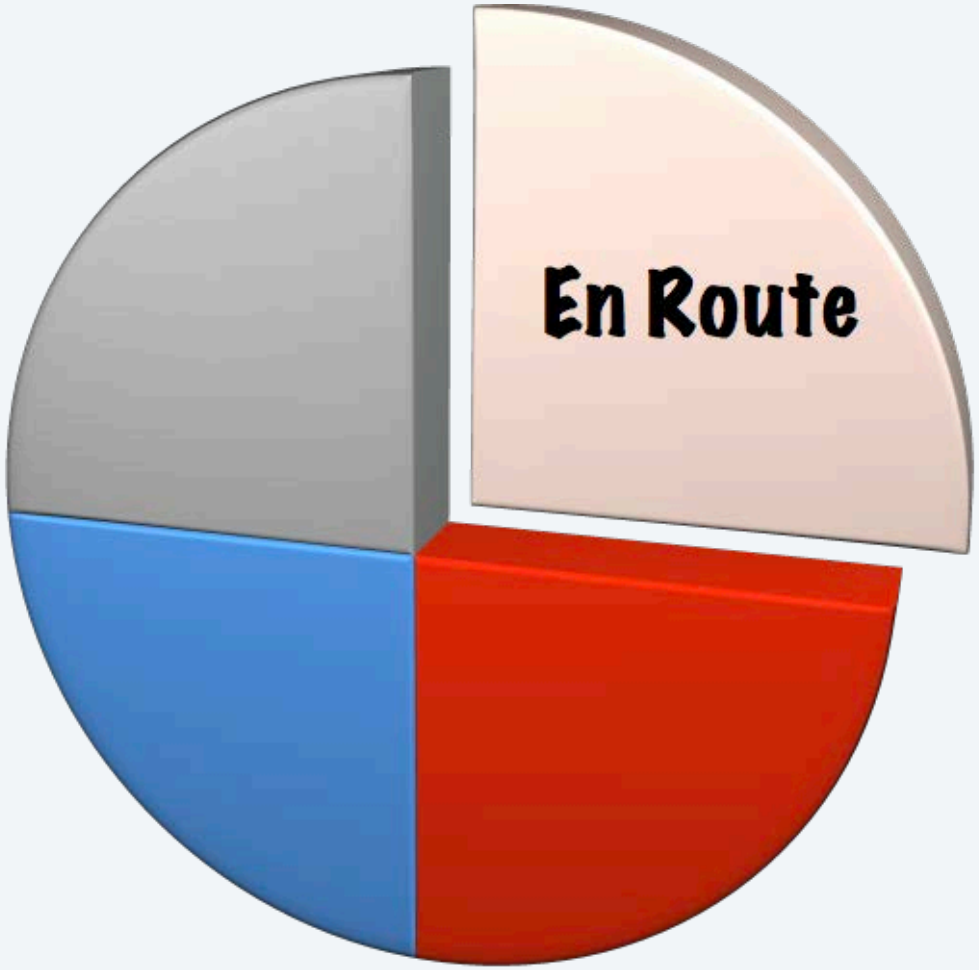
5 Year old cardiac arrest
5 Year old anaphylaxis

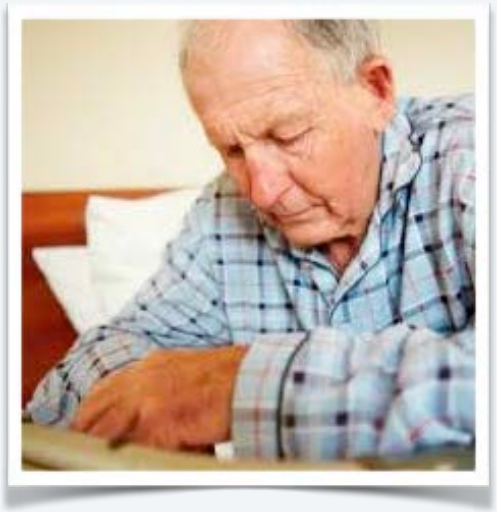
Lt. Jonathan Robbins

The Arrest Lifecycle

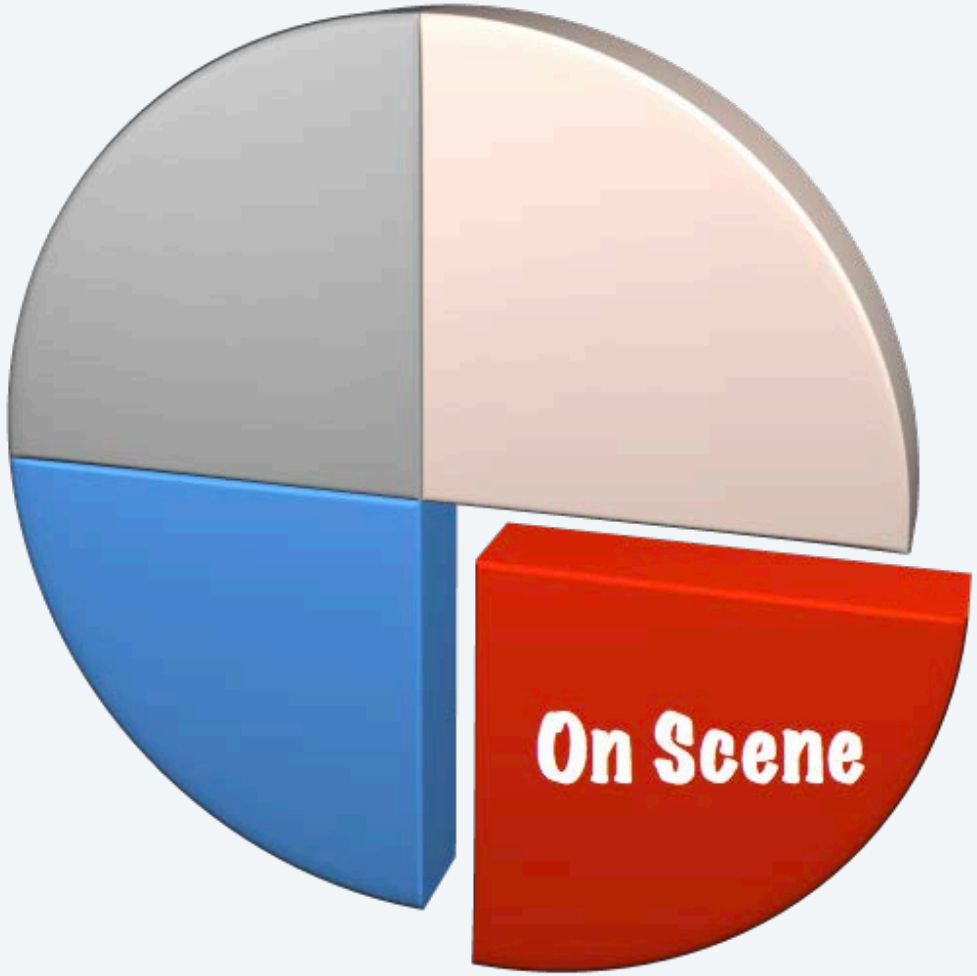


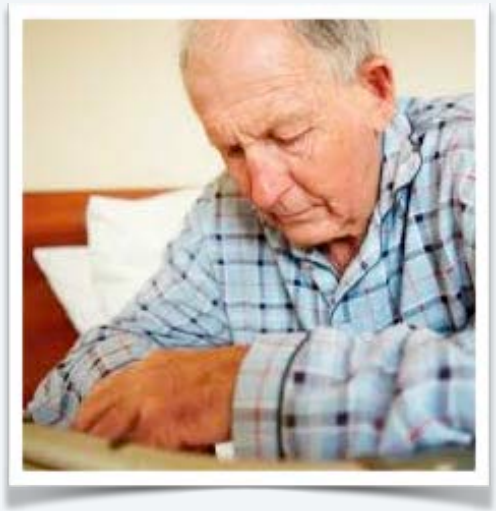
The Arrest Lifecycle



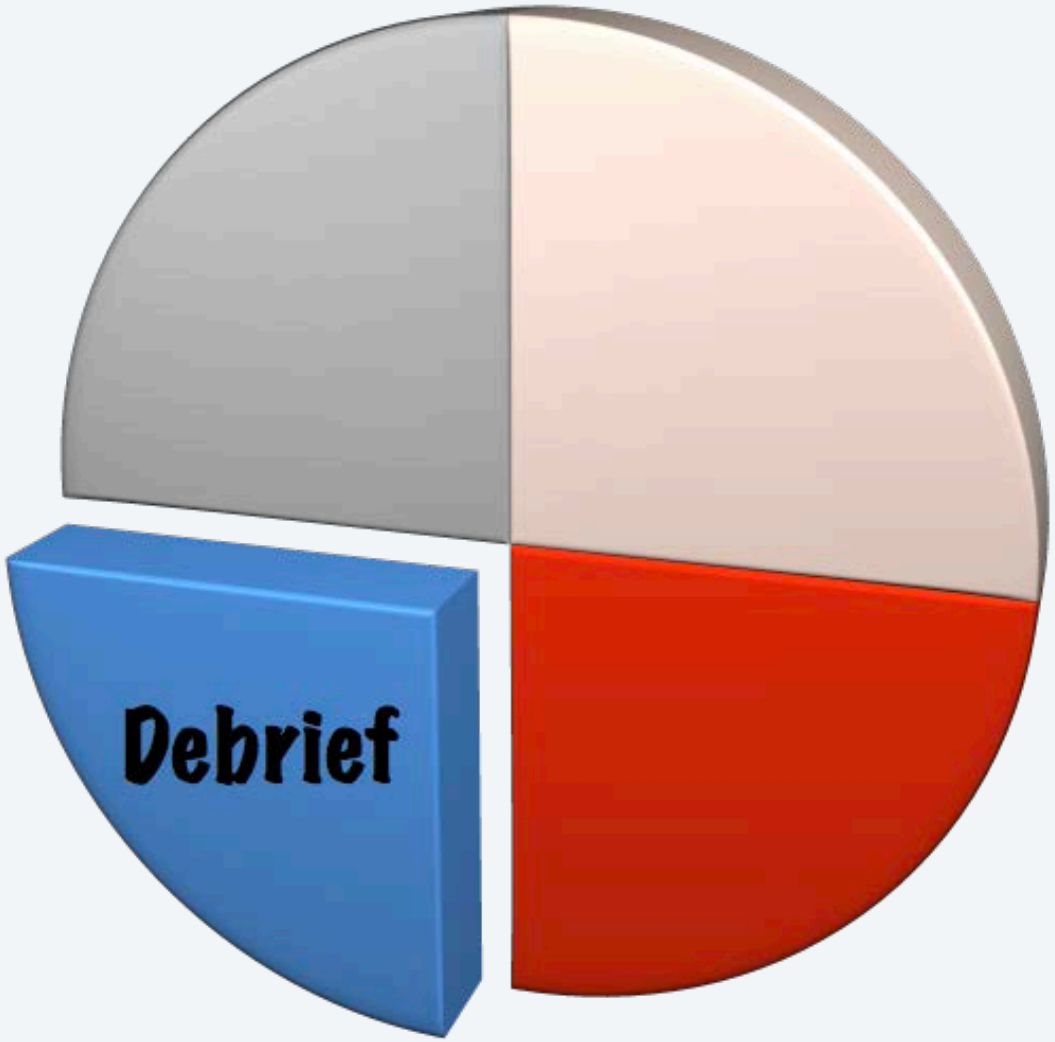


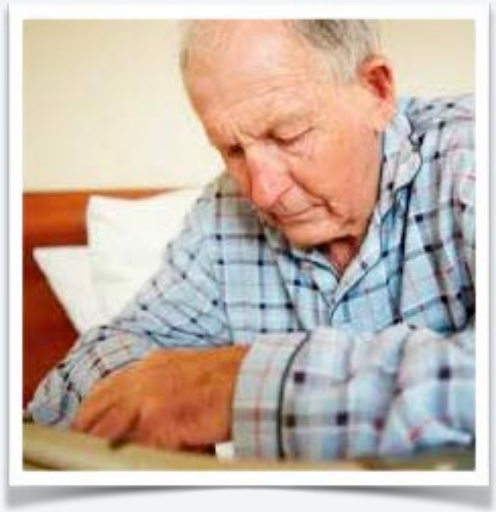
The Arrest Lifecycle





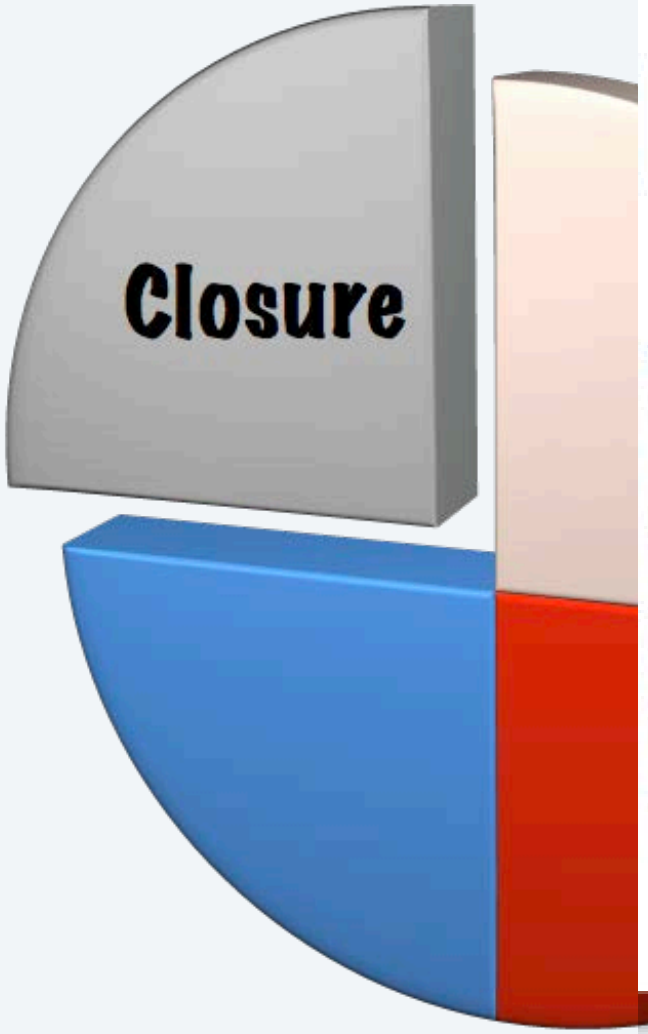
The Arrest Lifecycle





“What Could We Have Done Better?”

Resuscitations That Never End



VIEWPOINT

Resuscitations That Never End
Originating From Unresolved Integrity-Related Moral Distress

Tony A. Thomas, DO, MBE
Department of Pediatric Critical Care Medicine, Baylor College of Medicine/ Texas Children's Hospital, Houston.

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Center for Medical Ethics and Health Policy, Baylor College of Medicine, Houston, Texas.

Cardiopulmonary resuscitation (CPR) is a time-dependent clinical intervention. Unlike most other clinical interventions (eg, antibiotics for sepsis, chemotherapy regimens, and duration of mechanical ventilation) that are marked with distinct start and stop times, attempts at CPR are dependent on many process times requiring intense multidisciplinary teamwork in a short period of time. Process times that are simultaneously coordinated and recorded include the following: when the nurses and physicians arrive in the patient's room; the administration of medication; the cycle of chest compressions; pulse and rhythm checks; defibrillations or cardioversion attempts; and the last recorded time in a resuscitation, return of spontaneous circulation, or death. The resuscitation team leader declares, "the end," and the team's work stops. The title of

2 Year Old - Sepsis

Central Line

Norepinephrine Drip

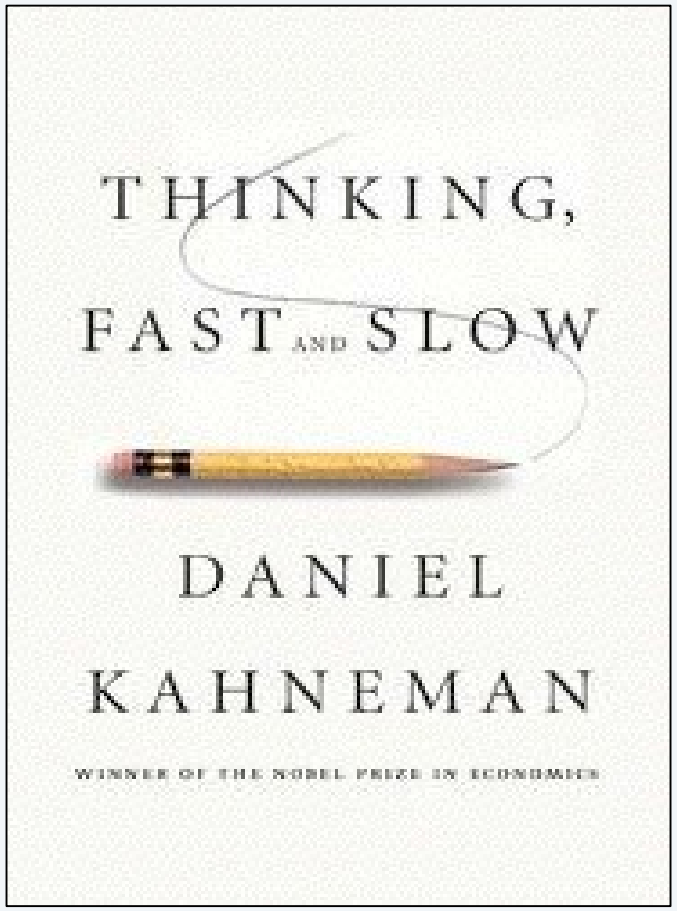
ET – Tube

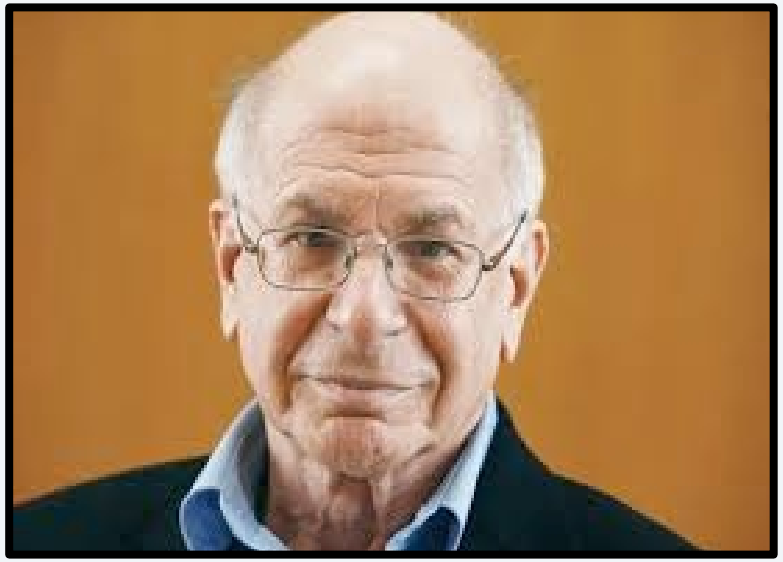
NG Tube

Foley Catheter

A Setup for Errors

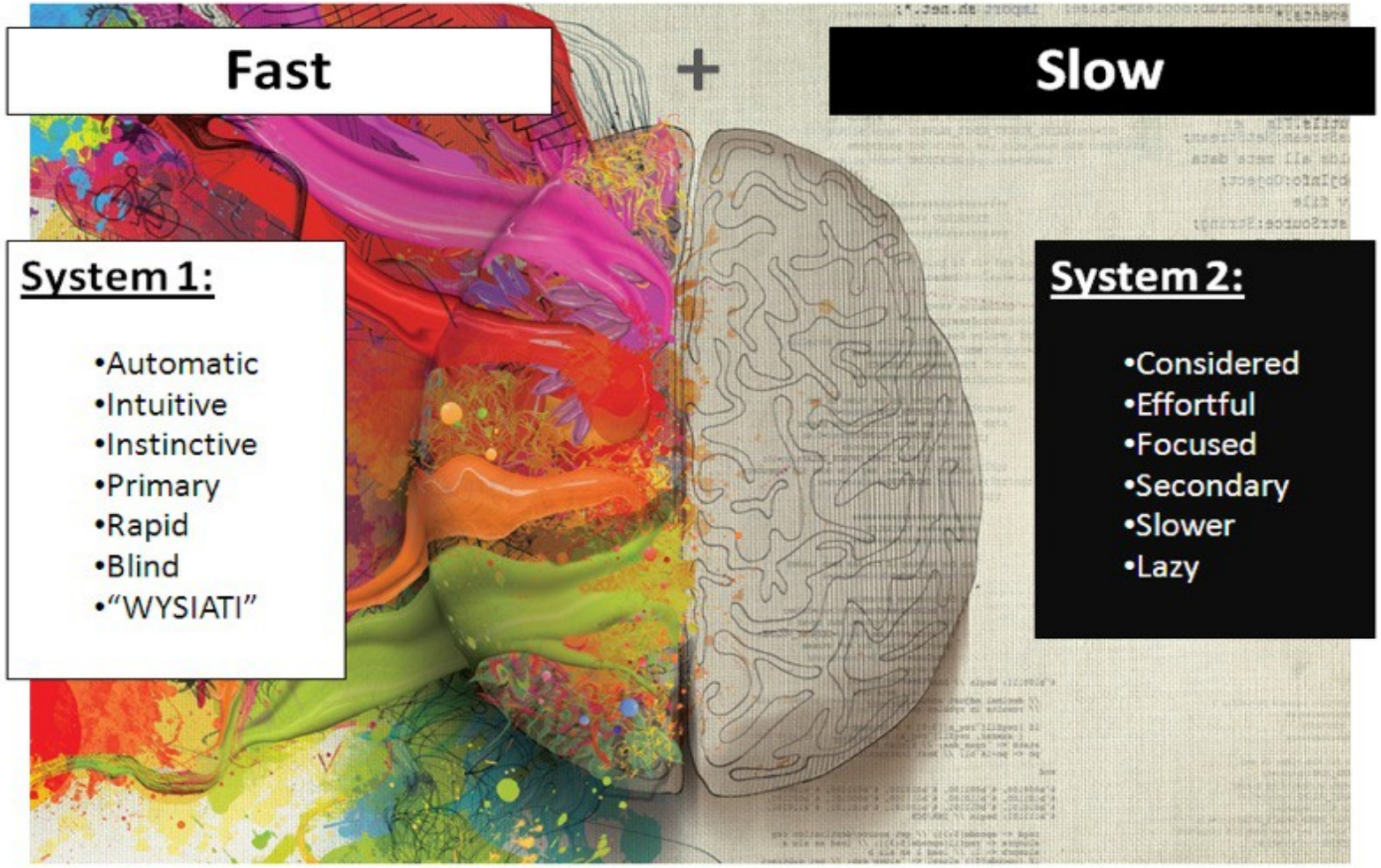
Psychology of Resuscitation



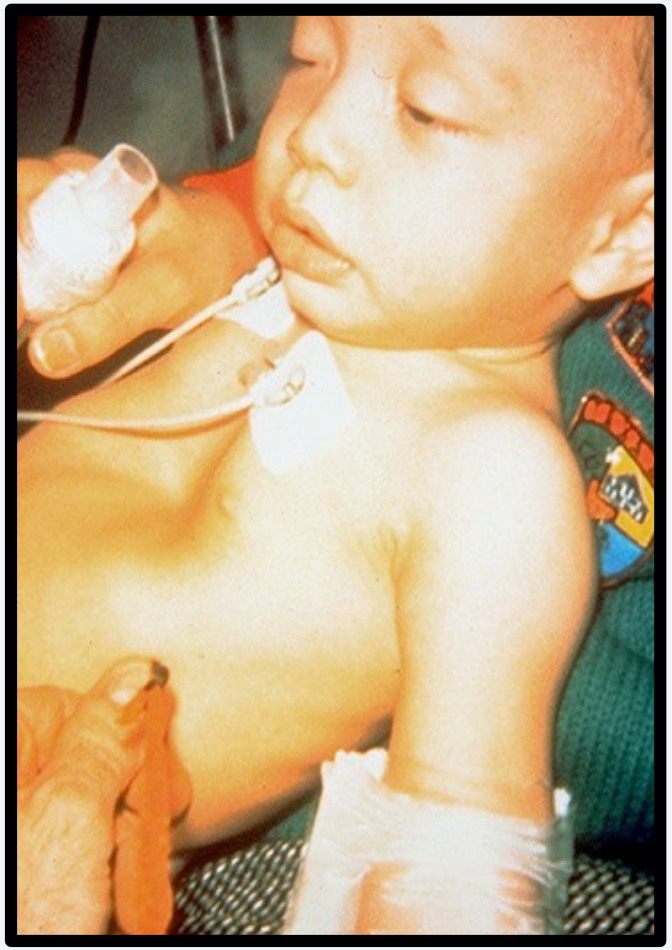


Hard Wired

Thinking



System 1 is Fast



Testing System 1

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

Moses Illusion

Does it Add Up?

1000
1000
1000
30
20
1000
40
1000
10

What Number Did You Get?

6000

System 1 Error

1000
1000
1000
30
20
1000
40
1000
10

5100

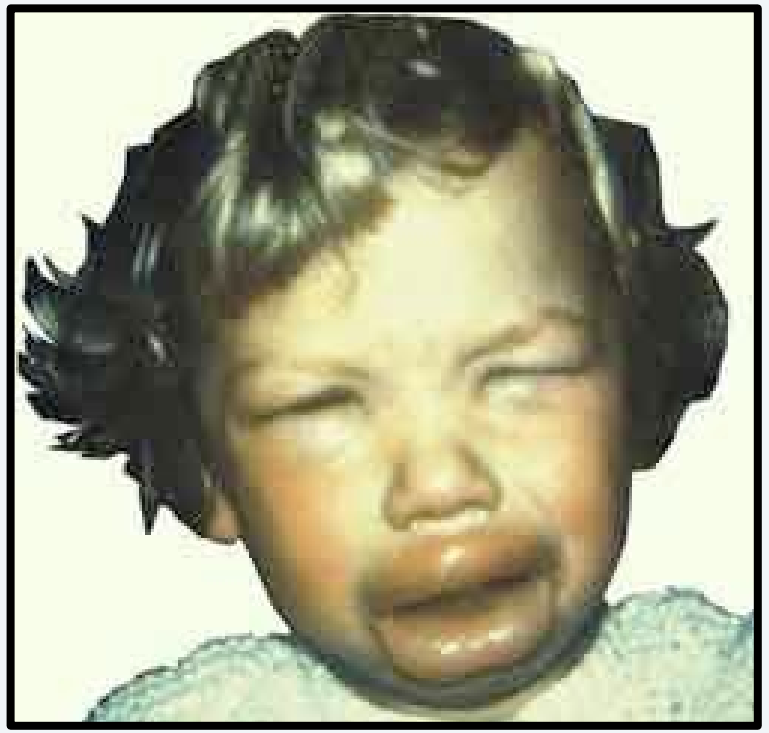
System 2

24 x 13

Recap

	Benefits	Dangers
System 1	Quick Decisions	Error Prone
System 2	Information Resource	Cannot Function During Stress

Current Practice



Epinephrine 1:1,000 IM

Fentanyl Intranasal

Midazolam IV

Current Practice

10 X

BLUE

RESUSCITATION	
Epinephrine (1:10,000)	0.21 mg (2.1 mL)
Epinephrine ET (1:1,000)	2.1 mg (2.1 mL)
Atropine (0.1 mg/mL)	0.42 mg (4.2 mL)
Atropine ET (0.4 mg/mL)	0.6 mg (1.5 mL)
Sodium Bicarbonate	21 mEq
Lidocaine	20 mg
Lidocaine ET	40-60 mgs
Defibrillation	
1st/2nd Dose (may repeat)	40J/80J
Cardioversion	
1st/2nd Dose	20J/40J
Adenosine	
1st Dose	2.1 mg
2nd Dose If Needed	4.2 mg
Amiodarone	105 mg
Calcium Chloride	420 mg
Magnesium Sulfate	1050 mg

RAPID SEQUENCE INTUBATION	
PREMEDICATIONS	
Atropine	0.42 mg
Pan/Vecuronium (Defasiculating Agent)	0.21 mg
Lidocaine	32 mg
Fentanyl	63 mcg
INDUCTION AGENTS	
Etomidate	6.3 mg
Ketamine	42 mg
Midazolam	6.3 mg
Propofol	63 mg
PARALYTIC AGENTS	
Succinylcholine (give atropine prior)	40 mg
Pancuronium	4.2 mg
Vecuronium	4.2 mg
Rocuronium	21 mg
MAINTENANCE	
Pancuronium/Vecuronium	2.1 mg
Lorazepam	1 mg

3 X

3 X

A Comparison of Medications in 38 Pediatric EMS Protocols to Those Listed on the Broselow™ Length-Based Tape

Caroline Epstein EMT-B, Peter Antevy MD, Patrick Hardigan PhD
Joe DiMaggio Children's Hospital, Hollywood, FL, Nova Southeastern University, Davie, FL

DISCLOSURE

Conflict of Interest / Disclosure Statement
Peter Antevy MD is the Founder & CMO of Pediatric Emergency Standards, Inc. and developer of a pediatric resuscitation system.

BACKGROUND

- Pediatric medication errors are common.[1]
- PALS 2015 recommends the use of a length based tape with precalculated doses.[2]
- This study seeks to compare pediatric drug dosages from large and small EMS agencies to those listed on the Broselow LBT and determine discordance rates.

METHODS

- Determine the percentage of medications on the Broselow LBT found at incongruent dosages compared to the EMS protocols.
- Determine the total number of medications from each EMS protocol that were not present on the Broselow LBT.
- For each EMS agency, the discordance rate was determined.
- Calculation of the frequency of each of the medications in each EMS protocol that were missing from the Broselow LBT, as well as those that were listed at incongruent doses.

RESULTS

38 EMS Agencies

Population 294 to 2.4 mill[illegible]n
Urban – Suburban – Rur[illegible]

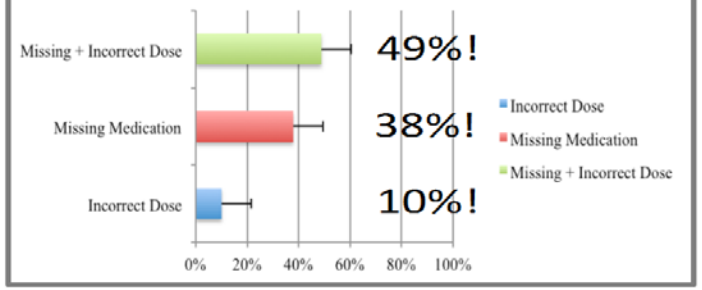
49% Discordance

Pediatric ALS Protocols Compared to Broselow LBT

Table 1. Missing and Incorrect Dosages

	M	SD	Min	Max
Incorrect Dose	10%	6%	0%	20%
Missing Medications	38%	7%	23%	50%
Missing Medication + Incorrect Dose	49%	8%	32%	63%

Average Discordance



Missing Medications*
Normal Saline
Ondansetron
Diphenhydramine
Morphine
Albuterol

*Represents 62% of all missing medications

Incorrect Dosing*
Epinephrine IM
Midazolam
Fentanyl
Diazepam

*Represents largest percentage of incorrectly dosed medications

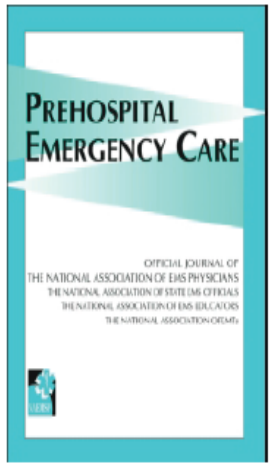
CONCLUSION

A significant discrepancy exists between the pediatric drug dosages found in 38 EMS protocols and those listed on the Broselow LBT.

REFERENCES

1. Hoyle Jr JD, Davis AT, Putman KK, Trytko JA, Fales WD. Medication dosing errors in pediatric patients treated by emergency medical services. Prehospital Emergency Care. 2011; 16(1): 59-66.
2. American Heart Association. 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. 2015; 132(18): S356.

Evidence Based



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Comparison of Errors Using Two Length-Based Tape Systems for Prehospital Care in Children

Lara D. Rappaport MD, MPH, Lina Brou MPH, Tim Givens MD, Maria Mandt MD, Ashley Balakas RN, BSN, Kelley Roswell MD, Jason Kotas NREMT & Kathleen M. Adelgais MD, MPH

3 – Fold

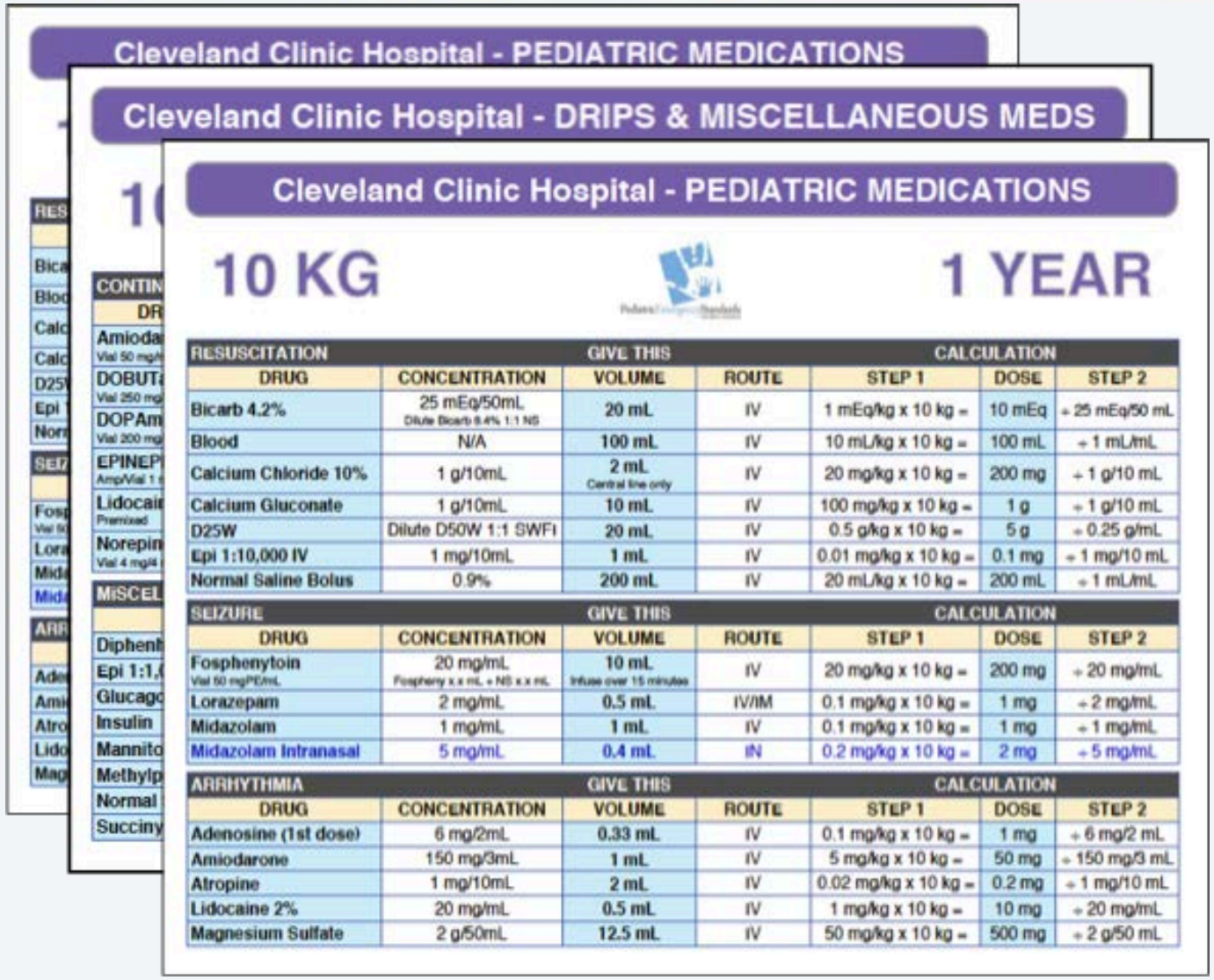
Lower

Error Rate

Remove Math

100 % Customized

Hospital Systems

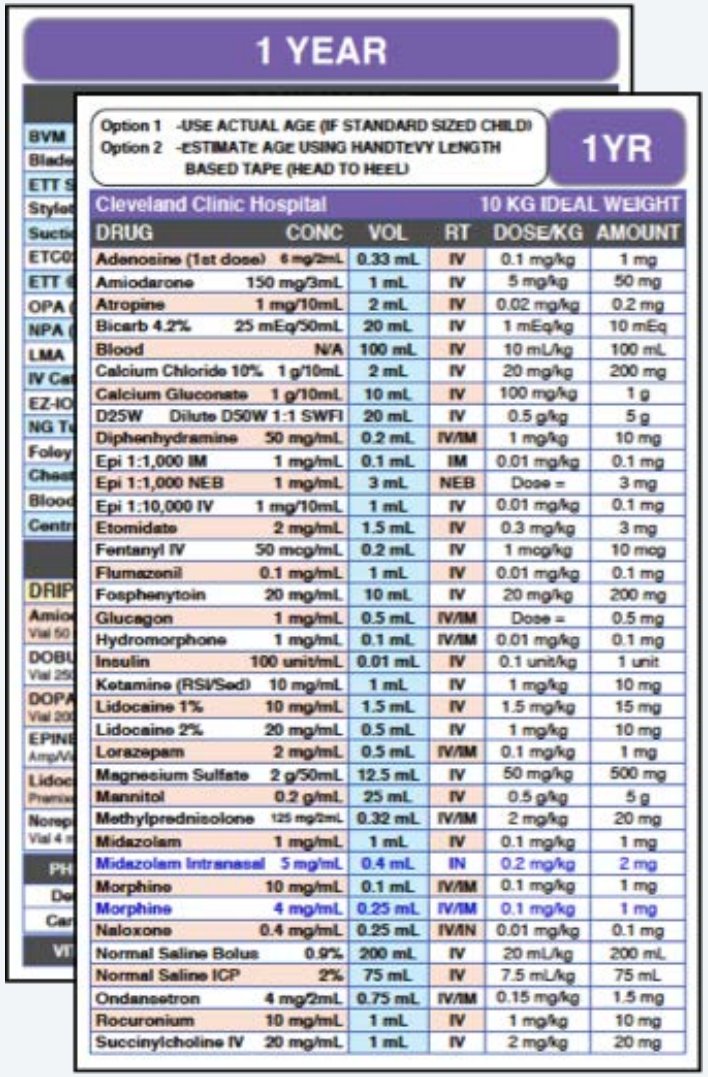


RESUSCITATION		GIVE THIS		CALCULATION		
DRUG	CONCENTRATION	VOLUME	ROUTE	STEP 1	DOSE	STEP 2
Bicarb 4.2%	25 mEq/50mL (Dilute Bicarb 8.4% 1:1 NS)	20 mL	IV	1 mEq/kg x 10 kg =	10 mEq	÷ 25 mEq/50 mL
Blood	N/A	100 mL	IV	10 mL/kg x 10 kg =	100 mL	÷ 1 mL/mL
Calcium Chloride 10%	1 g/10mL	2 mL (Central line only)	IV	20 mg/kg x 10 kg =	200 mg	÷ 1 g/10 mL
Calcium Gluconate	1 g/10mL	10 mL	IV	100 mg/kg x 10 kg =	1 g	÷ 1 g/10 mL
D25W	Dilute D50W 1:1 SWFI	20 mL	IV	0.5 g/kg x 10 kg =	5 g	÷ 0.25 g/mL
Epi 1:10,000 IV	1 mg/10mL	1 mL	IV	0.01 mg/kg x 10 kg =	0.1 mg	÷ 1 mg/10 mL
Normal Saline Bolus	0.9%	200 mL	IV	20 mL/kg x 10 kg =	200 mL	÷ 1 mL/mL

SEIZURE		GIVE THIS		CALCULATION		
DRUG	CONCENTRATION	VOLUME	ROUTE	STEP 1	DOSE	STEP 2
Fosphenytoin (Vial 50 mgPE/mL)	20 mg/mL (Fosphenytoin x.x mL + NS x.x mL)	10 mL (Infuse over 15 minutes)	IV	20 mg/kg x 10 kg =	200 mg	÷ 20 mg/mL
Lorazepam	2 mg/mL	0.5 mL	IV/IM	0.1 mg/kg x 10 kg =	1 mg	÷ 2 mg/mL
Midazolam	1 mg/mL	1 mL	IV	0.1 mg/kg x 10 kg =	1 mg	÷ 1 mg/mL
Midazolam Intranasal	5 mg/mL	0.4 mL	IN	0.2 mg/kg x 10 kg =	2 mg	÷ 5 mg/mL

ARRHYTHMIA		GIVE THIS		CALCULATION		
DRUG	CONCENTRATION	VOLUME	ROUTE	STEP 1	DOSE	STEP 2
Adenosine (1st dose)	6 mg/2mL	0.33 mL	IV	0.1 mg/kg x 10 kg =	1 mg	÷ 6 mg/2 mL
Amiodarone	150 mg/3mL	1 mL	IV	5 mg/kg x 10 kg =	50 mg	÷ 150 mg/3 mL
Atropine	1 mg/10mL	2 mL	IV	0.02 mg/kg x 10 kg =	0.2 mg	÷ 1 mg/10 mL
Lidocaine 2%	20 mg/mL	0.5 mL	IV	1 mg/kg x 10 kg =	10 mg	÷ 20 mg/mL
Magnesium Sulfate	2 g/50mL	12.5 mL	IV	50 mg/kg x 10 kg =	500 mg	÷ 2 g/50 mL

Cleveland Clinic



Cleveland Clinic Hospital				10 KG IDEAL WEIGHT	
DRUG	CONC	VOL	RT	DOSE/KG	AMOUNT
Adenosine (1st dose)	6 mg/2mL	0.33 mL	IV	0.1 mg/kg	1 mg
Amiodarone	150 mg/3mL	1 mL	IV	5 mg/kg	50 mg
Atropine	1 mg/10mL	2 mL	IV	0.02 mg/kg	0.2 mg
Bicarb 4.2%	25 mEq/50mL	20 mL	IV	1 mEq/kg	10 mEq
Blood	N/A	100 mL	IV	10 mL/kg	100 mL
Calcium Chloride 10%	1 g/10mL	2 mL	IV	20 mg/kg	200 mg
Calcium Gluconate	1 g/10mL	10 mL	IV	100 mg/kg	1 g
D25W Dilute D50W 1:1 SWFI		20 mL	IV	0.5 g/kg	5 g
Diphenhydramine	50 mg/mL	0.2 mL	IV/IM	1 mg/kg	10 mg
Epi 1:1,000 IM	1 mg/mL	0.1 mL	IM	0.01 mg/kg	0.1 mg
Epi 1:1,000 NEB	1 mg/mL	3 mL	NEB	Dose =	3 mg
Epi 1:10,000 IV	1 mg/10mL	1 mL	IV	0.01 mg/kg	0.1 mg
Etomidate	2 mg/mL	1.5 mL	IV	0.3 mg/kg	3 mg
Fentanyl IV	50 mcg/mL	0.2 mL	IV	1 mcg/kg	10 mcg
Flumazenil	0.1 mg/mL	1 mL	IV	0.01 mg/kg	0.1 mg
Fosphenytoin	20 mg/mL	10 mL	IV	20 mg/kg	200 mg
Glucagon	1 mg/mL	0.5 mL	IV/IM	Dose =	0.5 mg
Hydromorphone	1 mg/mL	0.1 mL	IV/IM	0.01 mg/kg	0.1 mg
Insulin	100 unit/mL	0.01 mL	IV	0.1 unit/kg	1 unit
Ketamine (RSI/Sed)	10 mg/mL	1 mL	IV	1 mg/kg	10 mg
Lidocaine 1%	10 mg/mL	1.5 mL	IV	1.5 mg/kg	15 mg
Lidocaine 2%	20 mg/mL	0.5 mL	IV	1 mg/kg	10 mg
Lorazepam	2 mg/mL	0.5 mL	IV/IM	0.1 mg/kg	1 mg
Magnesium Sulfate	2 g/50mL	12.5 mL	IV	50 mg/kg	500 mg
Mannitol	0.2 g/mL	25 mL	IV	0.5 g/kg	5 g
Methylprednisolone	125 mg/2mL	0.32 mL	IV/IM	2 mg/kg	20 mg
Midazolam	1 mg/mL	1 mL	IV	0.1 mg/kg	1 mg
Midazolam Intranasal	5 mg/mL	0.4 mL	IN	0.2 mg/kg	2 mg
Morphine	10 mg/mL	0.1 mL	IV/IM	0.1 mg/kg	1 mg
Morphine	4 mg/mL	0.25 mL	IV/IM	0.1 mg/kg	1 mg
Naloxone	0.4 mg/mL	0.25 mL	IV/IN	0.01 mg/kg	0.1 mg
Normal Saline Bolus	0.9%	200 mL	IV	20 mL/kg	200 mL
Normal Saline ICP	2%	75 mL	IV	7.5 mL/kg	75 mL
Ondansetron	4 mg/2mL	0.75 mL	IV/IM	0.15 mg/kg	1.5 mg
Rocuronium	10 mg/mL	1 mL	IV	1 mg/kg	10 mg
Succinylcholine IV	20 mg/mL	1 mL	IV	2 mg/kg	20 mg

Integrations

From:Children's Memorial Hermann To:Demo@Handtevy.com Page:2 of 2 03/21/2016 09:44:52 AM EDT

Cleveland Clinic

Cleveland Clinic
Hospital
9500 Euclid Ave
Cleveland, OH 44195

MEDICAL RECORDS

Page 2 of 2

General Information

Record #	Date	Charted By	Document Source
1234567	03-21-2016	Nurse Bobby Jones	CMH Pediatric ED

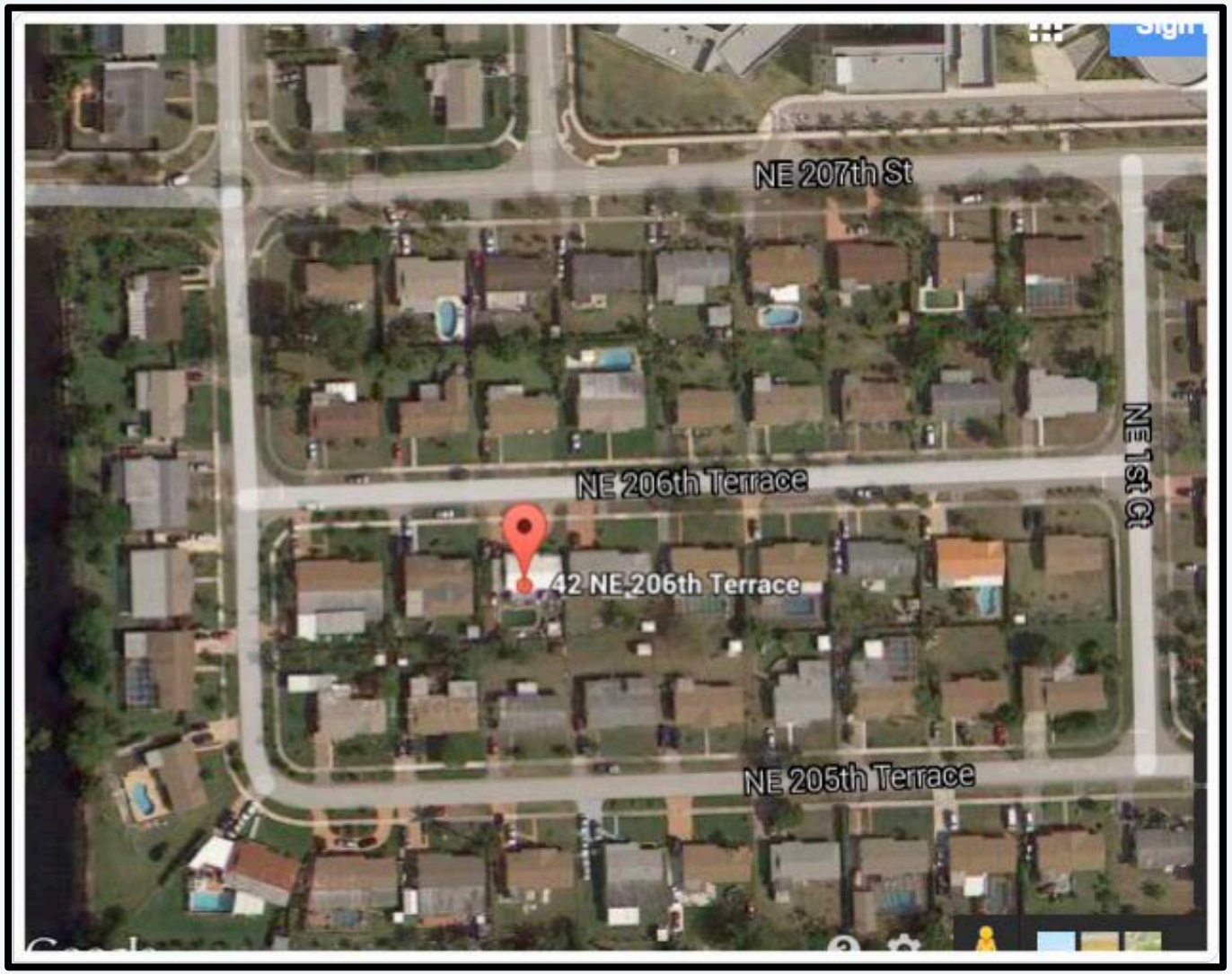
App Start Time	First Intervention	Last Intervention	Chart Completed
03-21-2016 09:41:56	03-21-2016 09:42:17	03-21-2016 09:43:18	03-21-2016 09:44:38

Sequence Chart

Date	Time	Event	Description
03-21-2016	09:42:17	Glucagon	IV / Dose = / 0 mg / Given
03-21-2016	09:42:21	Magnesium Sulfate	IV / Dose = / 0 mg / Given
03-21-2016	09:42:27	Adenosine (1st)	IV / Dose = / 0 mg / Given
03-21-2016	09:42:32	Adenosine (2nd)	IV / Dose = / 0 mg / Given
03-21-2016	09:42:44	ETT Size	6.5 Cuffed / Successful
03-21-2016	09:42:49	OPA (Teeth to Angle Jaw)	80 mm (Size 3) / Successful
03-21-2016	09:42:53	EZ-IO	25 mm / Successful
03-21-2016	09:42:57	Central Line	7 Fr 20 cm (2 or 3 Lumen) / Successful
03-21-2016	09:43:01	Chest Tube	32 - 38 French / Successful
03-21-2016	09:43:06	Dopamine	IV / 5 mcg/kg/min / 0 mcg/min / Given
03-21-2016	09:43:18	LIFEPAK	Defibrillation / 2 => 4 => 6 => 8 / 70.0 / 150.0 / 200.0 / 275.0
03-21-2016	09:43:28	Adenosine (2nd)	IV / Dose = / 0 mg / Given
03-21-2016	09:43:37	Suction Catheter	10 - 12 French / Successful

→ **EHR**

eso
Healthcare Connected


NE 207th St
NE 206th Terrace
NE 1st Ct
42 NE 206th Terrace
NE 205th Terrace

Lt. Jonathan Robbins

Lt. Jonathan Robbins

menu TODAY Parents

Strangers inspire family of injured boy with sweet 'turtle power' messages on Facebook

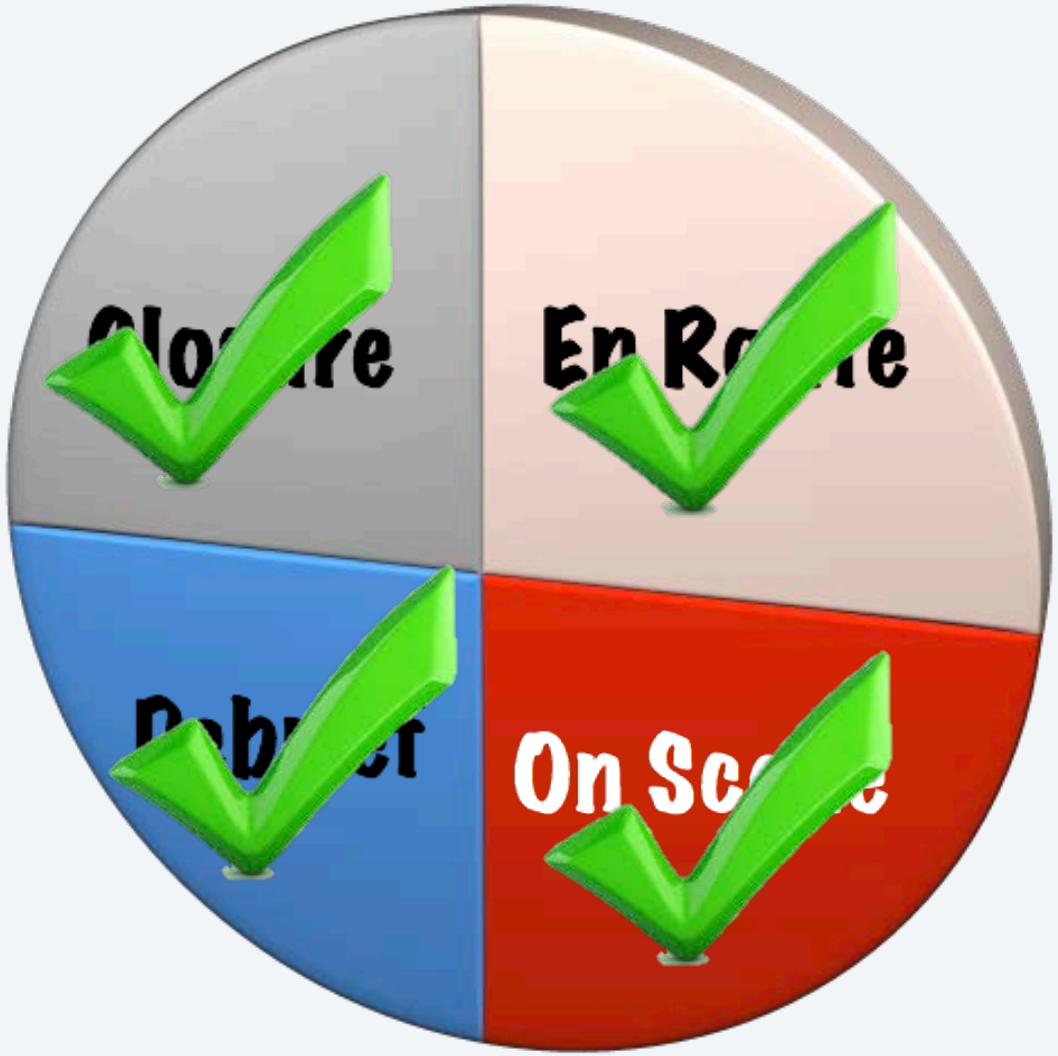
Eun Kyung Kim
TODAY

TeshaRezzi Photography

The parents of 1-year-old James Edwards, who nearly drowned last week, say they are leaning on the prayers and thoughts sent by thousands of Facebook users.

Florida – October 2016

Circling Back Around



A Great Team

Founded 2010
Unfunded
38 States
Team of 9 - Florida
Allison Antevy
President & CEO


DIGITAL
HEALTH
CONFERENCE
NYeC