

Pediatric Triage and Treatment

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Preparedness and Response Training Summit

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Objectives of the Workshop

- Describe appropriate use of a pediatric triage tool in disaster operations
- List 3 commonly encountered pediatric disaster related illnesses or injuries
- Create treatment plans based on the information presented

Course outline

- Introduction (5 minutes)
- Triage – Jim Sheard (15 minutes)
- Mental Health – Merritt Schreiber (10 minutes)
- Treatment – Shannon Manzi (10 minutes)
- Case presentations (60 minutes)
- Questions/wrap up (10 minutes)

What is Triage?

- “Triage” means “to sort”
- Looks at medical needs and urgency of each individual patient
- Sorting based on limited data acquisition
- Also must consider resource availability

Why Should Responders Care About Good Triage?

- Provides a way to draw organization out of chaos
- Helps to get care to those who need it and will benefit from it the most
- Helps in resource allocation
- Provides an objective framework for stressful and emotional decisions

Triage is a dynamic process and is usually done more than once.



TYPES OF TRIAGE

MCI/SURGE

- MASS, SMART
- SALT, SACCO
- START/Jump START
- Fixed set of evaluations
- Life saving ABC's

DMAT TENT/F.M.S

- Hospital Based
- Flexible
- Minor treatment

TRIAGE

- Regardless of what type.... Remember
- Go back to your core skills think EMTs
- How does your patient present
- Bull Sh*t vs. “OH SH*T”
- Oh my God vs. OH MY GOD
- Sick vs. Not Sick

What does the Triage Officer Do?

- Determines the priority of the patient by performing an Initial Basic Assessment
- Treatment to stabilize life threatening problems in the ABC's that can quickly be corrected
 - Open Airway
 - Direct pressure or tourniquet to control bleeding
 - Minor care – Rx refill
- Oh by the way “welcome to Walmart”
 - Security
 - Information
 - Press
 - Anything and everything else – Gate keeper

Primary Triage

- Goal: to sort patients based on probable needs for immediate care. Also to recognize futility.
- Pearls:
 - Do the greatest good.....
 - Medical needs outstrip available resources
 - Additional resources will become available with time (Thank God for LOG)
 - Which conditions will benefit the most from the expenditure of limited resources

Secondary Triage

- Goal: to best match patients' current and anticipated needs with available resources.
- Incorporates:
 - A reassessment of physiology
 - An assessment of physical injuries
 - Initial treatment and assessment of patient response
 - Further knowledge of resource availability

Secondary Triage Tools

- There is no widely recognized tool in the US that addresses secondary MCI triage.
- California “Medical Disaster Response” course’s SAVE tool (Secondary Assessment of Victim Endpoint)
- Many EMS systems use local trauma center triage criteria.

Secondary Triage

GLASGOW COMA SCORE

EYE OPENING :

SPONTANEOUS	4	<input type="text"/>
TO VOICE	3	
TO PAIN	2	
NONE	1	

VERBAL RESPONSE :

ORIENTATED	5	<input type="text"/>
CONFUSED	4	
INAPPROPRIATE WORDS	3	
INCOMPREHENSIBLE WORDS	2	
NO RESPONSE	1	

MOTOR RESPONSE :

OBEDS COMMANDS	6	<input type="text"/>
LOCALISES	5	
PAIN WITHDRAWS	4	
PAIN FLEXION	3	
PAIN EXTENSION	2	
NO RESPONSE	1	

GLASGOW COMA SCALE TOTAL :

TOTAL GLASGOW	13 - 15	4	<input type="text"/>
COMA SCALE	9 - 12	3	
	6 - 8	2	
	4 - 5	1	
	3	0	

RESPIRATORY	10 - 29	4	<input type="text"/>
RATE	30 or more	3	
	6 - 9	2	
	1 - 5	1	
	0	0	

SYSTOLIC BP	90 or more	4	<input type="text"/>
	76 - 89	3	
	50 - 75	2	
	1 - 49	1	
	0	0	

12 = PRIORITY 3
 11 = PRIORITY 2
 10 or less PRIORITY 1

TOTAL :

Tertiary Disaster Triage

- Goal: to optimize *individual* outcome
- Incorporates:
 - Sophisticated assessment and treatment
 - Further assessment of available medical resources
 - Determination of best venue for definitive care

The Best Tool?

It's likely that no existing MCI triage tool is suitable for use for *all* types of incidents.

The GOALS

- Flexible enough to use on adults & children of all ages
- Reflects unique aspects of pediatric physiology
- Use on ages 1-8 years
- Can accomplish within 30 seconds

Primary Disaster Triage

- One of the most commonly used systems is the START/ JumpSTART tool.
- Other tools exist but are less oriented to mass casualties than triaging smaller numbers of (adult) trauma patients.

START

- Utilizes the same four triage categories
- Used for Primary Triage
- www.start-triage.com

Triage Coding

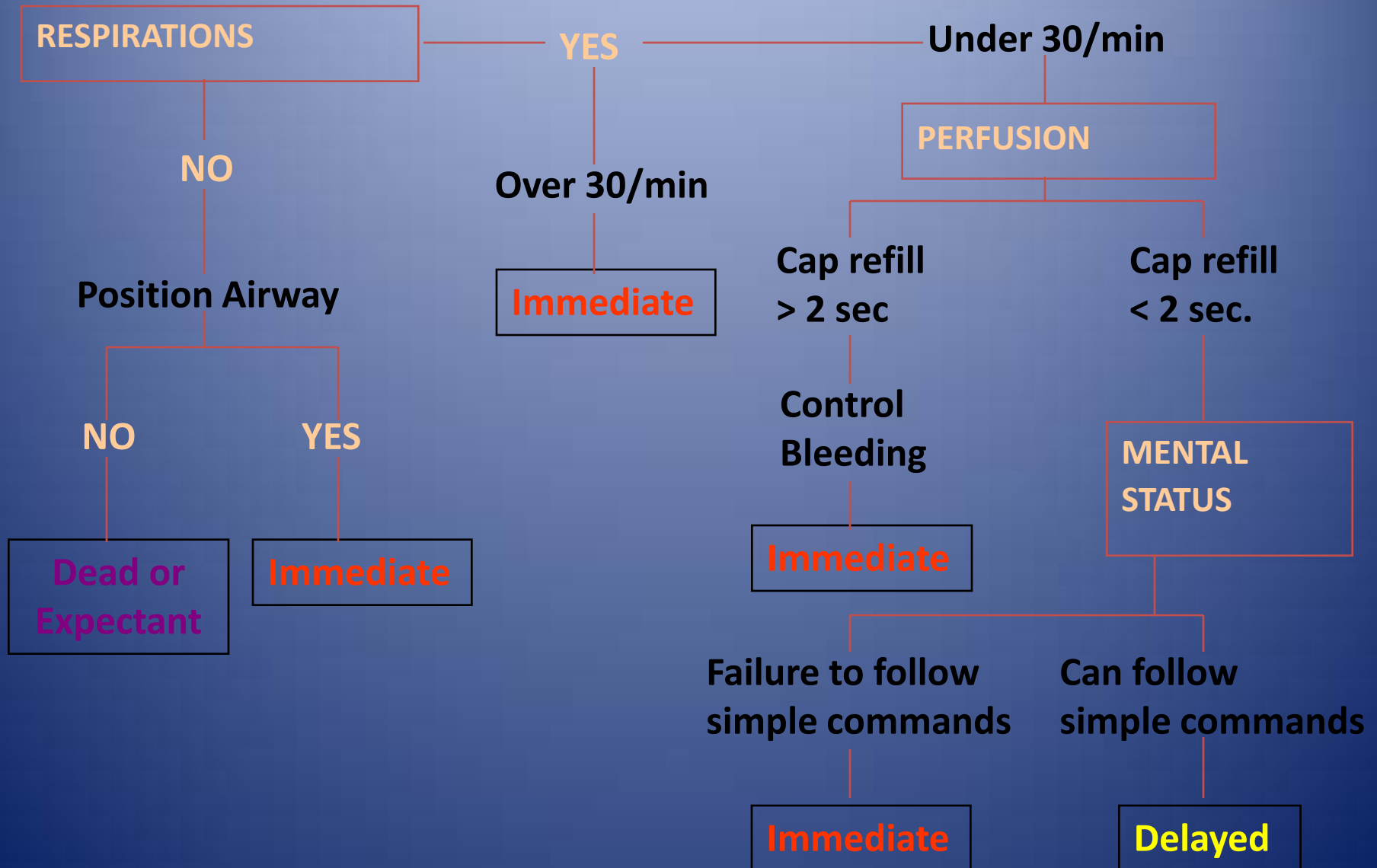
Priority	Treatment	Color
Immediate	1	Red
Urgent	2	Yellow
Delayed	3	Green
Dead	4	Black

START: Step 1

Triage officer announces that all patients that can walk should get up and walk to a designated area for eventual secondary triage.

All ambulatory patients are initially tagged as **Green**.

START Triage



Mnemonic

R

P

M

30

2

Can do

Protecting Children In Disasters

- Children spend 70 to 80 % of their time away from home.
- Soft targets
 - Multiple attacks in the past
 - Dunblame, UK. (1996)
 - Columbine, USA. (1999)
 - Beslan, Russia. (2004)
 - Lancaster County, Pa.(2006)

Why children are different

- Anatomical
 - Pliable skeleton, greater risk for multiple internal organ injuries after blunt trauma.
 - Large head to body ratio, more likely to sustain traumatic brain injuries.

Why children are different

- Developmental
 - Immature motor skills, may not be able to flee.
 - Immature cognitive skills, may not understand the danger.
 - May run toward hazard.
 - Less cooperative may “melt down” think Stop and Shop

Why children are different

- Physiological
 - Vital signs vary with age, making assessment difficult.
 - Faster respiratory rates and breathing zone closer to the ground.
 - Thinner skin, less protection and faster absorption of toxic chemicals.
 - Less fluid reserves even small amounts of fluid loss can mean big problems.

JumpSTART Pediatric MCI Triage

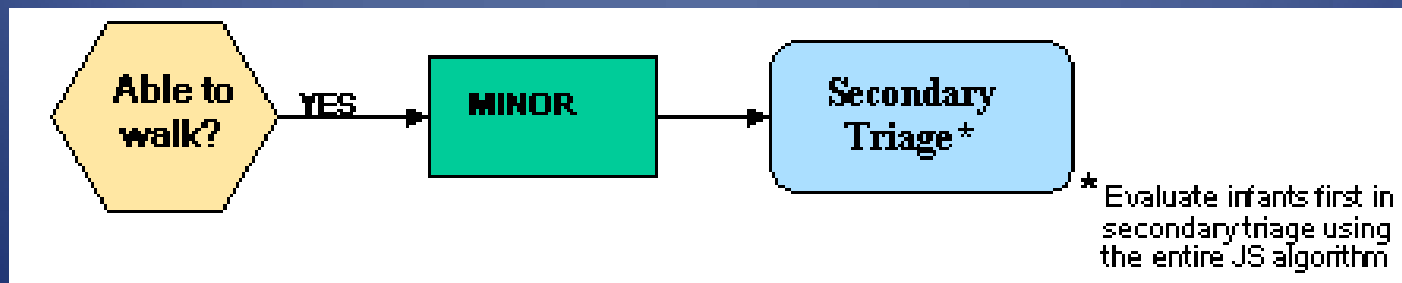
- Developed by Lou Romig MD, FAAP, FACEP
- www.jumpstarttriage.com
- Now in widespread use throughout the US and Canada
- Recognized by the US National Disaster Medical System
- Being taught in Japan, Germany, Switzerland, the Dominican Republic, Africa, Polynesia

JumpSTART Pediatric MCI Triage

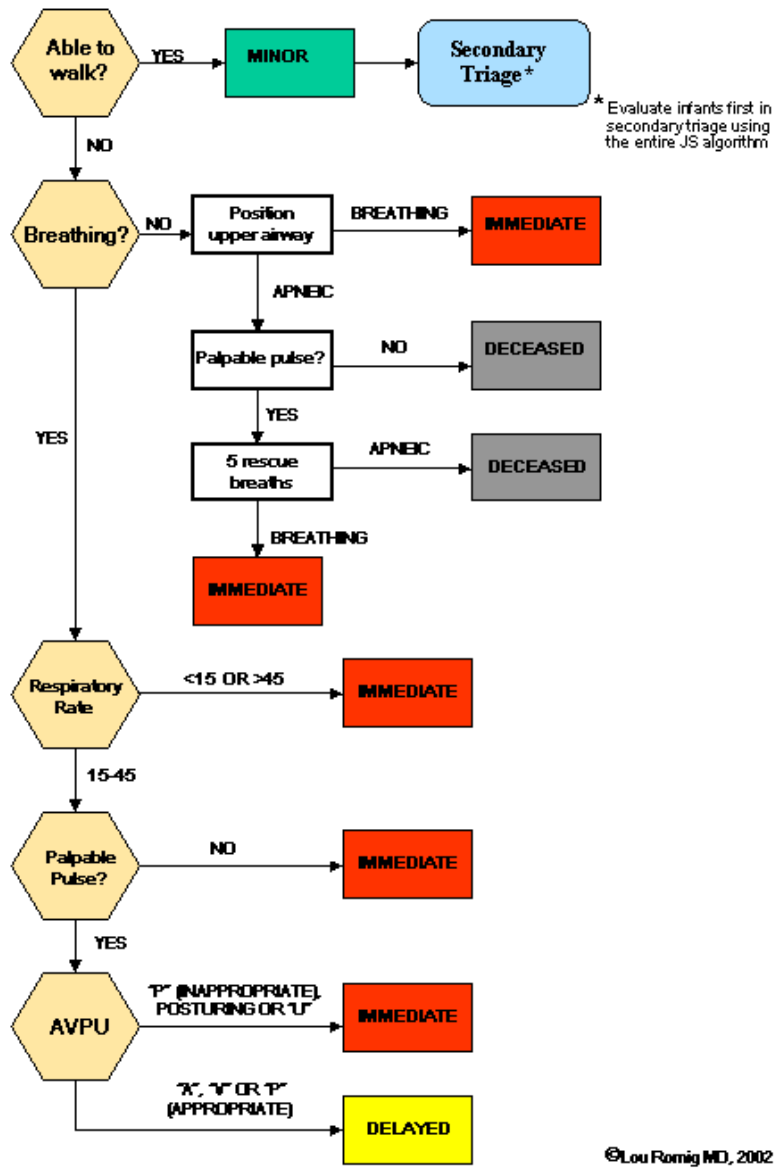
- The physiologic parameters used in START are not suitable for all ages of children
 - Walking
 - Respiratory death vs. cardiac death
 - Apneic child more likely to have primary respiratory problem
 - Respiratory rates
 - Cap refill may not adequately reflect hemodynamic status
 - Perfusion may be maintained for a short time
 - Mental status assessment
 - Obeying commands may not be good way to gauge mental status

How to Use JumpStart

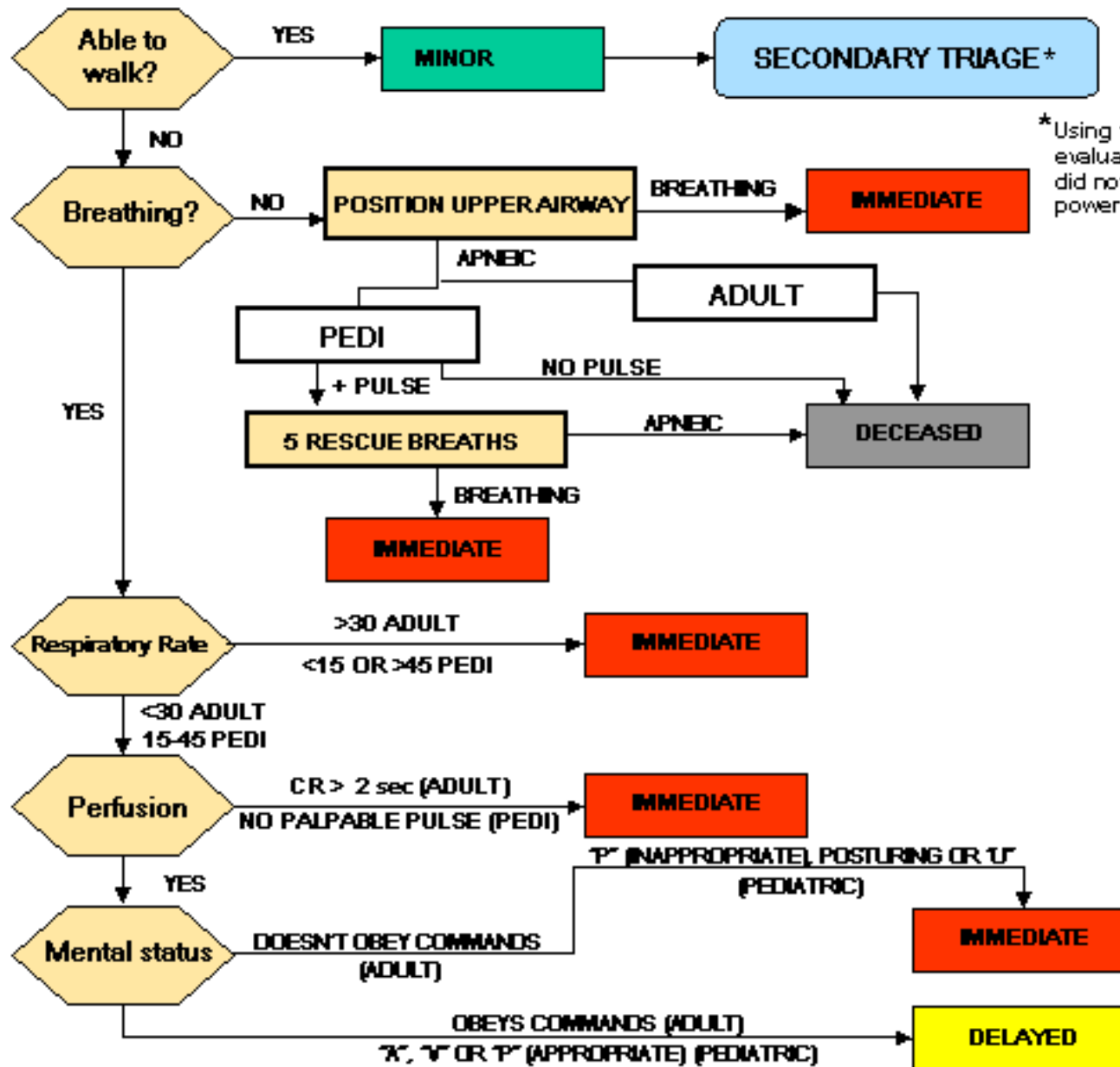
- Direct all ambulatory patients to designated **GREEN** area for triage
- If the child is carried to **GREEN** area assess first
- Begin assessment of non-ambulatory patients



JumpSTART Pediatric MCI Triage[®]

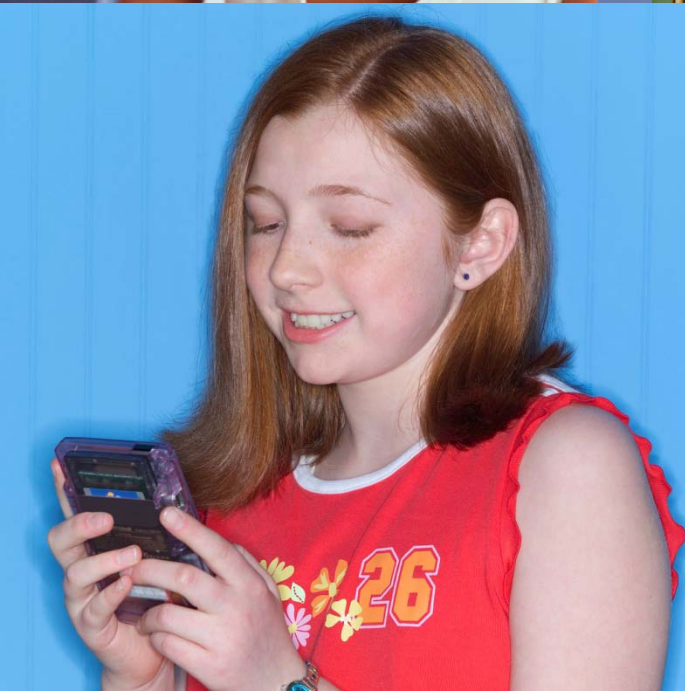
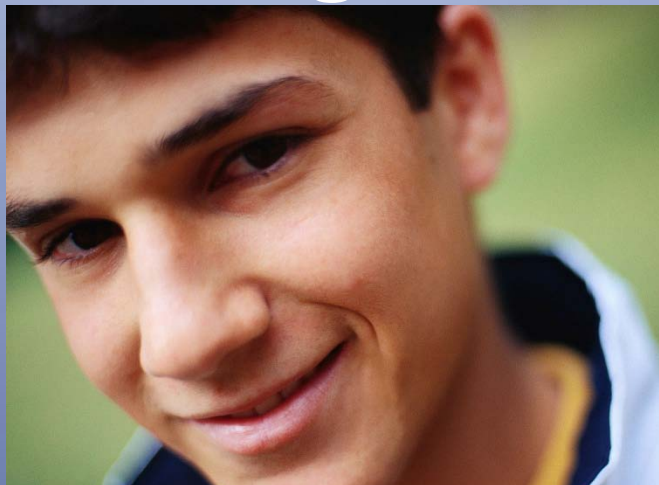


Combined START/JumpSTART Triage Algorithm



*Using the JS algorithm, evaluate first all children who did not walk under their own power.

What age?



Key Points about Triage

- Anything that can help organize the response is a good thing
- MCI triage is different than daily triage, in both field and F.M.S settings
- Triage should be done with the head, not the heart
- *This includes children!*

Key Points about Triage

Triage will never be logistically, intellectually, or emotionally easy...



but we must be prepared to do it using the best of our knowledge and abilities.

Psychological Impact

Providing emotional support to both patients and fellow rescuers will minimize the impact and lessen the long term impact Critical Incident Stress

- Patients

- Feelings of loss may be over whelming, even if uninjured
- Loss of friends/family
- Loss of Property
- Survivor Syndrome

- Rescuers

- Stress from environment
- Pain/suffering
- Loss of life
- Devastation
- Insufficient help or equipment

Treatment Principles

- Working differential
- Reliance on physical exam, limited imaging and laboratory testing
- Limited formulary – being creative with what you have, understand patient/family limitations and capability

The pediatric treatment area – when you are lucky



The Pharmacy – when you are lucky



Dr. Manzi's
World Famous



SNAKE OILS & POTIONS

"Healing and Magical Properties"

The pediatric treatment area – reality



The Pharmacy – reality



Disclaimer - FDA non-approved uses

- Nearly 70% of the treatments we use every day in children as standard of care are not approved by the FDA. This presentation will inevitably touch upon non-labeled uses for therapies that will be discussed. If you would like a notation of the off-label indications, please contact me after the meeting. Thank you.

Pharmacist responsibilities

- Roles of the pharmacist in a disaster
 - Drug information
 - Dispensing and patient counseling
 - Medication reconciliation
 - Inventory and controlled substance management
 - Drug security and environmental control
 - Interface with community pharmacies, hospitals, etc
 - Interface with RxResponse, EPAP, etc

Disaster medicine

- Most disaster pharmacy operations will need to support three types of dispensing:
 - medication orders for the treatment of patients undergoing immediate care
 - prescriptions for patients seen and discharged
 - team member prescriptions

EMR and MARs

- In shelter care situations, a medication administration record (MAR) will need to be created, either electronically or on paper for documentation of medication administration by the care provider at the bedside. Daily reconciliation of the MAR will need to be performed by pharmacy for accuracy and anticipation of what medications will be needed for the next day. Refills of medications need to be on a scheduled time frame (i.e. q24 hour pharmacy deliveries). Additionally a mechanism for refilling PRN medications and missing medications must be established.

Pediatric Disaster Pharmacy Concepts

- Cache contents – not all pedi friendly
- Resupply issues
- Pediatric dosing
 - Math
 - Kinetics
 - Dosage forms
- Medication error prevention, QI

It is all about the weight

1 amp ≠ 1 dose

- **Weight based calculations**
 - kg vs. lbs
 - BSA
 - Use of dosing tape, dosing cards
- **Use of dosing tapes, dosing cards**
 - Minimize math at the bedside
 - Standard doses, standard concentrations
- **Pediatric drug references for reconstitution, dilutions, infusion times**

Routes of administration

- IV
- IO
- IM
- Oral
- Nebulization
- Subcutaneous
- Sublingual
- Buccal
- Intranasal
- Rectal
- NG/Gtube/Jtube
- ETT
- Topical
- Other (epidural, wound catheter, etc)

Pediatric Pharmacokinetic Principles

- **Intramuscular & Subcutaneous & topical absorption**
 - reduced absorption in preterm infants
 - lower regional blood flow and reservoir mass
 - IM more effective in low perfusions states than SC
 - Stratum corneum underdeveloped, toxicity more likely
- **Intravenous & Intraosseous absorption**
 - Peripheral vs. central access
 - Scalp, umbilical, hand and foot vein cannulation
- **Oral absorption and bioavailability**
 - pH-dependent passive diffusion
 - gastric pH
 - motility of the stomach & small intestine
 - gastric emptying time
 - gastrointestinal perfusion

Manipulation of dosage forms

- Modifying adult dosage forms (bristojets), creating a suspension from tablets/injection with published recipes
- Cutting tablets and suppositories to an appropriate dose
- Serial dilutions of an injectable medication to obtain a measurable dose for a newborn or infant. Must avoid excessive free water (i.e. dilution in D5W or $< 0.45\%$ NaCl).
- Using suspensions for rectal dosing when a patient cannot take anything by mouth
 - Dilute 1:1 with tap water (sorbitol will induce expulsion)
 - Often used for anti-epileptic medications
- Using injectable form enterally
 - Dexamethasone, benzodiazepines, ondansetron

Example Calculations

- 2 year old with vomiting and diarrhea for 3 days. Appears lethargic and minimally responsive. IStat glucose is 40. Order is given for “Dextrose 0.5 grams/kg IV now”
- You have D50W, D25W and D10W available and the patient weighs 13 kg
- What volume of each concentration do you need?

Calculations

Answer

- D50W = 500 mg/mL
- D25W = 250 mg/mL
- D10W = 100 mg/mL

Therefore:

- D50W = 1 mL/kg x 13 kg = 13 mL
- D25W = 2 mL/kg x 13 kg = 26 mL
- D10W = 5 mL/kg x 13 kg = 65 mL

Commonly encountered pediatric illnesses post-disaster

- Allergic reactions/Anaphylaxis
- **Asthma/Status Asthmaticus**
- Bronchiolitis
- Croup
- Gastroenteritis
- New onset diabetes/DKA
- Overdose/toxic exposure
- Emotional disorder, acute
- Seizures/Status Epilepticus
- Sepsis/meningitis
- Trauma-related

Asthma/Status Asthmaticus

- **MDIs vs nebulizer**
 - Use spacer
 - Does not require electricity or compressed gas/O₂
 - Is equally effective, if not superior
- **Homemade spacers**
 - 500 mL plastic bottle



Chronic Pediatric Conditions to consider

- Asthma
- Bleeding disorders
- Complex care children
- Cystic fibrosis
- Diabetes
- Mood stabilization/ADHD
- End-stage renal disease
- Oncologic processes/fever & neutropenia
- Transplant recipients
- HIV/AIDS

Medication reconciliation

- Important for all, particularly important in a shelter mission
- Accurate retrieval of information has been shown to be best accomplished by a pharmacist or highly trained pharmacy technician
- Substitution and dose/frequency modifications are inevitable

The (Dreaded) Med List....

Remeron (mirtazapine) 15 mg PG bedtime

Fosamax (alendronate) tablet 70 mg PG
qWednesday

Klonopin (clonazepam) 0.5 mg PG BID

Klonopin (clonazepam) 1 mg PG bedtime

Zantac (ranitidine) 150 mg PG BID

Prilosec (omeprazole) 40 mg PG BID

Lasix (furosemide) 40 mg PG daily

Keppra (levetiracetam) 1500 mg PG BID

Actigall (ursodiol) 165 mg PG BID

Lovenox (enoxaparin) 100 mg/mL injection 33 mg
SC BID

Mycostatin (Nystatin) ointment, apply topically TID

Micatin (miconazole) powder, apply topically QID

Ocean spray (sodium chloride 0.65%) nasal drops,
Instill 1 drop each nare BID

Aldactone (spironolactone) 100 mg PG BID

Baclofen (baclofen) 10 mg PG TID

Allegra (fexofenadine) 30 mg PG BID

Elavil (amitriptyline) 30 mg PG bedtime

Culturelle (Lactobacillus GG) 2 caps PG TID

Neurontin (gabapentin) capsule 150 mg PG
TID

Tums EX (calcium carbonate) 1125 mg PG
BID

Bactroban (mupirocin) ointment, apply
topically BID

Domeboro Packet 1 pkt topically BID

Prednisone (prednisone) tablet 25 mg PG
daily

Potassium chloride 40 mEq PG BID (Put in
end of feed)

Bactrim DS
(sulfamethoxazole/trimethoprim)
tablet 160 mg (trimethoprim) PG daily

Vitamin D (ergocalciferol) 2000 units PG
daily

Flonase (fluticasone) nasal spray 2 sprays
daily

Ventolin (albuterol) MDI with spacer 2 puffs
inhaled TID PRN wheezing

Medication Errors in Pediatrics

- Literature vacuum of disaster medicine related errors
- ED/outpatient medication errors may correlate to some extent, closest surrogate available at this time
 - Pediatric ED related medication errors rate 1.6% in ED orders, 2.2% outpatient prescriptions defined as wrong dose (*Peds Emerg Care 2008*)
 - Pediatric ED trauma/resuscitation orders, error rate of 15% prior to implementation of standard ordering, 6% post implementation (*Peds Emer Care 2008*)

Medication Errors and Adverse Reactions in Pediatrics

- Return visits for Adverse Drug Reactions (may or may not involve an error) are estimated at 0.5% of all ED visits (*2009 Pediatrics*)
 - Antibiotics most common class
- Outpatient ADR rates have been estimated as high as 16% of all prescriptions
- Pilots of error rates in adults boarding in EDs have shown upwards of 17% missed doses of scheduled meds and a 3% preventable adverse reaction rate (*Ann Emerg Med 2009*)

Medication errors in DMAT/FMS operations???

- Completely unknown
- Requires study

Future enhancements (suggested)

- EMR upgrades to support
 - Pediatric dosing
 - Ongoing MAR documentation
 - Medication reconciliation
- Pediatric dosing cards, references
- Pediatric cache (both meds and equipment)
- Medication error/adverse drug event rates monitoring during/post disaster operations
- Include disaster training core content for pharmacists in pharmacy schools

Case presentation

- Rules of the game
- Team work
- Assignments

Wrap up & Questions

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