PEDIATRIC DISASTER TRIAGE:

DOING THE MOST GOOD FOR THE MOST PATIENTS IN THE LEAST TIME

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Emergency Medical Services for Children

Objectives:

- Recognize a disaster
- Understand pediatric disaster triage
- Consider special triage situations
- Learn JumpSTART triage
- Briefly consider treatment of child disasters victims

GENERAL PRINCIPLES OF DISASTER CARE

Scene Assessment

GENERAL PRINCIPLES OF DISASTER CARE

Triage Assessment

GENERAL PRINCIPLES OF DISASTER CARE

Initial Stabilization

GENERAL PRINCIPLES OF DISASTER CARE

Resuscitation

GENERAL PRINCIPLES OF DISASTER CARE

Transport Decisions

Scene Assessment

- Ensure scene safety
  - Avoid creating more victims
- Establish that disaster exists
- Estimate number of victims: adults/children

wsj.net

Mass Casualty Incidents and Disasters

Events which overwhelm medical resources

MPI: Multiple-Patient Incident

(up to 25 patients)

MCI: Mass Casualty Incident

(25-100 patients)

Disaster: Over 100 patients

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Disaster: Over 100 patients

Notify Dispatch or Medical Control

- Type of event
- Initial casualty estimate

- Make initial request for additional resources

Then begin triage assessment of individual patients

Triage Rationale

GUIDING PRINCIPLE IN DISASTER:

To do the best for the most using the least.

Triage

- Incident command system separates triage from treatment immediately
  - **see everybody once briefly for overview**
- Dynamic process
- Triage in disaster setting may be very difficult
  - Outdoors
  - Ongoing hazards

Primary Triage Performed at Event Site

- **Assumptions**
  - Medical resources are overwhelmed by need
  - Additional resources will eventually become available

- **A rapid sorting of patients based on:**
  - Severity of illness/injury
  - Likelihood of benefiting from expenditure of limited resources
  - Recognizing patients who benefit the most from immediate intervention

Immediate

Photo Source: www.swsahs.nsw.gov.au Public Domain

- Serious injuries
- Immediately life threatening problems
- High potential for survival.
- Examples
  - Tension pneumothorax
  - Nerve agent exposed patient
    - severe shortness of breath or seizures

Delayed

- Serious injuries
  - require care but management can be delayed without increasing morbidity or mortality.
- Examples
  - Long bone fractures
    - neuro-vascular intact
    - 40% BSA exposure to Mustard

Photo Source: Phillip L. Coule, MD

Minimal

- Injuries- require minor care or no care without adverse affect.
- Examples
  - Abrasions
  - Minor lacerations
  - Nerve agent exposure with mild rhinorrhea

Photo source: Phillip L. Coule, MD

Expectant

- Important for preservation of resources
- DOES NOT MEAN DEAD!
- Should receive comfort care or resuscitation when resources are available
- Serious injuries
  - very poor survivability even with maximal care in the hospital or pre-hospital setting.
- Examples
  - 90% BSA burn
  - Multiple trauma with exposed brain matter
  - Severe traumatic brain injury with herniation

Dead Patients

- Tag dead patients to prevent re-triage
- Do not move
  - Except to obtain access to live patients
  - Avoid destruction of evidence

Walking and Movement: The simplest sorting

- "If you can hear me and are able, walk over here" GREEN triage done

- Many victims may be green, self-extricate

Basic Triage Principles

As soon as you can categorize a patient, STOP evaluating

- if they are RED for breathing, they won't be seen any faster for additional problems

Minimal treatment during triage

- Airway maneuver (chin tilt, jaw thrust)
- Address life-threatening active blood loss

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Emergency Medical Services for Children
January 2011- July 2013

Throughout the presentation, please
Click the play button for video and audio

BROWN
Alpert Medical School

UMASS University of Massachusetts Medical School

Yale UNIVERSITY

January 9, 2011

SMART Triage System

- 1. Ensure you are wearing the correct protective equipment.
- 2. Unzip the pack. This will reveal your triage equipment.
- 3. Carry out your triage procedures.
- 4. Secure the pack and move to your next assessment.
- 5. Pediatric tape and adult triage tool inside

It's a job for two

Team member two

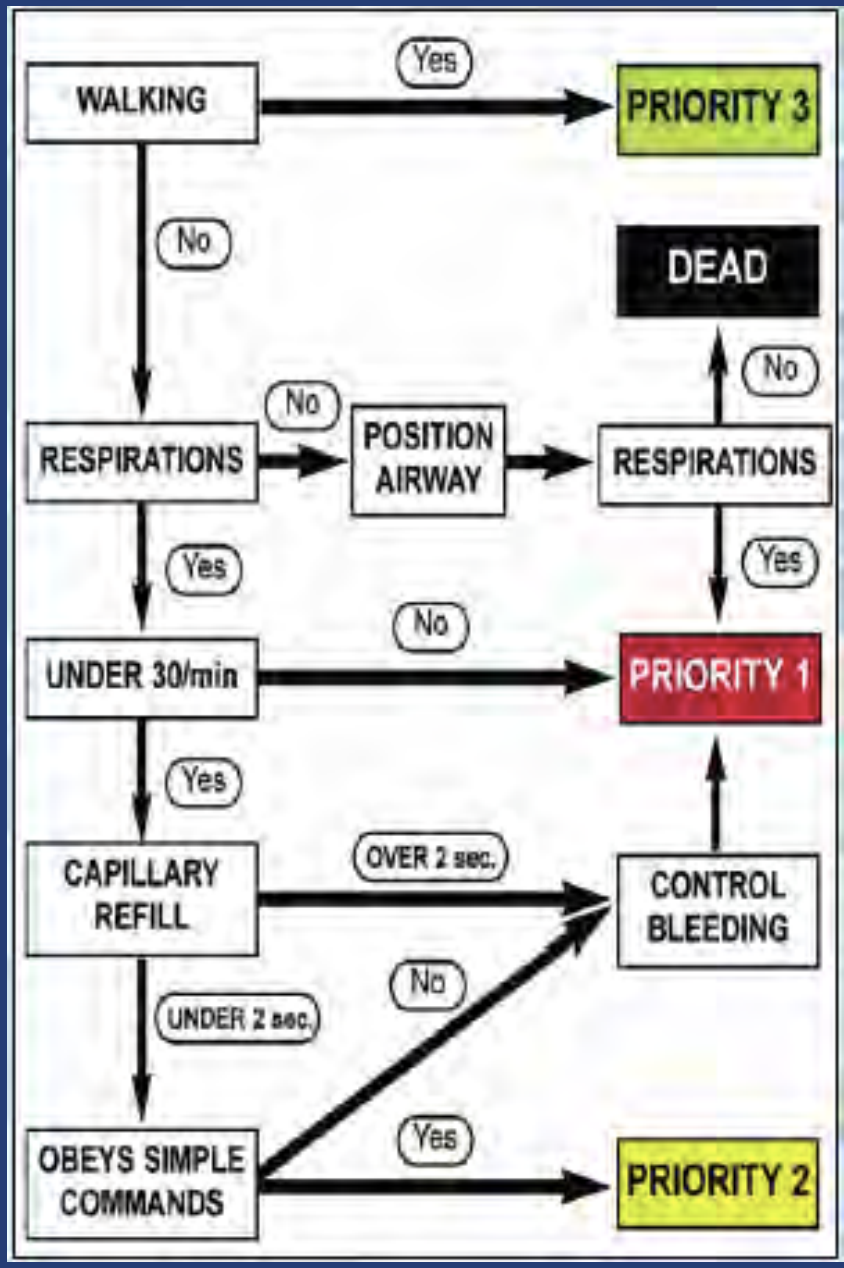
- Talks to uninjured survivors
- Prepares equipment
- Manages tags
- Counts victims
- Watches for hazards
- Picks your route
- Gathers information and communicates to others
- Provides morale support

Team member one

- Assess and tag
- Applies rapid treatment
- Attempt to correct airway blockage or uncontrolled bleeding
- Provides morale support

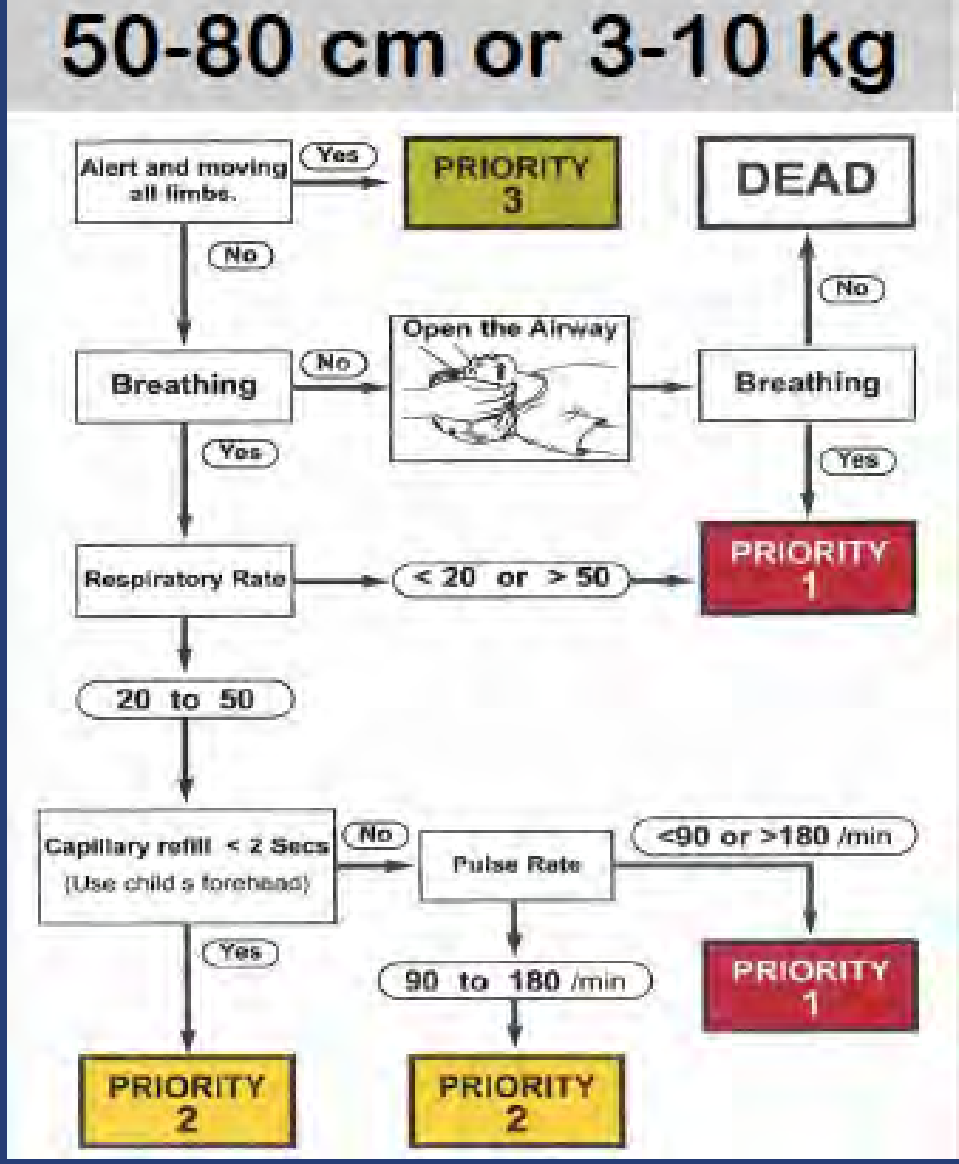
Smart Triage Basics: Adolescents and Adults

- Quickly sorts ambulatory victims
- Respirations, Perfusion and Motor considered in that order
  - Airway repositioned if not breathing
  - Respiratory rate > 30 = RED



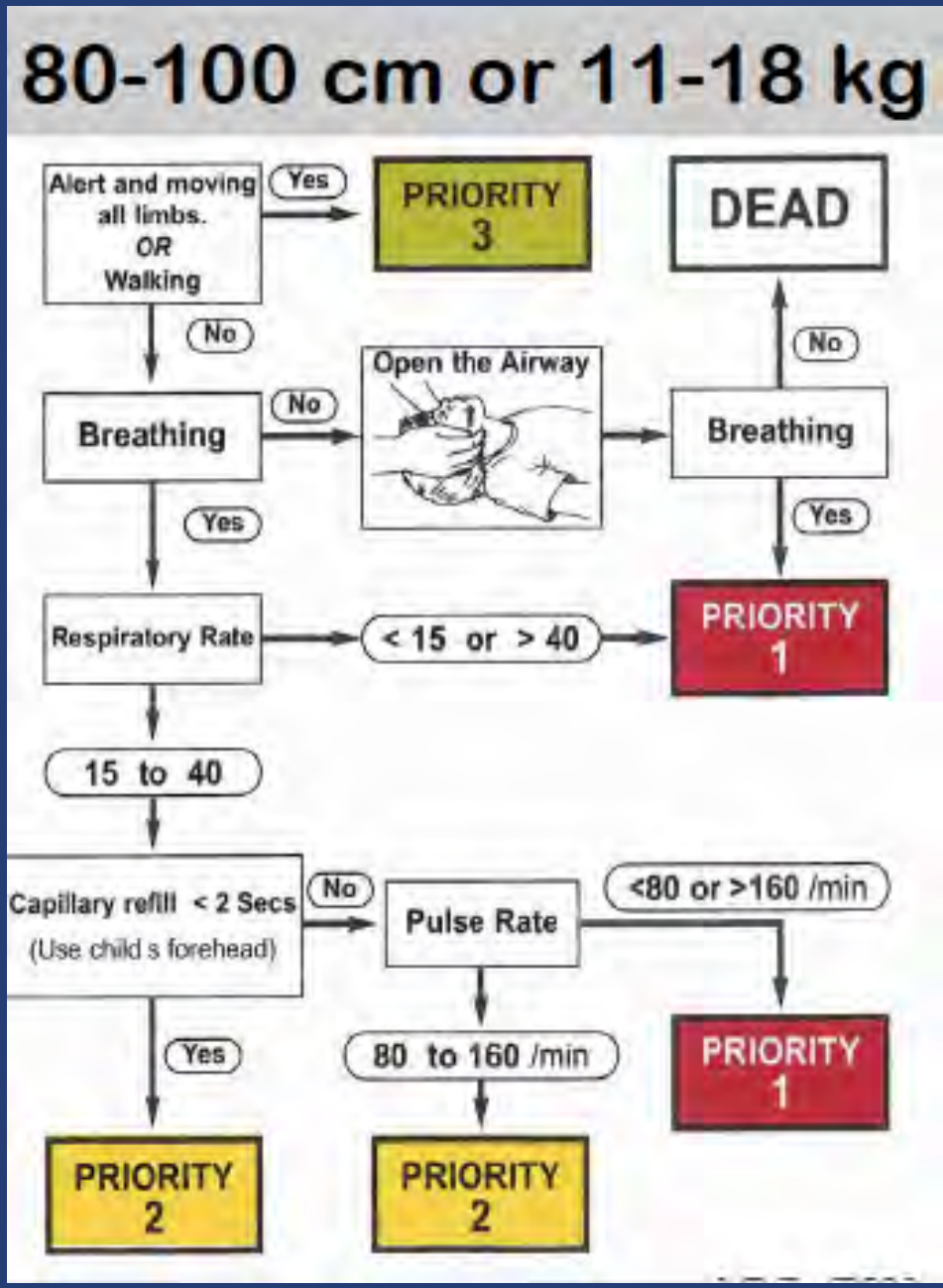
Smart Triage

- Proprietary triage tool
  - Integrated with a mass casualty event management system
  - Considers pediatric physiology (length-based tape)



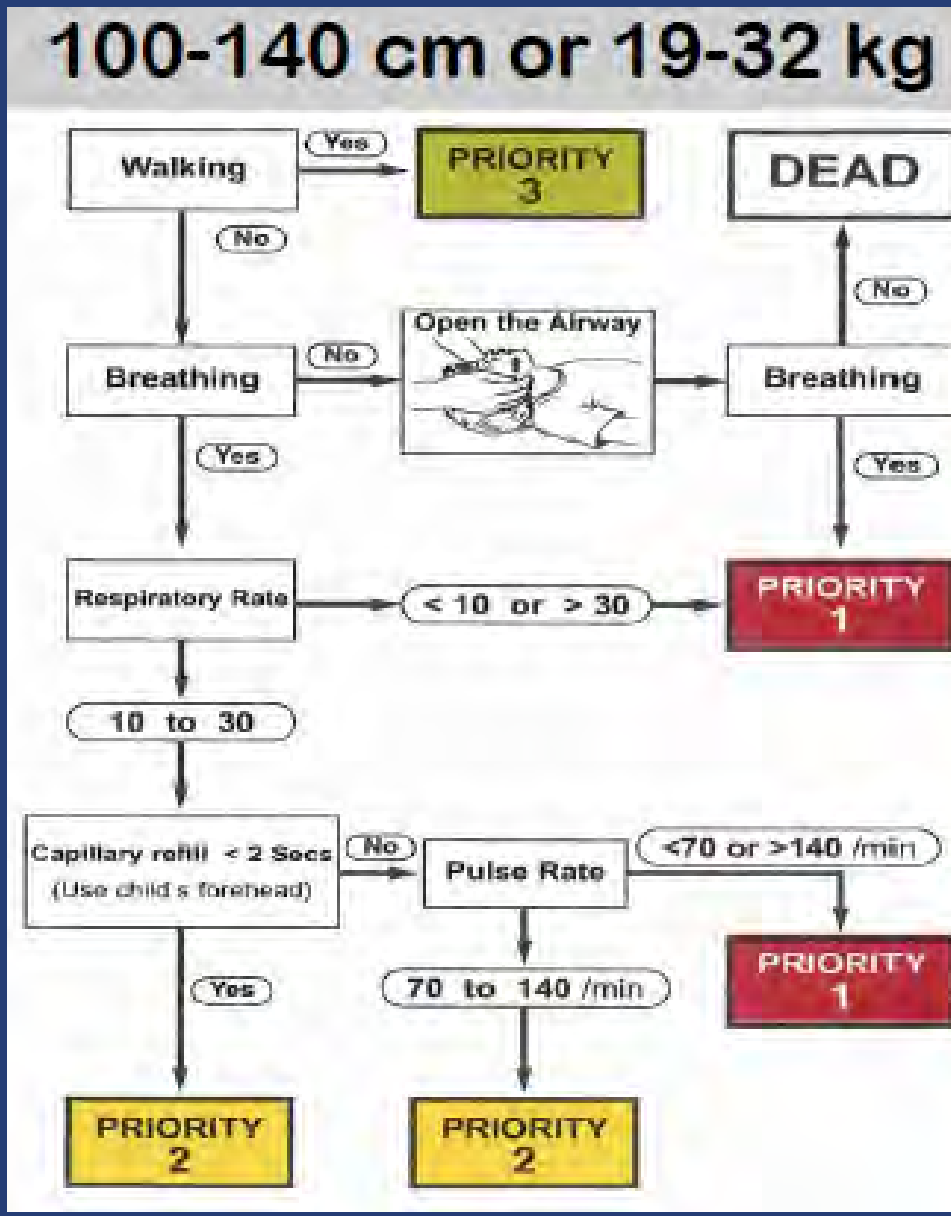
Smart Triage

- Differs from adult triage: no assessment with simple commands



Smart Triage

- Differs from adult triage: no assessment with simple commands
- Children > 71 lbs. triaged with adult tool



Instructions for Use of the SMART Tape™

6. **REMEMBER:**

The first colored box you come to determines the treatment / evacuation priority for that child – *prioritize and move to the next child immediately*.

Kids in triage

- Don't follow commands.
- May actually hide from rescuers
- Injured children extricated by well parents/ adults with delay in triage and treatment.
- Need distraction and dedicated supervisor able to run after wandering toddlers


Ruth Kennedy for FEM

- Two parents and their 1, 3, and 7 year-old children were driving on I-91.
- There was a crash.
- The parents have bruises, the father has a broken forearm.
- The younger kids have no obvious injuries
- The 7 year old is breathing, has a hematoma to the scalp, and is unresponsive.

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- *So far there is one ambulance. What transport issues do you foresee?*

Preserving the Family Unit

- Triaging children and their families together important for mental health
  - Send family unit to triage color area appropriate for most ill family member
  - Preservation may not be possible if children and adult are all immediate (red) category
  - Tracking system necessary in triage to ensure family reunification
  - Separation from parents and siblings greatly increases children's anxiety

Photo Credit: FEMA

Pediatric Triage Rationale

- Guiding principles in triaging children
  - Variations in normal vital signs with age
  - Apneic children more likely to have primary respiratory issue than adults
  - Developmental considerations
  - Pre-existing conditions/syndromes
  - Inability to walk/talk or obey commands, as used in adult triage
- Goal is triaging patient in less than 30 seconds

Examples

IMMEDIATE

- Awake 8 yr old child brought to field hospital 3 days after earthquake with 20 others
- Can not walk
- Responds to voice
- Respiratory Rate 60
- No obvious injuries

Examples

- Unconscious 4 year old hit in head by debris moments ago
- In a room full of injured children
- Not breathing
- Obvious head injury

Examples

- What do you do?
  How do you classify this child if he breathes?

IMMEDIATE

How do you classify this child if he does not breathe after 2 rescue breaths?

Examples

- You are responding to a school shooting.
- A crying, alert 16-year-old student has been shot in the thigh, and is unable to walk.
- No respiratory distress, and has a palpable pulse.

DELAYED

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DELAYED

Triage of Children with Head Injuries

- Head injuries carry a high risk
  - Intracranial hemorrhage
  - Cerebral edema
- The **AVPU** mnemonic allows rapid detection of significant head injury
  - **A**lert
  - Responds to **V**oice commands
  - Responds to **P**ainful stimuli
  - **U**nconscious
- **A**lert and "**V**oice" patients are in the delayed (yellow) triage category
- "**P**ain" and **U**nconscious patients are in the immediate (red) triage category

Children with Special Health Care Needs (CSHCN)

- Children with special medical or physical needs
  - Wheelchair or crutches
  - Cognitive disability
  - Vision, hearing, or language impaired
  - Technology dependent
    - Ventilator
    - Dialysis

Disaster Triage for Children with Special Healthcare Needs

- The triage plan still applies
- If chronically non-ambulatory and have no ABCD problems, may still be triaged to green area
- Technology dependent children with technological failure may need red or yellow triage
- Verbal instruction to children may be problematic

Secondary Triage

- Performed at the scene of the MCI or healthcare delivery venues when patients are delivered by ambulance
- Triage category BLACK patients reassessed following RED category
- In disasters, many patients may present with a parent or caregiver
- Flow within triage categories
  - Based on clinical changes
  - Requires communication between triage and treatment area leaders
- Reassess venue of treatment
  - Hospital vs. surge capacity venue vs. treating on-site
- Transportation to hospitals or surge capacity venues

Why are children more prone to injury and exposure in MCIs?

- Lack cognitive skills to avoid exposure and attack
- Lack motor skills
- High surface area to mass ratio increases risk for:
  - Hypothermia
  - Dehydration due to vomiting and diarrhea
  - Exposure to radiation, chemical, biological dangers


Photo Credit: FEMA

Why are children more prone to injury and exposure in MCIs?

- Faster respiratory rate speeds exposure to aerosolized agents
- Thinner skin increases the danger of chemical exposure
- Smaller circulating blood volume increases the risk of shock and death

Photo Credit: FEMA

Biological and Chemical Multiple Casualty Incidents

- Divided temporally into immediate and delayed symptoms
- Divided by predominant body system involved
  - Neuromuscular
  - Respiratory
  - Dermatological
- Chemical, Biological, Radiological and Nuclear (CBRN)

Biological Agents Causing Pediatric Disasters

- Influenza
- Smallpox
- Tularemia
- Brucellosis
- Plague
- Anthrax
- Botulism
- Viral Hemorrhagic Fevers

Chemical Weapons

- Neurotoxic
- Respiratory
- Dermatologic
- Radiological/Nuclear

A patient is found down in a field

- A teenager from Northampton has been growing a crop of winter wheat. After school, he applied a pesticide to the growing crop. Soon after, he developed watery eyes, rhinorrhea, nausea, and blurry vision.
- When EMS patches, they note wheezing and tachypnea.
- *What is the agent?*
- *How should the patient be treated?*

Neurotoxic Chemicals

- Organophosphate analogs (tabun, sarin, soman, vx)
- Generally colorless and odorless
- Inhibit acetylcholinesterase, causing parasympathetic symptoms
  - *Nicotinic symptoms:*
    Fasiculations, weakness, flaccid paralysis
  - *Muscarinic symptoms:*
    Pinpoint pupils, blurry vision, lacrimation, rhinorrhea, diarrhea, bronchoconstriction and bronchorrhea (**the killer B's**)
  - *Central nervous system symptoms*:
    Confusion → lethargy → coma
    Ataxia, seizures

Neurotoxic Chemicals: Treatment

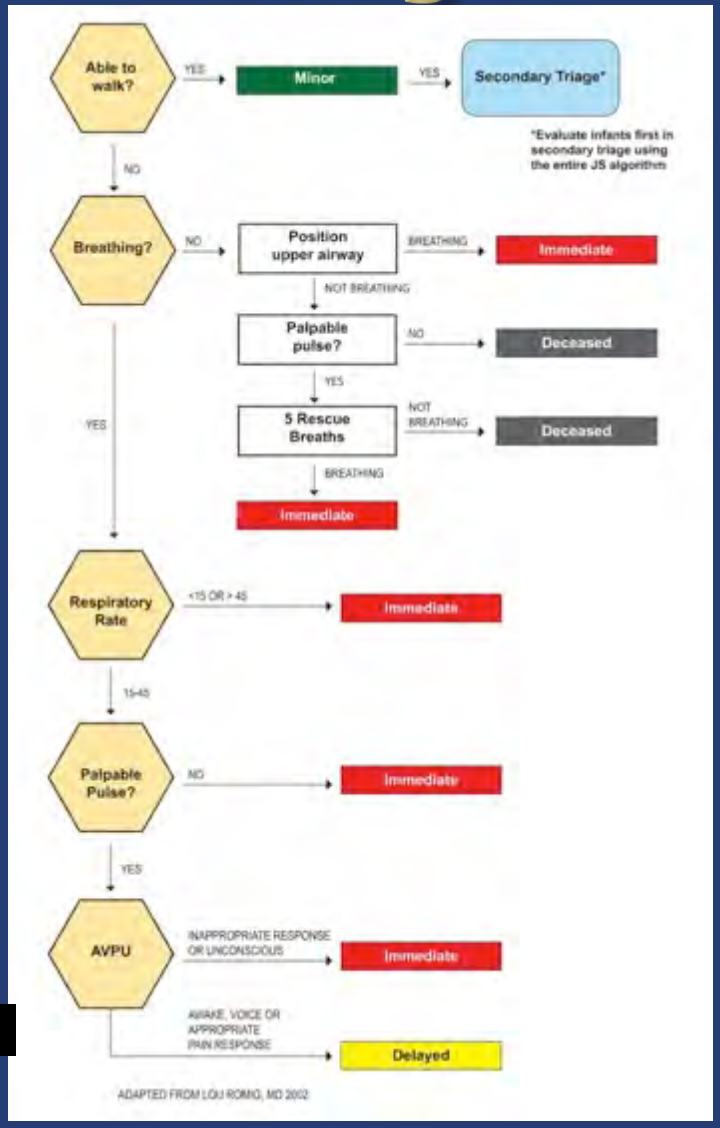
- Nicotinic symptoms may be treated with pralidixome (2-PAM)
- Muscarinic symptoms treated with atropine
- Atropine and 2-PAM are the components of the Mark-1 autoinjector kit
  - Mark 1 kit may be used in children
  - Atropine monotherapy (0.01 mg/kg, minimum dose 0.2 mg, maximum dose 0.4 mg in a child, 1 mg in an adult) may be sufficient treatment in mild cases
  - Diazepam or lorazepam 0.1 mg/kg IV for seizures

- Funded by EMSC
- Disaster Triage curriculum emphasizing children
  - Three simulations
  - Debriefings
  - Didactics
- Developed by pediatric emergency docs, paramedics
- Available at no cost for you to use
- Mark Cicero, 203-444-9786
- mark.cicero@yale.edu

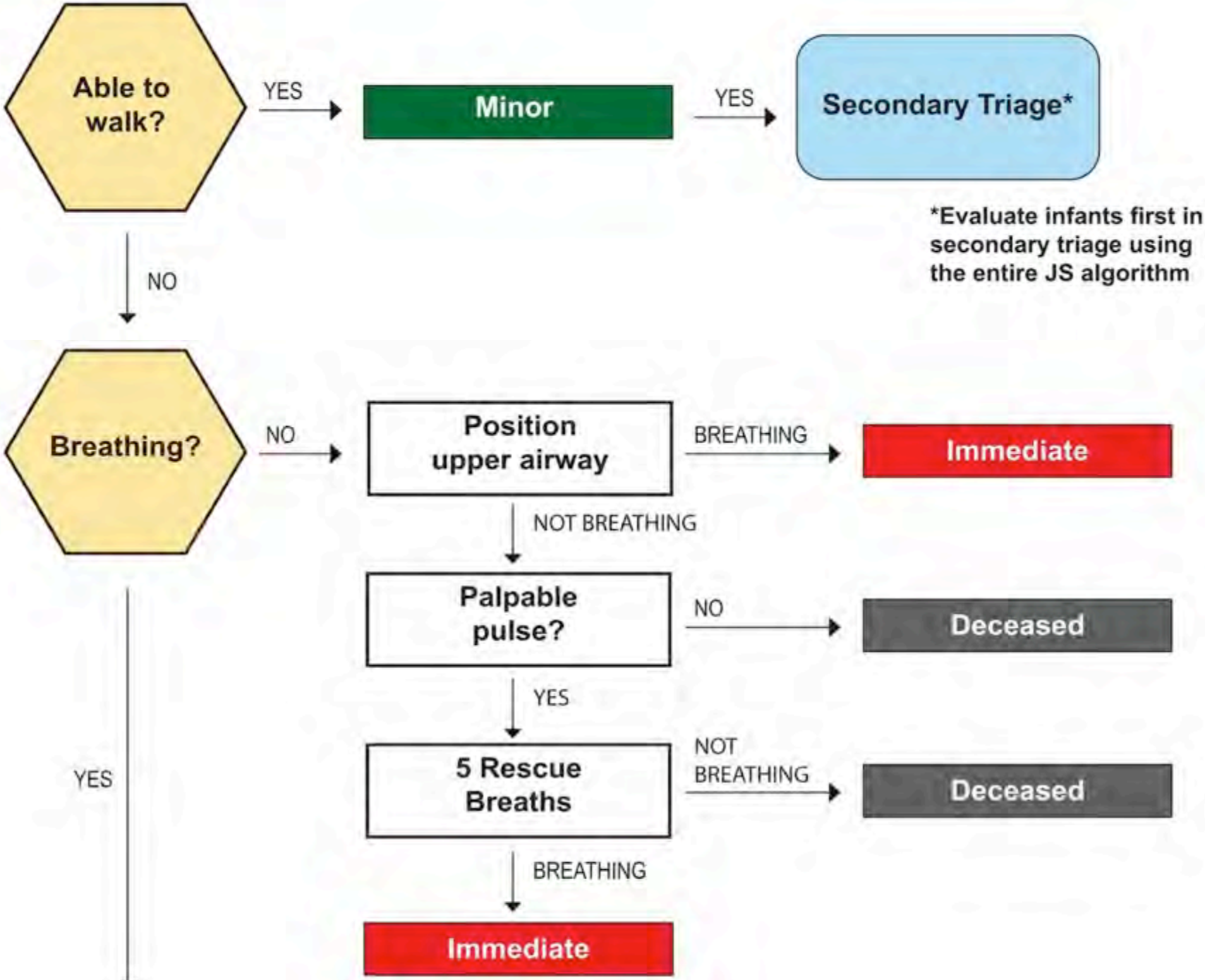
Summary

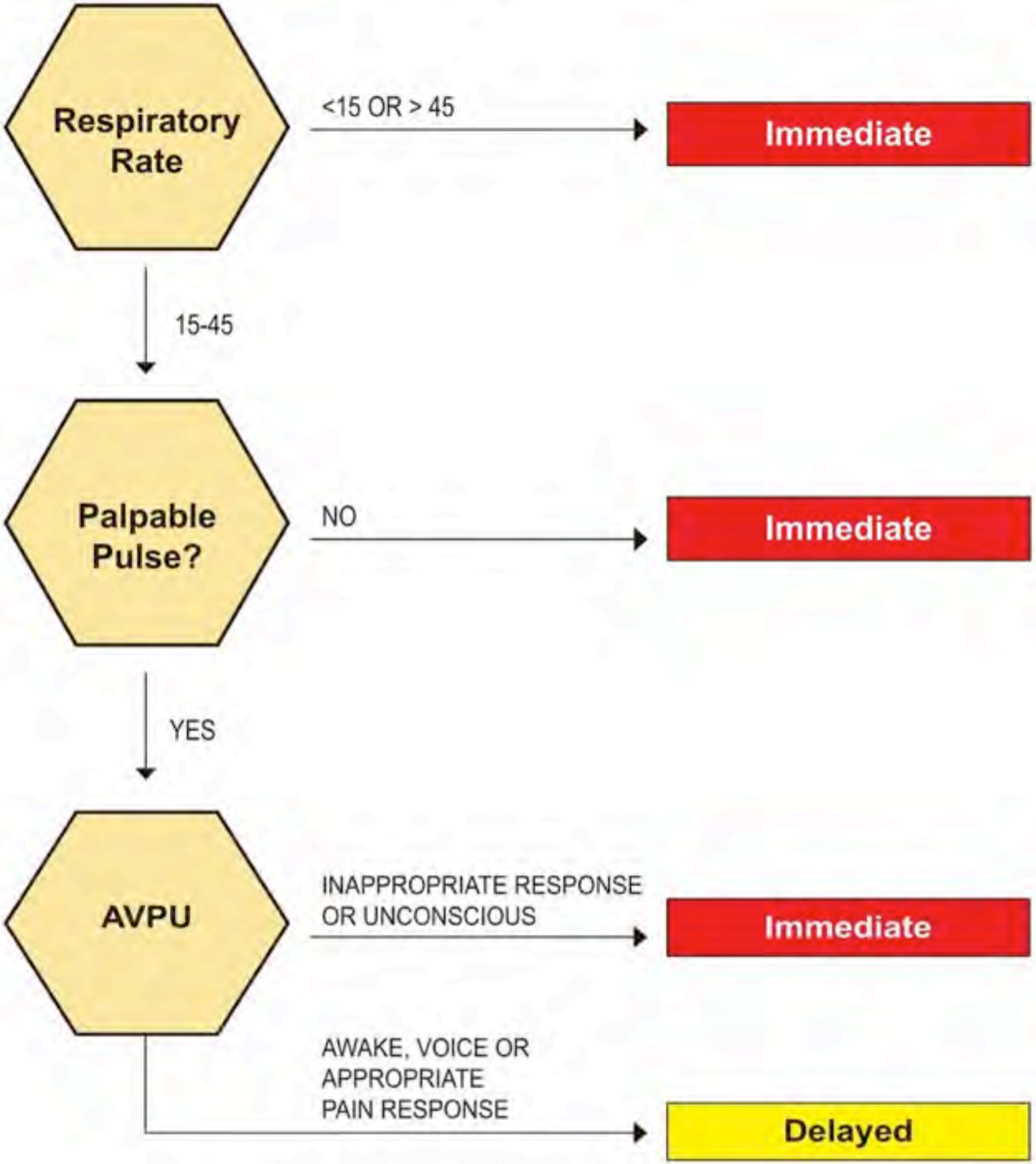
- Children will be victims in most foreseeable disasters
  - Integrate into triage scenarios
- Pediatric triage disaster scene → hospital
- Consider pediatric physiology
- Head injuries, CSHCN and mental health needs integrated into triage
- Treatment of child victims requires knowledge of vulnerabilities

JumpSTART Pediatric MCI Triage*



Adapted from Lou Romig, MD


Able to walk?
YES
Minor
YES
Secondary Triage*
*Evaluate infants first in secondary triage using the entire JS algorithm
NO
Breathing?
NO
Position upper airway
BREATHING
Immediate
NOT BREATHING
Palpable pulse?
NO
Deceased
YES
YES
5 Rescue Breaths
NOT BREATHING
Deceased
BREATHING
Immediate



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Model Uniform Core Criteria For Disaster Triage

- Triage systems must apply to all ages and populations of patients
- Triage systems must be applicable across a broad range of mass-casualty incidents with a single location with multiple patients
- Triage systems must be simple, easy to remember, and amenable to quick memory aids
- Triage systems must be easy to apply and practical for use in an austere environment.

Model Uniform Core Criteria For Disaster Triage

- Triage systems are resource dependent, and the system must allow for dynamic triage decisions based on changes in available resources and patient conditions.
- The triage system must require that the assigned triage category for each patient be visibly identifiable (e.g., triage tags, tarps, markers).
- Triage is dynamic and reflects patient condition and available resources at the time of assessment. Assessments must be completed whenever possible and categories adjusted to reflect changes

Model Uniform Core Criteria For Disaster Triage

- Simple commands must be used initially to prioritize victims for individual assessment.
- First identify those who need a lifesaving intervention.
- Second identify those who are unable to follow the command walk but are able to follow other commands (e.g., wave) or make purposeful movement.
- Last identify those who follow commands by walking to an assigned place or make purposeful movements

Model Uniform Core Criteria For Disaster Triage

- Lifesaving interventions are considered for each patient and before assigning a triage category.
- Lifesaving interventions are performed only if equipment available, within the provider's scope of practice, the intervention can be performed quickly (i.e., in less than 1 min), and if provider does not need to stay with the patient.
- Lifesaving interventions include: controlling life-threatening external hemorrhage, opening the airway using basic maneuvers (for an apneic child, consider 2 rescue breaths), chest decompression, and providing auto-injector antidotes.

Model Uniform Core Criteria For Disaster Triage

- Each victim must be assigned to 1 of 5 triage categories (immediate, delayed, minimal, expectant, and dead). Each category must be represented with an associated color: immediate/red, delayed/yellow, minimal/green, expectant/gray, dead/black.

- Assessment must not require counting or timing vital signs and instead use yes–or-no criteria.
- Diagnostic equipment must not be used for initial assessment.
- Capillary refill must not be used as a sole indicator of peripheral perfusion.

Model Uniform Core Criteria For Disaster Triage

- Patients who are not breathing after 1 attempt to open their airway (in children, 2 rescue breaths may also be given) must be classified as dead
- Patients are categorized RED, YELLOW, GREEN, GREY or BLACK based on standardized decision process

What Is SALT?

- SALT = Sort, Assess, Lifesaving interventions, Treatment/Transport
- Uses voice commands to globally sort patients.
- The goal is to globally sort patients for individual assessment.

SALT Primary Triage Performed at Disaster Site

SALT Categorization

Serious, life-threatening injuries. (Expected to survive with current available resources.)

Serious injury, however, care can be delayed without causing more harm.

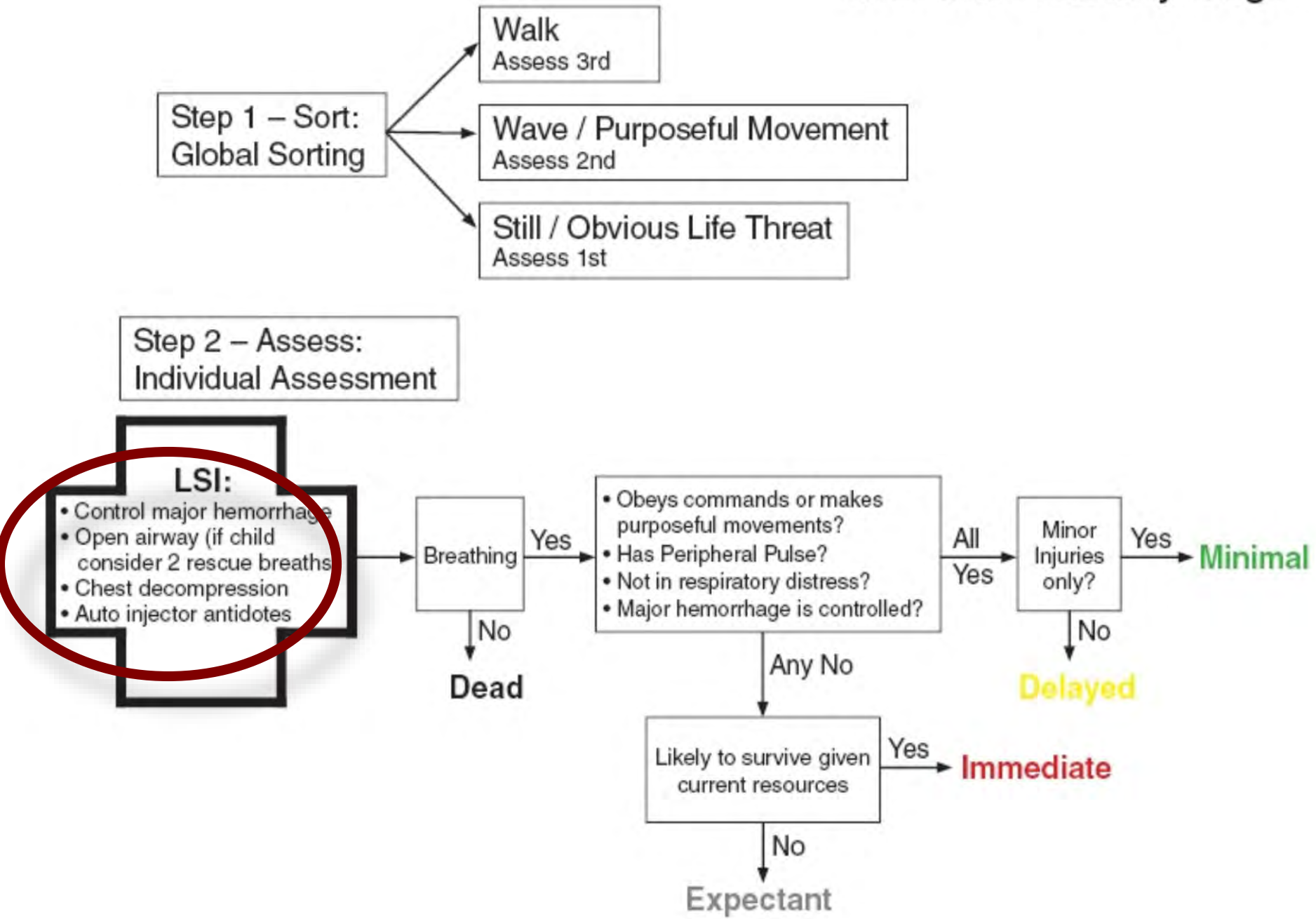
Minor injuries.

Serious, life-threatening injuries (NOT expected to survive with current available resources.)

Learn more about SALT at http://ncdmph.usuhs.edu/Documents/Mass%20Casualty%20Triage%20

NEXT

SALT Mass Casualty Triage



STEP 1: Global Sorting

- Priority 1: Still/Obvious life threat
- Priority 2: Wave/Purposeful movement
- Priority 3: Walk

Global Sorting: Action 1

- Action:
  - "Everyone who can hear me and needs help, move to [designated area]"
    - Use loud speaker if available
- Goal:
  - Group ambulatory patients using voice commands
- Result:
  - Those who follow this command - last priority for individual assessment

Global Sorting: Action 2

- Action:
  - "If you need help, wave your arm or move your leg and we will be there to help you in a few minutes"
- Goal:
  - Identify non-ambulatory patients who can follow commands or make purposeful movements
- Result:
  - Those who follow this command - second priority for individual assessment

Global Sorting Result

- Casualties are now prioritized for individual assessment
  - Priority 1: Still, and those with obvious hemorrhage
  - Priority 2: Waving
  - Priority 3: Walking

Step 2: Individual Assessment

- Provide Life Saving Interventions
  - Controlling major hemorrhage
  - Opening airway if not breathing
    - If child, consider giving 2 rescue breaths
  - Chest needle decompression
  - Auto injector antidotes