Pediatric Disaster Response: The Small Differences that Make a Big Impact

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Learning Outcome:

• Review historical context, prevalence and impact of mass casualty events that have high impact on children and apply lessons in design of disaster response plans that are specific to pediatrics

• Understand specific needs and considerations of the pediatric patient to include anatomic, physiologic and development milestones and how these differences may impact at response plan to include Children with Functional Access Needs (CFAN)

• Identify unique response teams and planning that are necessary when children are involved in a mass casualty event and how to adapt planning and education to meet those needs
Required Disclosures

Conflict of Interest:
Senior Consultant, Phillips
Mass Casualty Events (MCE) / Disaster

- Any event that overwhelms the resources
- Types
  - Natural
  - Accidental
  - Intentional Event
- Number of casualties
Pediatric Events over the Years


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Prevalence & Impact

- One-third of victims
- Pediatric Care data
- Disproportionate number of children
- Morbidity and mortality rates
- 3 impacts to children
  - Physical health
  - Mental health
  - Education

Kousky, 2016
Why is this important?

NEEDS of the kids + CARE consideration = The Difference
Parents come to critical access or community hospitals assuming that ED’s are prepared to care for emergency conditions in children – most not assuming that the “Right sized” equipment may not be there.

National Pediatric Readiness Project (2013) assessment

(EP) Elements of Performance will apply to hospitals and jointly supported by AAP, ACEP and ENA.
### Just What Are the Physiologic Differences?

<table>
<thead>
<tr>
<th>Feature</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thinner Skin</td>
<td>More pliable skeletons</td>
</tr>
<tr>
<td>Higher surface area to mass ratio</td>
<td>Developmentally reliant on adults</td>
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<tr>
<td>Higher minute ventilation</td>
<td>Immune systems</td>
</tr>
<tr>
<td>Larger heads</td>
<td>Dehydrate more easily than adults</td>
</tr>
<tr>
<td>Fontanelles may still be open</td>
<td>Short stature</td>
</tr>
<tr>
<td>Airway is floppy and difficult to maintain</td>
<td>Baseline mental status</td>
</tr>
<tr>
<td>Physiologic compensation mechanisms</td>
<td>Internal organs closer in proximity and not as fixed</td>
</tr>
<tr>
<td>Higher baseline pulse and respiratory rates</td>
<td>Interventions are weight based and in kilograms</td>
</tr>
</tbody>
</table>

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“Noggin” to Toe ~ Physiologic Differences

- Disproportionate head to body ratio – more susceptible to head injury
- Big head makes airway management more difficult
- Blast injury patterns larger head potentially increasing blunt traumatic brain injury
- Assessment of mental status matched to development
Just Breathe……

• Respiratory physiology varies by age
• Smaller airway prone to occlusion: secretions & debris
• Airway smaller & anterior making intubation difficult
• Kids are closer to the ground – getting them closer to high vapor density agents when they breathe
The ❤️ of it

• Circulatory collapse minimal fluid reserve
• Cardiac output dependent on HR over stroke volume
• Higher resting heart rate
• BP & cardiac output stability: miss early signs of shock and may under triage
Digestive / Organs

• Solid organs are proportionally larger and closer and less protected
• Fluid and Electrolyte balance difficult to maintain, become dehydrated easily from vomiting & diarrhea
• Metabolize drugs differently
• Air in the tummy
Sticks & Stones may hurt those ….

- Greater BSA relative to mass and permeable skin may receive higher doses of toxin
- Susceptible to heat loss, Thinner skin
- Younger than 8 more susceptible to high C-spine fracture
- Skeletons still under development
- Pliable bones may result in underlying organ injury without boney disruptions
Additional Body System considerations

• Renal – more prone to renal failure when under stress because of decrease in functional reserves
• More susceptible to seizures – toxic exposure
• Medication management - doses
Immune System

• Biologic agent exposure – immature immune systems resulting in higher mortality from infection – the treatment for biological terrorism is not studied and in some cases contraindicated in children

• Current pandemic & impact on children
Development ~ Through the Ages

- Lack preservation skills that enable them to react
- Vulnerable because of physical and mental limitations based on developmental milestones
- Communication and self protective abilities
- Coping skills
- Understanding psychological stress
Children with Functional Access Needs (CFAN)

- CFAN
- Children receiving routine medication at school
- Children needing specialize interventions
- Chronic health conditions
- IDEA categories
- Infrastructure failure

www.cdc.gov/ncbddd/disabilityandhealth/emergencypreparedness.html

Picture credit: Jennifer & Amy Makar
Plan for the Worst & Improve the Outcome

An organization or agency that plans for and incorporates the specific vulnerabilities of the pediatric population will increase the success in treating children and improve outcomes.

Burke, Iverson, Goodhue, Neches, Upperman (2010)
Disaster planning including Children

- Children assumed to be treated the same as adults
- Planning is a high priority as pediatric resources will quickly become overloaded and children will arrive at adult hospitals
- Considerations for usual transfer MOU / MOA
- Identification of at Risk Populations
What will your Workforce look like?

• 17% -25% reduction in workforce availability during an event – family and childcare play a role
• Mitigation – programs to support family care
• Concerns for personal safety
• Staff feeling prepared – organizations need to take steps to help staff feel prepared

www.cdc.gov
Components of Pediatric Readiness Response

- Preparation
- Partnership
- Essential Resources
- Infection Control & Decontamination
- Family Tracking

- Legal & Ethical
- Mental Health
- Children Functional Needs
- Staffing / Training
- Recovery & Resiliency
Mitigating Poor Outcomes – Planning for Peds

National Pediatric Readiness Project
Preparing for Pediatric Response

- Supplies
- Care team approach
- Pediatric training
- Pediatric advocates
- HVA – your risks
- Pediatric staff champion
Partnering to build Pediatric Surge Capacity

- Community partnership
- Capacity and capabilities
- Pediatric transport
- Telemedicine
Essential Resources

- Alternate / expanded care spaces
- Pediatric equipment
- Pharmaceuticals
- Dietary
- Accommodations
Infection Control / Decontamination

**Decontamination**

- Temperature based water controls for DECON
- Families intact

**Isolation & Disinfection**

- Pedi sized surgical mask
- Capabilities
- Cleaning toys
Tracking, Security & Reunification

- Child ID
- Tracking tool
- Keeping families intact
- Security
- Reunification
- Special populations
- Family Support & Information
Legal & Ethical Considerations

• Consent / Assent
• Vaccination
• Unattended children
• Provider credentialing & privileging
• Maltreatment
• Scare treatment allocation

• Understanding EMTALA, SCHIP impact on children during emergencies
• Regulatory preparedness requirements
• Crisis standards of care
Mental Health

- Pediatric psychological first aid
- Discharge planning for MH support
- Mental Health as part of core team
- Risk screening
- Death notification / bereavement support
- Exposure
Staffing, Drills & Training

- Pediatric victimology
- Pediatric Champions
- Triage
- Pediatric Care review process
- Curriculum & Training

Knowledge is power!
Recovery, Resiliency, Normalization

- Community partnerships
- Professional self care
- Bereavement support
- Disposition tracking
- Trauma Informed Care / Resiliency
- Parent Information Sheets
START Triage ~ Refresher

- 30 seconds or less per patient
- Limited interventions
- 4 Triage Categories
- START Triage
Pediatric Triage ~ Thinking a “little” different

- 1995 (2001) – Miami Florida Children’s Hospital
- Limited scientific review
- Most commonly used algorithm for children
Pediatric Triage ~ Yellow

- Respiratory rate between 10 / 15 – 45
- Palpable peripheral pulse
- Age appropriate mental status

ADULTS
- Respiratory Rate less than 45
- Radial pulse / Capillary refill
- Mental Status to obeys commands
Pediatric Triage ~ Red

- Positioning airway / Rescue breaths
- RR < 15 or > 45
- Absence of peripheral pulses
- Mental status is age in appropriate or posturing

ADULTS
- Positioning of airway only
- No pulse checks
You are part of the response to a rural location in which an EF4 tornado has just struck an area and one of the heavily impacted buildings is a daycare center. It is 1PM on a Tuesday. You are told from incident command that teachers at the school are unable to be located. There are two classrooms of children at the center. Each room is believed to have 10-15 children age 4 and younger. You arrive at the site and find a building fully collapsed upon itself. You are met by a bystander who has an 8 month old child in their arms.
Tornado hits daycare center

Second patient is 2 year old who was trapped under building debris. He is unresponsive, no pulse and not breathing. What is your first action?

a. Tag Black and move to the next patient
b. Perform CPR
c. Provide 5 rescue breaths
d. Immobilize his neck, initiate PALS and fluid resuscitate
A third child is found and pulled from under the debris of the building. He looks to be about 4 years old. Initially you see him breathing but becomes apneic and pulseless. What are your next steps?

a. Tag Black  
b. Tag Red  
c. Give 5 rescue breaths  
d. Tag Yellow
Tornado hits daycare

A 3 year old female is found to be semiconscious with multiple abrasions and a deformed right lower extremity. She is moaning in pain. A quick assessment of RR shows she is breathing 6 times a minute. How would you tag this patient according to JUMP Start?

a. Black
b. Red
c. Yellow
d. Green
Tornado hits daycare

A 4 year old child is found in the debris surrounded by the collapsed structure but has abrasions to arms, legs and face. He is able to tell you his name and assists in freeing self from the area once you make a space for him to crawl out. His clothes are torn and he is dirty.

What is the tag you apply to this child?

a. Yellow
b. Red
c. Green
d. Black
Recommendations & Conclusion

- Disaster response must address the unique needs – not just physical – of children.
- Participants of pediatric planning must include pediatric experts – pediatricians, teacher, child life.
- Hospitals must develop operational plans which include equipment, medications and training for the special population.
- More research is needed on hospital preparation for pediatric disaster response.
References


Centers for Disease Control (CDC). www.cdc.gov

Checklist: Essential Pediatric Domains and Considerations for Every Hospital’s Disaster Preparedness Policies. EMSC. Retrieved from https://emscimprovement.center/education-and-resources/toolkits/pediatric-disaster-preparedness-toolbox/


Questions
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1. **ENA Regional Symposium Attendee Survey**

2. **Continuing Nurse Education (CNE) Evaluation**
   a. Be sure to sign-in at the registration table
   b. Complete evaluation based on event day(s) attended
   c. Upon receipt of completed evaluation, your CNE certificate will be emailed to you
   d. All day attendance is required to claim CNE for the specific day