Pediatric Disaster Medicine – Practical Approaches with a Focus on the Haiti Response

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Objectives

• Describe the presenting injuries and medical conditions in children seen in an NDMS field hospital post earthquake

• Discuss the evaluation and management of pediatric disaster victims in an austere environment, including adaptation of adult equipment and supplies

• Identify at least two training opportunities for non-pediatric trained providers
Haiti Earthquake

• Estimated Death – 230,000

• People Displaced in Port-Au-Prince – 700,000

• Estimated people Departing Port-Au-Prince – 597,801

• Estimated Affected Population – 3 million
Activation

• MA-1 On Call for January 2010

• Wednesday, January 13, Team Activated
  – Passports
  – Immunizations
  – Review Personal Packs
  – Assign Groups

• Move 37 personnel to Atlanta, GA to Stage
Haiti Earthquake
Devastating Port-Au-Prince

• MA-1 First US Federal Medical Team in Haiti
• Set up Field Medical Hospital
• Treated over 500 patients
• Completed 66 Surgical Procedures
• Delivered 9 babies
• 1 Death
Haiti Earthquake
Devastating Port-Au-Prince

- IMSuRT E/W/S team I arrived at the site the following day
- Unified command established, integrated personnel
- IMSuRT E/W/S team II arrived to relieve MA-1 & IMSuRT team I on day 13
GHESKIO Field Hospital
Tent City Next To GHESKIO Field Hospital
Tent City Next To
GHESKIO Field Hospital
Making of a Field Hospital
Making of a Field Hospital
Haitian Earthquake

- Higher ratio of children to adult patients due to high birth rate
- Higher level of acuity
Pedi Ward

• Develop pediatric medical care/management area
  – Keep in mind space for guardians to help manage their child’s care
  – Let kids be kids. As bad as it was, the kids still wanted to play.
  – Maintain a safe area
    • No bedside medications
    • No sharp objects/electrical equipment within reach
Pedi Ward

• Psychosocial issues
  – Behavioral regression, personality changes, fear of being alone

• Items to distract the children
  – Balls, stuffed animals, balloons, candy, sun glasses
Pediatric Patient Management

• Family members
  – Goal is to not separate from parent/caregiver but limit to a manageable number at the bedside
  – Family expectations
    • May include unattainable goals such as curing a long standing chronic disease
    • Housing, placement not able to be addressed as we would have in a domestic response
    • Food and water provisions for families impossible in early response
Evaluation of Pediatric Patients

• Initial triage
  – Sick or Not Sick
  – JumpStart/pediatric triage tools
    • Often a combination of MCI triage and hospital triage
    • Initial vital signs

• Approaches to evaluation
  – Family provides history for younger children
  – Preverbal children
  – Nonverbal children
  – Developing trust/rapport quickly
Pediatric Treatment & Re-Evaluation

• Weight based equipment sizes and medication dosing primarily
  – Age based in some cases

• Pediatric patients can deteriorate rapidly
  – Smaller reserves (body water, body fat, lung capacity)
  – Vital sign vigilance
    • Tachycardia, tachypnea and hypotension
Airway Management

• Infants
  – Obligate nose breathers
  – Large occiput

• Children
  – Large tongue and tonsils, floppy epiglottis
  – Narrow airways – obstruction and inflammation result in quicker deterioration than adults
Airway Management

• Equipment sizes
  – Oral and nasal adjuncts
  – ET tubes and laryngoscope blades
  – BVM and mask sizes
  – Pediatric ventilators

• RSI medications
  – Dosing
  – Pharmacokinetic differences in various age groups

• Supply issues
  – Inappropriate BVM’s and ventilators the need to improvise and/or manually ventilate, minimal oxygen
Airway Management
IV/IO access

- Placement of neonatal/pediatric IVs
  - Dehydrated/clamped down states
  - Use of IOs
  - NG and SC fluid resuscitation

- Supply issues
  - Lack of neonatal and pediatric IV catheters
  - Non-needless IV set ups – increased risk of needle sticks
Pediatric medications

• Dose form
  – Suspensions not feasible, no refrigeration
  – Pre-cutting tablets, instructing to crush and put in water/food
  – IV dilutions
    • Aseptic as possible
    • Serial dilutions, minimizing free water
  – Alternate delivery methods
    • Using injectable products PO
    • SC delivery of medications
Pediatric Medications

• Dosing
  – Per kg until adult dose reached in most cases
  – Age based in some cases
  – Absorption kinetics
  – Metabolism kinetics
Environmental control

• Pediatric considerations
  – Loss of heat due to thin skin, less subcutaneous tissue
  – Less ability to generate heat due to smaller muscle mass

• Management
  – Warming lights, bundling, warmed IV fluid, lavages

• Supply issues
  – Limited clothing (hats, t-shirts, blankets, diapers)
  – Improvised incubators out of boxes, mylar blankets and paper sheets/chux.
  – Need for portable warming lights
Improvised Crib
Injuries

• Head trauma
  – Larger head in relation to body size
  – Seizures more common in children post head injury
  – Scalp swelling and hematoma more commonly indicate skull fracture
  – Due to free space in the skull, massive hemorrhages may present symptoms late in the course
  – Most prevalent cause of traumatic death in children
Injuries

• Spinal trauma
  – C-spine fracture less likely than in adults, subluxation more likely
  – SCIWORA

• Abdominal trauma
  – Multi-organ more prevalent due to proximity of organs
  – Rib cage more pliable, muscles less well developed, lack of adipose tissue
Injuries

- **Thoracic trauma**
  - Rib fractures unusual despite underlying trauma to organs

- **Extremity trauma**
  - Decreased calcification, open physes
  - Less likely to be a sprain, more likely to be bony involvement
  - Require early intervention due to increased growth activity at fracture location
Diagnostic Management

• Lack of routine diagnostic tests and imaging
  – Radiology (plain films) – limited, sporadic or not available
  – CT/MRI – not available
  – Laboratory tests – limited, sporadic or not available
    • iStat temperature labile, cartridges in short supply

• Limited OR capabilities
  – Exploratory surgeries generally not possible

• Reliance on physical exam
Medical Management

• Conscious sedation was invaluable
  – minimizing predictable pain and emotional trauma

• Returning patients for daily dressing changes

• Little girl in the party dress howled when removing the her dress for surgery.
  – The answer: remove the dress in the OR once she had been sedated
Daily wound management
Newborn Deliveries

• We delivered 9 babies in the first deployment, X in the second
• One mother with stalled labor
• One mother with pre-eclampsia
• Personnel must be skilled in labor and delivery
  – Mechanics, equipment and medications
  – Warmth, suction
  – Vitamin K, eye antibiotics
  – Magnesium, oxytocin
Delivery
Nutrition

• Food and Hydration
  – No formula, limited to no Pedialyte, the need to coach mothers to breastfeed, the need to make our own Pedialyte from our MRE supplies. Substituting parts of MRE’s for baby food such as apple sauce.
Patient Care & Basic TLC
Patient Care & Basic TLC

• Tent full of kids to play with provided a nice respite from the rest of the day that a lot of us took advantage of.
2 Six Week Old Babies in ICU

• Appropriately managing your current staffing to meet the needs of your patients and care being administered. Know your team personnel and their backgrounds.
Pediatric evacuation and dispo

• Immigration issues
  – USNS Comfort
  – US hospitals
  – Other countries

• Coordination with military transport, local health facilities

• Physical transportation issues
2 Pedi Stretcher
Evac to US Comfort
Pt Transport to LZ for Evac
Pt Evac to LZ

- Limited resources and supplies
Landing Zone
Evac to USNS Comfort
Pediatric Records

• Documentation limitations
  – Family members not present
  – Inability to relay personal information such as name or details of injury/illness
  – Difficulty transferring our EMR information to next care provider
Pt Records
Staff at GHESKIO- first wave
Pediatric Knowledge Gap

• Primarily adult trained providers

• Tools, pocket cards to provide equipment sizes and dosing information

• Just in time instruction by the pediatric providers on the ground
Pediatric Knowledge Gap

• Long term goals
  – Train, train, train
  – Ensure cache adequately address all age groups with proper equipment, medications and adjuvants
  – Develop pediatric tools and guidelines that are included in the cache
  – Consider making the AHA PEARLS and NRP course to be a requirement for all team members
  – Consider requiring maintenance of PALS provider status for all ED and ICU pediatric providers
Human Spirit is NEVER Down for Long!
This presentation includes photographs taken by members of MA-1 DMAT, IMSuRT-East, and by those bystanders kind enough to take our group photos.