EMS Subspecialty Certification Review Course

1.4.5 Controversies over airway management
1.4.5.1 Controversies over airway management
1.4.5.2 Pediatric trauma
1.4.5.3 Specialized equipment
1.4.5.4 Unique issues related to consent
1.4.5.5 Maltreatment
1.4.5.6 Apparent life-threatening event (ALTE)
1.4.5.7 Seizure mimics
1.4.5.8 Special needs children
1.4.5.8.1 Technology dependent

Version: 2017

Learning Objectives

Upon the completion of this program participants will be able to:

- Review demographics/challenges in pediatric EMS
- Review pediatric assessment
- Discuss peds airway management & controversies
- Describe pediatric trauma management
- Discuss Specialized equipment

Learning Objectives

Upon the completion of this program participants will be able to:

- Discuss issues related to consent
- Explain unique clinical issues:
  - Maltreatment
  - Seizures and seizure mimics
  - ALTE
  - Special needs and technology dependent children
Question

Which of the following numbers most closely approximates the volume of pediatric calls within a standard EMS system?

a. 5%
b. 20%
c. 40%
d. 75%

Demographics of Pediatric EMS

• 3.8-10% of volume
• 50% trauma, 50% medical Bimodal distribution: 0-3 years, 13-18 years
  – 0-3 yo: primarily medical: resp. distress and sz
  – 13-18yo: primarily trauma
• 0-3 years is the age group that causes the most concern for providers
  – 76% of providers wanted mandated peds con ed

Why are pediatric patients scary?

• Limited knowledge/skills
  – Inadequate initial training and continuing education
  – Infrequent field experience and skill retention issues
  – Weight based drugs and equipment variations (cognitive overload)
• Empathy for ill/injured child
• Underuse of online medical control
• Older providers trained in “problem-based” protocols (not assessment-based)
  – weaker overall assessment skills?
Pediatric Assessment Triangle

**Appearance**
- severity of illness: 5 components
  - TICLS: Tone, Interactiveness, Consolability, Look/gaze, Speech/Cry

**Work of Breathing**
- 4 Abnormals: Sounds, Position, Retractions, Flaring

**Circulation (to the skin)**
- 3 Abnormals: Pallor, mottling, cyanosis
Pediatric vital sign pitfalls

• overreliance on vital signs which vary by age
• Heart rate
  – > 220 in infant or > 180 in child requires action
  – < 60 if symptomatic requires CPR
• Respiratory rate: slow is bad
• Normal SBP = 70 + (2x age in years)
• Weight
  – Broselow = lean weight, underestimates actual

Pediatric treatments

• Next steps in evaluation are still ABCDEs
  – Caveat on “E”: more prone to hypothermia
• BLS is adequate for all but 12% of peds pts
• Treatments (IVs, etc) can worsen disease/increase distress
  – Often best treatment is NO treatment

Specialized Equipment for Peds

• Size/weight based equipment: can be overwhelming
• 48 states have minimum requirements for pediatric BLS and ALS equipment
• Transport of peds- Do’s and Don’ts from NHTSA
  – Do: drive cautiously/safely, encourage use of EVOC
  – Do: secure all devices and equipment
  – Do: ensure proper restraint systems (carseats for patients AND pediatric passengers, seatbelts for adults)
  – Do NOT: transport “held in arms”
Pediatric Consent/Refusal

- Implied Consent (Emergency Exception) applies in immediate life threats. 4 requirements
  - Legal guardian unavailable or unable to consent
  - Child has an emergency condition placing life/health in danger
  - Tx/transport cannot be delayed to wait for consent
  - Only tx for the emergency condition is provided
- Pediatric consent ages vary by state: usually 14-19 to consent/refuse
- Temporary protective custody by LEO if guardian not competent to refuse
- In cases of abuse/neglect: consent still applies, may need to involve police, med control. Know your mandatory reporting laws

Airway management

- Typically, peds cardiac arrest has respiratory etiology
- Distressed infants= grunting
- Distressed kids= retract and flare
- Give oxygen
- Watch mental status

Controversies in Pediatric Airway Mgmt

- Pediatric airway management remains the largest area of controversy in Peds EMS
  - No survival benefit for ETT vs BVM
  - High complication rates, low success rate
  - High training cost for skill retention,
  - Risk/benefit to patient = is it worth it?
- Limited SGA studies in peds LMA, King, iGel
- Excellent BVM skills are mandatory for peds
**ALTE**

- Apparent Life Threatening Events:
  - "An episode that is frightening to the observer and that is characterized by some combination of apnea (central or occasionally obstructive), color change (usually cyanotic or pallid but occasionally erythematous or plethoric), marked change in muscle tone (usually marked limpness), choking, or gagging. In some cases, the observer fears that the infant has died." (NIH 1986)
- 7.5% of infant EMS encounters, mortality <1-6%
- This has changed but remains in the current book.

New term, subset of ALTE = BRUE: Brief resolved unexplained event (BRUE) — BRUE is not a specific diagnosis but a description of a sudden, brief, and now resolved episode in an infant.

BRUE is defined as an event occurring in an infant younger than 1 year when the observer reports a sudden, brief, and now resolved episode of ≥1 of the following:
1. cyanosis or pallor;
2. absent, decreased, or irregular breathing;
3. marked change in tone (hyper- or hypotonia); and
4. altered level of responsiveness.

A BRUE is diagnosed only when there is no explanation for a qualifying event after conducting an appropriate history and physical examination. By using this definition and framework, infants younger than 1 year who present with a BRUE are categorized either as
(1) a lower-risk patient on the basis of history and physical examination for whom evidence-based recommendations for evaluation and management are offered or
(2) a higher-risk patient whose history and physical examination suggest the need for further investigation and treatment but for whom recommendations are not offered.

**ALTE**

- Peak incidence 10-12 weeks old
- 50% have a defined cause discovered on evaluation
  - 11% abuse: 911 call 5x more likely to be associated with head trauma
  - 1.5% ingestion
  - 0.8% cardiac
  - 0.5-1% meningitis
- If Parents relate a concern- all patients warrant transport for evaluation
- ALTE not a risk for SIDS
Seizures

- Pediatric seizure = 10% of 911 calls
- 5% of children <7y/o will have a febrile seizure
- Check glucose, tx if < 45 mg/dl in neonate, < 60 in older
- Simple = generalized, last < 15 minutes
- Complex febrile = > 15 min, focal, recurrent in 24h, associated with bacterial infection
- Consider ingestion, trauma /abuse (head inj)

Seizures and Mimics

- ABCs are still prime directive in management
- Management is supportive plus benzos (preferred delivery route is evolving)
- Beware mimics:
  - Hypoglycemia
  - Syncope (vasovagal) /Cardiac Arrest/Arrhythmia
  - Medication side effects
  - Myoclonic jerks
  - Pseudoseizures (non-epileptic seizures)

Shock / cardiac arrest

- Shock management / resuscitation
  - Recognition essential – hypotension is late in peds
  - Do not delay transport for IV access in critical ped
- Cardiac arrest: Rare in peds, usually respiratory etiology
  - ABC (not CAB as adult)
  - Initial rhythm asystole 70-80%, PEA 13%, VT/VF 4-8%
  - AEDs are not widely available with peds settings
    • Use adult AED on peds if no other option (supported by AAP).
  - No routine cooling recommended (yet)
Pediatric Trauma

- Leading cause of death and disability in children
- 90% blunt injury
- Head injury is most common, causes 1/3 of deaths
- Higher rates of occult injury (liver, spleen)
- Basic management similar to adults
  - Airway w/cspine, BCDE still in peds
  - Bolus 20cc/kg crystalloid
  - Higher tendency toward hypothermia

Pediatric injury patterns

- Waddells triad (struck by vehicle)
  - Femur fx (bumper)
  - Chest/abdominal injury (thrown on hood)
  - Head (fall back on pavement)
- Bicycle
  - Handlebar injury w/ duodenal hematoma
  - Head injury if unhelmeted
- Lap belt
  - Bruising raises risk
  - Vertebral compression

Peds are 25% of all injured pts in the US
For equivalent trauma severity, children are more likely to die during transport and resuscitation
Head injury most common – disproportionate size and weight causes head to lead.
Over 80% of multisystem trauma includes head injury
1/3 of deaths from head injury
Hypothermia – cover head, heat loss
Pediatric Trauma Score

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<th>+1</th>
<th>-1</th>
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<td>Size</td>
<td>&gt;20kg</td>
<td>10-20kg</td>
<td>&lt;10kg</td>
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<tr>
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<td>Normal</td>
<td>Maintainable</td>
<td>Unmaintainable</td>
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<tr>
<td>CNS</td>
<td>Awake</td>
<td>Obtunded</td>
<td>Comatose</td>
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<tr>
<td>SBP (or pulses)</td>
<td>&gt;90mmHg (palp radial/brach)</td>
<td>50-90mmHg (palp femoral)</td>
<td>&lt;50mmHg (carotid or none)</td>
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<tr>
<td>Open wounds</td>
<td>None</td>
<td>Minor</td>
<td>Major or penetrating</td>
</tr>
<tr>
<td>Skeletal injury</td>
<td>None</td>
<td>Closed fracture</td>
<td>Open/multiple fract.</td>
</tr>
</tbody>
</table>

• Scores -6 to +12
• scores less than 9 predict high mortality

Special needs and Technology Dependent Children

• Multitude of devices in the home: Cardiac and apnea monitors, home oxygen and ventilators, nebulizers, CPAP, peritoneal dialysis, tube feeds, trachs, VP shunt, central line
  – DOPE to troubleshoot: dislodgement, obstruction, pneumo/peritonitis/perf, equipment malfxn
• Utilize parents/caregivers as resources
• Can have high rates of caregiver distress and burnout and higher rates of abuse/neglect
• Consider refresher on new equipment as patients appear in your system
• Use backup devices (BVM, pumps, etc) with malfunctions

Child Maltreatment

• Significant public health issue
• Definition: acts of commission and omission that result in harm or threat of harm to a child
• Most vulnerable: infants, preverbal and special needs/disabled/chronically ill children
• EMS has unique view of home/scene
• Recognize abuse mimics: Mongolian spots, hemophilia
• History from child and caregiver/witness
• Know mandatory reporting laws
Child Maltreatment
• Careful exam for bruises, burns, fractures, injuries inconsistent with age/story, patterned injury, child sexual abuse
• Skin exam is essential:
  – If you don’t cruise (crawl) you don’t bruise.
  – Patterned injuries – cords, hands, pinching, bites
  – Bruise dating is unreliable
  – Bruise location:
    • Normal: bony prominences, forehead, hips
    • Potentially abusive: upper arms, abdomen, cheeks, ears, genitals, and buttocks
• Documentation is critical
• Any possible maltreatment should be transported

Child Maltreatment
• Burns:
  – About 10% of peds burns are abusive, scald most common
  – Recognize patterns:
    • Immersion versus splash
    • Cigarettes, clothes irons, curling irons, heated objects
  – Watch for delays in seeking treatment
• Fractures:
  – 11-55% of ped fx are abusive
  • 55-70% of abusive fractures are in children <1 year old
• Sexual abuse: preserve evidence

Question
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Take Home Points

- Based on clinical/oversight overlaps of pediatrics and total EMS volume of peds, I expect peds as a whole will comprise <10% of exam content
- Peds has a bimodal distribution and a 50/50 split in medical/trauma
- Pediatric Assessment Triangle (Appearance, Work of Breathing and Circulation to Skin)
- No demonstrated survival benefit from field ETT in children

Take Home Points

- Consent/refusal laws vary by state
- Pediatric trauma has the same management priorities as adults, but different scoring
- Maltreatment: document/transport
- Seizures: check for mimics, follow protocols
- ALTE: Bring them in
- Special Needs/Tech Dependent: Use your resources, use back up equipment if needed