Pediatric Office Emergencies and The Makenna David Pediatric Emergency Department

Craig T. Carter, D.O.  
Medical Director - Pediatric Emergency Medicine  
Assistant Professor - Emergency Medicine and Pediatrics  
University of Kentucky

Contemporary Pediatrics - April 9, 2010

Outline

1. History/EBM

2. Office Emergency Plan
   - Staff and training
   - Equipment

3. Primary Office Emergencies
   - Allergic Reaction
   - SOA (asthma, croup, etc)
   - Seizure

4. Transfer - Higher Level of Care
History

Preparedness of Practicing Pediatricians to Manage Emergencies

- 427/1000 office based Pediatricians surveyed
- >90% within 5 miles of ER
- 58% PALS/APLS certified
- 77% had seen ‘severe asthma’, 66% in past year
- 67% had seen ongoing seizure, 45% in past year
- 22% had an arrest in office, 6% in past year

Office Preparedness

- Office training
- Physician
- Nurse
- Tech
- Ancillary Staff
Office Preparedness

- Certification/Training/Courses
  - Basic First Aid
  - BLS/CPR
  - ACLS
  - PALS
  - NALS
  - APLS
  - ATLS

Office Preparedness

- Plan of Action
  - Protocols (set up in advance!)
  - Clearly defined staff roles
    - Primary
    - Secondary
    - Medications/equipment (O2 tank, nebulizer etc)
    - IV
    - Make the call – 911
    - Notify ED
Office Preparedness

- Practice
  - Run mock scenarios
  - Run mock scenarios
  - Run mock scenarios
  - SimBaby
    - Contact UK Physician Liaison
- Calendar/ Routine check
  - Equipment
    - O2 tanks are full
    - Equipment location and comfort with use and set-up
  - Medication
    - Expiration date
    - dosing

UK EM by the numbers…

- Current ED Volume Total - @ 48,000/yr
- Pediatric EM Volume - @ 12,000+/yr
- UK is only one of two Level 1 Pediatric Trauma Centers in the state
- UK has the second Pediatric ED in the state – Opened September, 2007
Pediatric ED at UK?

- “I’ll believe it when I see it.”
- “We have been hearing that for 20 years…”

The Makenna David Pediatric ED
Opens July 14, 2010

- The Pediatric ED
  - @ roughly 7,600 sf.
  - The total area of the ED is @ 37,000
    (length is size of football field plus end zones)
  - Plus additional 4,600 sf. for Radiology
- 12 core /+ 4 flex rooms
- Separate Entrance
- Separate waiting room and triage
- Separate Staff
The Makenna David Pediatric Emergency Department
Office Emergency Equipment/Supplies

- Suction/suction catheters
- Magill Forceps – remove foreign bodies
- Pulse oximeter/Cardiac monitor
- Nebulizer – single or ‘continuous’
- Face masks – various sizes
- Oral/Nasopharyngeal airway
- Ambubags
- Intubation equipment
  - Laryngoscope, blades & Endotracheal tubes
  - EZ cap
  - LMA
  - tape

Emergency Equipment/Supplies

- Portable Oxygen tank
  - Flow meters
  - Masks/tubing
- Albuterol – inhaled
- Nebulizer Equipment
- Racemic Epinephrine – inhaled
- Terbutaline – SQ or IV
- Decadron – PO, IM or IV
Emergency Equipment/Supplies
Vascular

- Automatic defibrillator
- IV, IO
  - EZ-IO
    Single or multi use
- IV tubing/setup
- IV boards
- Normal Saline
- Syringes

Emergency Equipment/Supplies
-Broselow Tape-
Emergency Equipment/Supplies – Commercial

- Broselow® Pediatric Resuscitation System

The Broselow System is designed with children's care in mind. The system supplies you with all the information and equipment you need for your young patients' emergency resuscitation requirements, all contained in a color coded, easy-to-use kit.

- Price: $1,950.00

Emergency Equipment/Supplies – Commercial

- Banyon – 700 Pedi Stat Kit
  - Price: $845
Emergency Medications

- Cardiac
  - Epinephrine
    - 1:1000 for SQ (allergic reactions)
    - 1:10000 (for cardiac/IV treatment)

- Respiratory
  - Albuterol
  - Racemic

- Other
  - Decadron
  - Ativan
  - Valium/Diastat
  - Ceftriaxone
  - Narcan
  - Glucose
  - Benadryl

Laryngeal Mask Airway (LMA)

The LMA consists of two parts:
- The mask
- The tube
Laryngeal Mask Airway (LMA)

- Designed to surround and cover the supraglottic area.
- Does not constitute a definitive airway unless an ETT is successfully passed.
- They do not prevent regurgitation or protect airway from aspiration.
- Patients must be significantly obtunded to tolerate insertion.

LMA Size Selection

- **Recommended Size guidelines:**

<table>
<thead>
<tr>
<th>Mask Size</th>
<th>Patient Size</th>
<th>Maximum Cuff Volume (Air)</th>
<th>Largest ETT ID (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Neonates/infants up to 5 kg</td>
<td>up to 4 ml</td>
<td>3.5</td>
</tr>
<tr>
<td>1 1/2</td>
<td>Infants 5-10 kg</td>
<td>up to 7 ml</td>
<td>4.0</td>
</tr>
<tr>
<td>2</td>
<td>Infants/children 10-20 kg</td>
<td>up to 10 ml</td>
<td>4.5</td>
</tr>
<tr>
<td>2 1/2</td>
<td>Children 20-30 kg</td>
<td>up to 14 ml</td>
<td>5.0</td>
</tr>
<tr>
<td>3</td>
<td>Children 30-50 kg</td>
<td>up to 20 ml</td>
<td>6.0**</td>
</tr>
<tr>
<td>4</td>
<td>Adults 50-70 kg</td>
<td>up to 30 ml</td>
<td>6.0**</td>
</tr>
<tr>
<td>5</td>
<td>Adults 70-100 kg</td>
<td>up to 40 ml</td>
<td>7.0**</td>
</tr>
<tr>
<td>6</td>
<td>Large adults over 100 kg</td>
<td>up to 50 ml</td>
<td>7.0**</td>
</tr>
</tbody>
</table>
Insertion Technique

1. Lubricate the posterior side of the LMA with water-soluble lubricant

2. Completely deflate the cuff after testing

3. Open the airway using head tilt

4. Press the device onto the hard palate and advance over the back of the tongue.

5. Inflate the collar with air
Problems with LMA Insertion

- Failure to press the deflated mask up against the hard palate or inadequate lubrication or deflation can cause the mask tip to fold back on itself.

- Once the mask tip has started to fold over, this may progress, pushing the epiglottis into its downfolded position causing mechanical obstruction.
Pediatric Emergency Floor Plan
Office Emergency Review

- 4 primary Office Emergencies
  - Allergic Reaction*
  - SOA (asthma, croup, etc)*
  - Seizure*
  - Sepsis

Case Review - true story

Mother of three year old male calls her child's physician and asks about a possible peanut allergy.

...she is concerned about a mild reaction child had the day before which included facial redness and itching after he ate a peanut butter sandwich.

The pediatrician replies....
Case Review  - true story

- Come on in tomorrow with the child and we will check him out....

- ...and bring a peanut butter sandwich, he can eat it in the office and we will see if he has a reaction...

- So the next day...

Case Review  - true story

- Anaphylaxis to peanut butter
  - SOA
  - Wheezing
  - Hives
  - Pruritis
  - Periorbital edema

- Luckily – the physician office was in the office park of hospital and had easy access to the ED
**Allergic Reaction/Anaphylaxis**

**Severity of Reaction**

- **Mild**
  - Pruritis
  - Topical rash
    - Localized reaction
    - Urticaria

- **Moderate**
  - Diffuse rash - severe pruritis
  - Cough
  - Anxious
  - Facial edema
    - Periorbital

- **Severe**
  - SOA
    - Retraction, NF, grunting, strider
  - Wheezing
  - Angioedema –
    - Drooling, tripod, voice changes
  - Severe agitation
  - N/V
  - CV compromise/hypotension
Allergic Reaction/Anaphylaxis

- ABC’s
- IV access and IVF
- Medication
  - Epinephrine
    - 1:1000 at 0.01 mg/kg SQ, max dose 0.3 mg SQ
  - Antihistamines
    - Benadryl – PO, IV
    - Non-sedating antihistamines (samples)
  - Corticosteroids – predolone, prednisone, prednisilone, decadron
    - IV, IM, PO
  - Albuterol MDI or HHN
  - H2 blocker

Asthma / RAD

- Severe Exacerbation
  - SOA
  - Wheezing
  - Retracting
  - Nasal Flaring
  - Grunting
  - AMS

- 4 questions for every asthmatic
  - 1. Have you ever been to ICU?
  - 2. Have you ever been intubated?
  - 3. Last hospital admission/ED visit?
  - 4. Last time on oral steroids?
Status Asthmaticus

Treatment/Intervention

- Pulse Oximetry
- IV Access
- Monitor
- Supplemental Oxygen
- Medications
  - Bronchodilators – B2 agonist
    - Albuterol
    - Xopenex
  - Corticosteroids
    - Decadron
    - Solumedrol – 1mg/kg IV or IM
    - Prelone/Prednisone  2 mg/kg load po
  - Magnesium Sulfate – MgSO4
    - 1mg/kg IV
  - Terbutaline
    - 0.01 mg/kg SQ (max 0.4 mg)
- LMA / RSI

All asthma may not wheeze...and all wheezing is not asthma

FB aspiration/ingestion
All wheezing is not asthma…

- Differential Diagnosis
  - FB aspiration
  - Croup
  - Epiglottitis
  - Allergic Reaction/Anaphylaxis
  - CHF
  - Congenital Heart Disease
  - Pneumonia

"The patient in the next bed is highly infectious. Thank God for these curtains."
Status Epilepticus

- Serial seizure activity without recovery or prolonged, continuous seizure activity that lasts over 30 minutes
- Estimated 100,000 – 150,000 per year in US
- Mortality 1-10%

Status Epilepticus: Causes

- Metabolic encephalopathy
- Infectious encephalopathy
- CNS lesions
- Intoxications / Toxic Ingestions
Status Epilepticus: Benzodiazapine Treatment

Diazepam

- Adult: 0.2mg/kg at 2 mg/min up to 20 mg
- Peds: 0.2-0.5mg/kg up to 20mg IV/IO/ET
- 0.5-1.0mg/kg PR (Diastat)

<table>
<thead>
<tr>
<th>Age</th>
<th>Recommended Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 to 5 years</td>
<td>0.5 mg/kg</td>
</tr>
<tr>
<td>6 to 11 years</td>
<td>0.3 mg/kg</td>
</tr>
<tr>
<td>12+ years</td>
<td>0.2 mg/kg</td>
</tr>
</tbody>
</table>

411 on the 911

- ABC’s – back to basics
  - Airway
  - Breathing
  - Circulation

- Call 911

- Attempt to stabilize but keep the transfer process moving forward to get patient to higher level of care
  - Local EMS
  - Neonatal transport team
  - Helicopter scene flight

- NPO

- Stay Calm!
Transport

- When do you need to call an ambulance:
  - Shock
  - Risk of deterioration
  - Need for monitoring
  - Airway issue/compromise
  - Oxygen requirement to maintain sats
  - Rapid transport
  - If you need to think about it – you probably need an ambulance!

- Consider riding along, depending on severity

- Call ahead to Emergency Room to give history
  - go to nearest Emergency Department

Important Local Numbers

- University of Kentucky - Emergency Department
  - General ED: 859 – 323 - 5901
  - Direct Physician Line: 859 – 257 – 3666
  - My personal Cell: 859-806-6753

Neonatal Transport Team
859-257–5522 (UKMD’s)
1-800 – 777- 8537

Helicopter Services
PHi 1-888-807-0682
LifeNet 1-800-678-9811
StatCare 1-888-729-9111