Approaches to Common Pediatric Disease and Injury: An Emergency Room Perspective

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Recognizing Normals

the basics....
How to do a physical exam

**Infant/toddler/preschooler**: parents present. Nursing consideration: Are they good historians?

**School age**: participatory, able to answer basic questions (remember, language they can relate to!)

**Adolescent**: independence and identity, need privacy and decision making in health care issues
Normal mapped growth and development

Growth and development charts
Health Assessment

1. History of present illness/condition....when did it start?
2. Family History
3. Past medical History, Allergies
4. Vital signs
5. Immunizations
6. Denver II screening test (well child)
7. Sleep patterns
8. Nutrition
Pediatric Systems Assessment: Know your norms!

Infant: grow more in the first year of life then the rest of lifespan combined!

Toddler: gross motor development refines

Preschooler: magical thinking, sensory development

School Age: Industrious and concrete

Adolescent: Identity and control, frontal lobe development
Anthropometric Measurements

- Height
- Weight
- Length
- BMI
- Childhood Obesity (2015, CDC 17%)
- Reasons..........................
More Assessment

9. General behavior.....
10. Skin: rashes
11. HEENT: screenings
12. Neck: swollen glands...what could they be?
13. Chest: Heart sounds/lung sounds
14. Cardiovascular: circulation
15. Gastrointestinal: Peds
16. GU: Common issues
Pediatric Pain

• Subjective vs. Objective
• 0-10 scale, when?
• Wong’s Faces scale: eh
• NIPS: research and current findings
• FLACC: key is consolability
• CHEOPS
What is the reason for using one scale over another?
Developmental perception of pain

• 0-2 yo: sensory stage, pain without understanding source
• 2-7 yo: preoperative stage: pain is punishment
• 7-11 yo: concrete operational: connect pain with injury
• 11-18 yo: formal operational thought
## Common Primary Diagnosis of Children Cared for at MRCH (2015)

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Incidence</th>
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</thead>
<tbody>
<tr>
<td>Fractures (assorted bones)</td>
<td>31</td>
</tr>
<tr>
<td>Asthma, acute exacerbation (3 with status asthmaticus)</td>
<td>18</td>
</tr>
<tr>
<td>Pneumonia, unspecified organism</td>
<td>11</td>
</tr>
<tr>
<td>Acute appendicitis</td>
<td>8</td>
</tr>
<tr>
<td>Appendicular concretions</td>
<td>8</td>
</tr>
<tr>
<td>Varicella without complications</td>
<td>5</td>
</tr>
<tr>
<td>Acute obstructive laryngitis</td>
<td>3</td>
</tr>
<tr>
<td>Acute non-obstructive tracheitis</td>
<td>1</td>
</tr>
<tr>
<td>Dehydration</td>
<td>1</td>
</tr>
<tr>
<td>Superficial foreign body, (unspecified area)</td>
<td>1</td>
</tr>
</tbody>
</table>
## Common Secondary Diagnosis on Children Cared for at MRCH (2015, by classification)

<table>
<thead>
<tr>
<th>Respiratory</th>
<th>GI</th>
<th>Abuse/Neglect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma</td>
<td>Malabsorption/intolerance</td>
<td>Exposure to toxic elements</td>
</tr>
<tr>
<td>ARDS (multi trauma)</td>
<td>Peritoneal abcess</td>
<td>Neglect</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>Appendicitis</td>
<td>Abandonment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trauma</th>
<th>Bones</th>
<th>Systemic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Falls</td>
<td>Fracture, supercondylar</td>
<td>Otitis Media</td>
</tr>
<tr>
<td>MVA/transport</td>
<td>Fracture, ulna</td>
<td>Dehydration</td>
</tr>
</tbody>
</table>
Hospitalization, Emergency Treatment and Family Centered Care

- Caregivers at bedside, why and why not?
- Therapeutic play
- Role modeling
- Guided imagery
- Age specific language
- Care giver needs/stressors

Procedures:

- Infants: parental involvement
- Toddlers: they hate you, accept it...
- Preschool: choice and reward
- School age: concrete, time stamped
- Adolescent: control and explanation
Common Respiratory Disease
REVIEW OF SYSTEMS

- Upper respiratory system
- Sinuses, nasal cavity
- Pharynx, Larynx
- Lower respiratory tract
- Trachea, bronchi, lungs
RESPIRATORY REVIEW....

• < 6 years of age, “belly breathers”
• At 7 years of age, tonsils done growing
• From 6 to 8 years of age, sinuses develop
• Diaphragm expands and contracts, negative pressure created, alveoli expand
  • 4mm to 12 mm
• FB more likely to lodge in Right bronchus
• Immature lung tissue, fully developed at about age 12
• Surface area of alveoli increase 9 times by 12 years old
• Alveoli in newborns 25,000,000, increases to 300,000,000 by age 12.
Respiratory ailments

• Asthma/RSV/Pertussis
• The younger the child, the sicker they can become, why?
• Compensatory mechanisms
Why are children at greater risk for respiratory ailments?

Immature immune systems coupled with rapid decompensation of respiratory system based on anatomy and physiology
Upper respiratory infections

• Nasopharyngitis, the common cold
• Viral in nature
• Pediatric considerations: fall and spring
• Emphasis on prevention and support
• No way to shorten symptoms

• Pharyngitis, sore throat
• Strep throat
• Nursing considerations: highly infectious, antibiotics, throw out your toothbrush (reinfection)
• Possible severe complications: Scarlet Fever, Pneumonia (PNA), rheumatic fever, acute glomularnephritis
Influenza....

- Viral illness
- Have you ever had the flu?
- Supportive treatment, may need hospitalization (weakness and lethargy)
- Opportunistic bacterial infections

- Flu shots
- Obtaining specimen
- If suspected, droplet precautions!
- Spreads very aggressively (epidemic)
- Viruses evolve and adapt prolifically
Tonsilitis

- Two lumps of lymph tissue in the throat, part of the immune system
- Inflammation causes sore throat, difficulty swallowing
- Can be acute, recurrent, chronic, peritonsillar abscesses (the nose knows...)

- Surgical removal if indicated
- Pain management
- Post op complications: bleeding
- No red ice pops!
Pertussis……Bordetella pertussis

- “whooping cough”
- Caused by bacterial infection
- Greater morbidity and mortality in children under 2 years old
- Can be fatal in infants less than 3 months old
- Droplet infection, 80 to 90% of those exposed get it

- Cycle…..
- Incubates in 6 to 21 days from exposure (can you say prodromal?)
- Cough can last for 6 to 10 weeks
- 2 to 4 weeks convalescent period
Pertussis

- First vaccine at 2 months
- Then at 4 months, 6 months
- Again at 15 months and 18 months
- Booster at 12 years

- “Whooping” sound is air intake after paroxysmal coughing
- Cough can rupture blood vessels in the eye and pleura, can cause rib fractures, vomiting, fainting.......
Croup.....

- Effects children 3 months to 36 months
- Edema in larynx accounts for the sound
- Causative agents: RSV, Paraflue
- Nursing considerations

- Steeple Sign
Epiglottitis

• **EMERGENCY!**
• Usually caused by Flu B
• Signs and symptoms: drooling, tripoding
• Rapid onset, systemic toxicity
ASTHMA

• Common chronic respiratory condition
• Varying degrees of severity
• Triad of symptoms: bronchiol spasm, inflammation of bronchiol mucosa, production of thick mucus

• Who is at risk?
  • Minorities
  • Lower socio economic
  • Males versus females
  • Allergies
  • Eczema
ASTHMA

- Signs and symptoms
- Wheezing
- Cough
- Exercise intolerance
- Chest tightness
- Increased expiratory phase
- Retractions/nasal flaring
- allergies
ASTHMA TRIGGERS....

- Allergens
- Weather
- Illness
- Anxiety/emotions
- Temperature
- Animals
- Odors
ASTHMA SEQUELAE.....

• Trigger happens: 10 to 20 minutes until attack
• Allergen specific immunoglobulin E (IgE)
• Activates mast cells/macrophages (remember inflammation lecture?)
• Inflammatory mediators, histamine/leukotrienes
• Smooth muscle contracts
ASTHMA

• Classified by age/symptoms/medication usage/activity intolerance
• Emphasis on prevention
• Peak Flow meter used to measure ability to push air out of lungs (pushing against resistance)
• The asthma personality
• Develop an “Asthma Action Plan”
ASTHMA MEDICATIONS

- Inhaled steroids
- Bronchodilators
- Oral steroids
- Rescue inhalors
- IV smooth muscle relaxers
Lower airway diseases

- RSV (respiratory syncytial virus)
- Causes bronchiolitis
- The smaller the child, the faster the respirations (compensatory mechanism)
- Supportive treatment, especially in infants

- Pneumonia
- Primary (disease process)
- Secondary......name some
- Defined by geography/anatomy
- Lobar, interstitial, empyema, aspiration....
Types of respiratory support......

• Blow by oxygen
• Cool mist
• Warm mist
• Nasal canula
• Simple mask
• Non rebreather mask
• CPAP
• BiPap
• Ventilator
• HFOV
Differences in respiratory distress in children and adults

• Children:
  • Ancillary muscle usage
  • Seek position of comfort
  • Fall off a cliff

• Adults:
  • Verbalize
  • Slide down a hill

Whoops

Un Oh...
Acute Respiratory Distress Syndrome

- Increased capillary permeability leads to pulmonary edema
- Causative agent: disease/trauma
- Nursing considerations
- Supportive care: prevention of hypoxemia, serial x-rays, labs, ABGs
- CPAP/peep
Tuberculosis....Mycobacterium Tuberculosis

- Airborne illness
- Primary (but not exclusively) a lung disease
- “Latent” infections eventually become active disease
- Lungs can become sclerosed or necrotic

- Can also become meningitis
- Can be glandular, skeletal, miliary (accounts for small percentages of cases)
CHRONIC OBSTRUCTIVE PULMONARY DISEASE

• Term for series of diseases
• Causes chronic airflow limitations (CAL)
• Hyperinflated lungs with flattened diaphragm
• Chronic bronchitis
• Emphysema

Lungs with COPD and Pneumonia from a PET Scan
COPD CONTINUED......

Chronic Bronchitis
• Caused by irritants (smoking)
• Bronchus gets irritated
• Cough, sputum production
• Alveoli not effected
• “blue bloaters”

Emphysema
• Caused by inhaled irritants
• Alveoli effected
• Loss of elasticity/hyperinflation of lung
• Dyspnea with increased respiratory rate
• “pink puffers”
COR PULMONALE

• Cardiac failure, right sided due to increased pulmonary resistance
• Lead to cardiac dysrhythmias (atrial fibrillation)
• Later stages of COPD
Infectious Disease

Signs and Symptoms...

Infections
- Viral
- Bacterial
- Fungal
- Parasitic
- Autoimmune

Common...
- Fever
- Malaise
- Congestion
- Cough

Mumps virus
And now some diseases.....

**Chicken Pox**
- Viral
- Caused by Varicella Zoster (Herpes)
- Common childhood illness
- Exposure/antibodies/
- IMMUNITY
- Fever, malaise, teardrop rash, scabs over
- Extreme pruritis
- Vaccine available

**Diptheria**
- Bacterial
- Tx: hospitalization for Antibiotic and Antitoxin therapy
- 50% mortality if untreated
- Vaccine available

Membrane forms
And more diseases.....

**Pertussis**
- Bacterial
- High mortality in infants
- Tx: supportive, antibiotic therapy
- Vaccine available

Whooping cough....

Sound of a child with whooping cough WITH whooping
Sound of a child with whooping cough WITHOUT whooping
CLASSICAL whooping cough with lots of whooping
Male with whooping cough making loud whooping sound
View videos of 2 year old and 6 year old children with whooping cough
Diseases continued…….

**German measles**
- Viral illness
- Similar to measles
- Red rash
- Different virus than the one that causes measles
- Not as infectious as measles
- Tx: supportive
- Vaccine available

**Measles**
- Viral illness
- Highly contagious
- Koplik’s sign
- Rash appears after 3 to 4 days
- Three Cs, cough, coryza, conjunctivitis
- Complications: blindness encephalitis, PNA
- Vaccine available
Classic Illnesses: Telltale Signs

A number of old diseases are making a comeback. The American Osteopathic Association recommends calling your physician immediately if you or a loved one has any of these unique symptoms.

<table>
<thead>
<tr>
<th>Illness</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measles</td>
<td>Rash that starts on the face, red eyes and a bad cough</td>
</tr>
<tr>
<td>Mumps</td>
<td>Swelling above the jaw; plus aches, fever and other flu-like symptoms</td>
</tr>
<tr>
<td>Rubella</td>
<td>Rash on face lasting for 2-3 days</td>
</tr>
<tr>
<td>Chickenpox</td>
<td>Itchy red bumps that appear in clusters, plus flu-like symptoms</td>
</tr>
<tr>
<td>Pertussis</td>
<td>Intense coughing, with a distinctive 'whoop' sound</td>
</tr>
</tbody>
</table>

Prevention:

<table>
<thead>
<tr>
<th>Illness</th>
<th>Vaccine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measles</td>
<td>MMR Vaccine</td>
</tr>
<tr>
<td>Mumps</td>
<td>MMR Vaccine</td>
</tr>
<tr>
<td>Rubella</td>
<td>MMR Vaccine</td>
</tr>
<tr>
<td>Chickenpox</td>
<td>Varicella Vaccine</td>
</tr>
<tr>
<td>Pertussis</td>
<td>DTaP/ Tdap Vaccine</td>
</tr>
</tbody>
</table>

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And more diseases....

**Parotitis**
- Mumps
- Viral
- Airborne transmission
- Tx: supportive

**Mononucleosis**
- Viral: Epstein Barr
- Long illness
- Tx: supportive
- Complications: Peritonsilar abscess, Hepatomegaly, Splenomegaly, Splenic rupture

Notice the assymetric jaw
Childhood communicable diseases

Pediculosis: head lice
- Parasitic infection
- Signs and symptoms, itching, especially around ears, bottom back of hair line
- Eggs are nits, stick to hair shaft
- Hatch cycle every 7 to 10 days
- Easily re-infest host
- Tx: Medicated shampoos, diligence

Scabies: mite rash
- Parasitic infection
- Highly infectious
- Itching, lines of reddened bumps (rash)
- Tx: Permethrin
Impetigo

- Bacterial, Strep or Staph
- Facial sores
- Highly contagious
- Tx: oral antibiotics

Tinea Capis, Corpis, Pedis: Ringworm

- Fungal infection
- Highly infectious
- Thrives in warm moist climate
- Tx: Antifungals, topical and oral
Animals as vectors

- Cat scratch fever
- West Nile virus
- Rabies
- Influenza pandemics
- Rocky Mountain Spotted Fever
- Lyme
Sexually Transmitted Infections

• STIs become sexually transmitted diseases when they are chronic
• Adolescents are a vulnerable population, why?
• EDUCATION!
• Condoms, information, monogamy, abstinence, decreased number of sexual partners
Herpes

- Incurable viral disease
- Why disease?
- Process of exacerbation and remission
- Signs and Symptoms: Papules on genitals or elsewhere after unprotected sex
- Caused by Herpes 2 and Herpes 1
- Many affected are asymptomatic
- Outbreaks and severity decrease over time
- Virus remains dormant in sacral nerve ganglia
- Pregnant women/girls candidates for cesation
- Tx: Antivirals
## Common Gastrointestinal Disease

<table>
<thead>
<tr>
<th>Upper GI</th>
<th>Variable site</th>
<th>Lower GI</th>
<th>Emergencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motility Disorders</td>
<td>Malabsorption</td>
<td>Motility +</td>
<td>Critical</td>
</tr>
<tr>
<td>Aerophagia</td>
<td>Celiac disease</td>
<td>Bellyaches</td>
<td>Pancreatitis</td>
</tr>
<tr>
<td>Dyspepsia</td>
<td>Congenital sucrase-isomaltase</td>
<td>Infant Dyschezia/straining</td>
<td>Appendicitis</td>
</tr>
<tr>
<td>Cyclic Vomiting Syndrome (CVS)</td>
<td>deficiency (CSID)</td>
<td>Functional Constipation</td>
<td>Malrotation with volvulus</td>
</tr>
<tr>
<td>Gastroparesis</td>
<td>Eosinophilic gastroenteritis</td>
<td>Soiling and Functional</td>
<td>Incarcerated hernia</td>
</tr>
<tr>
<td>Gastroesophageal Reflux Disease (GERD)</td>
<td>Food allergies</td>
<td>Fecal Retention</td>
<td>Intussception</td>
</tr>
<tr>
<td>Infant Regurgitation</td>
<td>Inflammatory bowel disease (IBD)</td>
<td>Non-retentive Fecal</td>
<td></td>
</tr>
<tr>
<td>Rumination Syndrome</td>
<td>Lactose intolerance</td>
<td>Incontinence</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Malabsorption</td>
<td>Diarrhea</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Volvulus</td>
<td>Intestinal Pseudo-Obstruction</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Irritable Bowel Syndrome (IBS)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hirschsprung's Disease</td>
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</table>
Appendicitis

Symptoms

• Loss of appetite, with or without vomiting or diarrhea
• Persistent, unexplained belly pain in the lower right side that lasts more than 24 hours
• Inability to cough, jump, or go over bumps in the car without pain
• Difficulty walking and/or staying upright
• "Rebound pain," so called because when you push gently on your child's belly it hurts more when you let go than when you pressed down
Most Common Symptoms

- Abdominal pain: Most common symptom.
- Nausea: 61-92% of patients.
- Anorexia: 74-78% of patients.
- Vomiting: Nearly always follows the onset of pain; vomiting that precedes pain suggests intestinal obstruction.
- Diarrhea or constipation: As many as 18% of patients.
What to look for......

<table>
<thead>
<tr>
<th>Finding</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right lower quadrant pain</td>
<td>81%</td>
<td>53%</td>
</tr>
<tr>
<td>Abdominal wall rigidity</td>
<td>27%</td>
<td>83%</td>
</tr>
<tr>
<td>Classic pain migration</td>
<td>64%</td>
<td>82%</td>
</tr>
<tr>
<td>Pain before vomiting</td>
<td>100%</td>
<td>64%</td>
</tr>
<tr>
<td>No similar pain previously</td>
<td>81%</td>
<td>41%</td>
</tr>
<tr>
<td>Positive psoas sign</td>
<td>16%</td>
<td>95%</td>
</tr>
</tbody>
</table>
Appendicitis

- Interdisciplinary Care
  - Labs - CBC, UA, pregnancy test
  - Diagnostic studies - abd X-ray, pelvic exam, ABD ultrasound
  - Pharmacology - IV’s, antibiotics - third generation cephalosporin - rocephin
  - Surgery - Appendectomy - exploratory vs laproscopy
Laboratory Information in Appendicitis

- CBC with Differential:
  - WBC >10,500 cells/µL: 80-85% of adults with appendicitis
  - Neutrophilia >75-78% of patients
  - Less than 4% of patients with appendicitis have a WBC count less than 10,500 cells/µL and neutrophilia less than 75%

**Note:** In infants, a WBC count is especially unreliable because these patients may not mount a normal response to infection. In pregnant women, the physiologic leukocytosis renders the CBC count useless for the diagnosis of appendicitis.

**Also Check:**
- C-reactive protein (CRP)
- Liver and pancreatic function tests
- Urinalysis (for differentiating appendicitis from urinary tract conditions)
- Urinary beta-hCG (for differentiating appendicitis from early ectopic pregnancy in women of childbearing age)
- Urinary 5-hydroxyindoleacetic acid (5-HIAA)
“Action” Trauma Magnets
Skeletal and Other Traumatic Injury

Areas:

• Upper extremity injury, which includes a broken arm or wrist, collarbone, or ribs
• Lower extremity injury, which includes a broken ankle, hip, or legs
• Soft tissue injury, which affects the muscles, tendon, and ligaments

The most common causes of pediatric traumatic injuries are:

• Falls
• Twisting the ankle
• Sporting accidents
• Other types of accident
• Blows to specific parts of the body
Assessment, Symptoms of a Broken Limb

- Swelling
- Tenderness
- **Bleeding**, but only if the break in the bone damages the skin
- Major bruising
- Inability to move the affected part without experiencing pain
- Bone sticking out at an abnormal angle
- Bone sticking out of the skin
- Numbness
- A pins and needles sensation if some nerves are injured
- Inability to lift or rotate the injured part
- Inability to put any weight (for leg injuries)
- Severe pain when breathing in (for broken ribs)
- Shallow breathing
- A grinding, cracking, or snapping noise is heard at the time of the fall or accident
Neurologic Injury and Disease in Children

Infections of the brain of spinal cord:

• Encephalitis (inflammation of the brain) can be caused by many types of infection (usually viral)

• Meningitis is caused by a bacterial or viral infection that inflames the meninges (membranes surrounding the brain and spinal cord).
Trauma

• Traumatic brain injury including Shaken Baby Syndrome
• Closed head injuries – where no damage is visible; these are common in car accidents.
• Open wounds – where the brain is exposed and damaged by an object.
• Crushing injuries – where the head is crushed and brain damage occurs.
• Spinal cord injuries
And...More Neurologic Injury and Disease

• Seizures
• Neoplasm
• Toxins: Exposure to environmental chemicals or toxins during childhood can lead to neurologic impairment.

**Common neurological disorders affecting children:**

- Brain tumor
- Cerebral palsy
- Congenital malformations
- Developmental disorders
- Encephalopathy, infective
- Epilepsy
Abuse and neglect
Grief......

- **Kubler Ross 5 stages**
  - Denial
  - Anger
  - Bargaining
  - Depression
  - Acceptance

- **Miles and Perry**
  - Shock
  - Intense grief
  - Reorganization
Pediatric perceptions of Death

- Infant: discomfort
- Toddler: separation and disruption, cues from parents
- Preschool: comprehension without verbalization ability
- School age: reasonable understanding, time and permanence
- Adolescent: understanding with difficulty accepting it
The end .....and a beginning...to better

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