Evidence Based Pediatric Treatment Guidelines 2010: Clinical Practice Strategies for the Retail Clinician

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Facilitated by Partners In Healthcare Education and funded by Take Care Health Systems

Recommendations for Preventive Pediatric Health Care

Development & Anticipatory Guidance

• Developmental Screening
  – 9 months
  – 18 months
  – 30 months
• Identify those infants and children with developmental disorders

http://aappolicy.aappublications.org/cgi/content/full/pediatrics;105/3/645/F1
accessed 02-01-2010
Development & Anticipatory Guidance

• Anticipatory Guidance
  – Every visit from birth – age 21
  – Specific guidance is based upon age

http://brightfutures.aap.org accessed 02-01-2010

Immunizations: 0 – 6 years

Recommended Immunization Schedule for Persons Aged 0 Through 6 Years—United States—2010

For those who fall behind or start late, see the schedule below and the catch-up schedule

www.cdc.gov accessed 02-01-2010

Adolescent Schedule: 2010

Recommended Immunization Schedule for Persons Aged 1 Through 18 Years—United States—2010

For those who fall behind or start late, see the schedule below and the catch-up schedule

www.cdc.gov accessed 02-01-2010
Management of Fever

• Definition
  – Temperature ≥ 37.2°C orally or ≥ 98.9°F in am
  – OR ≥ 37.7°C orally or ≥ 99.9°F in afternoon – pm

• When child presents with a fever of 5 – 7 days or less, must consider:
  – Viral vs. Bacterial infections
  – Bacteremia
  – Sepsis

Worrisome Findings: Consider Hospitalization

• Altered LOC
• Abnormal breathing
• Tachycardia in presence of significant findings
• Significantly elevated temperature
• Petechiae
• Cyanosis
• Pallor
• Delayed capillary refill (> 2 seconds)
• Poor muscle tone

Management of Fever

• Antipyretics
  – May mask signs and symptoms of serious conditions
  – Side effects may occur from these medications
  – Do not alter course of illness
• Benefits
  – Good when fever is ≥ 103
  – Always recommend in children with history of febrile seizure
  – May make more comfortable
Management of Fever

- Options for treatment (weight/age dosing)
  - Acetaminophen
  - Ibuprofen
- Caution regarding cool sponge baths
- Education:
  - Monitor closely
  - Reinforce when to call or return
  - Avoid aspirin and related products
  - Increase fluids

Screening

- Anemia
  - Initial anemia screening should be conducted at 9 months – 12 months of age
  - Additional screening between the ages of 15 months – 5 years and 11 years – 21 years, for patients at risk

Age-Based Preventive Screenings

- Lead
  - Environmental history is essential
  - All children should be screened between 9 – 24 months
  - Any child between 25-72 months of age, who has not previously been screened, should also have a blood lead screen performed immediately, regardless of risk
  - Mandatory for all children enrolled in Medicaid
General Health Counseling
• Seatbelts
• Helmets
• Sunscreen
• Smoke Detectors
• Pool Safety
• Carbon Monoxide
• Guns
• Domestic Violence

General Health Counseling
• Drugs
• Alcohol
• Smoking

Remember –
School / sport physicals may be the only contact that the child has with a healthcare professional in a year

Clinical Pearl:
Document visual acuity on all eye complaints
Hordeolum

- Etiology
  - Obstruction of the glands of Zeiss
  - *Staphylococcus aureus* is the most common causative organism
- History
  - Swollen, red, painful lesion on the lid margin
  - Itchiness of the eyelid

Hordeolum

- Physical examination
  - Erythematous, tender nodule on the margin of the eyelid
  - Surrounding edema
- Treatment
  - Warm compresses-20 minutes qid
  - Antimicrobial ointment or drops
  - Good eye hygiene and handwashing
**Viral Conjunctivitis**

- **Etiology**
  - *Adenovirus* is the most common cause
    - 40 strains identified
  - Recent studies have shown that it can remain viable on plastic and metal surfaces for up to 1 month

- **Symptoms**
  - Watery discharge, foreign body sensation, redness
  - URI symptoms are common including sore throat and fever
  - Often bilateral

- **Signs**
  - Normal visual acuity, PERRLA, EOMI, Fund nl
  - Mucoid-slightly watery discharge
  - Mild, diffuse injection
  - Preauricular lymphadenopathy

- **Treatment**
  - Symptomatic only
  - Cool compresses
  - Strict eye hygiene
Viral Conjunctivitis

Bacterial Conjunctivitis

- **Etiology**
  - *Staphylococcus aureus*
  - *Streptococcus pneumoniae/pyogenes*
  - *Haemophilus influenzae*
  - *Neisseria gonorrhoea*

- **Symptoms**
  - Redness, swelling, purulent discharge, itching
  - No symptoms until eye complaints began

Bacterial Conjunctivitis

- **Signs**
  - Normal visual acuity, PERRLA, EOMI, Fund nl
  - Diffuse injection
  - No ciliary injection
  - Unilateral at onset

- **Treatment**
  - Topical antimicrobials x 5-7 days
  - Warm compresses qid x 10-20 minutes
  - Strict eye hygiene given contagion
Bacterial Conjunctivitis

Conjunctivitis

- Viral
  - Palpable preauricular node
  - Watery discharge
  - Mild-moderate conjunctival injection
  - URI symptoms
  - Bilateral

- Bacterial
  - Non-palpable nodes
    - GC and Chlamydia +
  - Purulent discharge
    - GC-Mucopurulent
  - Moderate conjunctival injection
  - Unilateral at onset

Allergic Conjunctivitis

- Two types of allergic conjunctivitis
  - Seasonal and perennial
- Seasonal is most common and caused by the following triggers
  - Pollens
  - Grass
  - Ragweed
- Perennial persists all year and is caused by indoor allergens, such as dust mites
Signs and Symptoms

• Symptoms
  – Itching
  – Watery– stringy-like clear discharge

• Signs
  – Injected conjunctiva
  – Other physical examination findings such as:
    • Dennie’s lines
    • Allergic shiners
    • Allergic facies
    • Allergic crease
Treatment

- Systemic and/or topical antihistamines relieve acute symptoms due to interaction of histamine at ocular H1 and H2 receptors
- Examples of topical antihistamines include: epinastine (Elestat) and azelastine (Optivar)
- Vasoconstrictors are available either alone or in conjunction with antihistamines to provide short-term relief of vascular injection and redness
  - Common vasoconstrictors include naphazoline, phenylephrine, oxymetazoline, and tetrahydrozoline

Treatment

- Mast cell stabilizers include cromolyn sodium and lodoxamide (Alomide), Olopatadine (Patanol), nedocromil (Alocril)
- Nonsteroidal anti-inflammatory drugs (NSAIDs) act on the cyclooxygenase metabolic pathway and inhibit production of prostaglandins. One example is: ketorolac tromethamine (Acular)
Variations of Tympanic Membrane

Normal TM

Acute OM

Otitis Media with Effusion

Acute Otitis Media

• 75% of otitis media infections are viral
• S. pneumoniae is the most common bacterial pathogen
• Less common pathogens
  – H. influenzae
  – M. catarrhalis

Bullous Myringitis

• Mycoplasma
• Intensely painful
• Treatment is with a macrolide
Diagnosis of AOM

- History of acute onset
- Identify presence of middle ear effusion
  - Bulging TM
  - Decreased or absent mobility of TM
  - Air-fluid level present
  - Otorrhea
- Identify signs of middle ear inflammation
  - Erythematous TM
  - Otitis – which interferes with function/sleep

Criteria for Initial Treatment or Observation in AOM

<table>
<thead>
<tr>
<th>Age</th>
<th>Certain diagnosis</th>
<th>Uncertain diagnosis</th>
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<tbody>
<tr>
<td>6 mo-2 y</td>
<td>Antibacterial therapy</td>
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### Antibacterial Agents in AOM

<table>
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<tr>
<th>Temp = 39°C and/or Severe Otalgia</th>
<th>Clinically defined treatment failure at 48-72 hours after initial management with observation option or individual who is a candidate for treatment at initial visit</th>
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<tbody>
<tr>
<td>Recommended</td>
<td>Alternative for Penicillin Allergy</td>
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<tr>
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### Recommended Antibacterial Agents in AOM

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<td>Ceftriaxone 3 days</td>
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### Types of Hypersensitivity

- Non-Type I
  - Rash
- Type I
  - Urticaria or anaphylaxis

[www.aap.org](http://www.aap.org)
Remember…

• For children with OM and tympanostomy tubes:
  – You may also utilize topical medications
  – Floxin Otic (Ofloxacin) 0.3% solution
    • Age 1 - 12 years: 5 drops into affected ear bid x 10 days
  – Ciprodex (Ciprofloxacin):
    • 6 months and up: 4 drops into the affected ear bid x 7 days

Duration of Treatment for AOM

• Results
  – Similar response in all patients between short-course (eg, 5 days) and standard-course (eg, 10 days) therapy
  – Patients <2 years old and those in a daycare setting may achieve better results with 10-day therapy
  – Current recommendation: 5-7 days for all others

Otitis Media with Effusion

• Fluid in the middle ear
• No signs and symptoms of AOM
  – Air fluid levels
  – Dullness of TM
  – Decreased movement of TM
OME

- Treatment:
  - Observation as a treatment option
  - Majority – up to 90% will resolve within 3 months without intervention
  - If still present at 12 weeks – may need hearing evaluation, referral to ENT
  - High risk individuals may be candidates for myringotomy

http://pediatrics.aappublications.org/cgi/content/abstract/113/5/1412 accessed 02-01-2010

Otitis Externa
Otitis Externa

• Pathophysiology
  – Inflammation +/- infection of the external auditory canal
  – Associated with prolonged water exposure, inserting objects into ear, scratching the ear
  – 10-20x more common in the summer
  – Children with eczema, psoriasis, seborrhea are at a greater risk
  – Most common cause: *Pseudomonas*

• Symptoms
  – Unilateral ear pain
  – Discharge from the ear
  – Low grade fever
  – Recent history of swimming or placing something in ear
  – Pain with tragal movement
  – Redness around ear
  – Decreased hearing

• Signs
  – Erythematous, edematous canal
  – Pain with tragal/pinna movement
  – Yellow/green discharge
  – Foreign body
  – Pre or postauricular lymphadenopathy
Otitis Externa

• Plan
  – Diagnostic
    • None
    • Can check culture
  – Therapeutic
    • Remove foreign body
    • Irrigate canal
    • Cortisporin Otic Ear Solution: 4 drops qid into affected ear x 5 days
    • Ciprodex 3 – 4 drops tid into affected ear x 7 days

Otitis Externa

• Plan
  – Therapeutic
    • Warm compresses
    • NSAIDS/Tylenol
    • Prednisone
    • Auralgam
    • Wick

Otitis Externa

• Plan
  – Educational
    • Avoid prolonged water exposure - ear plugs
    • Ear wax removal kits
    • Prevention: Oil into canal; Vaseline on cotton ball
    • No Q tips in ear
    • Try to remove all water after bathing by manipulating ear
Pharyngitis

• Epidemiology
  – Group A Beta Hemolytic Strep
    • Most interest because of its association with severe complications
    • Peritonsillar abscesses, rheumatic fever, post-streptococcal glomerulonephritis - complications

Pharyngitis

• Symptoms
  – Group A Beta Hemolytic Strep
    • Rapid onset of sore throat
    • Fever 103-104
    • Swollen glands
    • Children often complain of abdominal pain
    • Usually-no URI symptoms
    • Headache
    • Decreased appetite
    • Dysphagia
    • Irritability
Exudative pharyngitis

- Differentials include:
  - Strep pharyngitis
  - Peritonsillar abscess
  - Mononucleosis
  - Viral pharyngitis

Pharyngitis

- Plan
  - Diagnostic
    - Throat culture: 24 hour is the gold standard
    - Quick strep: 85-100% sensitivity; 31-95% specificity
    - Must swab both tonsils for best results
    - Consider mononucleosis

Pharyngitis

Even with a best case scenario, 1/3 - 1/2 of cases of strep pharyngitis are missed or overdiagnosed using history and physical examination only!!!

MUST DO A THROAT CULTURE
Remember…
Children with mono have strep pharyngitis 50% of the time

Pharyngitis

• Plan
  – Therapeutic: Strep Pharyngitis
    • PCN VK-standard
    • Treatment is for 10 days
    • Warm water gargles
    • Tylenol/NSAID’s
  – Educational
    • Contagion
    • Quick improvement
    • Discard toothbrush

Peritonsillar Abscess

• Generally begins as an acute febrile URI or pharyngitis
• Condition suddenly worsens
  – Increased fever
  – Anorexia
  – Drooling
  – Dyspnea
  – Trismus
Peritonsillar Abscess

- Physical examination
  - May appear restless
  - Irritable
  - May lie with head hyperextended to facilitate respirations
  - Muffled voice
  - Stridor may be present
  - Respiratory distress

Peritonsillar Abscess

- Physical examination findings
  - Fiery red asymmetric swelling of one tonsil
  - Uvula is often displaced contralaterally and often forward
  - Large, tender lymphadenopathy

Peritonsillar Abscess
**Peritonsillar Abscess**

**Important Reminder**
- If respiratory distress is severe, do not examine the pharynx

**Treatment**
- Aspiration of the abscess may be performed for accurate diagnosis and treatment
- CT scan of the head and neck
  - Monitor airway at all times
- ENT consult is essential
- Usual management
  - IV antibiotics
  - Inpatient management
Viral Upper Respiratory Infection

• Caused by the rhinovirus, adenovirus or coronavirus
• Transmitted through respiratory droplets
• Most common ages: 4 – 7 years
• Begins with sore throat, low grade fever and progresses on to include nasal congestion and a cough
• Typically lasts 3 – 14 days

Treatment

• Mainly symptomatic
  – Avoid cough and cold medications in individuals < 2 years of age
• Consider the following:
  – Decongestants
  – First generation antihistamines
  – Cough suppressants
  – Guafenisen products
  – Chicken soup

General Signs and Symptoms of Respiratory Distress

• Respiratory rate which is > 50% above upper limits of normal for age
• Intercostal retractions
• Nasal flaring
• Substernal retractions
• Grunting with breathing
• Cyanosis/pallor
Asthma and Asthma Exacerbation

Impact of Asthma

- Most frequent cause for hospitalization in children (470,000 each year)
  - Emergency room visits and hospitalizations are increasing
- Most frequent cause of childhood death, particularly amongst certain groups (children, African Americans)
  - 5,000 people die yearly from asthma

Asthma is...

- A disease of:
  - Inflammation
    - Primary Process
  - Hyperresponsiveness
  - Airway bronchoconstriction
  - Excessive mucous production
Epithelial Damage in Asthma

Diagnosis of Asthma

What is Asthma

- "A common chronic disorder of the airways that is complex and characterized by variable and recurring symptoms, airflow obstruction, bronchial hyperresponsiveness, and underlying inflammation."
Diagnosis of Asthma

- History and Physical Examination
- Pulmonary Function Tests
- Monitoring:
  - Peak Flow Meters

Symptoms and Signs of Asthma in Children

- Coughing, particularly at night
- Wheezing
- Chest tightness
- SOB
- Cold that lingers x months with a persistent cough

Diagnosis

- Consider the diagnosis of asthma and perform spirometry if any of these indicators are present. These indicators are not diagnostic by themselves but the presence of multiple key indicators increases the probability of the diagnosis of asthma. Spirometry is needed to make the diagnosis of asthma.
Acute Asthma Exacerbation Management

Case Study

• 6 year old who presents with a 2 day history of increasing sob and wheezing
• Began after developing a URI
• + nasal discharge, wheezing, cough, fever – 99.6
  – Denies ST, ear pain, sinus pain, pain with inspiration
• Meds: none
• Allergies: NKDA
• PMH: Bronchiolitis: age 6 months – required hospitalization

Physical Examination

• 6 year old who is wheezing audibly and obviously uncomfortable
  – RR: 30 and labored
  – Pulse: 124 bpm
  – Lungs: + inspiratory and expiratory wheezes
  – No use of accessory muscles
  – Remainder of exam is unremarkable
Acute Asthma Exacerbation

• Measure Spirometry vs. Peak Flow
• FEV₁ is most important number
  – >80% predicted
  – 50% – 79% of predicted
  – < 50% of predicted

Spirometry Results

• FEV₁ = 62% of predicted
• FEV₁/FVC = 90%
• What does this mean for our patient?

Acute Asthma Exacerbation

• Inhaled short acting beta 2 agonist:
  – Up to three treatments of 2-4 puffs by MDI at 20 minute intervals OR a single nebulizer
• Can repeat x 1 – 2 provided patient tolerates
  – Xopenex 1.25 mg nebulizer
  – Reassess spirometry or peak flow after
• Consider cromolyn sodium nebulizer
Prednisone

- Multiple products available
- Prelone, Orapred, Prednisone
  - 1 mg/kg daily (may split dosage)
- Example: Prednisone 10 mg bid x 3 - 10 days
- No taper necessary

Home Nebulizer

- May be important to order the patient a nebulizer to be delivered to his/her home
- Will be set up by a respiratory company
- Patient and parent will be taught appropriate utilization

Patient Education

- Have plan in place for next URI
- Preventative therapy?
- Environmental modification
- Daily peak flows
Management of Moderate Exacerbations: Response from Emergency Treatment

- Good Response
  - Symptom relief sustained x 1hr; FEV1 or PEF ≥ 70%
  - D/C home
  - Continue SABA & oral corticosteroid
  - Consider inhaled corticosteroid (ICS)
  - Patient education / asthma action plan

- Incomplete Response
  - Mild-moderate symptoms, FEV1 or PEF 40-69%
  - SABA, oxygen, oral or IV corticosteroids
  - Can D/C home

- Poor Response
  - Marked symptoms, PEF <40%
  - Repeat SABA immediately
  - ED / 911; oral corticosteroid

Bronchiolitis
Bronchiolitis

- Bronchiolitis is the most common lower respiratory tract infection in infants and is usually caused by a viral infection
- Most common cause: respiratory syncytial virus
- RSV is responsible for > 50% of all cases
- Other causes: adenovirus and influenza
- Most commonly seen in the winter and spring

Bronchiolitis

- Bronchiolitis
  - Affects infants and young children most often because their small airways become blocked by mucous more easily than older children
  - Usually occurs between birth and 2 years of age
  - Peak occurrence: 3 – 6 months

Burden of Illness

- Typically, bronchiolitis is a mild illness
- Risk factors for more severe illness include:
  - Prematurity
  - Heart or lung disease
  - Weakened immune system
Complications of Bronchiolitis

- Hospitalization
- Respiratory distress
- Children with this condition are more likely to develop asthma later in life

Signs and Symptoms

- Usually presents as the common cold initially
  - Nasal congestion
  - Runny nose
  - Cough
- These symptoms typically last for 1-2 days and then symptoms begin to worsen
  - Fever
  - Vomiting after coughing

Signs and Symptoms

- Cough worsens
- Wheezes frequently occur
  - High pitched sounds indicating a difficulty with air movement
- Worsening respiratory distress may occur
  - Retractions
  - Flaring of the nostrils
  - Irritability
  - Tachycardia and tachypnea
Incubation Period and Duration

- Incubation period is:
  - Days – 1 week
  - This is dependent upon which virus is responsible for the infection
- Duration of symptoms
  - Typically 7 days but children with severe cases may cough for weeks

Treatment

- Symptomatic treatment is the most common treatment
  - Increased fluids
  - Cool mist vaporizer to thin the secretions
  - Tilting the child’s mattress up may be beneficial
- Antibiotics are not helpful

Pharmacotherapy

- Nebulized ipratropium bromide
- Corticosteroids
- Inhaled corticosteroids
Bronchitis

Bronchitis
• Definition: Inflammatory condition of the tracheobronchial tree
– Acute bronchitis
  • Most cases of acute bronchitis are viral (90-95%)
  • 5% are bacterial
– Most frequent cause of bacterial bronchitis – atypical pathogen (i.e. mycoplasma)

Treatment for Bronchitis
• Symptomatic
• Increase fluids
• Steam
• Guiafenesin or similar
• First generation antihistamine
• Cough syrup – usually not helpful or effective
Bronchitis

• Treatment
  – Antibiotics rarely needed
    • If needed, atypical pathogen coverage
  – Prednisone
    • Short, non-tapering burst is often very effective
    • i.e. 5 days

Pertussis

What Is Pertussis?

• Acute respiratory tract infection
• *Bordetella pertussis* (gram-negative aerobic bacillus)
• Highly communicable
• Morbidity in all ages, particularly infants
• Causes prolonged coughing
• Difficult to diagnose
When Is Pertussis Communicable?

Paroxysmal cough onset

<table>
<thead>
<tr>
<th>Weeks of cough</th>
<th>Catarhal stage</th>
<th>Paroxysmal stage</th>
<th>Convalescent stage</th>
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<tbody>
<tr>
<td>1</td>
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Period of communicability

- Persons with pertussis become highly infectious during the catarrhal period.
- Some individuals, especially infants, may be infectious for a period of time longer than shown above.

Reference:

Diagnostic Tests for Pertussis

- NP culture on special media (Regan-Lowe, Bordet-Gengou)
- PCR
- Serologic tests
- Increased WBC with an absolute lymphocytosis
- DFA—variable sensitivity/specificity

Treatment of Cases and Chemoprophylaxis of Close Contacts

- Erythromycin estolate or erythromycin ethylsuccinate (EES) 40-50 mg/kg/day (max 2 g/day) in 2-4 divided doses for 7-14 days*
- Azithromycin 10-12 mg/kg/day (max 500mg/day) 1 dose/day for 5 days†
- Clarithromycin 15-20 mg/kg/day (max 1g/day) in 2 divided doses for 7 days

References:
* Use caution when using macrolides, especially erythromycin, in infants less than 2 weeks old.
† Azithromycin may be given as 10-12 mg/kg/day (max 500 mg/day) on day 1 and 5 mg/kg/day (max 250 mg/day) on days 2-5.
Treatment of Cases and Chemoprophylaxis of Close Contacts (cont’d)

- For patients allergic to macrolides:
  - Trimethoprim-sulfamethoxazole 8mg TMP/40mg SMX/kg/day (max 320mg TMP/1600mg/day) in 2 divided doses for 14 days
- All of these agents reduce transmission of *B pertussis* and ameliorate early symptoms
- No antibiotic lessens the severity or shortens the duration of cough in patients who are already experiencing paroxysmal episodes
- Penicillins/cephalosporins are not effective

References:

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**Stridor**

- Few conditions in pediatrics are as emergent and potentially life threatening as an upper airway obstruction
- Rapid identification and treatment is essential
Differential Diagnosis for Stridor

- Differential
  - Laryngotracheobronchitis (croup)
  - Mechanical obstruction (birth)
  - Foreign body aspiration
  - Peritonsillar abscess
  - Epiglottitis
  - Angioedema

Croup

- Causes:
  - Usually caused by a virus
  - RSV, Parainfluenza or Rhinovirus
- Characteristics:
  - Inflammation and edema of the pharynx and upper airways
  - Narrowing of the subglottic region
  - + laryngospasm is frequently seen
Croup

• Presentation:
  – Mild URI symptoms x 24 – 48 hours
    • Rhinorrhea, cough, low grade fever, sore throat
  – Followed by a sudden onset of:
    • Croupy cough, hoarseness of the voice and stridor
  – Stridor usually begins when the child awakens suddenly from a nap or during the night with a fever

• Presentation:
  – May have wheezing on auscultation
  – Suprasternal and subcostal retractions are most common
  – Tachycardia and tachypnea are frequently present
  – Hypoxemia may occur
  – Severity and course varies significantly but illness usually lasts about 3 days – 1 week

• Treatment:
  – Exposure to a cool night; child often improves on the way to the ED
  – Humidification or mist may be helpful
  – Aerosolized racemic epinephrine can be helpful
    • Very short acting agent delivered via nebulizer
  – Nebulizer with albuterol or Xopenex may offer some benefit
  – Inhaled corticosteroids/prednisone is frequently beneficial
Treatment

- Symptomatic treatment is the most common treatment
  - Increased fluids
  - Cool mist vaporizer to thin the secretions
  - Tilting the child’s mattress up may be beneficial
- Antibiotics are not helpful

Severe Croup

- Airway management may be essential
- Possibilities includes tracheostomy vs. intubation depending upon severity
  - Rarely done any longer although may be needed if child is severe

Pneumonia

- Definition: Acute infection of the lung parenchyma
- Can occur as a result of:
  - Aspiration
  - Viruses
  - Bacteria
- Children < than 4 years
  - Consider: RSV and parainfluenza
  - Consider S. pneumoniae and H. influenzae
Pneumonia

- Children ≥ 5 years
  - Mycoplasma, S. pneumoniae, Chlamydia pneumoniae
- Physical Examination
  - Vital signs
  - Respiratory distress
  - Auscultate lungs (egophony, bronchophony)
  - Palpate for tactile fremitus

Pneumonia

- Diagnostic
  - Chest Xray is recommended for all suspected cases of pneumonia
- Treatment
  - 4 months – 4 years
    - Amoxicillin, Amox/clavulanate, Azithromycin or Clarithromycin
  - 5 years and older
    - Macrolides, doxycycline (generally ≥ 8 years of age)
    - Amox/clavulanate

Chest Pain

- Chest pain in children and adolescents rarely has a cardiac etiology
- Most frequent causes
  - Musculoskeletal injury vs. overuse
  - Gastrointestinal (i.e. reflux)
  - Lung/pleural etiology
  - Psychogenic causes
Cause of Chest Pain in Children

- Precordial Catch – (Texidor’s twinge)
  - Most common cause of chest pain
  - An innocent cause of chest pain
- Very typical history:
  - Sporadic (entirely random)
  - LSB (always same place)
  - Quality – sharp
  - Radiation: fingerpoint
  - Mild – severe
  - Lasts < 2 minutes
  - Respirations make it worse!!

Cardiac Causes of Chest Pain

- Congenital heart conditions i.e. cardiomyopathies
- Arrhythmias must also be considered
- Pericarditis vs. myocarditis must also be considered
- Important:
  - Comprehensive history and physical examination

Murmurs

- Innocent murmurs will be heard in up to 50% of school aged children
- Goal to make sure that you do not miss a serious cardiac anomaly
- Important questions:
  - Any sob with exercise?
  - Any dizziness or syncope with exercise?
  - Any family history of sudden cardiac death?
Characteristics of Benign Murmurs

- No radiation
- Systolic
- Grade ≤ III
- Does not interfere with S1 and S2
- Decreases with sitting or standing
- Equal femoral and radial pulses
- Normal PMI
- Normal history and physical examination

Characteristics of Pathologic Murmurs

- Radiation
- Diastolic
- Grade ≥ IV
- Interferes with S1 and/or S2
- Increases with sitting or standing
- Unequal femoral and/or radial pulses
- Displaced PMI
- Abnormal history

Work – up for Pathologic Murmur

- Cardiac consultation
- Echocardiogram
- If HCM is suspected, must deny sports participation pending additional work-up
  - Increases with standing
  - Systolic in nature
  - Often accompanied by shortness of breath with exercise
Acute vs. Chronic Abdominal Pain

- Acute gastroenteritis – number one cause of acute abdominal pain in children
- Other causes of acute pain:
  - RLL and LLL pneumonia, constipation, UTI, appendicitis, mittelschmerz, ectopic pregnancy and ovarian cysts

Causes of Chronic or Recurrent Pain

- Constipation
- Musculoskeletal pain
- Lactose intolerance vs. celiac disease
- Colitis vs. Crohn's
- IBS
Diarrhea

Statistics

• Common complaint worldwide
  – Millions of individuals develop diarrhea every year

• Young and old individuals at increased risk from this condition
  – Increased risk of dehydration
  – Increased risk of death

Pathophysiology

• 4 basic mechanisms causing diarrhea
  – Retention of water within the intestine
    • Malabsorptive syndrome; lactose intolerance
    • Maalox can produce diarrhea through this mechanism
  – Excessive secretion of water and electrolytes into the intestinal lumen
    • Cholera; E. Coli, Crohn’s disease, laxatives
  – Release of protein and fluid into the intestinal mucosa
    • Ulcerative colitis, Crohn’s disease, infections
  – Altered intestinal motility resulting in rapid transport through the colon
    • IBS, Scleroderma
Acute Diarrhea

• Cause: most likely to be an infectious agent
  – Most will resolve on own
  – If diarrhea persists for 72 hours or more, is associated with gross blood in stool, evaluation is essential

History

• Any other family/friends ill?
• Any recent trips/camping?
• Food intake?
  – Any nonpasturized ciders?
  – Any beef?
  – Uncooked meats?
  – Mayonnaise?
• Medications?

Symptoms

• Sudden onset
• Frequent bowel movements
• Loose, watery stools
• Bloody stools
• Abdominal cramping
• Thirst
• Decreased urination
• Dizziness
• Fatigue
Physical Examination

- Generally unremarkable
- Tachycardia
- Poor turgor
- Orthostatic signs
- Hyperactive bowel sounds (borborygmi)
- Tender abdomen
- Heme positive stool, possibly (E. Coli)
- Fecal impaction

Acute Gastroenteritis

- Symptoms
  - Abdominal pain described as colicky, diffuse, crampy
  - May have vomiting
  - Headache
  - Fever and chills
  - Profuse diarrhea often helps to differentiate it from appendicitis
    - Please remember that 15% of children with an appendicitis will have significant diarrhea

Gastroenteritis

- Signs
  - Temperature
  - Diffuse tenderness
  - No obturator, psoas or markle’s sign
  - Dehydration
    - No urination or tears in 8 hours constitutes dehydration in children
Gastroenteritis

• Diagnosis
  – History and physical examination
  – Fecal leukocytes
    • *Salmonella, Shigella, Amoeba and Campylobacter* all invade the intestinal mucosa and therefore cause leukocytes
    • Inflammatory bowel disease (Colitis, Crohn’s)
    • *E. coli*, viral etiologies do not generally produce these cells

• Stools for O&P
  – *Entamoeba histolytica*
  – *Giardia lamblia*

• Stools for C&S
  – *Salmonella or Shigella*
  – Need to request specific tests for *E. Coli, Yersinia, and Campylobacter*
  – *C. difficile*
    – Previous antibiotic therapy

Gastroenteritis

• Treatment
  – Fluids
  – BRATT diet
    • Avoid lactose
  – Antibiotics
    • Depending upon the pathology-antibiotic regimen varies
  – IV rehydration
  – Hospitalization
  – Anti-motility agents (controversial)
Constipation

• Normal frequency of BM's: 3/day – 3 per week
• Focus is shifting more toward comfort with BM’s rather than number
• Most common GI complaint in the US
• Always ask regarding following:
  – Weight loss, blood in stool, abdominal pain, anorexia, vomiting, anemia

Constipation

• Options for treatment
  – Fiber intake
  – Polyethylene glycol (Miralax)
  – Lactulose
  – Milk of Magnesia
  – Behavioral modification

Don...

Don is a 17yowm who presents with an 2 day history of worsening abdominal pain. Woke him from sleep today. Epigastric at onset. Now seems lower in right side of abdomen. Associated with nausea and vomiting for the past 2 hours and a temp of 100. Denies bowel changes, urinary symptoms.

Meds: none; Allergies: NKDA

What is going on with Don?
Appendicitis

• Inflammation/Infection of the Appendix
  – Can lead to ischemia and perforation of the appendix

• Etiology
  – Most common age: 10-19 years
  – Incidence: 1.1/1000 Persons each year
  – Males>females
  – Whites>Nonwhites
  – Summer-most common time of year
  – Midwest-highest incidence

Appendicitis

• Mortality and morbidity rates remain high
• Perforation rates: 17-40%
  – Perforation has been known to occur within 1st 24-48 hours of the infection

History of a patient with appendicitis

• Careful history is the most important aspect
  – Individual is usually a teen or young adult
• Classic presentation: awakens in the night with vague periumbilical pain
  • Worsens over the period of 4 hours
  • Subsides as it migrates to the RLQ
  • Worsened with movement, deep respirations, coughing
Clinical Pearl

The presence of pain before vomiting is highly suggestive of appendicitis.

Diarrhea before pain is more likely to be gastroenteritis.

Physical Examination

• Abdominal Examination
  – Tenderness at McBurney’s point
    • 1/3 the distance between the anterior iliac spine and the umbilicus
  – Guarding
    • Contraction of the abdominal walls
    • Frequently present

• Rigidity
  – Important predictor of appendicitis
  – Involuntary spasm of the abdominal musculature
  – Caused by peritoneal inflammation
• Markle’s sign
  – Heel-drop jarring test
Physical Examination

• Rebound tenderness
  – Press on area above the pain
  – Suddenly withdraw fingers

• Rovsing’s Sign
  – Pain felt in RLQ when examiner presses firmly in the LLQ and suddenly withdraws

• Psoas Sign
  – Patient is placed in a supine position
  – Ask patient to lift thigh against your hand that you have placed above the knee

• Obturator Sign
  – May be or may not be positive
  – Patient is positioned in supine position with the right hip and knee flexed
  – Internally rotate the right leg

• Internal Examination
  – Consideration to an ovarian cyst

• Rectal Examination
  – May be considered

Laboratory/Radiologic Testing

• CBC with differential
  – Normal wbc count doesn’t rule-out the diagnosis
  – White blood cell count may actually decrease
  – Look for wbc left shift
  – Elevated wbc
  – Elevated neutrophils
  – Elevated bands
Laboratory/Radiologic Testing

- Urinalysis
- CT Scan
  - Within past 2 years, new focused appendiceal/helical/spiral CT technique has been developed
  - Decrease in the laparoscopy rate
  - Ultrasound can still be performed but limitations exist

UTI

- Gram negative bacilli are the most common pathogens (*Escherichia coli*)
- *Staphylococcus saprophyticus* – more likely in young, sexually active women
- Preschoolers and young children will likely present with symptoms similar to an adult
  - Dysuria, urgency, frequency
- Must r/o or consider pyelonephritis

UTI

- Urinary dipstick findings
  - Leukocytes
  - Nitrites
  - RBC's
- Treatment
  - Trimethoprim/sulfamethoxazole (8 – 10 mg/day of trimethoprim)
  - Cefixime (Suprax) in children > 6 years
  - Cefpodoxime (Vantin)
  - Treatment: 7 days – 10 days
Enuresis

• Definition: involuntary urination at night after 5 years of age in girls and 6 years of age in boys
  – Small percentage have diurnal enuresis
• Differentials (particularly if dry in past)
  – Urinary tract infection
  – Emotional issues (divorce, new baby)
  – Type 1 diabetes
  – Neurologic abnormalities
  – Constipation

Enuresis

• Treatment Options
  – DDAVP (Nasal spray no longer approved)
  – Tricyclic antidepressants (caution advised)
  – Bed wetting alarm
  – Bladder training
  – Constipation treatments

School Physical Examination

• Help to maintain the health and safety of the young athlete by...
  – Detecting conditions that may predispose to injury (obesity, recurrent ankle sprains)
  – Detect conditions that may be life threatening (hypertrophic cardiomyopathy)
• Goal to not to exclude an individual from sport’s participation
  – But…to find any problems that might worsen with particular activities
Millions of Young Athletes

• Millions of young athletes are involved in a variety of activities

Goals of the Preparticipation Physical Examination

• Pre-participation physical is also not a substitute for routine primary care
  – However, the preparticipation physical examination is the only contact with a health care provider for 78% of all athletes

Kids Just Want to Have Some Fun!!
Frequency

- AAP recommends examinations every 2 years
- Many schools have different recommendations

http://www.emedicine.com/sports/TOPIC156.HTM#section~TimingFrequencyandTypeofEvaluations
accessed 02-10-2010

Preparticipation Physical Examination

- Guidelines issued by AHA, AAFP and AAP
- Standardized forms recommended to include history and physical examination
- Biggest concern
  - Cardiac pathology
- Most common abnormality
  - Orthopedic abnormality

http://pedsinreview.aappublications.org/cgi/content/extract/22/6/199 accessed 02-10-2010
Sprains/strains

- Most frequently encountered in children:
  - Ankles – number 1
  - Fingers
  - Knees
- Differentiation between various grades
  - First degree: minimal pain, joint stable
  - Second degree: severe pain, minimal joint instability
  - Third degree: severe pain and complete instability


Treatment of Ankle Sprains

- Grade I: ice, elevation, NSAIDs, ankle brace, weight bearing may begin immediately. D/C brace in 1 month.
- Grade II: ice, elevation, NSAIDs, ankle brace, no weight bearing x 7 days
- Grade III: walking cast x 3 – 4 weeks, PT, ankle brace


Fractures

- Most common in children:
  - Fingers, toes, distal radius, clavicle, ankle
- Assessment
  - Capillary refill
  - Surrounding skin
  - Sensation
- Treatment
  - Stabilization, elevation, ice
  - Casting
Chondromalacia Patella

- Occurs mainly in adults but can occur in adolescents
- Pain occurs when climbing stairs or going from a squatting position to standing
- Diagnosis:
  - Consider knee films to rule out subluxation of the patella

Treatment of Chondromalacia Patella

- Decrease activities which require full flexion of the knee and stress on the patellofemoral joint
- RICE
- Quad muscle strengthening
- Physical therapy may be helpful
- Consider orthotics if needed
- NSAIDs as needed

Osgood Schlatter Disease

- Most common in later childhood and early adolescence
- Painful swelling and tenderness of the tibial tuberosity
- Increases with resisting knee extension
- Treatment:
  - Decrease quad loading and bending
  - RICE treatment protocol
  - Quad and hamstring stretching
  - NSAID as needed
Neurologic Conditions

Headache

- Headaches are common in childhood and adolescence
- Primary headaches account for 90+% of all headaches:
  - Migraine
  - Tension
  - Cluster

Headache

- Indications for Headache Work-up
  - Systemic symptoms
  - Neurologic signs and symptoms
  - Onset
  - Older (< 5 or > 50)
  - Previous headache

Treatment for Headaches

- **Tension**:  
  - NSAID or acetaminophen  
  - Rest and heat

- **Migraine**:  
  - NSAID or acetaminophen  
  - Trigger Avoidance  
  - Triptans not indicated in children but frequently used by neurology  
  - Preventative therapies, as indicated

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Syncope

- *Syncope*: sudden loss of consciousness with spontaneous recovery
- Majority of syncopal episodes in children are benign however, must consider the following
  - Seizure activity  
  - Cardiac malformations/pathology

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Syncope

- History of sudden death, family/heart disease, neurologic symptoms, recent illness, drug, alcohol
- ECG, lab, ETT, echocardiogram
- Propranolol trial
- Prolonged biometric
- Neurologist consultation
- Cardiac/cerebrovascular consultation
- Fibrillation activity
- Cardiac malformations
- Neurological symptoms
- Critical care/ICU

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Concussions

- Confusion and amnesia will occur immediately after event
- Often accompanied by headache, dizziness, nausea and/or vomiting
- Symptoms following a concussion may last up to 3 months

Concussion

- Classification of Head Injuries
  - Minimal
    - No LOC + additional symptoms
  - Mild
    - LOC < 5 minutes + additional symptoms
  - Moderate or Severe
    - LOC > 5 minutes + additional symptoms

Second Impact Syndrome

- Suffers second head injury without having fully recovered from first
- May lead to severe intracranial swelling and death
Return to Play

- Multiple Grade 1 – 1 week
- Grade 2 – 1 week
- Multiple Grade 2 – 2 weeks
- Grade 3 – 1 – 2 weeks
- Multiple Grade 3 – 1 month or greater
- Remind player of preventive activities
  - Helmets


Concussion

http://www.cdc.gov/ncipc/tbi/Coaches_Tool_Kit.htm

Dermatologic Conditions
Abscess

- Definition:
  - Collection of pus in the cutaneous tissue which results in a painful, erythematous, fluctuant mass
- Most common locations
  - Inguinal region, neck or back, axillary region, vaginal

Cutaneous Abscesses

- Pathogens
  - Methicillin sensitive staphylococcus aureus
  - Methicillin resistant staphylococcus aureus
- Treatment
  - Incision and drainage is the treatment of choice
  - Many recommend wound culture
  - Antibiotics may be utilized but are not as effective as I&D
  - Warm soaks/compresses

Verruca Vulgaris

- Common warts
- Benign lesions of the epidermis caused by a virus
- Transmitted by touch and commonly appear at sites of trauma, on the hands, around the periungual regions from nail biting and on the plantar surfaces of the feet
Verruca Vulgaris

• Appearance
  – Smooth, flesh colored papules which evolve into a dome-shaped growth with black dots on the surface
  – Black dots are thrombosed capillaries and can be visualized with a 15 blade

Verruca Vulgaris

• Treatment
  – OTC product: Compound W or similar
  – OTC cryosurgery kit
  – Liquid nitrogen
  – Duct tape
  – Cryosurgery in office
  – Cimetidine
    • Immunomodulatory effects at high dosages; effects varied
  – Imiquimod
  – Retin A type products
  – Electrocautery
  – Blunt dissection (plantar lesions)
Urticaria

Etiology
- Referred to as wheals or hives
- Causes: Foods, soaps, inhaled substances
- 20% of the population will have at least one episode
- 2 types: Acute and Chronic
  - Acute is most common - lasting days to weeks (cause is most often identified)
  - Chronic: Lasts more than 6 weeks (cause is rarely identified)

Symptoms
- Hives itch!!!!
- Red plaques

Signs
- Red lesions which vary in size from 2 - 4 mm
- Blanche with palpation

Diagnosis
- History and physical examination
Urticaria

- **Plan**
  - **Therapeutic**
    - Stop medications if possible
    - Stop suspected foods or drinks
    - Cool compresses
    - Antihistamines/H2RA
    - Prednisone

Urticaria

- **Plan**
  - **Educational**
    - Avoid causes
    - Educate regarding possible etiology
    - Discuss side effects of antihistamines (sedation)

Impetigo

- Contagious, superficial skin infection
- Caused by *staphylococi* or *streptococi*
  - *Staph* is the most common cause
  - Makes entrance through small cut or abrasion
  - Resides frequently in the nasopharynx
- Spread by contact
- More common in children, particularly on the nose, mouth, limbs
  - Self-limiting but if untreated may last weeks to months
Impetigo

• Symptoms:
  – Rash that will not go away
  – Begins as a small area and then increases in size
  – Yellow, crusted draining lesions

• Physical Examination Findings
  – Small vesicle that erupts and becomes yellow-brown
  – Initially, looks like an inner tube
  – Crust appears and if removed, is bright red and inflamed

• Physical Examination Findings
  – 2-8 cm in size

• Diagnosis
  – Diagnostic:
    • Culture – Today, must absolutely consider MRSA
  – Therapeutic:
    • Bactroban vs. Altabax
    • 1st generation cephalosporin vs. TMP/SMX
**Impetigo**

- Educational
  - Good handwashing and hygiene
  - No school/daycare for 24 - 48 hours
  - Wash sheets and pillowcases
  - Monitor for serious sequelae

**Bites and Stings**

- Insect Sting
  - Reaction to wasp or yellow-jacket sting can begin within minutes – up to 60 minutes
  - Anaphylaxis can occur within minutes in the individual with allergy
- Treatment:
  - Remove stinger, if present
  - Oral antihistamine
  - Ice pack and elevate
  - Anaphylaxis history: Epi Pen with instructions

**Erythema Chronicum Migrans**

- Etiology
  - Caused by a spirochete called Borrelia Borgdorferi
  - Transmitted by the bite of certain ticks (deer, white-footed mouse)
  - 1st cases were in 1975 in Lyme, Connecticut
  - Occurs in stages and affects many systems
  - Children more often affected than adults
This is NOT a Lyme Bearing Tick

Lyme Bearing Tick

Erythema Chronicum Migrans

• Symptoms
  – 3-21 days after bite
  – Stage 1
    • Rash (present in 72-80% of cases)-slightly itchy
    • Lasts 3-4 weeks
    • Mild flu like symptoms (50% of time)
    • Migratory joint pain
  – Stage 2
    • Neurological and cardiac symptoms
  – Stage 3
    • Arthritis, chronic neurological symptoms
    • Make take years to get to this stage
Erythema Chronicum Migrans

- Signs
  - Rash: Stage 1
    - Begins as a papule at the site of the bite
    - Flat, blanches with pressure
    - Expands to form a ring of central clearing
    - No scaling
    - Slightly tender
  - Arthralgias: Stage 2
    - Asymmetric joint erythema, warmth, edema
    - Knee is most common location

Summer 2009

Erythema Migrans
Erythema Migrans


e 20

Erythema Chronicum Migrans

• Signs
  – Systemic symptoms: Stage 3
    • Facial palsy
    • Meningitis
    • Carditis
• Diagnosis
  – R/O Ringworm (Tinea Corporis)

Plan

– Diagnostic:
  • Sed rate: normal until stage 2
  • Lyme Titer
    – IGM: Appears first: 3-6 weeks after infection begins
    – IGG: Positive in blood for 16 months
    – High rate of false negatives early in the disease
    – Lyme Western Blot
Erythema Chronicum Migrans

- Plan
  - Therapeutic
    - Amoxicillin 500mg tid x 21 days
    - Doxycycline 100 mg 1 po bid x 21 days
    - If in endemic area and tick is partially engorged, may treat with doxycycline 200 mg x 1 dose with food

Pityriasis Rosea

- Etiology
  - Common, benign skin eruption
  - Etiology unknown but believed to be viral
  - Small epidemics occur at frat houses and military bases
  - Females more frequently affected
  - 75% occur in individuals between 10 and 35; highest incidence: adolescents
  - 2% have a recurrence
  - Most common during winter months

Pityriasis Rosea

- Symptoms
  - Rash initially begins as a herald patch
  - Often mistaken for ringworm
  - 29% have a recent history of a viral infection
  - Asymptomatic, salmon colored, slightly itchy rash

- Signs
  - Prodrome of malaise, sore throat, and fever may precede
  - Herald patch: 2-10cm oval-round lesion appears first
  - Most common location is the trunk or proximal extremities
Pityriasis Rosea

• Signs
  – Eruptive phase
    • Small lesions appear over a period of 1-2 weeks
      – Fine, wrinkled scale
      – Symmetric
      – Along skin lines
      – Looks like a drooping pine tree
      – Few lesions-hundreds
      – Lesions are longest in horizontal dimension

Pityriasis Rosea

• Signs (continued)
  – 7-14 days after the herald patch
  – Lesions are on the trunk and proximal extremities
  – Can also be on the face
Pityriasis Rosea

• Diagnosis
  – History and physical examination
• Plan
  – Diagnostic
    • Can do a punch biopsy if etiology uncertain
      – Pathology is often nondiagnostic
      – Report: spongiosis and perivascular round cell infiltrate
    • Consider an RPR to rule out syphilis

Pityriasis Rosea

• Plan
  – Therapeutic
    • Antihistamine
    • Topical steroids
    • Short course of steroids although, may not respond
    • Sun exposure
    • Moisturize
  – Educational
    • Benign condition that will resolve on its own
    • May take 3 months to completely resolve
    • No known effects on the pregnant woman
    • Reassurance

Molluscum Contagiosum

• Infection caused by the pox-virus
• Most commonly seen on the face, trunk and axillae
• Self-limiting
• Spread by auto-inoculation
• Incubation period: 2-7 weeks after exposure
• Contagious until gone
Molluscum Contagiosum

- Asymptomatic lumps
- May have 1 - hundreds
- Physical Examination
  - 2-5mm papule with an umbilicated center
  - Flesh toned - white in color
  - Most often around the eye in children
  - Scaling and erythema around the periphery of the lesion is not unusual
  - If in the genital area of a child should consider sexual abuse

Plan

- Diagnostic: None or KOH prep looking for inclusion bodies
- Therapeutic: Conservative treatment is the best for children
  - Curettage
  - Cryosurgery
  - Tretinoin
  - Salicylic Acid (Occlusal)
  - Laser
  - TCA
Molluscum Contagiosum

• Plan
  – Educational
    • May resolve on own in 6 - 9 months
    • Contagious until lesions are gone
    • Benign
    • Recurrence very common

Scabies

• Etiology
  – Contagious disease caused by a mite
  – Common among school children
  – Adult mite is 1/3 mm long
  – Front two pairs of legs bear claw-shaped suckers

Scabies

• Etiology
  – Infestation begins when a female mite arrives on the skin surface
  – Within an hour, it burrows into the stratum corneum
    • Lives for 30 days
    • Eggs are laid at the rate of 2-3 each day
    • Fecal pellets are deposited in the burrow behind the advancing female mite
    • (Scybala)-feces are dark oval masses that are irritating and often responsible for itching
**Scabies**

- **Etiology**
  - Transmitted by direct skin contact with infested person either through clothing or bed linen
  - Eruption generally begins within 4 – 6 weeks after initial contact
  - Can live for days in home after leaving skin

- **Symptoms**
  - Minor itching at first which progresses
  - Itching is worse at night (this is characteristic of scabies)

- **Signs**
  - Erythematous papules and vesicles
  - Often on the hands, wrists, extensor surfaces of the elbows and knees, buttocks
  - Burrows are often present; May see a black dot at the end of the burrow
  - Infants: wide spread involvement
Scabies

• Diagnosis
  – Scraping to look for mite, eggs or feces
• Plan
  – Diagnostic: Scraping
  – Therapeutic
    • Permethrin 5% cream

Scabies

• Plan
  – Therapeutic
    • Sulfur (6% in petroleum or cold cream qd x 3 days)
    • Antihistamine
  – Educational
    • Cut nails short
    • Scratching spreads the mites
    • Itching can last for weeks
    • Treat all family members
Scabies

• Plan
  – Educational
    • Wash all clothing, towels and bed linen
    • Do not need to wash carpeting
    • Consider animal bathing
    • Bag stuffed animals x 1-2 weeks

Lice/Pediculosis

• Caused by parasites that are found on the heads of individuals – most often children
• Very common in 3 – 10 year old individuals
• 1 out of 10 children will contract while in school
• Lice/eggs are most commonly located on the scalp behind the ears and near the neckline at the back of the neck

Treatment

• Treat hair with pediculicide and comb nits daily
• Machine wash all in hot water cycle (130 degrees F or dry clean items
• Put items which can’t be cleaned into a plastic bag and seal it for two weeks
• Soak combs and brushes for one hour in rubbing alcohol or Lysol
• Vacuum the floor and furniture
Candidiasis/Tinea Infection

- Infection frequently caused by *Candida albicans* which invades the epidermis when there is a break in the skin and there is excessive moisture and heat
- Candida always involves the skin folds
- Orally: thrush (Oral candidiasis)
  - Treatment: Mycelex troches, Nystatin

Candidiasis/Tinea

- Diaper: satellite lesions with well-defined beefy red rash
  - Treatment: Nystatin cream
- Tinea Cruris (male inguinal region)
  - Clotrimazole
  - Miconazole
  - Keep clean and dry
  - Consider treating the tinea pedis

Atopic Dermatitis

- Etiology
  - Most common inflammatory skin disease if childhood
  - Affects 10-12% of all children
  - Caused by an inflammation in response to an allergen, chemical or an unidentified etiology
  - Often occurs in an individual with a family history of allergies
  - 50% of eczematous children will develop allergic rhinitis, asthma
Etiology

• High levels of serum IgE are common
  – Higher the levels of IgE-more severe the case
• Proliferation of T-helper 2 cells; Th-2 cells produce cytokines
• Cytokines cause an inflammatory response in the skin

Atopic Dermatitis

• Signs
  – Pruritic, erythematous dry patches
  – Cracking and fissuring
  – Lichenification (Thickening of the skin)
  – Excoriations (Caused by scratching)
  – Diffuse borders (different than psoriasis)

Diagnosis?
Common Locations

- Infants: scalp, face, and extensors
- Children: neck, flexor folds, feet

Atopic Dermatitis

- Plan
  - Diagnostic
    - None
  - Therapeutic
    - Lubrication: Most important part
    - Perform multiple times daily; particularly after a bath

Atopic Dermatitis

- Therapeutic
  - Limit number of baths or showers
  - Avoid harsh soaps
  - Antihistamines: OTC or prescription
  - Low potency topical corticosteroids
  - Immunomodulator (Elidel or Protopic)
  - Avoids soaps, bath gels, bubble baths, shower gels
  - Intralesional injections of corticosteroids
  - Oral corticosteroids
Atopic Dermatitis

• Educational
  – Explain the chronic nature of this condition
  – Review medications and why they are utilized
  – Avoid harsh soaps
  – Monitor for yellow discharge—often results in impetigo

Acne Vulgaris

• Etiology
  – Disease involving the pilosebaceous unit
  – Most frequent and intense where sebaceous glands are the largest
  – Acne begins when sebum production increases
  – Propionibacterium acnes proliferates in the sebum
  – P. acnes is a normal skin resident but can cause significant inflammatory lesions when trapped in skin

Diagnosis?
Acne Vulgaris

- Diagnosis
  - History and physical examination
- Plan
  - Diagnostic: None
  - Therapeutic
    - Benzoyl Peroxide
    - Topical Antibiotics
    - Oral Antibiotics
    - Tretinoin
    - OCPs
    - Accutane

Chickenpox (Varicella)

- Highly contagious viral infection
- Varicella-zoster virus
- Affects most children before puberty
- Peak incidence is March-May
- Spread via airborne droplets or vesicular fluid
- Contagious for 1 - 2 days before rash until lesions crust
- Incubation period-up to 21 days

Chickenpox (Varicella)

- No prodrome or very mild
- Rash usually begins on the trunk and scalp and then spreads peripherally
- Moderate to intense itching
- Fever: 101-105
- Lesions erupt for 4 days
Chickenpox (Varicella)

- Physical Examination Findings
  - Lesions 2-4 mm papule (rose petal)
  - Thin walled clear vesicle (dew drop)
  - Vesicle becomes umbilicated within 8-12 hours
  - Followed by crusts
  - Lesions are in all stages – hallmark of this disease

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Chicken Pox

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Chickenpox (Varicella)

- Plan
  - Diagnosis: None
  - Therapeutic: Symptomatic Treatment
    - NO ASPIRIN
    - Clip Nails
    - Caladryl or Benadryl
    - Antiviral
Chickenpox (Varicella)

- Plan
  - Education:
    - Call immediately for worsening of symptoms
    - Contagious until all lesions crust
    - Caution of pregnant women and others without immunity
    - Monitor for secondary complications
    - Prevention: Varicella vaccine

Ringworm

- Tinea Corporis
  - Caused by a fungus / dermatophytes which lives on the dead layer of the outer skin
  - Can also be transmitted to an individual from an animal
  - Increased sweating can promote fungal growth

Tinea Corporis
Tinea Corporis

- Produces characteristic rash
  - Pink
  - Scaly
  - Round
  - May be 3 – 5 cm in size

- Treatment
  - Antifungal – topical
    - Miconazole
    - Clotrimazole
  - Avoid touching as it is very contagious
  - No contact sports x 48 hours into treatment

Herpes Simplex Virus

- HSV 1 and 2
- Spread in 3 manners
  - Respiratory droplets
  - Contact with an active lesion
  - Contact with fluid such as saliva
- 90% of primary infections are asymptomatic
- Symptoms usually occur 3 - 7 days after contact

- Symptoms
  - Tenderness, pain, paresthesia, burning, swollen glands, headache, fever, irritability, decreased appetite, drooling
Herpes Simplex Virus

• Physical Examination Findings
  – Grouped vesicles on an erythematous base
  – Gingivostomatitis: Erythematous, edematous gingiva that bleed easily with small, yellow ulcerations
    • Yellowish-white debris develops on mucosa
    • Halitosis
    • Lymphadenopathy
**Herpes Simplex Virus**

- **Plan**
  - **Diagnostic**
    - Viral Culture
    - HSV IgG & IgM serum antibodies
    - Most accurate: HerpeSelect
  - **Therapeutic**
    - Antiviral
    - Pain reliever
    - Cool rinses
    - Oragel

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**Herpes Simplex Virus**

Plan

- **Educational**:
  - Prevent contact with infected individuals
  - Discussion regarding asymptomatic shedding
  - Prevent recurrences
  - Call for worsening of symptoms (I.e. inability to drink, no urination x 8 hours)

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**Roseola**

- Viral infection caused by HHV6 (human herpes virus – 6)
- Most common ages: 3 months – 4 years
- Incubation period: 5 – 15 days
- Fever up to 105 will precede the rash

http://www.ahrq.gov/professionals/clinicians-patients/ency/article-00968.htm accessed 03-01-2010
**Roseola**

- Fever - up to 3 – 5 days
- The fever falls quickly – usually between day 2 - 4
- Rash will first appear on the trunk and then spreads to the limbs, neck, and face
- Rash lasts from hours to 2 days
- May be associated with a febrile seizure


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**Roseola**

- Treatment
  - Ibuprofen
  - Acetaminophen
  - Tepid baths
  - Cautiously with fever


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**Fifth’s Disease (Erythema Infectiosum)**

- Human Parvovirus B19
  - Occurs in epidemics
  - Occurs year round: Peak incidence is late winter and early spring
- Most common in individuals between 5-15 years of age
  - Period of communicability believed to be from exposure to outbreak of rash
  - Incubation period: 5-10 days
  - Can cause harm to pregnant women and individuals who are immunocompromised

Fifth’s Disease (Erythema Infectiosum)

• Low grade temp, malaise, sore throat
  – May occur but are less common
• 3 distinct phases
  – Facial redness for up to 4 days
  – Fishnet like rash within 2 days after facial redness
  – Fever, itching, and petechiae
    • Petechiae stop abruptly at the wrists and ankles
      – Hands and feet only

Fifth’s Disease (Erythema Infectiosum)

• Physical Examination Findings
  – Low grade temperature
  – Erythematous cheeks
    • Nontender and well-defined borders
  – Netlike rash
    • Erythematous lesions with peripheral white rims
    • Rash-remits and recurs over 2 week period
  – Petechiae on hands and feet

• Fifth’s Disease
Fifth’s Disease

• Diagnosis/Plan
  – Parvovirus IgM and IgG
  – IgM=Miserable and is present in the blood from the onset up to 6 months
  – IgG=Gone and is present beginning at day 8 of infection and lasts for a lifetime
  – CBC-May show a decreased wbc count

Fifth’s Disease (Erythema Infectiosum)

• Diagnosis/Plan
  – Was contagious before rash appeared therefore, no isolation needed
  – Spread via respiratory droplets
  – Symptomatic treatment
  – Patient education-I.e. contagion, handwashing
  – Can cause aplastic crisis in individuals with hemolytic anemias
  – Concern regarding: miscarriage, fetal hydrops
  – Adults: arthralgias
Hand, Foot, and Mouth Disease (Coxsackie Virus)

• Caused by the coxsackie virus A16
• Most common in children
• 2-6 day incubation period
• Occurs most often in late summer-early fall
• Symptoms
  – Low grade fever, sore throat, and generalized malaise
  – Last for 1-2 days and precede the skin lesions
  – 20% of children will experience lymphadenopathy

• Physical Examination Findings
  – Oral lesions are usually the first to appear
    • 90% will have
  – Look like canker sores; yellow ulcers with red halos
  – Small and not too painful
  – Within 24 hours, lesions appear on the hands and feet
    • 3-7 mm, red, flat, macular lesions that rapidly become pale, white and oval with a surrounding red halo
    • Resolve within 7 days

• Hand/feet lesions
  – As they evolve – may evolve to form small thick gray vesicles on a red base
  – May feel like slivers or be itchy
Hand, Foot, and Mouth Disease (Coxsackie Virus)

• Plan
  – Diagnostic: None
  – Therapeutic
    • Tylenol
    • Warm baths
    • Oragel or Benadryl/Maalox
    • Magic mouthwash
Hand, Foot, and Mouth Disease (Coxsackie Virus)

- Plan
  - Educational
    - Very contagious (2d before -2 days after eruption begins)
    - Entire illness usually lasts from 2 days – 1 week
    - Reassurance
    - No scarring

Kawasaki Disease

- Characterized by a systemic vasculitis throughout the body
- Seventy-five percent of patients are under five years old
- It is more common in boys than girls
- Majority of cases occur in the winter and early spring
- Believed to be viral in etiology and is not contagious

Kawasaki Disease

- Diagnosis is based on clinical criteria by the American Heart Association:
  - fever for 5 or more days (102 – 104)
  - a polymorphous exanthem
  - nonpurulent conjunctivitis
  - changes in the mucosa of the lips / oral cavity
  - redness or edema with later desquamation of the extremities
  - at least one cervical lymph node > 1.5 cm in diameter
Kawasaki Disease

- Coronary artery aneurysms develop in 15% to 25% of untreated children
- May lead to ischemic heart disease or sudden death
- Treatment
  - IV immunoglobulin
  - Aspirin
  - Echocardiography and cardiac consult

http://circ.ahajournals.org/cgi/content/full/110/17/2747 accepted 03-01-2010

Thank you for your time and attention!
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