



## DISORDERS OF THE GASTROINTESTINAL & GENITOURINARY SYSTEMS

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# Disclosures

Albrey Berber DNP, CPNP-PC

- Has no financial relationship with commercial interests
- This presentation contains no reference to unlabeled/unapproved uses of drugs or products

# Learning Objectives

Upon completion of this review, the course attendee should be able to:

- Describe the process of history/physical assessment of GI/GU systems.
- Summarize common diagnostic tests utilized when evaluating a GI/GU concerns
- Compare and contrast the pathophysiology, clinical presentation, management, and follow-up of the most common GI/GU diagnoses seen in primary care
- Describe education needs related to the most common GI/GU disorders

# Presentation Outline

- I. History and Physical Assessment
  
- II. Common Diagnostic Tests
  
- III. Common GI/GU Diagnoses
  
- I. Education Needs

# **DISORDERS OF THE GASTROINTESTINAL SYSTEM**

# History

- Symptom analysis:
  - How long? How bad? What makes it better/worse? Interventions?
  - Impact on ADLs?
- Heartburn, belching, vomiting
- Nutritional patterns:
  - Increased/decreased appetite/thirst? Food intolerance? Allergies?
  - Nutrition history, feeding habits/patterns
- Elimination patterns:
  - Bowel habits (frequency, times per day/week, consistency, pain, medications)
  - Constipation/diarrhea

# History

- Presence of pain:
  - Epigastric (usually indicates pain from the liver, pancreas, biliary tree, stomach, upper small bowel)
  - Periumbilical (pain generated from the distal end of small intestine, cecum, appendix, ascending colon)
  - Colonic visceral (lower abdominal pain that be dull, diffuse, cramping, burning)
  - Suprapubic (pain indicates distal intestine, urinary tract, pelvic organs)
  - Referred pain?
  - Acute continuous pain is more indicate of an acute process
- Family history of GI disease (gallbladder, ulcers, food allergy)
- Past Medical History (illness, surgeries, clef lip/palate, etc)
- ROS (apnea, asthma, GERD, s/s of cardiac insufficiency, autoimmune symptoms (i.e. rash)

# Physical Examination

- Head to toe examination
- Growth parameters, including BMI
- Assess hydration status (skin turgor, mucous membranes, pulses, tears, cap refill)
- Abdominal assessment (inspect, auscultate, percuss, palpate)
- Assess for peritoneal irritation (obturator, psoas)
- Rectal examination (if indicated)



# Common Diagnostic Tests

- UA & culture
- CBC w/differential
- Serum chemistry, liver profile, lipid profile, C-reactive protein (CRP)
- Fecal fat collection for 72 hours to rule out fat malabsorption
- Pregnancy test
- Urine test for Gonorrhea, Chlamydia
- X-ray (KUB, Upper GI series, Bone age, Chest x-ray-rule out pneumonia)
- Ultrasound
- CT scan (Gold stand for appendicitis)
- MRI
- Esophageal probe (GERD)
- Sweat chloride test (CF)

# Dysphagia

- **Key Characteristics:**

- Difficulty swallowing
- Swallowing is made up of 3 phases: oral, pharyngeal, esophageal
- Can be a result of a structural defect, neurologic, allergic, motor disorders, or mucosal injury

- **S/S:**

- Persistent cough, drooling
- Discomfort w/swallowing or feeling like food get stuck
- Picky eating (prefers liquids, food refusal)
- Heartburn, halitosis, chest pain

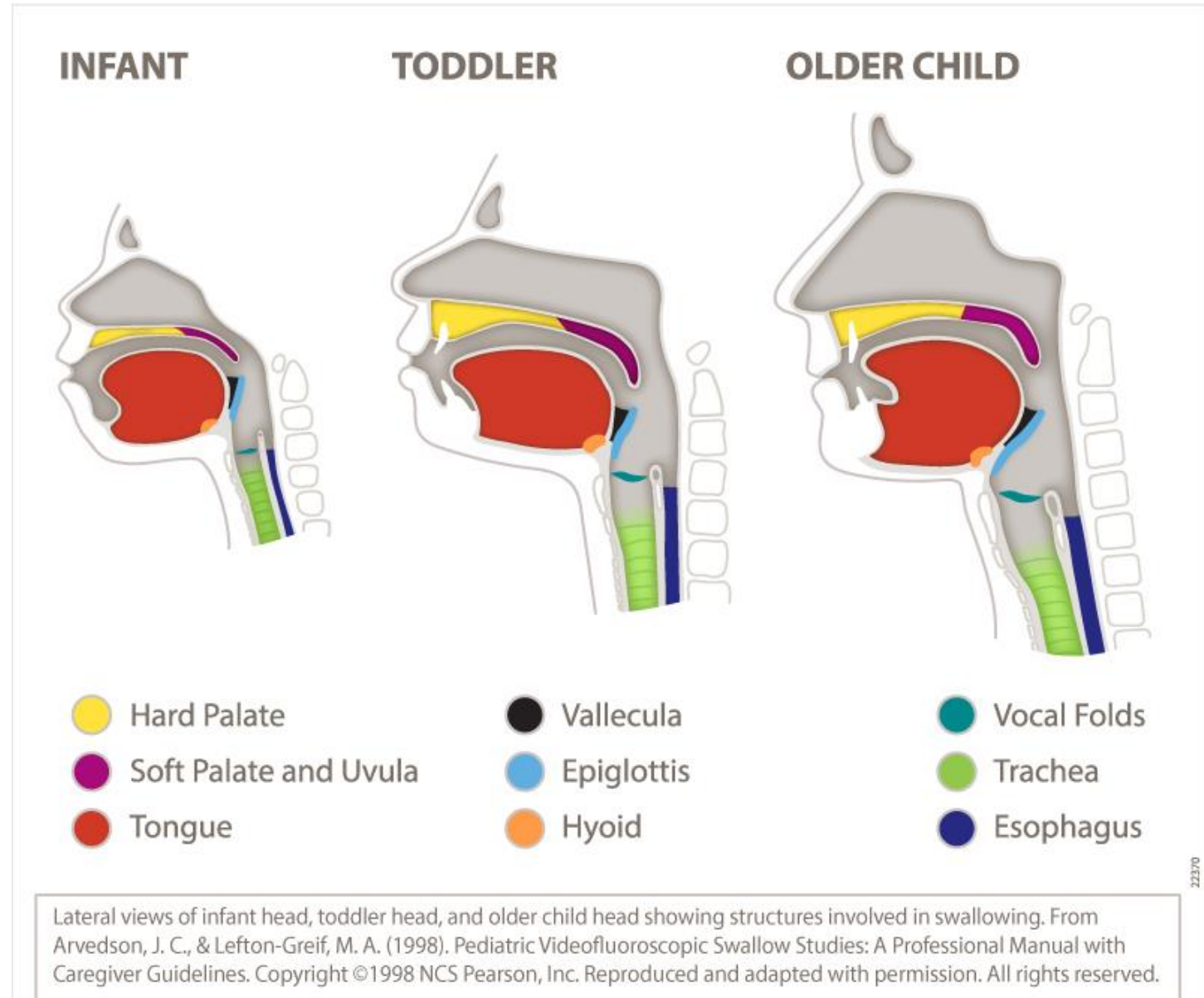
# Dysphagia

## • Evaluation:

- Observe feeding if able
- Complete PE, focus on mouth, throat, neck
- Lateral neck film
- Barium swallow
- Swallow study
- Manometry (gold standard for motor disorders)
- MRI (for structural defects)

## • Management:

- Multidisciplinary approach
- ENT
- ST, OT
- Psychology
- GI
- Nutrition



# Pyloric Stenosis

- **Key Characteristics:**

- Gastric obstruction at the pylorus muscle
- Maternal smoking during pregnancy increases risk
- **Usually occurs 2-3 weeks of age up to 5 months**

- **S/S:**

- Non-bilious projectile vomiting
- Immediately after feeding (can be intermittent or w/every feed)
- Infant hungry after emesis **“happy hungry babies”**
- Visible peristalsis after feeding possible

# Pyloric Stenosis

- **Evaluation:**

- Assess weight gain
- Assess overall hydration
- **Palpable olive-shaped mass, usually right of the umbilicus**
- Abdominal US confirms majority of cases

- **Management:**

- Admission-Rehydration if indicated w/referral to surgery (pyloromyotomy)

# Foreign body (FB) ingestion

- Most FB are not serious; objects pass through the gut w/o consequence.
- Most FB are radiopaque (coins and small toy objects are the most common)
- **Emergent removal of battery ingestion is essential**
- Esophageal FB
  - Common symptoms include: initial episode of choking, gagging & coughing, followed by excessive salivation, dysphagia, food refusal, emesis, pain
- Abdominal FB
  - Most ingested objects that reach the stomach pass through the remainder of the GI tract
  - Abdominal distention or pain, vomiting, hematochezia & unexplained fever could indicate lodging
- Rectum FB
  - Small objects usually pass on their own, large or sharp objects should be retrieved after sedation

# Foreign body (FB) ingestion

- Laboratory studies are usual not helpful unless identifying potential infection
- Most FB are radiopaque. (single frontal x-ray that includes, neck, chest & entire abdomen is usually sufficient to locate the object)
- Esophageal objects should be precisely located w/frontal and lateral views
  - Coins in the esophagus are usually seen on the front view, whereas tracheal coins are more often seen from the lateral)
- Esophageal object removal is mandatory unless it is a blunt objects that have been in place <24 hours
- Abdominal object removal usually not indicated (should pass in 2-3 days)

# Gastroesophageal Reflux Disease

- **Key Characteristics:**

- GER: physiologic process that occurs in healthy infants (normal)
- GERD: pathologic degree of GER, causing symptoms

- **S/S:**

- Infants: Recurrent vomiting, “spitting-up” usually effortless (normal if otherwise healthy & growing)
- Children: Regurgitation, possible vomiting, nausea, epigastric pain, pain can be poorly localized. GERD: Emesis + irritability w/feedings, poor growth, recurrent lung problems. May be related to apnea

- **Evaluation:**

- Plot growth curve
- Upper GI only to r/o structural defects
- **Must order Upper GI in infants who are forcefully vomiting**



# Gastroesophageal Reflux Disease

- **Management:**

- **GER:**

- Infants: Smaller, more frequent feedings, increase burping, hold upright after feeds
    - Children: Smaller more frequent meals, avoid caffeine, carbonation, fatty fried foods, chocolate, peppermint, no eating 2 hrs before bed

- **GERD:**

- If conservative management alone does not improve symptoms after 2 weeks consider medication management
    - H2 blockers: Zantac
    - PPI: Can try after 2 week trial of H2 blocker if no response. Prevacid, Prilosec. If effective continue for 8-12 weeks before weaning

# Acute Abdominal Pain

- **Key Characteristics:**

- Pain located in the abdomen lasting up to several days
- Frequently caused by viral gastroenteritis, UTI, & constipation but varies by age

<b>Infant</b>	Colic, gastroenteritis, viral illness, dietary protein allergy, UTI, Intussusception, incarcerated hernia, testicular torsion
<b>Preschool</b>	Gastroenteritis, viral illness, constipation, pharyngitis, UTI, appendicitis, intussusception, pneumonia, trauma
<b>School age</b>	Gastroenteritis, viral illness, pharyngitis, UTI, constipation, appendicitis, pneumonia, pancreatitis, trauma
<b>Adolescents</b>	Gastroenteritis, viral illness, UTI, constipation, appendicitis, pancreatitis, cholelithiasis, IBD Female: PID, dysmenorrhea, ectopic pregnancy, ovarian cyst

# Acute Abdominal Pain

- **S/S:**
  - Associated symptoms include: vomiting, fever, diarrhea, cough, anorexia (depending on etiology)
  - History of hematochezia or melena?
  - Symptoms outside the GI tract (cough, congestion, dysuria, sore throat, fever, headache)
  - Sexual activity? Vaginal discharge
  - Hydration status?

# Acute Abdominal Pain

- **Evaluation:**

- Differential diagnosis include: appendicitis, pancreatitis, cholelithiasis
- CBC, CMP, amylase, lipase, UA, UPT, occult blood (if indicated) Chest x-ray (if pneumonia suspected), Abdominal x-ray
- **SEE HANDOUT**

- **Management:**

- Depends on the final diagnosis
  - Appendicitis: surgical consult
  - Pancreatitis: Consult GI (possible admission for IV hydration, pain control)
  - Intussusception: Admission for diagnosis/treatment

# Appendicitis

- **Key Characteristics & S/S:**

- Pain: Initially vague periumbilical pain (earliest sign) that migrated to the RLQ after a few hours and becomes more intense, continuous
- Nausea/Vomiting: Typically occurs after the pain
- Anorexia
- Low volume of stool with mucous, diarrhea is atypical but can occur
- Fever is neither sensitive or specific for appendicitis
- WBC could be elevated
- Difficulty walking
- Rupture of appendix: Sudden relief of pain (very common in < 5 years)

# Appendicitis

- Evaluation:
  - McBurney's point
  - Peritoneal signs: inability to jump, cough, climb
  - Psoas sign: RLQ pain with extension of right hip
  - Rovsings: RLQ pain when pressure applied to left abdomen
  - Obturator: RLQ pain with internal rotation of right hip
  - Diagnostic studies include:
    - CBC (not sensitive or specific, during 1<sup>st</sup> 24 hours often within normal range)
    - Amylase, lipase, LFTs to r/u liver, gallbladder or pancreas
    - UA, Urine pregnancy
    - X-ray, US, CT (gold standard)

# Viral Gastroenteritis

- **Key Characteristics & S/S:**

Several viruses but mainly:

- **Rotavirus (mainly winter months):** Highly contagious, spread fecal-oral. Most common viral cause
  - **Adenovirus (increase in winter months):** Mainly children younger than 2 years of age
  - **Norovirus (year round):** Mainly older children, adults. Spread fecal-oral. From contaminated food, water, or person-to-person
- **Watery diarrhea (most common), fever, vomiting**

# Viral Gastroenteritis

- **Evaluation & Management:**
  - Assess hydration status
  - Complete physical exam with attention to abdomen
  - Diagnostic tests not usually indicated
  - Supportive care measures (prevent/correct hydration)



# Acute & Chronic Diarrhea

Result from alterations in the normal functioning of the GI system

- Nonabsorbable solutes in the GI tract:
  - Malabsorption and/or excessive fluid intake account for most chronic diarrhea; dumping syndrome, lactase deficiency, overfeeding, malabsorption syndrome
- Invasion, inflammation and/or release of toxins:
  - Viruses, bacteria
- Alterations in the anatomy of the surface/function:
  - Short bowel, IBS, Celiac
- Change in motility (increased or decreased):
  - Irritable bowel, pseudo obstruction, toddlers' diarrhea

# Vomiting

- **Key Characteristics:**

- Non-bilious vomiting: infection, inflammation, metabolic, neurologic, or psychological
- Bilious vomiting: Obstructive
- Bloody vomiting: Gastritis, peptic ulcer disease

- **S/S:**

- **Vomiting early in the morning increased ICP**
- Capillary refill is the most useful clinical sign of hydration status should be <2 seconds
- Hypotension is a late sign of dehydration

# Constipation

- **Functional:**

- Most common, diet low in fiber/fluids, lack of exercise, obesity, stool withholding to painful defecation, family history

- **Outlet Dysfunction:**

- Hirschsprungs disease, tethered cord, anal stenosis,

- **Metabolic/GI:**

- Celiac disease, hypothyroidism, hypercalcemia

- **Other causes:**

- Cystic fibrosis, malnutrition, sexual abuse, cow's milk protein intolerance (infants), medications (narcotics)

# Constipation

- S/S:
  - Hard bowel movements
  - Stool withholding (dancing, crosses legs, hides for BM)
  - Abdominal pain
  - Poor appetite
  - Nausea
  - Irritable
  - Blood associated w/stools

**Red flag symptoms suggesting pathology include:**

**fever, vomiting, severe abdominal distention, hx of delayed meconium passage**

# Constipation

- **Evaluation:**

- Abdomen: assess for masses distention, tenderness
- Anus: placement, fissures, erythema, consider digital exam
- Lower back: tuft of hair, gluteal crease, deep sacral dimple
- Testing not usually necessary
- KUB to assess fecal load
- Labs only if red flags present (electrolytes, calcium, lead, TSH, Celiac, sweat test if poor growth)
- Barium enema if hx of delayed meconium

# Constipation

- **Management:**

- **Stool softeners (1<sup>st</sup> line treatment):**

- Miralax:

- Child 10-30 kg 0.2-0.84 mg/kg/day
- Child > 30 kg 17g/day
- Usually continued for 2 + months & all symptoms resolved for 1 month prior to weaning

- **Laxatives (mainly used for clean-out/disimpaction):**

- Magnesium citrate:

- 2- 6 years of age 2-4mml/kg/day
- 6-10 years of age 100-150ml/day
- 1-3 days

# Constipation

- **Management:**

- Increase dietary fiber
- Prune or pear juice good for stool softening
- If child is not toilet trained: delay until constipation resolved
- If toilet-trained, scheduled time 2-3 times/day for 5-10 min

**Refer to GI if unresponsive to treatment, red flags, or abnormal test results**

# Encopresis

- **Key Characteristics:**

- Fecal incontinence usually after toilet training is complete
- Vast majority caused by functional constipation

- **S/S:**

- Stool incontinence usually during day, varying quantities
- Stool is soft and sometimes mistaken as diarrhea
- Abdominal distention/full
- Dull on percussion
- Anus may appear erythematous

- **Evaluation:**

- Diagnostic tests rarely necessary
- KUB to assess fecal load
- MRI if concerns of tethered cord

- **Management:**

- Must have “clean-out” as stooling will not resolve w/o disimpaction
- Daily stool softener after clean out
- BM calendar
- Toilet re-training
- + reinforcement, no punishment



# Intussusception

- **Key Characteristics:**

- Most common causes of intestinal obstruction in age 6-36 months
- Invagination (telescoping) of a section of the intestine into the distal bowel that causes bowel obstruction
- Can follow infections such as: gastroenteritis, OM, URI, Adenovirus
- **Pediatric emergency**

# Intussusception

- **S/S:**

- Sudden onset abdominal pain (usually periumbilical/lower abdomen)
- Pain is colicky, paroxysmal at frequent intervals
- During pain child flexes legs, pulls knees to abdomen, cries
- Vomiting is common
- Currant jelly stools
- Slightly tender sausage-shaped mass in RUQ (Danca's sign)

# Intussusception

- **Evaluation & Management:**

- Diagnosis usually made by history/physical
- US can detect intussusception
- Barium enema used to diagnose & treat
- **Untreated condition almost always fatal**
- Surgery if barium enema unsuccessful or if secondary to a “lead point” (Meckels diverticulum or polyp)

# Functional Abdominal Pain

- **Key Characteristics:**

- Happens at least 4x/month for at least 2 months
- Episodic or continuous pain that does not occur solely w/physiologic events (eating, menses)
- Vast majority of children w/recurrent abdominal pain is functional

# Functional Abdominal Pain

- **S/S:**

- Periumbilical or generalized abdominal pain
- Occurs daily or intermittently (at least once per week)
- Can have nausea, fatigue, headache, pallor
- **Does not wake them up from sleep**
- No weight loss/growth delay
- No fever, vomiting, melena, or hematochezia

# Functional Abdominal Pain

- **Evaluation:**

- No diagnostic tests make diagnosis of FAP
  - Screening tests include: UA, Urine culture, CBC, ESR, CRP, Celiac panel

- **Management:**

- Eliminate caffeine
- Can eliminate dairy but rarely helpful
- Increase fiber (AAP recommends Childs age +5 = grams/day)
- Symptom diary
- Sleep hygiene (associated with FAP)
- Exercise
- Follow-up in 1/month after FAP diagnosis made

# Irritable Bowel Syndrome

- **Key Characteristics & S/S:**

- Most common cause of FAP
- **Diagnosis much include all of the following for at least 2 months:**
  - Abdominal discomfort or pain associated w/2 + of the following  $\frac{1}{4}$  of the time
    - Improved w/defecation
    - Onset associated w/change in frequency of stool
    - Onset associated w/change in appearance of stool
  - No evidence of an inflammatory anatomic metabolic or neoplastic process
- Dyspepsia (30% of patients)
- + FMH of IBS
- Bloating/abdominal distention

# Irritable Bowel Syndrome

- **Evaluation & Management:**

- Normal physical exam
- Normal growth curves/BMI
- No specific lab markers for IBS
- Goal of treatment is to improve quality of life:
  - Dietary interventions:
    - Fiber supplement
    - Avoid trigger foods (caffeine, sorbitol, fatty food, large meals, carbonated drinks, lactose if intolerant)
  - Probiotics commonly used
  - Drug therapy (peppermint oil, antispasmodics, amitriptyline, SSRIs)
  - Biopsychosocial (yoga, CBT, acupuncture)



# Biliary Atresia

- **Key Characteristics:**

- Obstruction or absence of the extrahepatic bile ducts
- Leads to significant cellular damage and eventual liver failure and death

- **S/S:**

- Healthy at birth, then develop acholic stool
- Bile-stained urine
- Hepatomegaly
- Jaundice
- Late signs include: malabsorption of fat and fat-soluble vitamins, pruritus, xanthomas (retained bile salts & cholesterol)

- **Evaluation:**

- Early!
- CBC
- Bilirubin
- LFTs
- Abdominal US

- **Management:**

- Surgical procedure (Kasai)
- Nutritional support

# Inguinal Hernia

- **Key Characteristics:**

- Higher incidence in premature babies, CF, + FMH, Hypospadias
- Indirect is most common type (99%)

- **S/S:**

- Bulge in inguinal region, may extend to scrotum
- Bulge more noticeable with crying/straining
- Intermittent swelling of labial/scrotum

- **Evaluation:**

- Palpate testes before palpation of inguinal bulge (retractile testes)
- If swelling not present during exam check for thickening of spermatic cord (silk-glove sign)
- All girls with inguinal hernia should have rectal exam (possible pelvic US)
- Diagnosis can be made by history & physical alone
- US can confirm

- **Management:**

- Surgical management

# Umbilical Hernia

- **Key Characteristics:**

- Due to weakness/incomplete closure of umbilical ring
- Defect varies from 1-5 cm
- Usually resolves by 1 year
- Larger hernias by 5-6 years

- **S/S:**

- Soft mass covered by skin that protrudes from umbilicus

- **Evaluation:**

- Physical exam

- **Management:**

- Most resolve by 5 years
- Surgery for hernias that persist after 3-4 years or becoming progressively larger
- **Educate on signs of strangulation: pain, vomiting, persistent bulge that is not reducible**

# Hirschsprung Disease

- **Key Characteristics:**

- Congenital megacolon
- More common in males and children with Down syndrome

- **S/S:**

- Absence of meconium with 24-36 hours after birth
- S/S of obstruction: vomiting, pain, distention, FTT
- Ribbon like stools/foul-smelling

- **Evaluation:**

- X-ray
- Barium enema
- Dx confirmed with rectal biopsy

- **Management:**

- Surgical removal of affected portion

# Malabsorption Syndromes

- **Key Characteristics:**

- Caused by many genetic, congenital, & acquired conditions
- Usually lead to decrease in weight followed by deceleration in height velocity
- Celiac disease, lactose intolerance, cow's milk protein intolerance

# Malabsorption Syndromes

- **General History**

- Past surgical/trauma history
- Growth failure
- Delayed puberty
- Voracious appetite/food avoidance
- Chronic diarrhea w/frequent, large, foul-smelling, pale stools
- Abdominal distention with excessive gas
- Pallor, fatigue, hair abnormalities, digital clubbing, dizziness, (symptoms of vitamin deficiency r/t malabsorption)

# Malabsorption Syndromes

Disease specific history:

- Celiac Disease:
  - Chronic/intermittent diarrhea, persistent/unexplained GI symptoms, sudden or unexpected weight loss, prolonged fatigue
- Lactose Intolerance:
  - Abdominal pain, diarrhea, nausea, gas, bloating related to the amount of lactose ingested
- Cow's protein intolerance & allergy:
  - Family history of allergy

# Malabsorption Syndromes

## PE findings

- Celiac Disease:
  - Impaired growth, FTT, unexplained iron anemia, abdominal distention, bloating/cramping pain
- Lactose Intolerance:
  - Abdominal distention
- Cow's protein intolerance & allergy:
  - Immediate (anaphylaxis is rare, lip, tongue swelling, itching, n/v, rash, sneezing rhinitis, wheezing)
  - Late onset (Typically non IgE mediated, n/v, abdominal pain, diarrhea, bloody stool, GERD, eczema, FTT)



# Malabsorption Syndromes

## Diagnostics:

- Celiac Disease:
  - Serologic (IgA Tissue transglutaminase antibody, IgA endomysial antibody)
  - If + blood refer to endoscopy w/biopsy for confirmation
  - Bone density test
- Lactose Intolerance:
  - Lactose hydrogen breath test (gold standard) do not take abx during time of test
  - Trial of lactose free diet for 2 weeks
- Cow's protein intolerance & allergy:
  - Skin patch for true allergy
  - Serum IgE
  - Elimination diet

# Malabsorption Syndromes

## Management:

- Celiac Disease:
    - Strict gluten free diet is the only effective treatment
    - Lactose free diet may be helpful in young children (not case in adolescents/adults)
  - Lactose Intolerance:
    - Reduce lactose exposure
    - Use oral lactase supplements
    - Ensure adequate calcium/Vitamin D from other sources
  - Cow's protein intolerance & allergy:
    - Breastfeed
    - Restrict milk/milk products
    - Extensively hydrolyzed formula (no soy formula until 6 + months of age)
    - EpiPen if anaphylaxis concern
    - Monitor G/D closely
- Oral food challenge (Gold Standard)

# Irritable Bowel Disease

- **Key Characteristics:**
  - 3 types:
    - Crohn disease
    - Ulcerative colitis
    - Unclassified IBD
  - Can occur any age but peak onset is 15-20 years of age
  - IBD in infants is rare

# Crohn Disease

- **Key Characteristics:**

- Any part of the GI tract can be involved, terminal ileum/colon most commonly affected
- Exact cause unknown but likely due to environmental exposure to triggers to susceptible person

- **S/S:**

- Low grade fever
- Weight loss (average of 5-7 kg)
- Delayed growth velocity
- Delayed bone age
- Bloating, feeling full quickly w/meals
- Umbilical pain & RUQ (may awaken @ night)
- Diarrhea

# Crohn Disease

- **Evaluation:**

- Carefully assess growth parameters
- Abdominal exam (RLQ tenderness or mass?)
- ESR, CRP
- Albumin, Iron panel
- CBC, AST, ALT, Total bili, Amylase, Lipase
- Stool culture, O&P, C-diff, Fecal calprotectin assay (good initial test)
- Bone age (usually delayed by 2 years, abdominal x-ray, Upper GI, CT w/contrast)

- **Management:**

- Refer to GI
- Monitor growth
- Ophthalmology exam
- Nutrition

# Failure to Thrive

- **Criteria that define FTT**

- Weight less than 80% of median weight for length
- Weight for length less than 80% of ideal weight
- Weight for length less than the 10<sup>th</sup> percentile
- BMI for chronologic age less than 5<sup>th</sup> percentile
- Weight for chronologic age/sex less than 5<sup>th</sup> percentile or more than 2 standard deviations
- Length to chronologic age/sex less than 5<sup>th</sup> percentile
- Weight deceleration crossing more than 2 standard deviations

# Failure to Thrive

- **Evaluation:**

- Feeding assessment
- Developmental assessment
- CBC, CRP, ESR, UA/culture, CMP, stool studies

- **Management:**

- Treat cause
- Restore nutritional intake
- Expected weight gain by age:
  - Birth- 3 months: 25-30 g/day
  - 3-6 months: 15-20 g/day
  - 6-12 months: 10-15 g/day
  - 12 + months: 5-10 g/day
- Weekly weight checks

# Question 1

A toddler who was born prematurely refuses most solid foods and has poor weight gain. A barium swallow study reveals a normal esophagus. What will the primary care pediatric nurse practitioner consider next to manage this child's nutritional needs?

1. Consultation with a dietician
2. Fiberoptic endoscopy evaluation
3. Magnetic resonance imaging
4. Videofluoroscopy swallow study



# Question 1

A toddler who was born prematurely refuses most solid foods and has poor weight gain. A barium swallow study reveals a normal esophagus. What will the primary care pediatric nurse practitioner consider next to manage this child's nutritional needs?

Answer: Videofluoroscopy swallow study

## Question 2

A school-age child has recurrent diarrhea with foul-smelling stools, excessive flatus, abdominal distension, and failure-to-thrive. A 2-week lactose-free trial failed to reduce symptoms. What is the next step in diagnosing this condition?

1. Lactose hydrogen breath test
2. Serologic testing for celiac disease
3. Stool for ova and parasites
4. Sweat chloride test for cystic fibrosis

## Question 2

A school-age child has recurrent diarrhea with foul-smelling stools, excessive flatus, abdominal distension, and failure-to-thrive. A 2-week lactose-free trial failed to reduce symptoms. What is the next step in diagnosing this condition?

**Answer: Serologic testing for celiac disease**

## Question 3

A 12-month-old infant exhibits poor weight gain after previously normal growth patterns. There is no history of vomiting, diarrhea, or irregular bowel movements, and the physical exam is normal. What is the next step in evaluating these findings?

1. Complete blood count and electrolytes
2. Feeding and stooling history and 3-day diet history
3. Stool cultures for ova and parasites
4. Swallow study with videofluoroscopy

## Question 3

A 12-month-old infant exhibits poor weight gain after previously normal growth patterns. There is no history of vomiting, diarrhea, or irregular bowel movements, and the physical exam is normal. What is the next step in evaluating these findings?

**Answer: Feeding and stooling history and 3-day diet history**

## Question 4

A toddler is seen in the clinic after a 2-day history of intermittent vomiting and diarrhea. An assessment reveals an irritable child with dry mucous membranes, 3-second capillary refill, 2-second recoil of skin, mild tachycardia and tachypnea, and cool hands and feet. The child has had two wet diapers in the past 24 hours. What will the primary care pediatric nurse practitioner recommend?

1. Anti-diarrheal medication and clear fluids for 24 hours
2. Bolus of IV normal saline in the clinic until improvement
3. Hospital admission for IV rehydration and oral fluids
4. Oral rehydration solution with follow-up in 24 hours

## Question 4

A toddler is seen in the clinic after a 2-day history of intermittent vomiting and diarrhea. An assessment reveals an irritable child with dry mucous membranes, 3-second capillary refill, 2-second recoil of skin, mild tachycardia and tachypnea, and cool hands and feet. The child has had two wet diapers in the past 24 hours. What will the primary care pediatric nurse practitioner recommend?

**Answer: Oral rehydration solution with follow-up in 24 hours**

# Question 5

A 2-month-old infant cries up to 4 hours each day and, according to the parents, is inconsolable during crying episodes with fists and legs noted to be tense and stiff. The infant is breastfeeding frequently but is often fussy during feedings. The physical exam is normal, and the infant is gaining weight normally. What will the primary care pediatric nurse practitioner recommend?

1. A complete work-up, including laboratory and radiologic tests
2. Eliminating certain foods from the mother's diet
3. Empiric treatment with a proton pump inhibitor medication
4. Stopping breastfeeding and beginning a hydrolyzed formula



## Question 5

A 2-month-old infant cries up to 4 hours each day and, according to the parents, is inconsolable during crying episodes with fists and legs noted to be tense and stiff. The infant is breastfeeding frequently but is often fussy during feedings. The physical exam is normal, and the infant is gaining weight normally. What will the primary care pediatric nurse practitioner recommend?

**Answer: Eliminating certain foods from the mother's diet**

## Question 6

The parent of a 3-month-old reports that the infant arches and gags while feeding and spits up undigested formula frequently. The infant's weight gain has dropped to the 5th percentile from the 12th percentile. What is the best course of treatment for this infant?

1. Begin a trial of extensively hydrolyzed protein formula for 2 to 4 weeks.
2. Institute an empiric trial of acid suppression with a proton pump inhibitor (PPI).
3. Perform esophageal pH monitoring to determine the degree of reflux.
4. Reassure the parent that these symptoms will likely resolve by 12 to 24 months.

## Question 6

The parent of a 3-month-old reports that the infant arches and gags while feeding and spits up undigested formula frequently. The infant's weight gain has dropped to the 5th percentile from the 12th percentile. What is the best course of treatment for this infant?

**Answer: Begin a trial of extensively hydrolyzed protein formula for 2 to 4 weeks.**

# Question 7

An adolescent is diagnosed with functional abdominal pain (FAP). The child's symptoms worsen during stressful events, especially with school anxiety. What will be an important part of treatment for this child?

1. Informing the parents that the pain is most likely not real
2. Instituting a lactose-free diet along with lactobacillus supplements
3. Teaching about the brain-gut interaction causing symptoms
4. Using histamine<sub>2</sub>-blockers to help alleviate symptoms

## Question 7

An adolescent is diagnosed with functional abdominal pain (FAP). The child's symptoms worsen during stressful events, especially with school anxiety. What will be an important part of treatment for this child?

**Answer: Teaching about the brain-gut interaction causing symptoms**

# **DISORDERS OF THE GENITOURINARY SYSTEM**

# History

- HPI
  - Fever?
  - Abdominal/flank pain?
  - Injury or preceding illness?
  - Voiding pattern (frequency, color, odor, dysuria, enuresis)
  - Diarrhea/constipation
  - Sexual activity/abuse?
  - Vomiting
  - Past medical history (UTI, hematuria, proteinuria, syndromes?)
  - Family history (renal disease, deafness, hypertension, UTI, hematuria)

# Physical Examination

- Growth parameters (FTT can be associated w/UTI, RTA & chronic RF in infants)
- BP (often elevated in nephritis & nephrotic syndrome)
- Assess hydration status (skin turgor, mucous membranes, pulses, tears, cap refill, pallor)
- Ear position or formation (low-set or abnormal)
- Abdominal assessment (masses, flank or suprapubic tenderness)
- CVA tenderness
- External genital abnormalities
- Unusual facial features associated w/syndromes that have renal disease)



# Common Diagnostic Tests

- Urinalysis
- Urine Culture & Sensitivities
- 24-hour urine collection
- Serum BUN, Creatinine, Electrolytes
- Renal Ultrasonography
- Voiding Urosonography (VUS)
- Dimercaptosuccinic Acid (DMSA)
- Voiding cystourethrogram (VCUG)



# Cryptorchidism

- **Key Characteristics:**

- Can be absent, undescended, ectopic
- Right more common than left
- Prematurity increases risk

- **S/S:**

- Retractable testes can be manipulated into scrotum & will remain there for short time
- Testes should be considered undescended if retract immediately once manipulated down to scrotum
- Scrotum may be undeveloped/flat on affected side

# Cryptorchidism

- **Evaluation:**

- Often helpful to have child in cross-legged position for exam
- If unilateral or bilateral palpable testes, no diagnostics indicated
- Bilateral nonpalpable or cryptorchid testes associated with hypospadias requires referral to Pediatric Urology for life-threatening conditions such as congenital adrenal hyperplasia

- **Management:**

- If at 6 months of age testes remain undescended intervention is necessary
- Treatment depends on testes locations, age, associated w/other abnormalities

# Hydrocele

- **Key Characteristics:**

- Occurs when the channel that allows the testicles to move from abdomen to scrotum during development remains patent

- **S/S:**

- Rare in females but if present soft bulge in labia/inguinal canal (bulge can represent ovary/hernia)
- Scrotal swelling in one or both sides (intermittent or continuous)
- Parents may say the scrotum has a blueish hue, often small in morning larger as day goes on

# Hydrocele

## • Evaluation:

- Physical exam to assess genitals
  - Noncommunicating: Scrotal sac tense, slightly blue, fluctuant, does not reduce, no swelling in inguinal area
  - Communicating: Fluid in the scrotal sac comes & goes)
- Transillumination w/penlight to scrotum
- If testes not seen or palpated US to confirm/differentiate

## • Management:

- Noncommunicating: Fluid usually absorbs spontaneously; no treatment indicated unless large/uncomfortable or persists longer than 1 year
- Communicating: Many will resolve w/o surgery. If persist > 1 yr, referral is recommended

# Epididymitis

- **Key Characteristics:**

- Can occur from infectious/inflammatory cause
- Can be difficult to distinguish from testicular torsion (both painful)
- *Neisseria gonorrhoeae* & *Chlamydia* are common pathogens

- **S/S:**

- Urethral discharge maybe present
- Often slow onset pain that worsens
- May have dysuria/blood or discharge in urine
- Swollen/inflamed scrotum
- Tenderness along epididymis
- If testicle is tender/swollen may also have orchitis
- 1/3 are febrile

# Epididymitis

- **Evaluation:**

- UA/urine culture may be + or – for bacteria
- If + urine culture VCUG and Renal US is indicated
- Scrotal US is useful to differentiate from torsion

- **Management:**

- If UA + start 2 weeks of appropriate abx
- NSAIDs
- Scrotal support
- Limit activity 2-3 days
- STI should be treated w/appropriate antibiotic
- Children not sexually active Cephalexin 40 mg/kg/day in two divided doses

# Testicular Torsion

- **Key Characteristics:**

- Most common in adolescence and is uncommon before 10 years of age
- Generally 6 hour window before ischemic damage occurs

- **S/S:**

- Sudden onset of unilateral, unremitting scrotal pain
- Hx of intermittent pain (transient pain reported in ½)
- Swollen/inflamed scrotum (ipsilateral)
- Fever is minimal or absent
- Can occur after physical exertion, trauma, or on arising



# Testicular Torsion

- **Evaluation:**

- Ipsilateral scrotum can be edematous, erythematous, and warm on PE
- “Blue dot” sign
- Cremasteric reflex is absent on affected side

- **Management:**

- **Surgical Emergency**
- Testicular atrophy, abscess, decreased fertility, & loss of the testis as a result of necrosis can occur if persists > 24 hrs

# Hypospadias

- **Key Characteristics:**

- Unknown cause, possibly genetic
- Mild forms found during circumcision (should not circumcise as foreskin is used to repair)

- **S/S:**

- Urethral meatus is located on the undersurface of the penis any place between the glans & scrotum
- Difficult to stand & urinate if older
- Chordee (bend of penis)
- Foreskin typical only on dorsal side of penis “hooded”

- **Evaluation:**

- Physical exam for abnormal genitalia
- Diagnostics rarely indicated

- **Management:**

- Referral to pediatric urologist

# Phimosis

- **Key Characteristics:**

- Risk factors: Poor hygiene, recurrent balanitis, ballooning of foreskin, post-urination dribbling

- **S/S:**

- Unable to retract foreskin
- Ballooning of foreskin w/urination
- Pain
- Skin irritation
- Dysuria
- Drainage can be present

- **Evaluation:**

- Physical exam
- UA/culture if UTI suspected

- **Management:**

- Prevention: Gentle retraction of the foreskin during voiding/bath
- Avoid strong soaps/creams
- **Paraphimosis is a medical emergency (foreskin is pushed back & entraps glans)**
- Monitor for infection

# Labial Adhesions

- **Key Characteristics:**

- Fusion of labia minora as a result of vulvar irritation, lack of estrogen
- Possible causes: Chronic irritation, secondary infection, trauma, incontinence
- Primary in girls 3 months- 6 years

- **S/S:**

- Dysuria/incontinence
- Toilet trained may complain of dribbling

- **Evaluation:**

- Physical exam findings of thin film that begins posteriorly & advances anteriorly
- Diagnostics not necessary (UA/culture if UTI suspected)

- **Management:**

- Majority requires no treatment, resolve spontaneously
- More significant w/symptoms can be treatment topically:
  - Premarin cream 0.625 mg: BID x 10-14 days
  - Betamethasone 0.05% or 0.1% @ bedtime for up to 4 weeks

# Enuresis

- **Key Characteristics & S/S:**

- Voluntary or involuntary urination in bed or clothes
- Can occur during the night and/or day (important to gather detailed history on both)
- Primary: Never experienced control or dryness
- Secondary: Has been dry for a 6-12 month period of dryness & new onset of wetting

# Enuresis

- **Evaluation:**

- Assess external genital for signs of irritation, infection, labial fusion, stenosis of meatus
- Assess abdomen for masses (suprapubic midline, left lower quad)
- Assess for neurologic function & DTRs
- Emotional: Increased stress due to family disruption, pressure during toilet training, inadequate attention to voiding cues, sexual abuse

- **Management:**

- **UA is recommended for all children with enuresis**
- Treatment of daytime urinary dysfunction & constipation should be done before treating nocturnal enuresis
- Aggressive treatment (6-8 years old, because function enuresis is usually self-limiting)
- Enuresis Alarms
- Medications (DDAVP- Vasopressin)
- These findings warrant referral to urologist:
  - **Weak or interrupted urinary stream**
  - **Need to use abdominal pressure to urinate**
  - **Combined daytime/incontinence & nocturnal enuresis**

# Urinary Tract Infection

- **Key Characteristics:**

- There are 3 kinds of UTI in children
  - Asymptomatic Bacteriuria (bacteria in the urine w/o symptoms, benign, no renal injury)
  - Cystitis (infection in the bladder, produces lower tract symptoms, no fever or renal injury)
  - Pyelonephritis (involves kidneys, symptom & fever producing, + renal injury)
- E. Coli most common pathogen (70%)
- GBS common in neonates
- Infection begins w/colonization of the urethral area & ascends the urinary tract
- Up to 6 months of age more common in males
- Uncircumcised males less than 6 months increases UTI risk 10-fold

# Clinical Findings of UTI in Various Ages

Neonates	Infants	Toddlers/Preschoolers	School-Age/Adolescents
Jaundice Hypothermia Failure to thrive Sepsis Vomiting Diarrhea Cyanosis Abdominal Distention Lethargy	Malaise Irritability Difficulty feeding Poor weight gain Fever* Vomiting Diarrhea Malodor Dribbling Abdominal pain Colic	Altered voiding pattern Malodor Abdominal/flank pain* Enuresis Vomiting or diarrhea* Malaise Fever* Diaper rash	“Classic dysuria” Malodor Enuresis Abdominal/flank pain* Fever/chills* Vomiting or diarrhea* Malaise

\* Findings increase likelihood of pyelonephritis



# Urinary Tract Infection

- **Evaluation:**

- It is acceptable to collect UA on a non-toilet trained with a sterile adhesive bag. However, If the bagged urine is + for leuk est or nitrites, child is younger than 2, has potential risk factors, or symptomatic, a sterile in & out cath should be performed
- **Urine culture is essential to confirm diagnosis**
- CBC, ESR, BUN, CREAT in child <1, appears ill, pyelonephritis is suspected
- Serum procalcitonin level of more than 0.5 mg/ml is an accurate at reliable biologic marker for renal involvement during a febrile UTI, Pyelonephritis & renal scarring
- Blood cultures for suspected sepsis

# Urinary Tract Infection

- **Important: How urine is collected!**
  - Any culture result  $> 100,000$  single organism catheter/suprapubic or clean catch  $\rightarrow$  UTI
  - 10,000-100,000 single or multiple organism catheter/suprapubic  $\rightarrow$  UTI
  - 10,000 = 100,000 single or multiple organisms clean catch  $\rightarrow$  possible UTI
- $\uparrow$  WBCs, RBCs, and nitrite (a + nitrite in the absence of RBCs is often considered a UTI pending culture and treated as one)



# Management

- Augmentin, Bactrim, Cephalosporins (Regional Antibigram) until sensitivity is known for infants older than 2 months/children
- Infants less than 2 months w/ UTI/pyelonephritis & children w/suspected pyelonephritis should be evaluated for hospitalization/IV antibiotics
- Increase fluids
- Hygiene/Clothing fabric
- Eliminate bubble baths/fragrance soaps & detergents
- Follow-up cultures (should be done 3-7 days after completing antibiotics for recurrent problems, fever, illness, dysuria, or frequency)

***There would be 25% less adults on renal dialysis if pediatric management of a first UTI was appropriate***

# Sexually Transmitted Infections

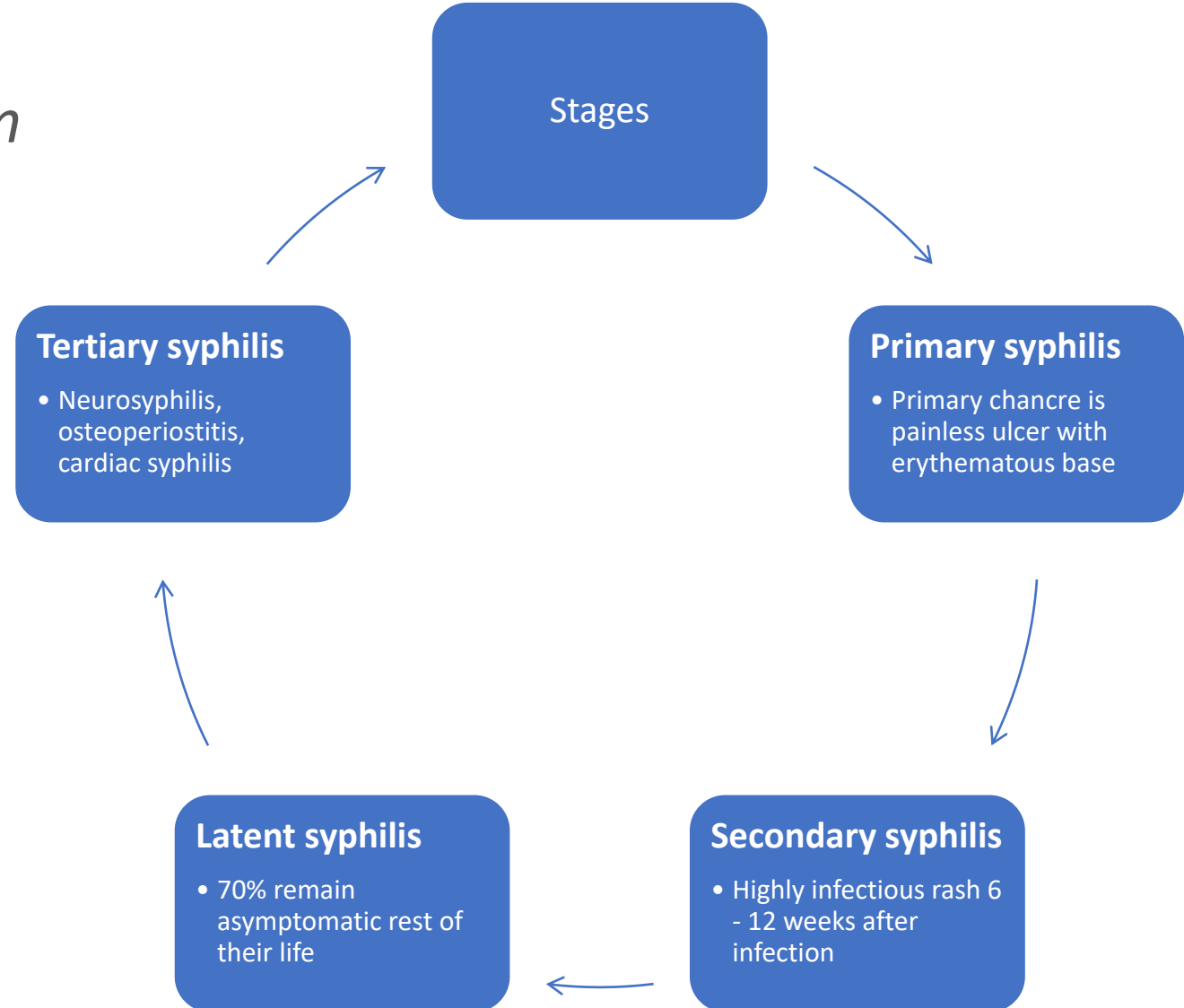
- Herpes Simplex Virus
- Syphilis
- Chlamydia
- Gonorrhea
- Trichomonas
- Human Papilloma Virus

# Herpes Simplex Virus

- Chronic, life-long viral infection
  - History and PE:
    - **Painful rash, blisters and ulcers**, burning and irritation 24 hours prior to outbreak, dysuria.
    - White to yellow discharge, **vesicles on erythematous base that ulcerates**, lymphadenopathy
  - Diagnostic Considerations
    - Viral Culture and PCR
  - Management
    - Antiviral chemotherapy
    - Counseling
  - Treatment:
    - Varies depending on disease
- Treatment
    - First Clinical Episode
      - Acyclovir 400 mg orally three times a day for 7–10 days
    - OR
    - 200 mg orally five times a day for 7–10 days
  - Recurrent
    - Acyclovir 400 mg orally TID for 5 days
  - OR
  - 800 mg orally BID for 5 days or TID for 2 days

# Syphilis

- Caused by *Treponema pallidum*



# Syphilis

- History
  - Primary: vaginal, anal, or oral chancre
  - Secondary: Copper-penny rash on palms and soles
- Physical Exam
  - **Single painless papule with serous discharge**, smooth base and raised edges; painless lymphadenopathy
- Diagnostic Considerations
  - Screening vs Confirmatory
  - Screen using RPR, VDRL, TRUST (Nontreponemal)
    - Confirmatory tests when nontreponemal tests are +
  - Direct visualization with darkfield microscopy or DFA test is definitive
    - VDRL used to monitor disease progress
    - PCR tests are not suitable for screening asymptomatic patients
- Treatment
  - Primary, secondary, or early latent <1 year
    - benzathine penicillin G: 2.4 million units IM in a single dose
  - Latent >1 year or of unknown duration
    - benzathine penicillin G: 2.4 million units IM in 3 doses each at 1 week intervals
- Follow-up
  - Clinical and serologic evaluation should be performed at 6 and 12 months after treatment;

# Chlamydia

Most common STI  
in the U.S.

- Comorbidity with gonorrhea & trichomonas

History

- Often none; spotting, vaginal discharge, painful urination, mild ABD pain

Physical Exam  
Findings:

- Female: white/clear/ **yellow discharge**, painful urination, right upper quad abdominal pain, cervicitis, **postcoital bleeding**.
- Males: **thick, cloudy, penile discharge**, testicular pain.

Diagnostic  
studies:

- Culture, DNA Probes, and NAATs are acceptable in adolescents.
- Urine testing is now method of choice for detection.



# Chlamydia

## Treatment

- **Azithromycin** 1 g orally in a single dose  
OR
- **Doxycycline** 100 mg orally twice a day for 7 days

## Follow up

- 3 months after treatment

## Considerations

- Treat for coinfections

# Gonorrhea

Second most commonly reported STI

- Increased incidence with adolescents
- Asymptomatic in up to 80% of females
- Comorbidity: anorectal & pharyngeal infections

History and PE

- Females: Dysuria, profuse, **thick, green discharge**, labial pain/swelling, Skene or Bartholin gland abscess, fever, bleeding between periods and painful periods
- Males: Dysuria, frequency, white/**yellow-green penile discharge**, **testicular pain**

Diagnostic studies

- Culture, DNA Probes, and NAAT

# Gonorrhea

## Treatment

- **Ceftriaxone** 250 mg IM in a single dose  
**PLUS**
- **Azithromycin** 1g orally in a single dose

## Follow up

- None if treated correctly

# Trichomonas

## History and Physical Exam

- **Profuse vaginal discharge**
- Pruritis and irritation with burning on urination
- **Frothy greenish or yellowish , fishy discharge**
- **Strawberry cervix** (red with petechiae) that bleeds easily

## Diagnostic studies:

- NAAT, Gen-Probe, Culture no longer preferred method

## Treatment

- Metronidazole 2 grams in a single dose

## Considerations

- Alcohol consumption should be avoided for 24 hours after taking the medication
- Follow up testing should occur 3 months after treatment

# Human Papilloma Virus

## History

- Asymptomatic or unrecognized
- Painful warts or “rash”

## Physical Exam

- **Warts** (may be friable or pruritic), **cauliflower like**
- Occurs 4-6 weeks after exposure

## Treatment

- No treatment will eradicate this disease.

# STI Overview

- Most patients are asymptomatic
- Thorough history of
  - Type of sexual activity
  - Number of partners
  - Gender of partners
  - Known exposure or past STI's
  - Any symptoms, including systemic symptoms
- Education

# Question 8

A thick, purulent vaginal discharge that is greenish-yellow is most likely an infection caused by:

1. Chlamydia trachomatis
2. Herpes simplex virus
3. Neisseria gonorrhoea
4. Human papillomavirus

# Question 8

A thick, purulent vaginal discharge that is greenish-yellow is most likely an infection caused by:

**Answer: Neisseria gonorrhoea**



# Question 9

The treatment for *Neisseria gonorrhoea* infection, according to the CDC guidelines is:

1. Amoxicillin
2. Ceftriaxone + Azithromycin
3. Ofloxacin
4. Ceftriaxone or Azithromycin

# Question 9

The treatment for Neisseria gonorrhoea infection, according to the CDC guidelines is:

Answer: **Ceftriaxone + Azithromycin**

# Question 10

15 year old Jessie tells you that she is worried because she has a painful rash that looks like a "blisters" in her vaginal area . The most likely diagnosis is:

1. Herpes Simplex Virus
2. Chlamydia
3. Syphilis
4. Gonorrhea

# Question 10

15 year old Jessie tells you that she is worried because she has a painful rash that looks like a "blisters" in her vaginal area . The most likely diagnosis is:

**Answer: Herpes Simplex Virus**

# Question 11

18 year old Bella tells you that she has been experiencing a frothy green discharge that smells like fish . The most likely diagnosis is:

1. Trichomonas
2. Chlamydia
3. Syphilis
4. Gonorrhea

# Question 11

18 year old Bella tells you that she has been experiencing a frothy green discharge that smells like fish . The most likely diagnosis is:

Answer: Trichomonas

# Hematuria

- **Macroscopic Hematuria**

- UTI
- Trauma
- Tumors
- Sickle cell trait
- Renal stones
- Thin basement membrane (benign recurrent hematuria)
- PSGN

- **Microscopic Hematuria**

- HUS
- Henoch Scholein Purpura
- Leukemia
- Thrombocytopenia
- SBE
- Polycystic renal disease
- Infectious diseases
- Exercise
- Drugs

# Hematuria

- S/S:
  - Urinary frequency, fever, dysuria may indicate infection
  - Acute Nephrotic Syndrome:
    - Associated with gross hematuria, edema, HTN, renal insufficiency
    - PGSN occurs 7-14 days after onset of strep throat
    - Winter months: Strep pharyngitis/Summer months: Skin infections
  - Hemolytic Uremic Syndrome:
    - One of most common causes of ARF: preceded by gastroenteritis, bloody diarrhea
    - Joint pain, edema, tenderness?
    - Any recent cold, URI symptoms? Sore throat or skin rash present?



# Hematuria

- **Evaluation:**

- Full body exam
- UA
- CBC w/diff
- CMP
- ASO
- ANA
- C3
- Skin/throat cultures
- STI screening as indicated
- Sickle cell screen in all AA patients
- Renal US

- **Management:**

- Ill-child, admit for evaluation
- If elevated ASO/C3 refer to nephrologist for nephritis work-up
- If abnormal US refer to urologist
- With UTIs consider VCUG
- Abnormal ANA results, consult Rheumatology/Nephrology
- HTN? Refer to Nephrology
- If Chlamydia/Gonorrhea antibiotics
- **Parents should know S/S of renal disease: Edema, HTN, increasing blood in urine, proteinuria, UTI, lethargy, pallor**

# Wilms' Tumor

- **Key Characteristics:**
  - “Nephroblastoma”
  - Malignant tumor (more common L kidney)
  - Occurs 3x more in AA
  - Peak age of diagnosis is 3 years
  - More frequent in males
- **S/S:**
  - Abdominal swelling/mass
  - Firm, non-tender/confined to one side
  - Hematuria
  - Fatigue/malaise
  - HTN (occasionally)
  - Weight loss
  - Fever
- **Evaluation:**
  - **Do not palpate abdomen once suspected unless absolutely necessary**
  - Abdominal Ultrasound
- **Management:**
  - Surgical Removal
  - Chemotherapy and/or Radiation
  - Prognosis is 90% cure

# Acute Poststreptococcal Glomerulonephritis

- **Key Characteristics:**

- Occurs as an **immune reaction** to a group A-beta-hemolytic streptococcal infection of the throat or skin
- Most frequent in children age 5 to 12
- Clinical symptoms usually develop 1-2 weeks after initial strep infection

- **S/S:**

- Strep skin (more likely) or pharyngeal infection w/in 2-3 weeks
- Abrupt onset of gross hematuria
- Reduced urine output
- Lethargy, anorexia, N/V, abdominal pain
- Fever, chills
- Backache/CVA tenderness (pyelonephritis)
- HTN (transient)
- Edema (periorbital)
- Rashes (SLE, HSP, Impetigo)

# Acute Poststreptococcal Glomerulonephritis

- **Evaluation:**

- Urinalysis shows RBC casts, leukocytes, &  $\geq 2+$  protein
- CBC w/diff may show anemia
- $\uparrow$  potassium, BUN, and creatinine
- Elevated ASO titer
- $\downarrow C^3$
- $\uparrow$  ESR during acute phase

- **Management:**

- Consultation w/Nephrology is recommended in ALL cases
- PSGN treatment is supportive
- During peak of oliguria & HTN may need hospitalization
- Resolution occurs once diuresis begins
- Gross hematuria persists 1-2 weeks
- UA can be abnormal for 6-12 weeks

# Hemolytic Uremic Syndrome (HUS)

- **Key Characteristics:**

- Most common cause of acquired acute renal failure in children
- Occurs primarily in infants and small children
- Between 6 mo - 5 years
- Coxsackie, echovirus & adenovirus
- Also some cases due to E. Coli
  - Odwalla juice prior to pasteurization

- **S/S:**

- The triad of anemia, thrombocytopenia & RF is significant**

- Vomiting, irritability, lethargy
- Marked pallor, oliguria or anuria
- CNS involvement
  - Seizures
  - Stupor
- Hemorrhagic
  - Bruising
  - Petechiae
  - Jaundice
  - Bloody diarrhea

# Hemolytic Uremic Syndrome

- Early diagnosis & aggressive treatment!
- Recovery rate is about 95% w/prompt treatment
- Residual renal impairment ranges from 10-50%
- Long term complications include:
  - Chronic renal failure
  - HTN
  - CNS disorders

# Question 12

A child who had GABHS 2 weeks prior is in the clinic with periorbital edema, dyspnea, and elevated blood pressure. A urinalysis reveals tea-colored urine with hematuria and mild proteinuria. What will the primary care pediatric nurse practitioner do to manage this condition?

1. Prescribe a 10- to 14-day course of high-dose amoxicillin.
2. Prescribe high-dose steroids in consultation with a nephrologist.
3. Reassure the parents that this condition will resolve spontaneously.
4. Refer the child to a pediatric nephrologist for hospitalization

## Question 12

A child who had GABHS 2 weeks prior is in the clinic with periorbital edema, dyspnea, and elevated blood pressure. A urinalysis reveals tea-colored urine with hematuria and mild proteinuria. What will the primary care pediatric nurse practitioner do to manage this condition?

**Answer: Refer the child to a pediatric nephrologist for hospitalization**



# Question 13

A healthy 14-year-old female has a dipstick urinalysis that is positive for 5-6 RBCs but otherwise normal. What is the first question the primary care pediatric nurse practitioner will ask this patient?

1. Are you sexually active?"
2. "Are you taking any medications?"
3. "Have you had a recent fever?"
4. "When was your last menstrual period (LMP)?"

## Question 13

A healthy 14-year-old female has a dipstick urinalysis that is positive for 5-6 RBCs but otherwise normal. What is the first question the primary care pediatric nurse practitioner will ask this patient?

Answer: “When was your last menstrual period (LMP)?”

# Question 14

A dipstick urinalysis is positive for leukocyte esterase and nitrites in a school-age child with dysuria and foul-smelling urine but no fever who has not had previous urinary tract infections. A culture is pending. What will the pediatric nurse practitioner do to treat this child?

1. Order ciprofloxacin ER once daily for 3 days if the culture is positive.
2. Prescribe trimethoprim-sulfamethoxazole (TMP) twice daily for 3 to 5 days.
3. Reassure the child's parents that this is likely an asymptomatic bacteriuria.
4. Wait for urine culture results to determine the correct course of treatment

## Question 14

A dipstick urinalysis is positive for leukocyte esterase and nitrites in a school-age child with dysuria and foul-smelling urine but no fever who has not had previous urinary tract infections. A culture is pending. What will the pediatric nurse practitioner do to treat this child?

**Answer: Prescribe trimethoprim-sulfamethoxazole (TMP) twice daily for 3 to 5 days.**

# Question 15

During a well child examination of a 2-year-old child, the primary care pediatric nurse practitioner palpates a unilateral, smooth, firm abdominal mass which does not cross the midline. What is the next course of action that?

1. Order a CT scan of the chest, abdomen, and pelvis.
2. Perform urinalysis, CBC, and renal function tests.
3. Reevaluate the mass in 1 to 2 weeks.
4. Refer the child to an oncologist immediately

## Question 15

During a well child examination of a 2-year-old child, the primary care pediatric nurse practitioner palpates a unilateral, smooth, firm abdominal mass which does not cross the midline. What is the next course of action that?

**Answer: Refer the child to an oncologist immediately**

# Question 16

An adolescent has 2+ proteinuria in a random dipstick urinalysis. A subsequent first-morning voided specimen is negative. What will the primary care pediatric nurse practitioner do to manage this condition?

1. Monitor for proteinuria at each annual well child examination.
2. Order a 24-hour timed urine collection for creatinine and protein excretion.
3. Reassure the parents that this is a benign condition with no follow-up needed.
4. Refer the child to a pediatric nephrologist for further evaluation.

## Question 16

An adolescent has 2+ proteinuria in a random dipstick urinalysis. A subsequent first-morning voided specimen is negative. What will the primary care pediatric nurse practitioner do to manage this condition?

**Answer: Monitor for proteinuria at each annual well child examination.**



# Question 17

The mother of a 12-month-old uncircumcised male infant reports that the child seems to have pain associated with voiding. A physical examination reveals a tight, pinpoint opening of the foreskin, which thickened and inflamed. What will the primary care pediatric nurse practitioner do?

1. Attempt to retract the foreskin to visualize the penis.
2. Order corticosteroid cream 3 times daily for 4 weeks.
3. Refer the child to a pediatric urologist.
4. Teach the mother to gently stretch the foreskin with cleaning.

## Question 17

The mother of a 12-month-old uncircumcised male infant reports that the child seems to have pain associated with voiding. A physical examination reveals a tight, pinpoint opening of the foreskin, which thickened and inflamed. What will the primary care pediatric nurse practitioner do?

**Answer: Refer the child to a pediatric urologist.**

# Question 18

A 6-month-old infant has a retractile testis that was noted at the 2-month well baby exam. What will the primary care pediatric nurse practitioner do to manage the condition?

1. Reassure the parent that the testis will most likely descend into place on its own.
2. Refer the infant to a pediatric urologist or surgeon for possible orchiopexy.
3. Teach the parent to manipulate the testis into the scrotum during diaper changes.
4. Tell the parent that hormonal therapy may be needed to correct the condition.

## Question 18

A 6-month-old infant has a retractile testis that was noted at the 2-month well baby exam. What will the primary care pediatric nurse practitioner do to manage the condition?

**Answer: Refer the infant to a pediatric urologist or surgeon for possible orchiopexy.**

# Question 19

A 30-month-old girl who has been toilet trained for 6 months has daytime enuresis and dysuria and a low-grade fever. A dipstick urinalysis is negative for leukocyte esterase and nitrites. What is the next step?

1. Begin empiric treatment with trimethoprim-sulfamethoxazole.
2. Discuss behavioral interventions for toilet training.
3. Reassure the child's parents that the child does not have a urinary tract infection.
4. Send the urine to the lab for culture.

## Question 19

A 30-month-old girl who has been toilet trained for 6 months has daytime enuresis and dysuria and a low-grade fever. A dipstick urinalysis is negative for leukocyte esterase and nitrites. What is the next step?

**Answer: Send the urine to the lab for culture.**

## Question 20

A 3-year-old child has just completed a 7-day course of amoxicillin for a second febrile urinary tract infection and currently has a negative urine culture. What is the next course of action?

1. Obtain a renal and bladder ultrasound.
2. Prescribe prophylactic antibiotics to prevent recurrence.
3. Refer the child for a voiding cystourethrogram.
4. Screen urine regularly for leukocyte esterase and nitrites.

## Question 20

A 3-year-old child has just completed a 7-day course of amoxicillin for a second febrile urinary tract infection and currently has a negative urine culture. What is the next course of action?

**Answer: Obtain a renal and bladder ultrasound.**