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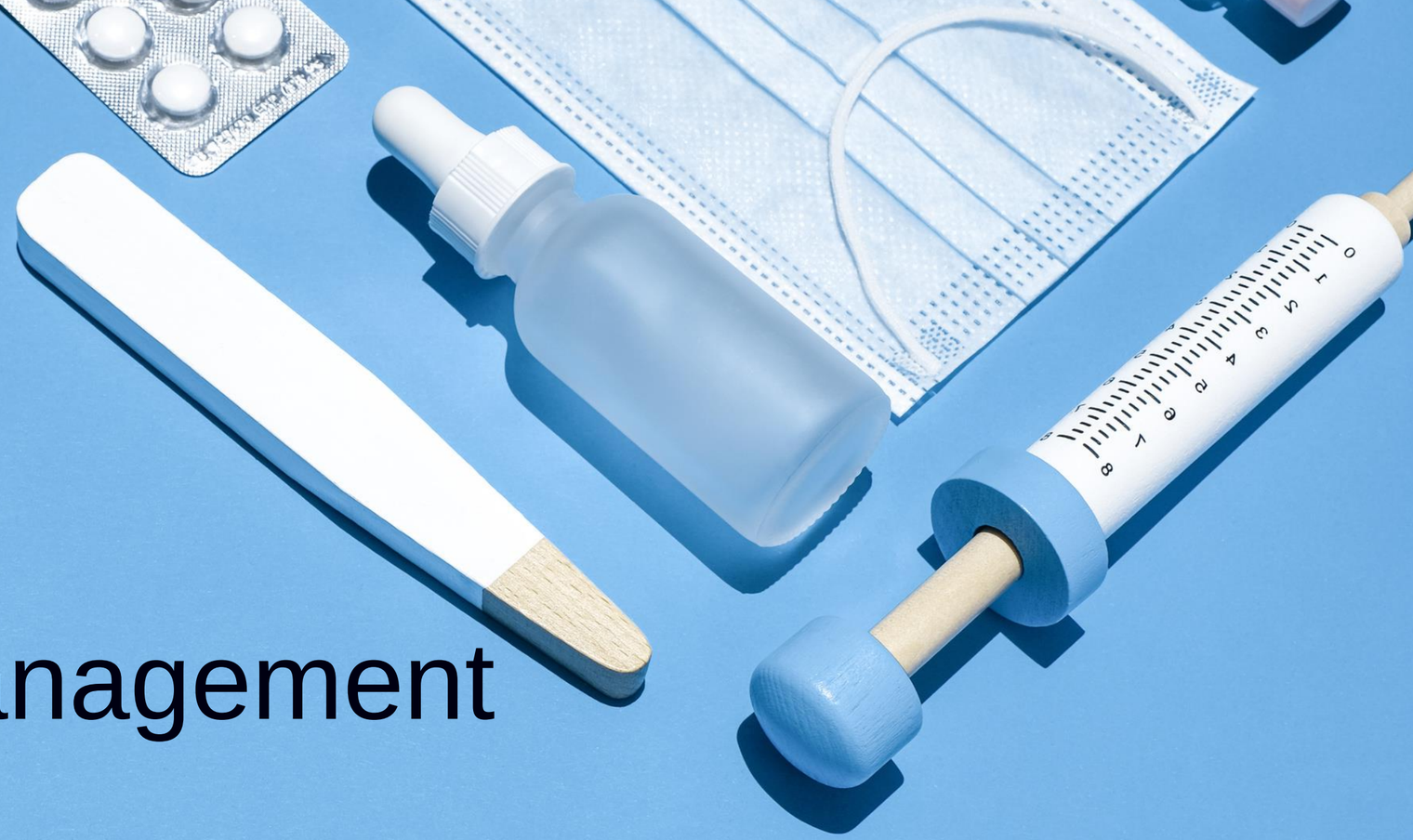

Pharmacologic Management of Pediatric UTIs and Bladder-Bowel Dysfunction

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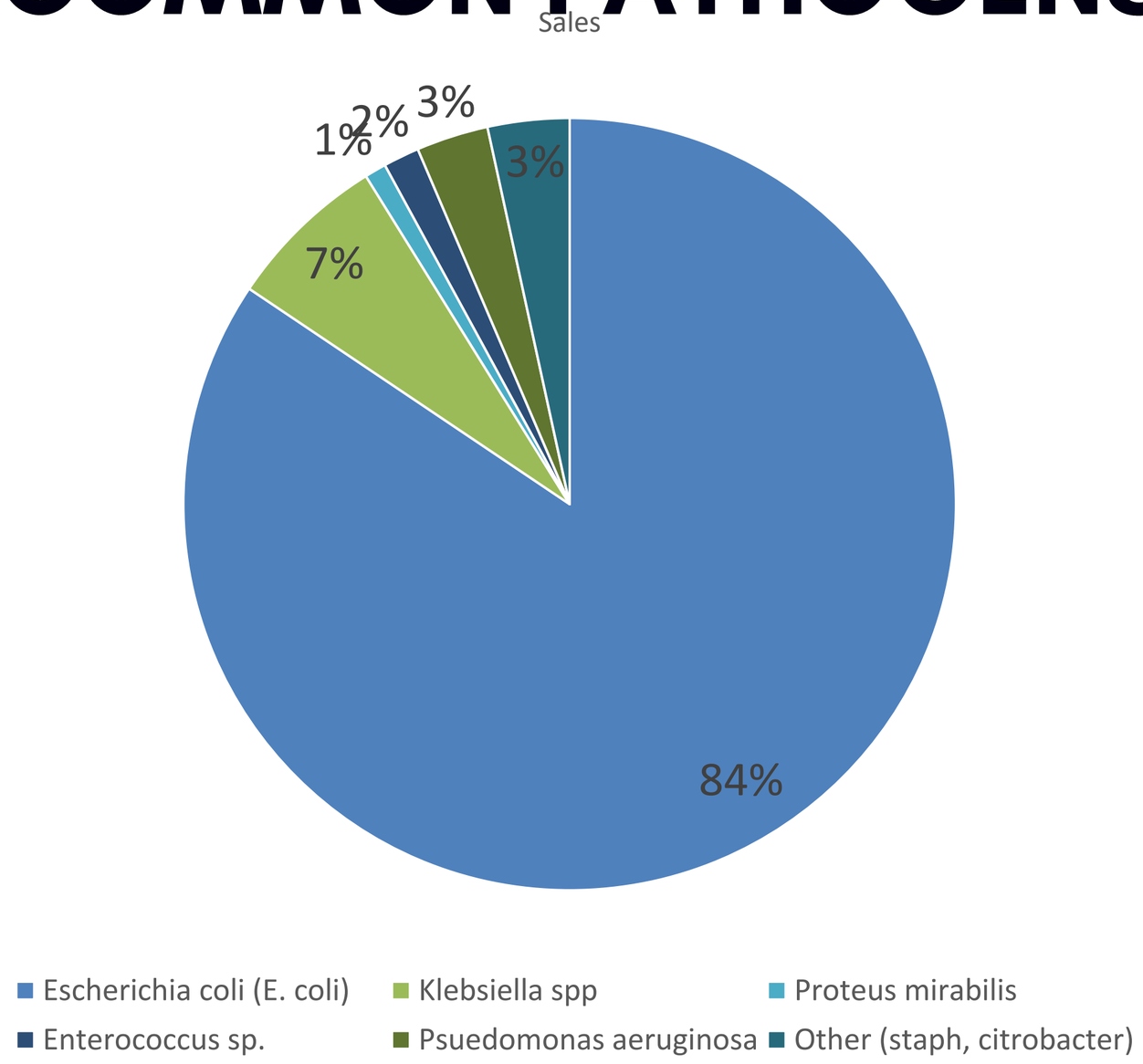
LEARNING OBJECTIVES

1. Identify key clinical signs and symptoms of UTIs in infants, toddlers, and older children.
2. Recognize the role of constipation and bladder–bowel dysfunction in recurrent UTIs.
3. Incorporate constipation management into treatment plans.
4. Apply evidence-based pharmacologic treatment strategies.

PEDIATRIC UTI OVERVIEW

- UTIs are among the most common bacterial infections in children
- 7% of girls and 2% of boys will experience a UTI by age 7
- Highest risk: infants < 12 months, uncircumcised males, toilet-training children
- Recurrence: 30%

COMMON PATHOGENS



CLINICAL PRESENTATION BY AGE

- Infants
  - Fever, poor feeding, vomiting, irritability, failure to thrive
  - < 6 months old boys are at increased risk
  - < 12 months old uncircumcised boys are at increased risk
- Toddlers
  - Fever, strong smelling urine, hematuria, dysuria, frequency, abdominal or flank pain, new onset urinary accidents in an otherwise potty-trained child
- Older Children
  - similar symptoms of an adult
  - dysuria, frequency, urgency, suprapubic/flank pain, fever

WHEN TO SUSPECT A UTI

- Fever without source
- Dysuria or frequency
- Abdominal or flank pain
- New urinary incontinence
- Foul-smelling urine
- Hematuria

DIAGNOSTIC TESTING

- Urinalysis (with or without microscopy)
- Urine Culture: >50,000 uropathogenic organisms
- Collection methods:
  - Infants: catheterization
  - Toilet-trained: clean catch
  - Bag specimens: no longer recommended

URINALYSIS SENSITIVITY & SPECIFICITY RANGES

Test	Sensitivity (Range), %	Specificity (Range), %
Leukocyte esterase test	83 (67–94)	78 (64–92)
Nitrite test	53 (15–82)	98 (90–100)
Leukocyte esterase or nitrite test positive	93 (90–100)	72 (58–91)
Microscopy, WBCs	73 (32–100)	81 (45–98)
Microscopy, bacteria	81 (16–99)	83 (11–100)
Leukocyte esterase test, nitrite test, or microscopy positive	99.8 (99–100)	70 (60–92)

AAP: https://publications.aap.org/pediatrics/article/128/3/595/30724/Urinary-Tract-Infection-Clinical-Practice

CONSTIPATION AND UTIS

- Bladder- Bowel Dysfunction
  - Children with this have significantly higher UTI recurrence rates
  - Most common around ages 2-5 years old
    - Why this age group?

CONSTIPATION AND UTIS

- Bladder-bowel dysfunction mechanisms include:
  - Incomplete bladder emptying
  - Increase bladder pressure
  - Urinary stasis
  - Bacterial colonization

Rome IV Criteria

FUNCTIONAL CONSTIPATION

Diagnostic criteria

1. Must include **two or more** of the following criteria fulfilled for the last 3 months with symptom onset at least 6 months prior to diagnosis:
2. Straining during more than ¼ (25%) of defecations
3. Lumpy or hard stools (Bristol Stool Form Scale 1-2) more than ¼ (25%) of defecations
4. Sensation of incomplete evacuation more than ¼ (25%) of defecations
5. Sensation of anorectal obstruction/blockage more than ¼ (25%) of defecations
6. Manual maneuvers to facilitate more than ¼ (25%) of defecations (e.g., digital evacuation, support of the pelvic floor)
7. Fewer than three SBM per week
8. Loose stools are rarely present without the use of laxatives
9. Insufficient criteria for irritable bowel syndrome

INCORPORATING CONSTIPATION MANAGEMENT

- Dietary Consideration
- Polyethylene glycol
    - Disimpaction
    - Maintenance therapy

PHARMACOLOGIC TREATMENT PRINCIPLES IN ANTIBIOTICS

- Treatment goals:
  - Eradicate the infection
  - Prevent complications
  - Minimize antibiotic resistance
  - Avoid unnecessary treatment
  - Treat any underlying causes

PRINCIPLES OF ANTIBIOTIC SELECTION

Consider:

- Patient age
- Severity of illness
- Local resistance patterns
- Renal function
- Ability to tolerate oral therapy
- Empiric therapy should target **E. coli**.

FIRST LINE ORAL ANTIOBITICS

Common outpatient agents:

Drug	Class
Cephalexin	1st generation cephalosporin
Cefixime	3rd generation cephalosporin
Amoxicillin-clavulanate	β-lactam/β-lactamase inhibitor
Trimethoprim-sulfamethoxazole	Folate inhibitor

CEPHALOSPORINS

Mechanism:

- Beta lactam antibiotic
- Prevent cell wall synthesis

Advantages:

- Wide spectrum, effective against Gram-negative organisms
- Safety profile in children

Common Adverse Effects

- GI upset
- Rash or mild allergic reaction
- Rare but serious allergic reactions
- Changes in liver function tests

Examples:

- Cephalexin
- Cefixime
- Cefdinir

AMOXICILLIN-CLAUVULONATE

Mechanism:

- Amoxicillin inhibits cell wall synthesis
- Clavulanate inhibits β-lactamase enzymes

Advantages:

- Broad spectrum coverage
- Useful when resistance suspected

Common adverse effects:

- Diarrhea
- Rash

TRIMETHOPRIN-SULFAMETHAXOLE

Mechanism:

- Sequential blockade of folate synthesis:
- Sulfamethoxazole → inhibits dihydropteroate synthase
- Trimethoprim → inhibits dihydrofolate reductase

Advantages

- Strong activity against E. coli

Common Adverse Effects

- GI upset
- Skin rash
- Elevated liver enzymes, although uncommon

Avoid in:

- Infants under 2 months
- Avoid in pregnancy or with breastfeeding

ANTIBIOTIC MANAGEMENT

- Antibiotic agent
- Dosing
  - Mg/Kg
- Duration
  - 2-24 months: typically, 7-14 days

REDUCING UNNECESSARY ANTIBIOTIC USE

- Asymptomatic bacteriuria in pediatrics
  - Negative leukocyte esterase on urinalysis
  - Lack of symptoms consistent with a UTI: including but not limited to fever, dysuria, frequency, flank pain
- Antibiotic Prophylaxis
  - In regards to febrile UTIs with vesicoureteral reflux (VUR)
- Overtreatment
  - Accurate diagnosis

PREVENTING RECURRENT UTIS

- Bowel bladder dysfunction
- Infants and those in diapers
  - Frequent diaper changing as needed
- Proper toilet training techniques
  - Wiping front to back
  - Not “holding it”
- Adequate hydration

KEY TAKE AWAYS

- UTIs are a common cause for antibiotic use in children
- Risk factors: female sex, uncircumcised males < 12 months, constipation
- Common pathogens: E. coli
- Antibiotic therapies: based on local sensitivity, duration for children 2-24 months is 7-14 days
- Antibiotic stewardship and UTI prevention

QUESTIONS

- Any questions regarding UTIs, bowel bladder dysfunction, or treatment regimens