



Cystitis

Renal Block

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Objectives

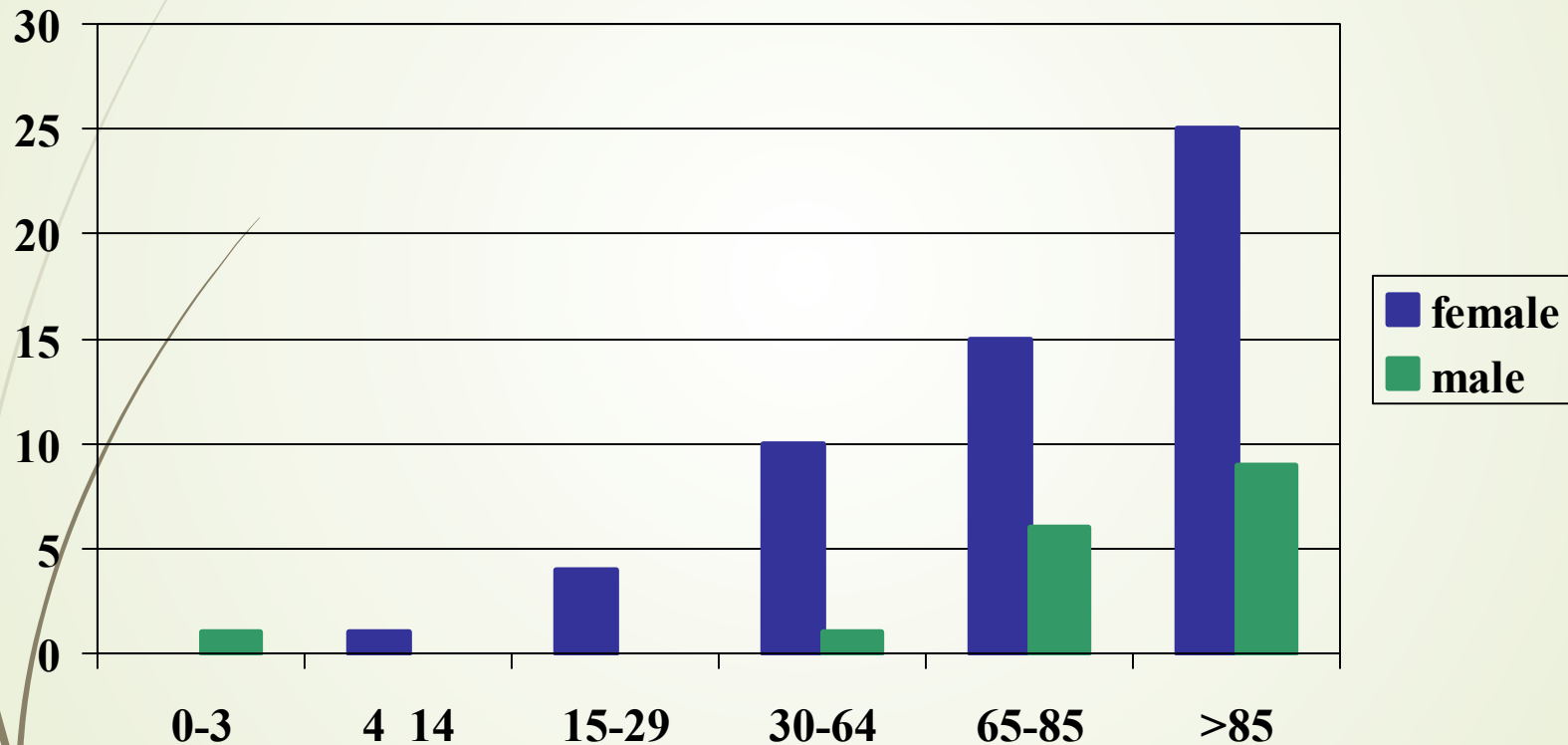
- 1-To define the term cystitis and who is commonly get cystitis.
- 2- To describe the pathogenesis and risk factors of cystitis.
- 3- To know the most common causative organisms of cystitis
- 4- To recognize different types of cystitis (infectious and non-infectious).
- 5- To recognize that venereal diseases can present with cystitis.
- 6- To understand the laboratory diagnostic of cystitis
- 7-To know the antimicrobial agents suitable for the treatment and prevention of cystitis.



Introduction

- Urinary Tract infection (UTI) divided into upper and lower urinary tract infections
- **Patient presents with urinary symptoms and significant bacteriuria= 10^5 bacteria/ml**
- Asymptomatic bacteriuria when the patient presents with significant bacteria in urine but without symptoms

Prevalence of Bacteriuria in different age groups





Classification

Lower UTIs

Cystitis (infection of the bladder: a superficial mucosal infections)

Urethritis (sexually transmitted pathogens)

- urethritis in men & women

Prostatitis and Epididymitis

Upper UTIs Acute pyelonephritis

Chronic pyelonephritis

Uncomplicated UTI (empirical therapy is possible)

Complicated UTI (nosocomial UTI, relapses, structural or functional abnormalities)


Cystitis



- **In women** :cystitis is common due to a number of reasons
 - Short urethra
 - Pregnancy
 - Decreased estrogen production during menopause.
- **In men**: mainly due to persistent bacterial infection of the prostate.
- **In both sexes**: common risk factors are :
 - Presence of bladder stone
 - Urethral stricture
 - Catheterization of the urinary tract
 - Diabetes mellitus



Pathogenesis of cystitis

- Due to frequent irritation of the mucosal surfaces of the urethra and the bladder.
 - Infection results when bacteria ascends to the urinary bladder . These bacteria are residents or transient members of the perineal flora, and are derived from the large intestine flora.
 - Toxins produced by uropathogens.
 - **Conditions that create access to bladder are:**
 - **Sexual intercourse** due to short urethral distance.
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Pathogenesis of cystitis

- **Uncomplicated UTI** usually occurs in non pregnant , young sexually In sexually active female without any structural or neurological abnormality
- **Risk factors :**
 - Catheterization of the urinary bladder , instrumentation
 - Structural abnormalities
 - Obstruction
- **Haematogenous** through blood stream (less common) from other sites of infection



Etiologic agents

- ***E.coli*** is the most common (90%) cause of cystitis. Other Enterobacteriaceae include (*Klebsiella pneumoniae*, *Proteus* spp.) Other gram negative rods eg. *P.aeruginosa*.
- **Gram positive bacteria** :*Enterococcus faecalis*, group B *Streptococcus* and *Staphylococcus saprophyticus* { honeymoon cystitis}.
- *Candida* species
- Venereal diseases (gonorrhea, Chlamydia) may present with cystitis.
- *Schistosoma hematobium* in endemic areas.

Pathogens involved

Uncomplicated UTI

E. coli 64%
Enterobacteriaceae 16%
Enterococcus spp 20%
Pseudomonas spp <1%
S. aureus <1%

Special cases

(*S. epidermidis*)
S. saprophyticus
Yeasts (catheter related result)
Viruses (Adeno, Varicella)
Chlamydia trachomatis

Complicated UTI

E. coli
Enterobacteriaceae
Pseudomonas spp
Acinetobacter spp

(% is not possible to

judge, often multi-resistant strains)

Clinical presentation

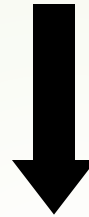
Symptoms usually of acute onset.

- Dysuria (painful urination)
- Frequency (frequent voiding)
- Urgency (an imperative call for toilet)
- Hematuria (blood in urine) in 50% of cases.
- Usually no fever.



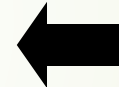


Vaginitis (5%)
Candida spp.
T. vaginalis



**Dysuria and
frequency**

Urethritis (10-15%)
C. trachomatis,
N. gonorrhoeae
H. simplex
Other bacteria?



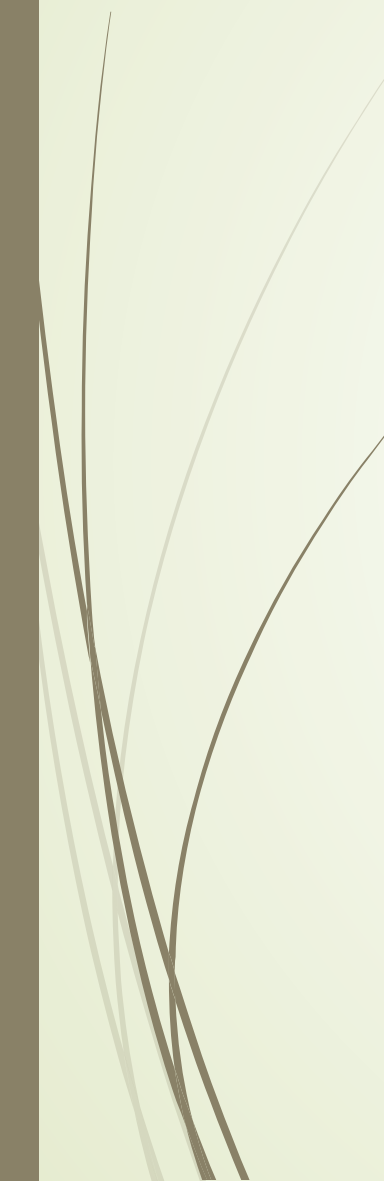
Cystitis (80%)
E. coli,
S. saprophyticus
Proteus spp.
Klebsiella spp.



Non-infectious (<1%)
Hypoestrogenism
Functional obstruction
Mechanical obstruction
Chemicals



How to differentiate between cystitis and urethritis ?

- Cystitis is of more acute onset
 - More severe symptoms
 - Pain, tenderness on the supra-pubic area.
 - Presence of bacteria in urine (*bacteriuria*)
 - Urine cloudy, malodorous and may be bloody
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Differential diagnosis (types of cystitis)

► Non-infectious cystitis such as:

1. **Traumatic cystitis** in women
2. **Interstitial cystitis** (unknown cause, may be due to autoimmune attack of the bladder)
3. **Eosinophilic cystitis** due to *Schistosoma hematobium*
4. **Hemorrhagic cystitis** due to radiotherapy or chemotherapy.




Laboratory diagnosis of cystitis

1. Specimen collection:

- Most important is clean catch urine [Midstream urine (**MSU**)] to bypass contamination by perineal flora and must be *before starting antibiotic*.
- **Supra-pubic aspiration** or **catheterization** may be used in children.
- Catheter urine should not be used for diagnosis of UTI.



2- **Microscopic examination:**

- About 90% of patients have **> 10 WBCs /cumm**
 - Gram stain of uncentrifuged sample is sensitive and specific.
 - One organism per oil-immersion field is indicative of infection.
 - Blood cells, parasites or crystals can be seen
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3- **Chemical screening tests:**

- ▶ **Urine dip stick** –rapid ,detects *nitrites* released by bacterial metabolism and *leucocyte esterase* from inflammatory cells. Not specific.

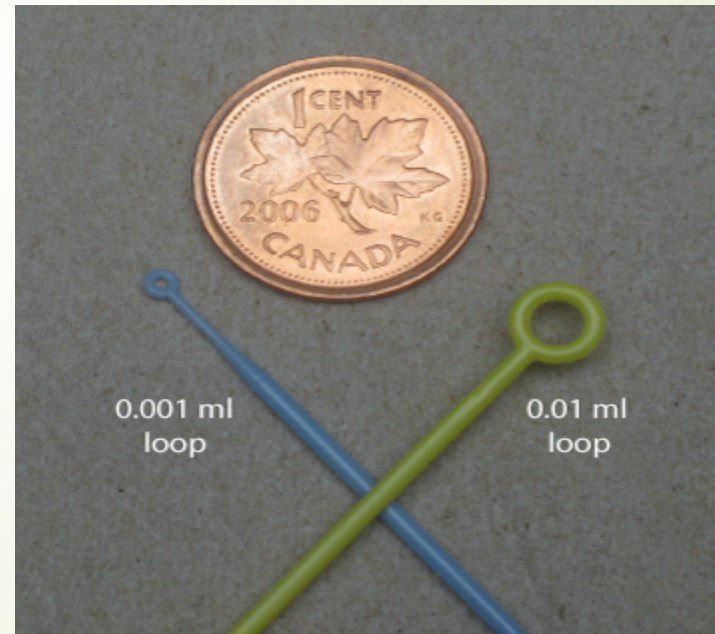
4- **Urine culture:** important to identify bacterial cause and antimicrobial sensitivity .

- ▶ **Quantitative culture** typical of UTI (>100,000 /cumm)
Lower count (<100,000 or less eg. 1000/cumm) is indicative of cystitis if the patient is *symptomatic*.

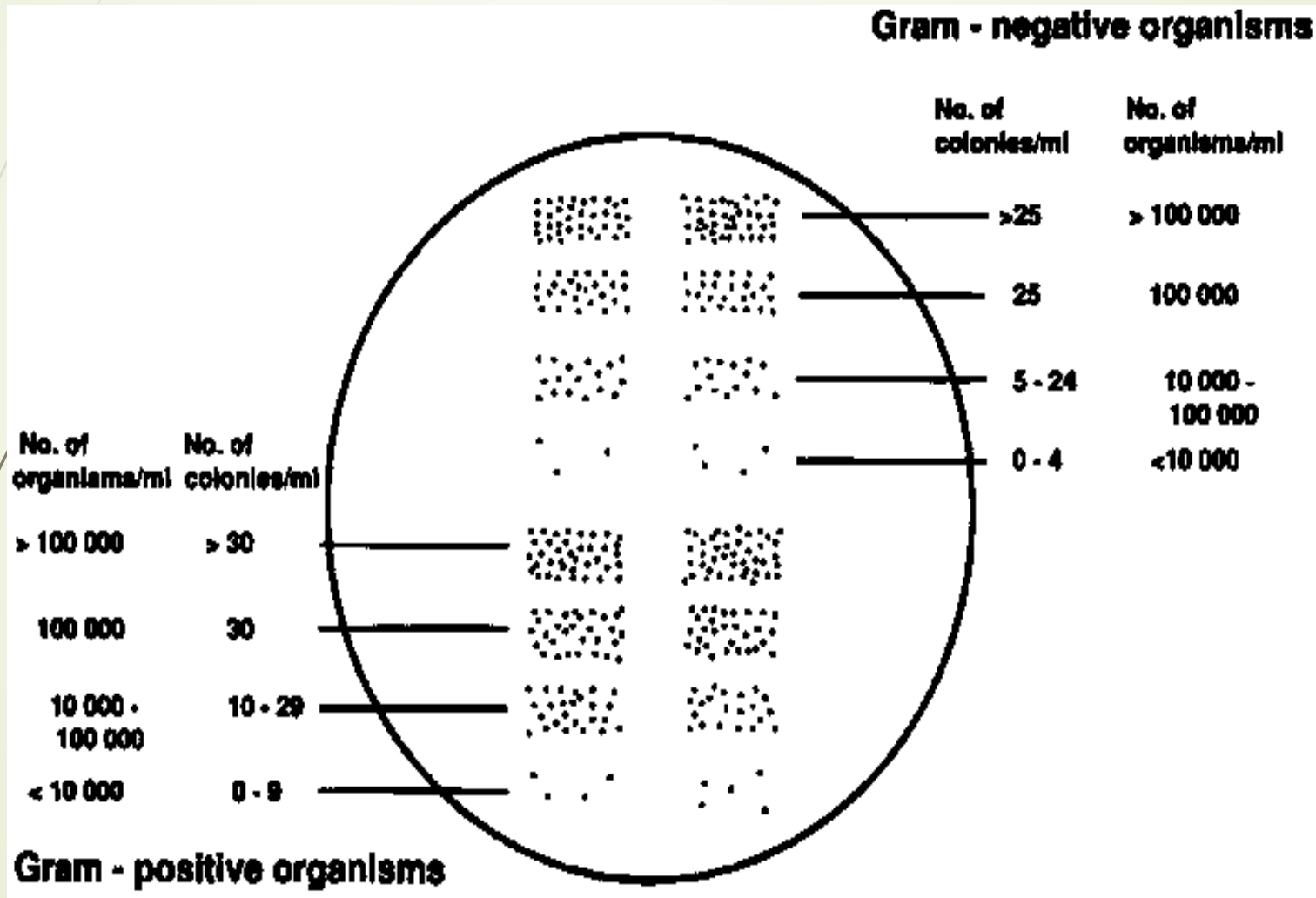


Urinalysis (sample collected after fluid therapy)

Specimen	Cystocentesis
Color	Yellow
Appearance	Cloudy
Specific gravity	1.014
pH	5.5
Protein	Trace
Glucose	3+
Ketones	1+
Bilirubin	1+
Blood	2+
Urobilinogen	0.2
Bacteria	Negative
Epithelial cells	0-3




Quantitative Urine Culture







Recurrent cystitis

- Three or more episodes of cystitis /year
 - Requires further investigations such as Intra-Venous Urogram (**IVU**) or Ultrasound to detect obstruction or congenital deformity.
 - Cystoscopy required in some cases.
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Treatment of cystitis

- **Empiric treatment** commonly used depending on the knowledge of common organism and sensitivity pattern.
- **Treatment best guided by susceptibility pattern of the causative bacteria.**
- **Common antimicrobial agents:** Ampicillin, Cephadrine, Ciprofloxacin, Norfloxacin, Gentamicin or Trimethoprim-Sulfamethoxazole (TRM-SMX).

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- **Duration** of treatment: three days for uncomplicated cystitis
 - 10-14 days for complicated and recurrent cystitis.
 - **Prophylaxis** required for recurrent cases by Nitrofurantoin or TRM-SMX .
 - **Prevention** : drinking plenty of water and prophylactic antibiotic.