Micro1

Urinary Tract Defenses

The urinary tract is normally sterile. Several mechanisms **prevent infection:**

- **Urine Flow:** Regular urination flushes out non-adherent microbes.
- Periurethral/Urethral **Microbiota**: Normal flora (lactobacilli, coagulase-negative staph, corynebacterium, streptococci) act as barriers; their balance is influenced by estrogen, vaginal pH, and cervical IgA.
- **Urine Composition:** Low pH, high osmolarity, salts, urea, and organic acids inhibit bacterial growth.
- **Lactoferrin**: Binds iron, depriving bacteria of this essential nutrient.
- **Anti-Adherence Factors**: Tamm-Horsfall protein, secretory IgA, and uromucoid prevent bacterial attachment.
- **Immune Response:** Bladder epithelium expresses Toll-like receptors (TLRs) that trigger innate and adaptive immune responses. Exfoliation of infected cells helps remove bacteria.
- **Kidney Immunity**: Local synthesis of immunoglobulins (IgG, IgA) in response to infection.

Bacterial Entry and Risk Factors

- Most Common Route: Ascending infection from urethra **to** bladder.
  - ❖ Risk Factors:
- **Reduced Urine Flow:** Obstruction (e.g., prostatic hyperplasia), neurogenic bladder, low fluid intake, voiding dysfunction.
- **Facilitating Ascent**: Catheterization, urinary/fecal incontinence, residual urine, ischemic bladder wall.

UTI Clinical Entities and Definitions

Clinical Entities:

- **Asymptomatic bacteriuria** (ASB)
- **Cystitis**
- **Prostatitis**

- **Pyelonephritis**

❖ Key Terms:

- **Contamination**: Organisms introduced during urine collection; not clinically significant.
- **Asymptomatic Bacteriuria**: Bacteria in urine without symptoms; often doesn't require treatment.
- **Infection (UTI):** Pathogen presence with symptoms/inflammatory response; requires treatment.
- **Uncomplicated UTI**: Healthy, non-pregnant, pre-menopausal women with normal urinary tracts.
- **Complicated UTI**: Associated with factors like obstruction, retention, immunosuppression, renal failure, pregnancy, or foreign bodies.
- Recurrent UTI: ≥2 infections in 6 months or >3 in 12 months.
- **Re**infection: New infection by different bacteria.
- Persistent UTI: Same bacteria from a persistent focus.

Epidemiology and Predisposing Factors

❖ **Community**:

- 50–80% of women experience at least one UTI in their lifetime (mostly **un**complicated cystitis).
- 20–30% of women with a UTI will have recurrences.
- **A**symptomatic bacteriuria: 1–3% in non-pregnant women, 2–9.5% in pregnant women بتزيد الأعراض مع الحامل .

❖ **Hospital**:

- **UTIs** are the **most common healthcare-associated infection** (>30% of hospital infections).
- Nearly all hospital-acquired UTIs are linked to instrumentation (catheters القسطرة).

- Sources: **Endogenous** (meatal, rectal, vaginal colonization) and **exogenous** (contaminated hands/equipment).

Table 1 Incidence of Urinary Tract Infection According to Age and Sex

Age Group	Incidence (%)	Approximate Sex Ratio (Male:Female)
Neonatal	1.0	1.5:1.0
Preschool age	1.5-3.0	1:10
School age	1.2	1:30
Reproductive age	3-5	1:50
Geriatric	10-30	1:1.5

Key points from the table:

- **Neonatal**: Incidence is 1.0%, with a male-to-female ratio of 1.5: 1 (more males affected).

- **Preschool age:** Incidence is 1.5–3.0%, with a ratio of 1:10 (many more females affected).-> due to anatomical factors such as a shorter urethra in females, which facilitates easier ascent of bacteria into the urinary tract.

- **School age:** Incidence is 1.2%, with a ratio of 1:30 (even more females affected).

- **Reproductive age:** Incidence increases to 3–5%, with a ratio of 1:50 (vastly more females affected).

- **Geriatric**كبار السن**:** Incidence is highest at 10–30%, with a ratio of 1:1.5 (slightly more females affected).-> عند النساء لضعف المناعه وعند الرجال لازدياد مشاكل البروستاتا

Clinical Categories of UTIs

- Uncomplicated UTIs: Affect healthy individuals without urinary tract abnormalities.

- Complicated UTIs: Occur in the presence of factors compromising urinary tract/host defense (e.g., obstruction, catheters, immunosuppression).

Etiology of UTIs

Main Pathogens:

- **Escherichia coli** (E. coli): **Most common cause**, especially in women; a gram-negative rod, facultative anaerobe, E. coli and other facultative anaerobes constitute about 0.1% of gut microbiota.

- **Enterococcus faecalis**: Gram-positive cocci, common in nosocomial infections, often linked to catheterization.

->E. faecalis is found in the large intestine in high concentrations & in the genitourinary tract.

- **Klebsiella pneumoniae**: Normal flora in the GI tract,mouth , nose, but also colonizes hospital environments, contributing to hospital-acquired infections❗.

- **Proteus mirabilis:** Gram-negative, swarming motility, produces **urease** يحلل اليوريا لأمونيا, raises urine pH ↑ ❗, and forms stones (**struvite**, **apatite**).

الأمونيا ترفع درجة الحموضة (pH) في البول"قاعدي"، فتؤدي إلى ترسب المعادن الموجودة في البول مثل المغنيسيوم + الأمونيوم + الفوسفات وبالتالي تُشكّل حصى تُعرف(struvite)، الكالسيوم + الفوسفات تُشكّل حصى تُعرف (apatite)

Antimicrobial Resistance

Key Terms:

- AMR: Antimicrobial resistance.
- MDR: Multidrug-resistant.
- XDR: Extensively drug-resistant. مقاومة واسعه
- ESKAPE Pathogens: Enterococcus faecium, Staphylococcus aureus, Klebsiella pneumoniae, Acinetobacter baumannii, Pseudomonas aeruginosa, Enterobacter spp. (sometimes extended to include E. coli).

Virulence Factors in Uropathogenic E. coli (UPEC) and Others

- **Adhesive fimbriae**: Enable attachment to urothelium.
- **Flagella:** Allow motility, including *ascent* from bladder to kidneys.
- **Toxins**: Haemolysin, cytotoxic necrotizing factor disrupt epithelial barriers.
- **Siderophores**: Iron acquisition for bacterial growth.
- **Capsules**: Resist complement and phagocytosis.

Pathophysiology of UTIs

- Bacteria ascend from the **urethra**, attach to **bladder** epithelium, evade host defenses, and may ascend further to infect **kidneys**.
- Host response includes immune activation, inflammation, and sometimes exfoliation of infected epithelial cells.

Key MCQ Highlights from the Lecture

- Most common UTI pathogen in women: **Escherichia coli.**
- Most affected age group: Older adults.
- Gender most prone to UTIs: Females.
- Anatomical risk factor in women: Shorter urethra.
- Risk factor for recurrent UTIs: Diabetes mellitus.

ارتفاع سكر البول (Glycosuria) مرضى السكري يعانون من وجود جلوكوز في البول، ما يوفر بيئة مغذية للبكتيريا. بالإضافة لضعف جهاز المناعة خاصة الخلايا المناعية التي تهاجم البكتيريا، مما يقلل القدرة على مقاومة العدوى. ايضاً ضعف في وظيفة المثانة وهو خلل في التفريغ الكامل للبول، مما يؤدي إلى احتباس بولي ويُعطي فرصة للبكتيريا أن تتكاثر. وبعض أنواع البكتيريا، مثل E. coli، تلتصق بسهولة أكبر بخلايا المسالك البولية عند مرضى السكري

- Most common mode of transmission: Direct contact.
- Most common site of infection: **Urethra**.

Micro2

UTIs encompass several clinical entities:

- Asymptomatic bacteriuria (ASB)
- Cystitis
- Pyelonephritis
- Prostatitis

Clinical Presentation

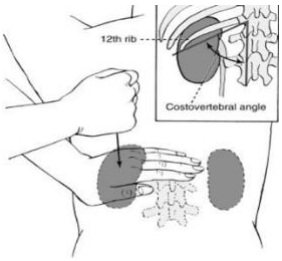
- **Cystitis**التهاب المثانة: Dysuria, urinary frequency, **urgency**الالحاح البولي, **nocturia**تبول ليلي, **hesitancy** صعوبة ببدء التبول, suprapubic discomfort, and sometimes gross hematuria.

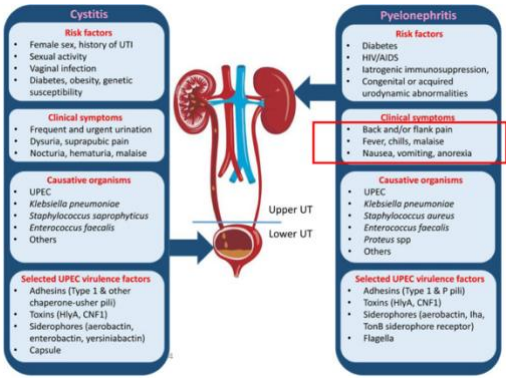
- **Mild Pyelonephritis**: Low-grade fever, possibly lower-back or costovertebral-angle pain.

- **Severe Pyelonephritis**: High fever, rigors, nausea, vomiting, flank and/or loin pain.

-**Constitutional Symptoms**: Fever is mild or absent in **cystitis** but **common in pyelonephritis.**

-**Murphy's Percussion Test**: التقييم الألمUsed to assess costovertebral angle tenderness, indicating pyelonephritis.





Diagnosis of UTIs التشخيص

❖ Diagnosis begins with a detailed **history**.

- In women with at least one UTI symptom and **no** complicating factors, probability of **acute cystitis** or **pyelonephritis** is ~**50%.**

- If risk factors are presentعدوى سابقة and **no** vaginal discharge/complicating factors, probability rises to ~**90%**, often not requiring lab evaluation before therapy.

- Important to differentiate from sexually transmitted diseases, especially **Chlamydia trachomatis.**

❖ **Dipstick and Urinalysis:** التحليل البولي

- Detects **nitrites** (produced by Enterobacteriaceae) and **leukocyte esterase** (from polymorphonuclear leukocytes).

- Dipstick may be less sensitive if voiding frequently تبول متكررor in pregnant women.

❖ **Urine Culture:**زراعه

- **Gold standard for diagnosis.**
- Colony count threshold $\geq 10^2$ bacteria/mL is more sensitive and specific for **acute cystitis** in women than $>10^5$/mL.
- **Risk** of contamination from distal urethra, vagina, or skin ‹midstream clean catch or suprapubic aspiration may be necessary.
- **Culture** results take 24 hours; organism identification may require an additional 24 hours.

Treatment of UTIs

Antimicrobial Therapy:

- Indicated for **all** symptomatic UTIs.
- Choice of agent, onset, and duration depend on infection site and complicating conditions.
- Regional variation in antimicrobial resistance affects empirical treatment choices.
- *Antibiotic Effectiveness:* ***Ciprofloxacin*** is **most effective against isolated strains,** ***Oxacillin*** is **least effective.**

Table 1. Antibiotics for non-pregnant women aged 16 years and over

Antibiotic[1]	Dosage and course length[2]
First choice[3]	
Nitrofurantoin – if eGFR ≥45 ml/minute	50 mg four times a day or 100 mg modified-release twice a day for 3 days
Trimethoprim – if low risk of resistance and not used in the past 3 months	200 mg twice a day for 3 days
Second choice (no improvement in lower UTI symptoms on first choice taken for at least 48 hours, or when first choice not suitable)[3,4]	
Nitrofurantoin – if eGFR ≥45 ml/minute and not used as first choice	50 mg four times as day or 100 mg modified-release twice a day for 3 days
Pivmecillinam	400 mg initial dose, then 200 mg three times a day for a total of 3 days
Fosfomycin	3 g single dose sachet

TREATMENT STRATEGIES FOR ACUTE UNCOMPLICATED CYSTITIS

DRUG AND DOSE	ESTIMATED CLINICAL EFFICACY, %	ESTIMATED BACTERIAL EFFICACY,* %	COMMON SIDE EFFECTS
Nitrofurantoin, 100 mg bid × 5–7 d	84–95	86–92	Nausea, headache
TMP-SMX, 1 DS tablet bid × 3 d	90–100	91–100	Rash, urticaria, nausea, vomiting, hematologic abnormalities
Fosfomycin, 3-g single-dose sachet	70–91	78–83	Diarrhea, nausea, headache
Pivmecillinam, 400 mg bid × 3–7 d	55–82	74–84	Nausea, vomiting, diarrhea
Fluoroquinolones, dose varies by agent; 3-d regimen	85–95	81–98	Nausea, vomiting, diarrhea, headache, drowsiness, insomnia
β-Lactams, dose varies by agent; 5- to 7-d regimen	79–98	74–98	Diarrhea, nausea, vomiting, rash, urticaria

9

Causative Organisms

- Most common: **Escherichia coli** (53.24%)
- Others: Enterococcus faecalis, Proteus spp., Staphylococcus aureus, Staphylococcus epidermidis, Staphylococcus saprophyticus, Klebsiella spp., Enterobacter spp., Pseudomonas aeruginosa, Citrobacter spp., Serratia marcescens.

Complications of Pyelonephritis

❖ **Acute Complications:**

- Single episode can cause renal scarring.

-Potentially **fatal** if complicated by:

- **Emphysematous** pyelonephritis (20–80% mortality)
- **Perinephric abscess** (20–50% mortality)
- **Sepsis**

❖ **Chronic Complications:**

- Chronic pyelonephritis may develop after childhood acute pyelonephritis, especially with **vesicoureteric reflux** ارتجاع مثاني حالبي(VUR).

❖ **Emphysematous Pyelonephritis:**

- Severe necrotizing infection with **gas** in renal and perinephric tissues, often in **diabetics**.
- Diagnosed by CT scan; treated with **antibiotics**, **drainage**, or **nephrectomy**.
- High mortality (~60%).

❖ **Xantho****granulomatous Pyelonephritis:**

- Rare, chronic inflammatory mass with lipid-laden macrophages, necrosis, and hemorrhage.
- Often associated with **Proteus**, **E. coli,** or **Pseudomonas** in chronic obstruction.

Prostatitis

Epidemiology:

- Up to **50% of men** experience symptoms at some point; bacterial infections are a minority.
- Includes infectious and non-infectious abnormalities.

❖ ***Acute Bacterial Prostatitis:***

- Presents with dysuria, frequency, pelvic/perineal pain, fever, chills, and bladder outlet obstruction symptoms.ضعف تدفق البول أو صعوبة بالبدء
- Diagnosis: Digital rectal exam (edematous, tender prostate), urine Gram stain and culture.

- Risk factors: Previous acute prostatitis, urinary tract manipulation خلال الإجراء الطبي كالقسطرة او المنظار..., diabetes, smoking.

❖ ***Chronic/Recurrent Bacterial Prostatitis:***

- Occurs in young/middle-aged men.

Pathogens:

- Reflect those causing **cystitis**, urethritis, and deeper genital tract infections; mainly **gram-negative Enterobacterales.**

Management:

- **Antimicrobial** therapy and **supportive** measures; rarely invasive interventions for complications.

Micro3

Asymptomatic Bacteriuria (ASB)

Diagnosis:

- **Women**: **2** consecutive voided urine specimens with the same bacterial strain, $\geq 10^5$ CFU/mL, and no symptoms.

- **Men**: Single, clean-catch voided urine specimen with 1 bacterial species, $\geq 10^5$ CFU/mL.

- Organism: **Escherichia coli** is the **most common**, but strains in ASB have fewer virulence factors than those in symptomatic infections.

- Testing: Diagnosis should be based on a properly collected urine specimen to minimize contamination.تلوثها يعني نتيجة خاطئة

Screening & Management of ASB

Who to screen:

- **Pregnant women:** Early pregnancy ASB **increases risk** (20–30 fold) for **pyelonephritis**, premature delivery, and low birth weight infants.

- Recommendation: Screen at least once early in pregnancy and treat if positive.

- **Patients undergoing traumatic genitourinary procedures:** High risk of post-procedure bacteremia and sepsis; screening and treatment are recommended **before** transurethral resection of the prostate. قبل الإجراء ك استئصال البروستاتا يجب الفحص والعلاج

- **Not** recommended: Routine screening or treatment for ASB or funguria in patients with **indwelling urethral catheters** ❗قسطرة بولية دائمة.

Catheter-Associated Urinary Tract Infection (**CAUTI**)

- Epidemiology: UTIs are the **most common healthcare-associated infection** (>30% of hospital infections).❗

- Cause: Almost **all** healthcare-associated UTIs are due to instrumentation, especially **catheters.**

Sources of Infection:

- **Endogenous**: Meatal فتحة الاحليل, rectal, or vaginal colonization. البكتيريا الموجودة
- **Exogenous**: Contaminated hands of healthcare personnel or equipment.

Prevention:

- Catheterize only with clear indications.
- Consider alternatives بدائل للقسطرة(e.g., intermittent catheterization).
- Remove or replace catheters when possible.
  - ❖ Treatment: **Empirical IV antibiotics** based on local susceptibility أنماط مقاومة البكتيريا الشائعة بمنطقة معينة and previous infections السجل المرضي.

Routes of Bacterial Entry in CAUTI:

- **Extraluminal**: Outside of the catheter (between catheter and urethral surface).

- **Intraluminal**: Inside the catheter (e.g., breaks in the closed system, poor aseptic technique).
  - ❖ **Types**: **CAUTI** may be endogenous or exogenous in origin.

➢ Clinical Case Scenarios

Case 1: ASB in Pregnancy

- Presentation: 23-year-old, 8 weeks pregnant, **a**symptomatic, urine culture >100,000 CFU/mL gram-negative rods.

- *Risks if Untreated*❗: Pyelonephritis, preterm labor, second-trimester abortion, preeclampsia, maternal anemia, chorioamnionitis التهاب المشيمة.

- *Treatment*: **Nitrofurantoin** or **trimethoprim** (safe in pregnancy).

Case 2: Acute Cystitis

- Presentation: 25-year-old woman, urinary frequency, dysuria, suprapubic tenderness❗, urinalysis positive for leukocyte esterase and nitrites❗.

- Most Common Organism: **Escherichia coli.**

Case 3: CAUTI and Urosepsis in Elderly

- Presentation: 82-year-old woman, indwelling Foley catheter❗, back pain, fever, tachycardia, costovertebral tenderness، positive urinalysis.

- Management: Remove Foley catheter, start empiric antibiotics as per local guidelines.

Case 4: **Un**complicated UTI

- Presentation: 48-year-old woman, burning, bloody urine, increased frequency, positive urine dipstick for leukocyte esterase and nitrites❗.

    - Uncomplicated UTI is most commonly caused by Escherichia coli and trimethoprim-sulfamethoxazole (TMP-SMX) is the most common first line empiric antibiotic used for treatment whilst awaiting culture results.

    - Individualized treatment choice between nitrofurantoin, TMP-SMX, and ciprofloxacin **depends** largely on clinical picture, allergy, tolerability, compliance and local community resistance patterns

Special Considerations

- Recurrent UTIs & Alkaline Urine (pH >8): البول الطبيعي عادةً حمضي اقل من ٧Suggests ١urease-producing organisms تحليل اليوريا لأمونيا or٢ struvite (triple phosphate) kidney stones (magnesium, ammonium, phosphate).

- Case Example: 38-year-old woman with recurrent UTIs; symptoms resolve with antibiotics but recur after stopping.

تتحسن مع المضادات الحيوية، لكن الأعراض تعود بسرعة بعد التوقف عن العلاج. قد يكون لديها بكتيريا مزمنة تُنتج اليورياز أو حصى تعمل كـ"خزان" للبكتيريا وبالتالي، المضادات الحيوية تقتل البكتيريا في البول مؤقتًا، لكنها لا تصل إلى البكتيريا الموجودة داخل الحصى، فتعودالعدوى

Micro4

Genital infections cover a range of clinical entities, including:

SEXUALLY TRANSMITTED AND SEXUALLY TRANSMISSIBLE MICROORGANISMS

BACTERIA	VIRUSES	OTHER[a]
Transmitted in Adults Predominantly by Sexual Intercourse		
Neisseria gonorrhoeae	HIV (types 1 and 2)	Trichomonas vaginalis
Chlamydia trachomatis	Human T cell lymphotropic virus type 1	Pthirus pubis
Treponema pallidum	Herpes simplex virus type 2	
Haemophilus ducreyi	Human papillomavirus (multiple genital genotypes)	
Klebsiella (Calymmatobacterium) granulomatis	Hepatitis B virus[b]	
Ureaplasma urealyticum	Molluscum contagiosum virus	
Mycoplasma genitalium		

- Bacterial vaginosis
- Chancroid
- Gonorrhoea
- Chlamydia
- Syphilis
- Mycoplasma genitalium
- Trichomoniasis
- Vulvovaginal candidiasis
- Genital warts
- HIV
- Genital herpes

Symptoms and Signs:

- Vaginal/penile discharge, genital ulcers, pelvic pain, dysuria, dyspareunia.
- Many **STDs**" Sexually Transmitted Infection"can be **a**symptomatic.

- Patients with one STI should be assessed for others due to overlapping risk factors.

Risk Factors:

- Multiple/new sexual partners, lack of barrier contraception, low socioeconomic status, age <25, symptomatic partner, sexual orientation (e.g., higher prevalence among MSM for certain STIs), and sexual practices (orogenital/anogenital contact).

Epidemiology of Sexually Transmitted Diseases

Global Prevalence (2012, ages 15–49):

- Chlamydia: Women 4.2%, Men 2.7%
- Gonorrhoea: Women 0.8%, Men 0.6%
- Trichomoniasis: Women 5.0%, Men 0.6%
- Syphilis: Women 0.5%, Men 0.48%
- Nearly 1 million new curable STI infections daily worldwide.

Prevalence and incidence vary by region and sex.

➢ **Bacterial Vaginosis** (**BV**)

Etiology

- **Not** an STI, but increases risk of acquiring STIs.
- Caused by imbalance in vaginal flora (loss of Lactobacillus, overgrowth of anaerobes like Bacteroides, Mobiluncus).
- **Lactobacilli** produce H_2O_2, keeping pH low; loss raises pH and allows overgrowth of anaerobes.

Epidemiology, Signs, and Symptoms

- Prevalence: 11–48% in women of childbearing age.
- Risk factors: New/multiple partners, douching, smoking; can occur without intercourse.
- 50–75% **a**symptomatic; symptomatic cases: thin, white, fishy-smelling discharge (worse after intercourse).

- **Pregnant** women: higher risk of preterm delivery and complications.
- Increases risk of other STDs, including HIV.

Diagnosis

Amsel Criteria:

1. Homogeneous, watery, white-grey discharge
2. Vaginal pH >4.5 normal 3.8 – 4.5
3. Positive amine ("whiff") test (fishy odor with KOH)
4. Presence of "**clue cells**" on wet mount (best predictor)❗

First three findings can also be present in trichomoniasis.

Treatment

- Often resolves spontaneously in 1/3 of cases.
- *Medications*: **Metronidazole** 500mg twice daily for 7 days or **clindamycin** 300mg twice daily for 7 days.
- 30% recurrence within 3 months; consider longer/alternative treatment for recurrences.

➢ Trichomoniasis

Etiology:

- STI caused by **Trichomonas vaginalis** (flagellated protozoan).
- Pathogenesis: damages host tissue, disrupts vaginal flora, triggers inflammation.

Epidemiology, Signs, and Symptoms

- **T**ransmitted sexually; highest incidence in women with multiple partners or other STIs.
- **A**symptomatic in 10–50% of women, 15–50% of men.
- Symptoms: Frothy, yellow, itchy/smelly discharge, dyspareunia, dysuria, lower abdominal pain, "strawberry cervix" (punctate hemorrhages) in 2%.

- Can cause **urethritis** in men.

Diagnosis and Treatment

- Microscopy: Wet mount shows motile protozoa (48–80% sensitivity in women, 50–90% in men).
- Rapid tests: Sensitivity 80–94%, specificity >95%.
- **NAATs** "Nucleic Acid Amplification Test": Highest sensitivity (gold standard).❗
- Treatment: Metronidazole or tinidazole 2g single dose; treat partners and **a**symptomatic cases.

➢ **Vulvovaginal Candidiasis**

Etiology

- Caused by **Candida albicans** (opportunistic yeast, normal gut/vaginal flora).
- Candida present in 10–20% of **a**symptomatic women.
- 29–49% of premenopausal women report at least one episode.
- Rare in prepubertal girls.
- C. albicans causes 80–92% of cases; others (e.g., C. glabrata) possible.
- Recurrent infection: ≥4 episodes/year (seen in 5–8% of women, often genetically predisposed).

Signs and Symptoms

- Itching, soreness, thick white "cottage cheese" discharge, vulvar erythema/edema.

Diagnosis

- Wet mount with 10% KOH: May show yeast/hyphae, but negative in ~50%.
- Self-diagnosis **un**reliable (only 34% accuracy).
- Vaginal pH typically **normal** (4–4.5), **unlike BV** or **trichomoniasis**.ترفع الph
- Culture recommended for persistent/recurrent cases not responding to azoles. مضادات الفطريات

Treatment

- 90% are **un**complicated (healthy, non-pregnant, mild/moderate, infrequent, C. albicans).
- **Oral/topical azoles** equally effective; topical acts faster, oral preferred by many يفضله المرض اكثر لسهوله الاستخدام(e.g., **fluconazole**).
- Severe/immunosuppressed: 7–14 days topical therapy.
- **Pregnancy**: **Only** treat symptomatic cases with topical imidazole for 7–14 days; **oral azoles contraindicated.**❗

Case

History

Tanya Walters is a 24-year-old single female who presented at her clinic with complaints of a smelly, yellow vaginal discharge and slight dysuria for one week.

- Denies vulvar itching, pelvic pain, or fever
- Has had 2 sex partners over the past 6 months—did not use condoms with these partners—on oral contraceptives for birth control
- No history of sexually transmitted diseases, except for trichomoniasis one year ago
- Last check-up one year ago

Findings: Vaginal pH: 6.0 (elevated), Wet mount: Numerous motile trichomonads, no clue cells, KOH mount: Negative for yeast/pseudohyphae -> trichomoniasis

Parameter	Normal findings	Vulvovaginal candidiasis	Bacterial vaginosis	Trichomoniasis
Symptoms	None or mild, transient	Pruritus, soreness, dyspareunia	Malodorous discharge, no dyspareunia	Malodorous discharge, burning, postcoital bleeding, dyspareunia, dysuria
Signs	Normal vaginal discharge consists of 1 to 4 mL fluid (per 24 hours), which is white or transparent, thin or thick, and mostly odorless	Vulvar erythema and/or edema Discharge may be white and clumpy and may or may not adhere to vagina	Off-white/gray thin discharge that coats the vagina	Thin green-yellow discharge, vulvovaginal erythema
Vaginal pH	4.0 to 4.5	4.0 to 4.5	>4.5	5.0 to 6.0*
Amine test	Negative	Negative	Positive (in 70 to 80% of patients)	Often positive
Saline microscopy	PMN:EC ratio <1; rods dominate; squames +++	PMN:EC ratio <1; rods dominate; squames +++; pseudohyphae (present in approximately 40% of patients); budding yeast for nonalbicans *Candida*	PMN:EC <1; loss of rods; increased coccobacilli; clue cells comprise at least 20% of epithelial cells (present in >90% of patients)	PMN ++++; mixed flora; motile trichomonads (present in approximately 60% of patients)
10% potassium hydroxide microscopy	Negative	Pseudohyphae (in approximately 70% of patients)	Negative	Negative
Other tests	–	If microscopy nondiagnostic: • Culture • Nucleic acid amplification test • DNA hybridization probe	Quantitative microscopy (eg, Nugent criteria, Hay/Ison criteria) Nucleic acid amplification test DNA hybridization probe Culture of **no** value	If microscopy nondiagnostic: • Culture • Rapid antigen test • Nucleic acid amplification test • DNA hybridization probe
Differential diagnosis	Physiologic leukorrhea	Contact irritant or allergic vulvar dermatitis, chemical irritation, focal vulvitis (vulvodynia)	Elevated pH in trichomoniasis, atrophic vaginitis, and desquamative inflammatory vaginitis	Purulent vaginitis, desquamative inflammatory vaginitis, atrophic vaginitis, erosive lichen planus

Micro5

- **Syphilis** الزهري

Etiology

- Caused by **Treponema pallidum,** a thin, helical, gram-negative spirochete.
- Cannot be cultured easily due to dependence on host cells and sensitivity to oxygen.❗

Epidemiology

- Rising incidence since 2000.
- **Increases risk of HIV transmission** when lesions are present.
- Spread mainly via direct sexual contact; also congenital and via contaminated blood نادر.

Clinical Course

- **Primary phase**: Skin lesions (chancres) at infection site.
- **Secondary phase:** Disseminated disease (skin lesions, fever, headache); symptoms resolve in weeks. لكن العدوى موجودة
- **Late phase:** بعد سنوات من الاصابه الغير معالجة Severe organ damage (neurosyphilis, cardiovascular syphilis, blindness, dementia).

Diagnosis & Treatment

- Diagnosis: **Darkfield microscopy**, immunofluorescent stains, PCR, serology (VDRL, RPR, TP-PA لتأكيد التشخيص).
- Treatment: **Penicillin** (benzathine benzylpenicillin/Penicillin G) is drug of choice.
- Prevention via safe sex and adequate antibiotics.

- **Gonorrhoea**

Etiology

- Caused by **Neisseria gonorrhoeae**, an aerobic gram-negative diplococcus.
- Always significant when found in clinical specimens.

Epidemiology

- **Second** most common STI in the UK, especially in young adults.
- Increasing incidence and antimicrobial resistance.

Pathophysiology

- Infects mucous membranes (urethra, rectum, cervix, conjunctiva, pharynx).

Signs & Symptoms

- Men: Purulent urethral discharge, dysuria; almost always symptomatic.❗
- Women: Often mild or **a**symptomatic❗; risk of PIDالتهاب الحوض, salpingitis التهاب فالوب, tubo-ovarian abscesses.

Diagnosis & Treatment

- Diagnosis: Swab exudatesمسحات من الإفرازات, urine, cervical/throat swabs; microscopy (gram-negative diplococci), culture, NAATs الأكثر دقة.
- Treatment: **Ceftriaxone** 500mg IM + **azithromycin** 1g PO (single doses); treat patient and partners.

➢ **Chlamydia**❗ الأكثر انتشاراً

Etiology

- Caused by **Chlamydia trachomatis,** an obligate intracellular parasite with a unique life cycle: **elementary**(المعدي) الجسم الأولي and **reticulate bodies** الشبكي يتكاثر ويتحول لمعدي
- Infects mucous membranes of urogenital and other tracts.

Epidemiology

- **Most common bacterial STD**❗; leading cause of infectious **blindness** (trachoma).
- Transmission: sexual, **eye-to-eye** (trachoma)بين الأطفال خاصة, contaminated hands/clothing, flies.

Signs & Symptoms

- Women: Mostly **a**symptomatic (up to 80%); risk of PID, infertility, ectopic pregnancyحمل خارج الرحم.

- Men: Mostly symptomatic مع أعراض غالبا, but 25% may be inapparent.
- Can ***cause*** cervicitis, urethritis, proctitis, and lymphogranuloma venereum (**LGV**)الورم اللمفاوي التناسلي

Diagnosis & Treatment

- Diagnosis: **NAATs** (high sensitivity), swabs, first-catch urine->

أخذ أول 10–20 مل من البول الخارج من الإحليل عند التبول لأول مرة في اليوم أو بعد الامتناع عن التبول لمدة ساعتين على الأقل.

لأن البكتيريا مثل Chlamydia trachomatis وNeisseria gonorrhoeae تتركز غالبًا في الإحليل الأمامي، فتظهر بكثافة أكبر في أول كمية من البول

- Treatment: **Doxycycline** 100mg PO bid for 7 days or **azithromycin** 1g single dose; treat patient and partners.

➢ **Nongonococcal Urethritis (NGU)**

Etiology

- **Mycoplasma genitalium** and **Ureaplasma urealyticum**: smallest free-living bacteria, lack cell wall.
- Cause **NGU** غالبا عند الذكور and **PID** التهاب المرض غالبا عند النساء.

Diagnosis & Treatment

- Diagnosis: PCR amplification of species-specific genes.
- Treatment: **Azithromycin** is preferred due to resistance to doxycycline and cell wall-active antibiotics.

Resistance

- Rising incidence and antimicrobial resistance are major concerns.

➢ **Urethritis in Adult Males**

Causes

- Most often due to **N. gonorrhoeae**, **C. trachomatis**, and **M. genitalium**.
- **Coinfections** are common. اكثر من عدوى بنفس الوقت

Symptoms

- Chief complaint: dysuria.

- Other: pruritus, burning mainly , discharge (mucoid to purulent), sometimes **a**symptomatic.
- May be associated with epididymitis or prostatitis.

Clinical Considerations

- Evaluate for fever, testicular pain/swelling, urinary symptoms, pelvic pain.

Antimicrobial Resistance

- Resistance testing: Multiple drug resistance found against many antibiotics except **gentamicin**, **rifampicin**, and **azithromycin**.

Clinical Approach

- History and physical examination are essential for diagnosis and management.

Infection	Etiology	Diagnosis	Treatment
Syphilis	Treponema pallidum	Serology, microscopy	Penicillin
Gonorrhoea	Neisseria gonorrhoeae	Microscopy, NAAT, culture	Ceftriaxone + Azithromycin
Chlamydia	Chlamydia trachomatis	NAAT	Doxycycline or Azithromycin
Mycoplasma NGU	M. genitalium, U. urealyticum	PCR	Azithromycin

Micro6

Sexually Transmitted Diseases (STDs) & **Genital Ulceration**

- Genital ulceration is a significant feature of several STIs and increases the risk of HIV transmission.

PCR testing of genital ulcers shows:

- **HSV** (Herpes simplex virus): **62%**
- Treponema pallidum (**syphilis**): 13%
- Haemophilus ducreyi (**chancroid**): 12–20%

Genital **herpes** is now the **most common cause of genital ulceration globally.**

Ulcerative Genital Infections

- **Genital Herpes**

  - *Epidemiology*: Over 400 million people affected worldwide; **HSV-2** is the **main cause**, with 1 million new US cases annually.

  - *Pathophysiology*: Lifelong infection with periodic reactivation.

  - *Signs/Symptoms:* Vesicles on genitalia that **ulcerate**, malaise, **fever**, **lymphadenopathy**; recurrences are common, especially with HSV-2.

  - *Diagnosis*: Viral culture, PCR, antigen detection.

  - *Treatment*: Systemic antivirals (**acyclovir**, **valacyclovir**, famciclovir) control symptoms but do not cure or prevent recurrences; symptomatic relief includes saline baths and analgesics.

- **Chancroid**

  - Caused by **Haemophilus ducreyi.**

  - Features: Painful, necrotizing genital ulcers with erythematous papules turning into pustules and ulcers.

  - *Treatment*: Single-dose **azithromycin** or **ciprofloxacin**, or **IM ceftriaxone;** syndromic management includes therapy for both chancroid and syphilis.

- **Genital Warts (HPV Infection)**

  - Etiology: Caused by **human papillomavirus** (HPV), mainly subtypes **6** and **11**; types 16 and 18 linked to cancer.

  - Epidemiology: Up to 50% of the population may acquire HPV; **more common in women.**

  - Pathophysiology: **Koilocytes** (atypical keratinocytes) are characteristic histologically.

  - Signs/Symptoms: Lesions appear 2–3 months post-exposure, often **a**symptomatic but can cause discomfort, burning, or pruritus.

  - Prevention: **Gardasil vaccine** protects against major oncogenic and wart-causing strains; Pap tests مسحة لعنق الرحم for early detection.

- Treatment: generally, includes topical agents and surgical removal.

➢ **Pelvic Inflammatory Disease** (**PID**)

- Definition: Infection ascending from cervix/vagina to upper genital tract (endometrium, fallopian tubes, ovaries); can extend to peritonitis or abscess.
- Causes: Often due to **STIs**, can also follow invasive procedures or other infections.
- Signs/Symptoms: Pelvic tenderness, lower abdominal pain, sometimes fever; symptoms may be subtle.
- Diagnosis: Clinical findings, laparoscopy (invasive), endometrial aspiration, MRI, NAATs for **N. gonorrhoeae** and **C. trachomatis,** increased vaginal WBCs.
- Complications: Scarring, adhesions, tubal obstruction, infertility, ectopic pregnancy, chronic pain.
- Treatment: **Empirical broad-spectrum antibiotics.**

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