

433 Teams

OBSTETRICS & GYNECOLOGY

UTI and anemia in pregnancy

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Urinary tract infection (UTI) and pyelonephritis in pregnancy

Define symptomatic UTI and asymptomatic bacteriuria in pregnancy.

Describe the incidence, causes and epidemiology of urinary tract infection (UTI) including pyelonephritis and asymptomatic bacteria in pregnancy.

Describe a diagnostic approach to a patient presenting with UTI.

Outline the plan of management for UTI in pregnancy.

Describe the Impact and complications of UTI on pregnancy and on maternal health.

Anemia in Pregnancy, Thyroid in Pregnancy and Heart Diseases in Pregnancy

Define anemia in pregnancy.

Identify the common types of anemia in pregnancy diagnosed in Saudi Arabia

Identify the causes and complications of iron-deficiency anemia in pregnancy.

Describe the clinical picture of anemia in pregnancy.

Anatomic Changes in Pregnancy

- **Kidneys:** ↑ in length, weight, and pelvis size (physiologic hydronephrosis); Rt > Lt
- **Ureters:** dilated or hydroureter (Rt > Lt), (because the ureter is compressed between the pelvic bone and the uterus and the enlarged uterus is tilted to the right side more than the left)
- **urinary stasis** (caused by the high levels of progesterone during pregnancy and that decreases the contractility of smooth muscles, therefore peristalsis of ureter is decreased).
- **Mechanism:** hormonal (progesterone) or mechanical
- **Consequences:** ↑ risk of urinary tract infections

Physiologic Changes in Pregnancy

- 40-50% ↑ in renal blood flow and glomerular filtration rate (GFR) → creatinine clearance
- ↓ serum level of creatinine, urea, uric acid by 25%
- (The physiologic increase in GFR during pregnancy normally results in low serum creatinine levels, so in a normal pregnant woman creatinine levels should be sub normal if they were high normal then there is an abnormality.)
- Fluid volumes: ↑ extracellular volume (intravascular 50% & interstitial component)
- Na & Ka levels maintained
- Chronic loss of renal HCO₃ → ↑ risk of metabolic acidosis

Urinary Excretion of nutrients

- **Glucosuria:** ↑ filtered tubular glucose and ↓ tubular reabsorptive capacity as a consequence there is an ↑ risk of UTI.
- **Protienuria:** abnormal.
- **Aminoaciduria:** ↑ risk of UTI.
- **Water---soluble vitamins:** folate and B12.

UTI in Pregnancy

- Common medical complication of pregnancy (2-10%)
- **Pathophysiology:** ascending infection from vagina and rectum
- **Most common causative organisms:**
 - gram –ve enteric bacteria (e.g: **E.Coli 60-80%**, Proteus, K. Pnemoniae, Pseudomonas, and GBS)
 - Lactobacilli cause no UTI

Risk Factors for UTI's in Pregnancy

- **Mechanical obstruction:** ureteropelvic junction, urethral or ureteric stenosis, & calculi
- **Functional obstruction:** pregnancy & vesicoureteral reflux
- **Systemic diseases:** DM, sickle cell trait/disease, gout, cystic renal disease

Terminology

Bacteriuria

- Bacteria in the urine

Significant bacteriureia

- = or > 10⁵ CFU/mL of urine

Asymptomatic bacteriuria

- at least 10⁵ CFU/mL in a clean urine specimen from an asymptomatic patient.

Classification of UTI's

Clinical

- Asymptomatic (8%)
- Symptomatic (1-2%) :(e.g., cystitis, pyelonephritis).

Anatomical

- Lower tract dis (bladder/urethra): asymptomatic bacteriuria and acute cystitis
- Upper tract dis (ureter/kidney): acute pyelonephritis

Types of UTI Recurrences

Significant Relapse

- same organism within 2-3 wks
- 2ndry to perineal colonization or inadequate Rx

Reinfection

- new organism within 12 wks
- 2ndry to recurrent bladder bacteriuria

Superinfection

- new organism while on Rx
- Usually in immunocompromised PTs

recurrent UTI

- 2 in 6 months or = >3 in 1year

Asymptomatic Bacteriuria (ABU)

- **Incidence in pregnancy:** 2-10% similar to sexually active women
- **Most common UTI in pregnancy**
- By definition, asymptomatic bacteriuria is the presence of at least 100,000 organisms/mL in a clean urine specimen from an asymptomatic patient.
- **Clinical presentation:** no symptoms
- **Diagnosis:** +ve urin culture showing >100, 000 colony forming units (CFU) of a single organism
- **Consequences:** acute cystitis or acute pyelonephritis (30%)
- **Management:**
 - outpatient Abx (amoxil, 1st generation cephalosporin, nitrofurantoin)
 - length: 3-10 days
 - After treatment, it is wise to follow with urine cultures because up to 25% of patients have a recurrence later in the pregnancy.

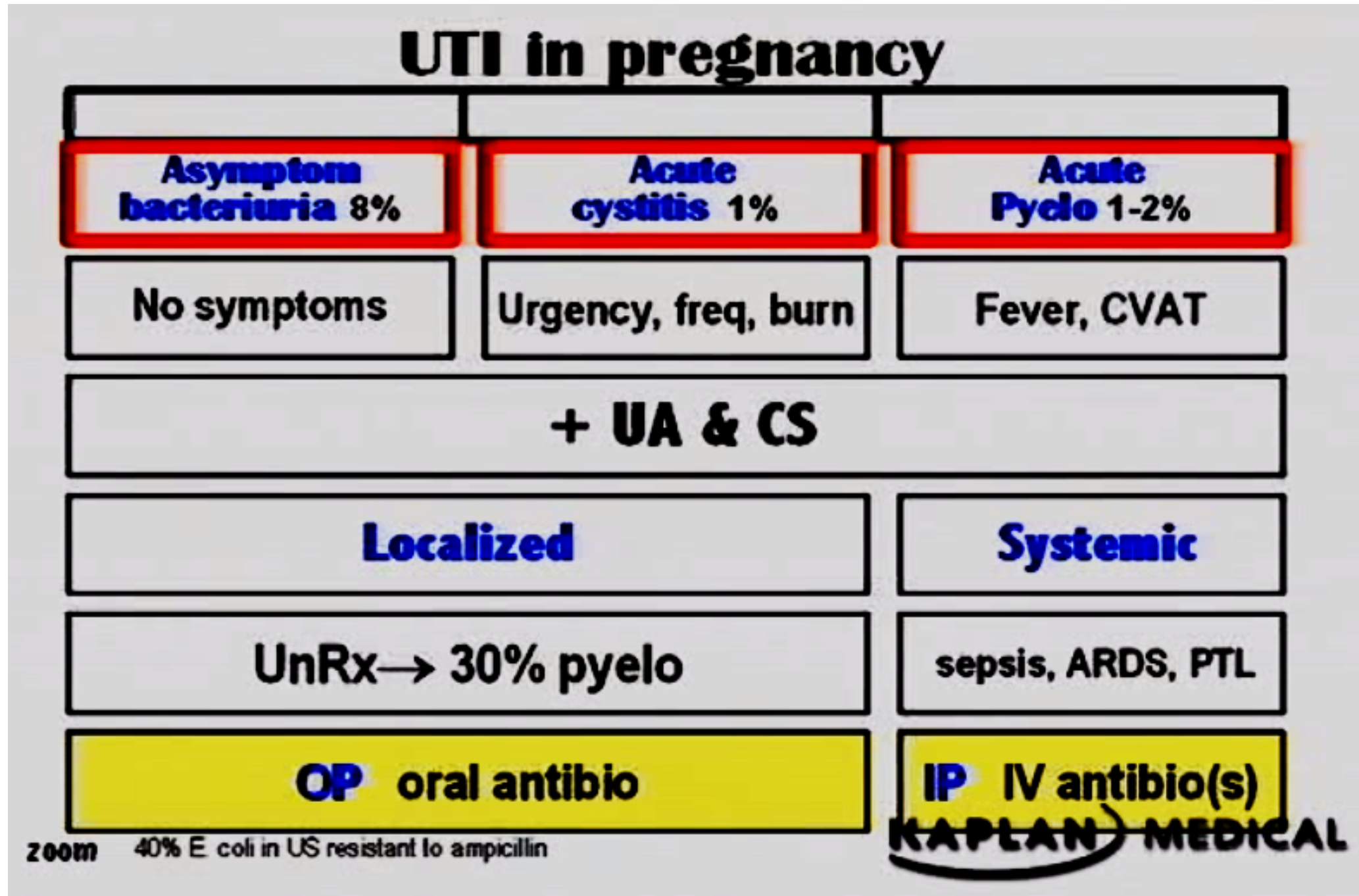
Acute Cystitis

- **Incidence in pregnancy:** 1-2%
- **Consequences:** acute pyelonephritis (30%)
- **Clinical presentation:** characterized by dysuria, frequency, urgency, and hematuria. Systemic signs and symptoms are absent.
- **Diagnosis:** +ve urin culture showing >100,000 colony forming units (CFU) of a single organism
- **Management:**
 - outpatient Abx,
 - analgesics
 - Length: 7-10 days
 - Re culture (Follow-up surveillance cultures are indicated).

Acute Pyelonephritis

- **Incidence in pregnancy:** 2-4%
- Most commonly in second Tx
- The leading cause of **ARDS** and **septic shock** in pregnancy
- **Consequences:** **sepsis, adult respiratory syndrome, anemia, renal failure, preterm labor**
- **Clinical presentation:** fever/chills, and costovertebral angle tenderness, nausea and vomiting, **urinary complaints of cystitis**
- **Diagnosis:** S&S – Leukocytosis - Urine culture - Blood culture +ve in 10%
- **Management:**
 - Admission (Inpatient)
 - Antipyretic agents, **monitoring for preterm labor, and close observation of fluid status and pulse oximetry.**
 - **Abx (i.v. ampicillin or cephalosporin then p.o)**
 - Length: 10-14 days
 - **Most patients (>80%) become asymptomatic and afebrile within 48 hours of initiation of antibiotic therapy and may be discharged at this point, continuing oral antibiotics for a 10-day course.**
 - Serial urine cultures are indicated because 10% to 25% of patients have a recurrence later in the pregnancy.
 - Those with recurrent pyelonephritis should receive chronic antibiotic suppression and have an IV pyelogram performed 6 weeks postpartum to rule out urinary tract abnormalities

summary from Kaplan ..



Notes from 432

- Entrance of bacteria into the urinary tract does not necessarily result in infection. Natural barriers for invasion, such as the “washout” effect of normal periodic voiding, the antiseptic properties of the bladder tissues, and the high concentration of organic acids in normal urine, prevent bacterial invasion. Other factors such as a pH of less than 5 and urea. If invasion takes place, the bacteria may remain in the bladder or may ascend to the kidney.
 - treatment of pregnant patients with acute cystitis is initiated before the results of the culture are available
 - urine culture should be routinely obtained in pregnant women as part of antenatal care.
 - Urine dipstick is done initially but urine culture is confirmatory.
 - 25% of patients have recurrence later in pregnancy so re-culture is very important.
- Some antibiotics should not be used during pregnancy, because of their effects on the fetus. These include the following:

Tetracyclines

- adverse effects on fetal teeth and bones and congenital defects

Trimethoprim in the first trimester

- facial defects and cardiac abnormalities

Chloramphenicol

- gray syndrome

Sulfonamides in the third trimester

- hemolytic anemia in mothers with glucose-6-phosphate dehydrogenase [G6PD] deficiency, jaundice, and kernicterus

Anemia in pregnancy

[summary from Kaplan ..](#)

<i>Questions</i>	<i>Diag</i>	<i>Mgmt</i>
Confirm criteria?	Hb < 10 g/dL	Heme or globin?
MCV <80, RDW↑	Iron defic	FeSO4 325 mg tid
MCV >100, RDW↑	Folate defic	Folate 1 mg qday
Produc Abn Hgb Electrophoresis	Sickle cell	Avoid hypoxia; folate

Physiologic anemia (dilutional anemia)

- dilution because the plasma volume expands more than the erythrocyte volume
- (The hematocrit in pregnancy normally drops several points below its pregnancy level)
- the oxygen-carrying capacity of the blood is not deficient
- The total blood volume increase by 40%(10-24w)
- single pregnancy and to 30% during late multifetal pregnancy
- Red cell mass (driven by an increase in maternal erythropoietin production) also increases, but relatively less, compared with the increase in plasma volume
- Women who take iron supplements have less pronounced changes in hemoglobin, as they increase their red cell mass in a more proportionate manner than those not on hematinic supplements.

Women after middle age: 11.7 to 13.8 gm/dl

Hemoglobin (whole blood)

Hg decreases as pregnancy progresses 

Units	Nonpregnant Female	First Trimester	Second Trimester	Third Trimester
g/dL	12 -15.8	11.6 - 13.9	9.7 - 14.8	9.5 -15
g/L	120 -158	116 - 139	97 - 148	95 - 150

Normal Hg values
in 1st, 2nd, & 3rd trimesters

(WHO recommendation) : Daily oral iron and folic acid supplementation is recommended as part of the antenatal care to reduce the risk of low birth weight, maternal anaemia and iron deficiency.

Supplement composition	Iron: 30–60 mg of elemental iron ^a Folic acid: 400 µg (0.4 mg)
Frequency	One supplement daily
Duration	Throughout pregnancy. Iron and folic acid supplementation should begin as early as possible
Target group	All pregnant adolescents and adult women
Settings	All settings

^a 30 mg of elemental iron equals 150 mg of ferrous sulfate heptahydrate, 90 mg of ferrous fumarate or 250 mg of ferrous gluconate.

Pathological anemia

- the oxygen-carrying capacity of the blood is deficient because of disordered erythrocyte production or excessive loss of erythrocytes through destruction or bleeding
- during pregnancy, anemia is defined as Hb < 10 g/dL (Hct < 30%)
- Anemia occurs in up to one third of women during the 3rd trimester
- **Causes:**
 - Iron deficiency
 - Folate deficiency
 - HEMOGLOBINOPATHIES

Iron deficiency anemia

- **Diagnosis :**
 - Typically, Hct is $\leq 30\%$, MCV is < 79 fL
 - Decreased serum iron and ferritin and increased serum transferrin levels confirm the diagnosis.
- **Risk factors:**
 - poor nutrition
 - multiple pregnancies.
- **Management :**
 - Usually ferrous sulfate 325 mg po once/day
 - parenteral therapy:
 - IM: 20% of pregnant women do not absorb enough supplemental oral iron
 - absolute non-compliance
 - IV: faster increases in Hb and better replenishment of iron stores in comparison with oral therapy
- **COMPLICATIONS: (the Dr. said that iron deficiency anemia rarely harm the fetus)**
 - Preterm delivery.
 - Intrauterine growth restriction (IUGR).
 - Low birth weight.

Folate deficiency

(Megaloblastic Macrocytic Anemia)

- increases risk of neural tube
- Deficiency occurs in 0.5 to 1.5% of pregnant women Diagnosis Measurement of serum folate
- Severe megaloblastic anemia may warrant bone marrow examination and further treatment in a hospital
- Treatment is folate 1 mg po bid
- Prevention : 0.4 mg po daily, if high risk (T1DM,T2DM,SEIZURE disorders, previous baby with NTD) : 4mg po daily
- **COMPLICATIONS:**
 - Preterm delivery.
 - Intrauterine growth restriction (IUGR).
 - Low birth Weight
 - Neural tube defect

Additional from Kaplan notes ..

Sickle Cell Anemia

This is an inherited autosomal recessive disease resulting in normal production of abnormal globin chains.

Screening Test. These are peripheral blood tests used to detect the presence or absence of hemoglobin S. They do not differentiate between disease and trait.

Diagnostic Test. A hemoglobin electrophoresis will differentiate between SA trait (<40% hemoglobin S) or SS disease (>40% hemoglobin S).

Risk Factors. African and Mediterranean descent is the only significant risk factor for sickle cell anemia.

Effects on Pregnancy.

- **With SA**, the patient may have increased urinary tract infections (UTIs) but pregnancy outcome is not changed.
- **With SS**, the pregnancy may be complicated by increased spontaneous abortions, IUGR, fetal deaths, and preterm delivery.

Treatment. Avoid hypoxia, take folate supplements, and monitor fetal growth and well-being.

Qs

Q1: Your 25-years old patient is pregnant a t 36 weeks gestation. She has an acute urinary tract infection (UTI). Of the following medications used in the treatment of UTIs, which is contraindicated in the treatment of this patient?

- a . Ampicillin
- b. Nitrofurantoin
- c. Trimethoprim/sulfa methoxazole
- d. Cephalexin
- e. Amoxicillin/clavulanate

Q2: The most common type of anemia in pregnancy is due to :

- a.Iron deficiency.
- b.Sickle cell disease.
- c.Folate deficiency.
- d.Hemolytic disease.

Q3: A 23-year-old G3P2002 at 25 weeks gestation presents to triage with fever, nausea, and vomiting for 1 day. She complains of back pain and lower abdominal pain. She has a fever of 101.2˚ F (38.9˚ C), clear lungs, and right costovertebral tenderness. Fetal heart rate is reassuring. The monitor shows contractions every 2 min. Cervix is closed/thick/high. Urine dip shows many bacteria, leukocytes, nitrites, and ketones. What is the most likely diagnosis? What is the next step in management?

Answers

Q1: Trimethoprim-sulfamethoxazole should not be used in the third trimester because sulfa drugs can cause kernicterus .

Q2: Iron deficiency

Q3: The clinical presentation is most consistent with pyelonephritis. She should be admitted to the hospital and given IV hydration and IV antibiotics.

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