



[Color index: **Important** | **Notes** | **Males Notes** | Extra]
Editing file [link](#)



Urinary Tract Infections & Anemia in Pregnancy

Objectives:

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

The doctor said this topic was not written well in the book & you can depend on the slides

Done by: Asrar Batarfi, Luluh Alzeghayer

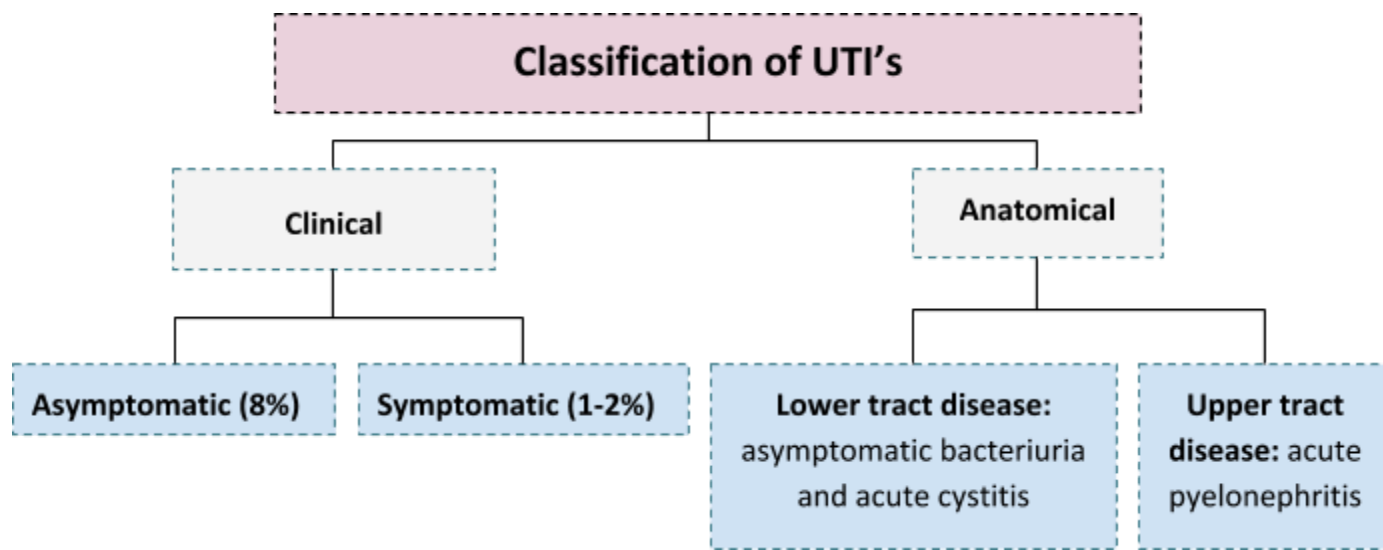
Revised by: Dalal Alhuzaimi , Khaled Al jedia

Special thanks to Heba al- qattan

Team Leaders: Luluh Alzeghayer & Haifa Almohsen

Urinary Tract Infections in Pregnancy

(the 2nd most common pregnancy problem)



- **Bacteriuria:** Bacteria in the urine
- **Significant bacteriuria:** $\geq 10^5$ CFU/mL of urine some say $\geq 10^3$
- Upper tract disease: ureter and kidney. Lower tract: bladder and urethra.

Types of UTI Recurrences:

| | Definition | Cause |
|---------------------------|--|--|
| 1. Relapse: | same organism <u>within 2-3 weeks</u> | secondary to perineal colonization or inadequate Rx (not treated probably, wrong treatment ¹ or low dose) |
| 2. Re-infection: | recurrent new organism or same organism within <u>12 weeks</u> | Secondary to bladder bacteriuria Usually in high risk patients as diabetics ... |
| 3. Superinfection: | new organism <u>while</u> on Rx (those who take antibiotics then develop the infection) | - Usually in Immunocompromised PTs. patients with voiding problem or other problems of the bladder. |
| 4. Recurrent UTI : | <u>2 in 6 months</u> , or ≥ 3 in <u>1 year</u> | very common in pregnancy *Pregnancy itself is a risk factor for UTI * |

¹ They give empirical antibiotic without culture but here in KSA it's very important to culture and not give the antibiotic blindly because 20-30% of people have resistance against ampicillin. So, u r not treating them!

Urinary Tract Infections in Pregnancy

- Common medical complication of pregnancy (2-10%) *it depends on the country, it's higher in the developing countries.*
- **Pathophysiology:** **ascending infection** from vagina and rectum
- **Most common causative organisms:**
 - gram(- ve) enteric bacteria e.g: **E.Coli** 60-80%, Proteus, K. Pneumoniae, Pseudomonas...
 - **GBS** (Group b strep): if we saw it in the urine culture we have to treat because **it affects the pregnancy** (preterm labour, small babies & premature rupture of the membrane).
A previous history of GBS UTI or +ve culture with group b strept. from the vagina or perineum is an indication for intrapartum antibiotic to prevent neonatal sepsis.
 - **Lactobacilli don't cause UTI²**

Causes:

1. **FEMALE GENDER:** Lifetime risk is 50%
Why it's more common in female? Why being a female is a high risk?
 - 1) the short urethra *around 4 cm* while males urethra is 10-15 cm.
 - 2) males' urethra is dry while in females it closer to the anus and vagina (normal flora), thus, women are prone to UTI after intercourse.
 - 3) males have antimicrobial material produced by the prostate.
 - 4) use of contraceptive sponge (spermicidal) increases risk of infection.
2. **Anatomic Changes in Pregnancy:**
 - **Kidneys:** increase in length, weight, and pelvis size (**physiologic hydronephrosis**); more in the Rt kidney than the Lt **because of the pelvis anatomy in the rt side**
 - **Ureters:** dilated or **physiologic hydroureter** (Rt > Lt), **more fluid and stays in the bladder → infection**
 - **Mechanism:** hormonal³ (**very high state of hormones**) or mechanical (**the dextro-rotation of uterus causes the uterus to put pressure more on the Rt ureter**)
 - **Consequences:** **increase stasis** → increase risk of urinary tract infections

Risk Factors for UTIs in Pregnancy:

- **Mechanical obstruction:** at ureteropelvic junction, urethral or ureteric stenosis, & calculi
- **Functional obstruction:** pregnancy & vesicoureteral reflux
- **Others:** Systemic diseases like DM, sickle cell trait/disease, gout, cystic renal disease
- **Another small factor:** normally they have glycosuria so it becomes attractive to the bacteria

Prevention:

- Prenatal screening for asymptomatic bacteriuria in pregnant women. **Usually we start screening in the 12th week.** *For every women you have to check the urine*
- **Drink a lot of water, cranberry juice**
- Hygiene, **void urine after intercourse**

مهم نستوعب ان اذا جاتها يرناري انفكشنز كثير قبل الحمل لازم اعطيها بروفياكسس

² Lactobacillus crispatus (gram +ve rod shaped), an organism in the healthy vaginas that protects against UTIs.

³ Progesterone and relaxin.

| | Asymptomatic Bacteriuria (ABU): | Acute Cystitis: | Acute Pyelonephritis: |
|--------------------------------|---|--|--|
| Incidence in pregnancy: | <ul style="list-style-type: none"> - This is the most common UTI in pregnancy - 2-10% in pregnancy, similar to sexually active women, but complicated. | <ul style="list-style-type: none"> - This is a UTI localized to the bladder without systemic findings - 1-2% | <ul style="list-style-type: none"> - involving the upper urinary tract. - 2-4%, Most commonly in the second trimester most of the dilation and physiological hydronephrosis happens in the 2nd trimester. |
| Consequences | <ul style="list-style-type: none"> ● Acute pyelonephritis (30%) if we don't treat ● preterm labour, small babies & premature rupture of the membrane that comes with +ve group b streptococcus culture. <p>Screening and treating ABU is more cost effective than avoiding the screening and dealing with the complications.</p> | | <p>if we don't treat → sepsis, adult respiratory distress syndrome (ARDS), anemia, renal failure, preterm labor⁴</p> <p>The leading cause of ARDS and septic shock in pregnancy</p> |
| Clinical presentation: | <p>asymptomatic, discovered during routine antenatal screening</p> | <ul style="list-style-type: none"> - Urgency, frequency, and burning are common. - Severe suprapubic pain, dysuria/burning, frequent urge to urinate | <ul style="list-style-type: none"> - It has systemic findings. fever/chills, tachycardia, CVA tenderness (R>L)⁵, nausea and vomiting. |
| Diagnosis: | <ul style="list-style-type: none"> - Made with a positive urine culture showing >100K colony-forming units (CFU) of a single organism. urine dipstick maybe false negative thus urine culture is better and most commonly used. | | <p>Signs & Symptoms, Leukocytosis, Urine culture, Blood culture +ve in 10%</p> |
| Management: | <p>outpatient Abx for 3-10 days⁶ EVEN ASYMPTOMATIC PREGNANT WOMEN YOU HAVE TO TREAT THEM (because pregnant women are considered immunocompromised)</p> <p>Usually we don't treat asymptomatic bacteriuria in young healthy people. We just treat immunocompromised pt., pt who will undergo a procedure & pregnant women.</p> <ul style="list-style-type: none"> - After treating the patient you don't need to Re culture. | <ul style="list-style-type: none"> - outpatient Abx & analgesics for 7-10 days - After treating the patient you need to Re culture | <ul style="list-style-type: none"> - Inpatient some say you can treat as outpatient after fever subsides - Generous IV hydration, Antipyretic agents, Abx for 10-14 days - Re culture, because it's 10-25% recurrent Risk of recurrence is so high |
| Abx. | <ul style="list-style-type: none"> ● Amoxil (amoxicillin): resistance has emerged and is therefore rarely used nowadays. ● 1st generation cephalosporin: most commonly used ● Nitrofurantoin: bacteriostatic, however well-secreted in the urine and thus has good effect & Less resistance. | | <p>i.v. ampicillin or cephalosporin then p.o</p> |

⁴ preterm premature rupture of the membrane: happens before the 37th week

⁵ **Costovertebral angle tenderness (CVAT)** is a medical test in which pain is elicited by percussion of the area of the back overlying the kidney

⁶ Studies show that treating pt with 3 days has same effect as 10 days. So, we don't prescribe long period unless there is complication or if it's a pregnancy bc we lack evidence

Anemia in pregnancy

(the most common pregnancy problem)

1. Physiologic anemia (dilutional anemia)

Hb of 10 in a pregnant lady is **NOT anemia**. Actually the Hb low bc of the dilutional effect in the plasma that lowers the hematocrit levels while the capacity of O₂ carrying is normal → no symptoms

The blood during pregnancy is diluted as the plasma volume expands more than the erythrocyte volume. Although red cell mass also increases due to the increase in maternal erythropoietin production, this increase is still relatively less than the increase in plasma volume (not proportional). The hematocrit in pregnancy normally **drops** several points below its normal level, however, the oxygen-carrying capacity of the blood is not deficient.

- The **total blood volume** increase by 40% (10-24w)
- **Hct** decreases from between 38% and 45% in healthy women who are not pregnant to about 34% during late single pregnancy and to 30% during late multifetal pregnancy
- **Physiological changes that happen are:** Plasma volume increase by 50% & Red cell mass increase by 25%, Fall in Hb concentration and haematocrit due to haemodilution. MCV increase secondary to erythropoiesis. Serum iron and ferritin decrease because of utilization .
Total iron binding capacity increases "TIBC"
- **Thus during pregnancy, anemia is defined as Hb < 10 g/dL (Hct < 30%)**
According to doctor ahmed slides +he said that it is below **11**
- 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.
- Normal values in gestational age

| | Nonpregnant female | Women after middle age: | 1st trimester | 2nd trimester | 3rd trimester |
|--------------------------|--------------------|-------------------------|----------------|---------------|---------------|
| Hemoglobin (whole blood) | 12-15.8 g/dl | 11.7 to 13.8 g/dl | 11.6-13.9 g/dl | 9.7-14.8 g/dl | 9.5-15 g/dl |

- Daily 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.
 - Doses: iron: 30-60 mg of elemental iron⁷, Folic acid: 400 μg (0.4 mg) (increase it if she has anemia)

2. Pathological anemia in pregnancy

- When the patient is symptomatic and the Hb level is less than 10 (WHO 11)
- The oxygen-carrying capacity of the blood is **deficient** because of **disordered erythrocyte production** or **excessive loss** of erythrocytes through destruction or bleeding

⁷ 30 mg of elemental iron = 150 mg of ferrous sulfate heptahydrate = 90 mg of ferrous fumarate = 250 mg of ferrous gluconate.

- Anemia occurs in up to **one third** of women during the 3rd trimester **Incidence 30-50%**
pregnant women are having anemia at pregnancy.
90% have iron deficiency anemia & 5% folate deficiency
- **Causes: Iron deficiency**, Folate deficiency, HEMOGLOBINOPATHIES

| Iron deficiency anemia | Folate deficiency |
|---|---|
| <ul style="list-style-type: none"> - Commonest & most widespread nutritional problem - Affect mostly malnourished teenagers, kids & pregnant women - The risk is up to 29% in certain areas <p>Often asymptomatic. Diagnosed in routine screening(routine screening at the beginning of the pregnancy is a cheap and simple way to detect it early) but, tiredness, dizziness, fainting, pallor may be apparent</p> <p>Diagnosis:</p> <ul style="list-style-type: none"> ● CBC, MCV⁸ is low (<79 fL), Hct is ≤ 30%. ● <u>Decreased serum iron and ferritin + increased serum transferrin levels confirm the diagnosis.</u> <p>Pathophysiology: Falling hemoglobin values do not occur until complete depletion of iron stores in the liver, spleen, and bone marrow, which is followed by a decrease in serum iron with increase in total iron binding capacity (TIBC). Increase demand in pregnancy due to expanding red cell mass and fetal requirement</p> <p>Risk Factors: Chronic bleeding, poor nutrition, and frequent pregnancies.</p> <p>Fetal Effects: Increased IUGR and preterm birth. Infection , Medical intervention during labor.Post partum blood loss.</p> <p>Treatment: We start it in the 2nd trimester bc they don't need it in the 1st & they already have nausea & vomiting Usually ferrous sulfate (FeSO4) 325 mg p.o. once/day. Ferrous salt is better absorbed than the ferric form. "Hb increases 0.8 g/dl per week"</p> <ul style="list-style-type: none"> ● With iron we give a supporting agent for absorption such as vitamin C (do not give calcium and iron together) We usually prefer oral iron ● Main side effect are gastro intestinal, gastric upset and constipation <p>Parenteral therapy" Lack of compliance, severe GIT side Effect and malabsorption are the indications" if pt. Can't tolerate it orally</p> <ul style="list-style-type: none"> ● IM: 20% of pregnant women do not absorb enough supplemental oral iron + absolute non-compliance painful cause discoloration of the skin | <ul style="list-style-type: none"> - Folate deficiency (Megaloblastic Macrocytic Anemia) increases risk of neural tube. - Deficiency occurs in 0.5 to 1.5% of pregnant women (Not Common) <p>Diagnosis:</p> <ul style="list-style-type: none"> ● RBCs are macrocytic. Hemoglobin ≤10 g/dL, MCV >100, RDW >15. ● RBC folate levels are low. ● Peripheral smear may show hypersegmented neutrophils. ● Measurement of serum folate ● Severe megaloblastic anemia may warrant bone marrow examination and further treatment in a hospital <p>Pathophysiology: Folate stores in the body are usually enough for 90 days. Falling hemoglobin values do not occur until complete depletion of folate stores.</p> <p>Fetal Effects:Increased IUGR ,Preterm birth and NTD.</p> <p>Treatment: folate 1 mg po bid</p> |

⁸ RBCs are microcytic and hypochromic.

- **IV:** faster increase in Hb and better replenishment of iron stores in comparison with oral therapy but it is more invasive You need to admit the patient when you want to give IV iron

Blood transfusion:

The most rapid way to increase the Hb.

Used when there is no time to correct anemia.

Risks include allergy and transmission of infections.

“Do not give blood unless you think the patient is going to die if you do not give her

Or in late gestational age with low hg and the patient expected to bleed for example with placenta previa (iv iron will take time to utilize and you can not give her anesthesia with low hg(Oxygen capacity) specially for brain perfusion)”

- ❖ Prevention is possible with a good balanced diet.
- ❖ Identification and treatment of iron deficiency prior to pregnancy are optimal.
- ❖ Routine iron supplementation in pregnancy improve in hematological indices.

FDA drug risk classification *just have an idea*:

| CATEGORY | INTERPRETATION |
|----------|--|
| A | Proven safe for human & animals like vitamins *except A* |
| B | Proven safe for animals & no evidence on humans like most of the antibiotics |
| C | No proven problems on human or animals |
| D | Can't be used unless in the extreme cases |
| X | Complete contraindication |

E.g. quinolones are contraindicated during pregnancy



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

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

Q2: A pregnant woman with iron deficiency anemia at 20 weeks of gestation. Her Hb is 9 mg/dL and she is not on any treatment, what is the best management for her?

- A- IV iron as inpatient treatment
- B- Blood transfusion
- C- Oral iron and folic acid
- D- Immediate delivery to avoid further drop in hemoglobin

Q3: All the following are true about acute pyelonephritis except:

- a. Occurs in 60% of pregnant patients.
- b. Can be preceded by asymptomatic bacteriuria
- c. Treated by I.V. antibiotics.
- d. When recurrent, should be investigated
- e. May lead to premature labour

Q4: a 36 year old G3, P2 presents for her first prenatal visit. Urinalysis shows bacteria 100000 CFU/ml. She has no symptoms. What is the management?

- a. Encourage to take plenty of water
- b. Reassurance and ask patient to report symptoms.
- c. Reassurance and report urine culture next visit.
- d. Treatment with oral antibiotics.

Answers: 1) c 2) c 3) a 4) d