MCQs in
URINARY TRACT INFECTION
IN CHILDREN

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1. When urine is collected by urethral catheterization, the colony count that is significant to be termed as UTI is:
   a. > 10^5 CFU/ml
   b. > 10^4 CFU/ml
   c. > 5 x 10^4 CFU/ml
   d. Any number of pathogens

2. In an uncentrifuged sample of urine, definition of significant pyuria is:
   a. >5 leukocytes per high power field
   b. >10 leukocytes per high power field
   c. >10 leukocytes/cu.mm
   d. >5 leukocytes/cu.mm

3. A child presents with fever of 102'F and dysuria. Urine pyuria is present, and urine culture shows 10^4 colonies of E.coli. What would be appropriate in this child:
   a. Treat as UTI
   b. 10^4 can be considered insignificant
   c. Repeat Urine routine and Culture
   d. USG abdomen to rule out features of UTI

4. Age below which any UTI should be admitted and treated with parenteral antibiotics is:
   a. 3 months
   b. 5 months
   c. 6 months
   d. 1 year

5. Feature/s of bowel bladder dysfuntion is/are:
   a. Thickened bladder wall >2 mm
   b. Post void residue >20 mL
   c. Voiding <3 or >8 times a day
   d. All of the above

6. A 2 ½ year old girl presents with UTI. Culture is positive. What initial investigations would you suggest for her?
a. USG abdomen
b. USG + MCU
c. USG + DMSA
d. USG + MCU + DMSA

7. Acute hemorrhagic cystitis is most commonly caused by:
a. E.coli
b. Adenovirus
c. Klebsiella
d. Proteus

8. Of the following,the statement FALSE about UTI prophylaxis is:
a. Recommended for infants while awaiting imaging studies
b. Recommended for children with urinary tract obstruction
c. Recommended for recurrent febrile UTI even if there is no urinary tract abnormality
d. Continue prophylaxis in severe VUR even after 5 years if there is bowel bladder dysfunction

9. Which of the following statements regarding UTI is FALSE?
a. Repeat Urine culture if fever/toxicity > 72 hrs of antibiotics
b. All patients with recurrent UTI need USG+DMSA+MCU
c. Asymptomatic bacteriuria in a patient previously treated for UTI should be considered as recurrent UTI.
d. Therapy of asymptomatic bacteriuria is not required.

10. The drug of choice for UTI Prophylaxis in a 2 month old infant is:
a. Cefixime
b. Cefadroxil
c. Cotrimoxazole
d. Cephalexin

ANSWERS AND EXPLANATION:

1. When urine is collected by urethral catheterization, the colony count that is significant to be termed as UTI is:
   a. > 10^5 CFU/ml
   b. > 10^4 CFU/ml
   c. > 5 x 10^4 CFU/ml
   d. Any number of pathogens

TABLE III CRITERIA FOR THE DIAGNOSIS OF UTI

Method of collection	Colony count	Probability of infection
Suprapubic aspiration	Any number of pathogens	99%
Urethral catheterization	$>5 \times 10^4$ CFU/mL	95%
Midstream clean catch	$>10^5$ CFU/mL	90-95%

CFU: colony forming units.

2. In uncentrifuged sample of urine,definition of significant pyuria is:
   a. >5 leukocytes per high power field
   b. >10 leukocytes per high power field
   c. >10 leukocytes/cu.mm
   d. >5 leukocytes/cu.mm

Significant pyuria is defined as >10 leukocytes per mm^3 in a fresh uncentrifuged sample, or >5 leukocytes per high power field in a centrifuged sample. Leukocyturia might occur in conditions such as fever, glomerulonephritis, renal stones or presence of foreign body in the urinary tract. The detection of leukocyturia in absence of significant bacteriuria is not sufficient to diagnose a UTI.

3. A child presents with fever of 102'F and dysuria. Urine pyuria is present, and urine culture shows 10^4 colonies of E.coli. What would be appropriate in this child:
   a. Treat as UTI
   b. 10^4 can be considered insignificant
   c. Repeat Urine routine and Culture
   d. USG abdomen to rule out features of UTI

Nelson : " If culture shows >100,000 colonies of a single pathogen, or if there are 10,000 colonies and the child is symptomatic, the child is considered to have UTI"

4. Age below which any UTI should be admitted and treated with parenteral antibiotics is:
   a. 3 months
   b. 5 months
   c. 6 months
   d. 1 year

> Children less than 3 months of age and those with complicated UTI should be hospitalized and treated with parenteral antibiotics. The choice of antibiotic should be guided by local sensitivity patterns. A third generation cephalosporin is preferred

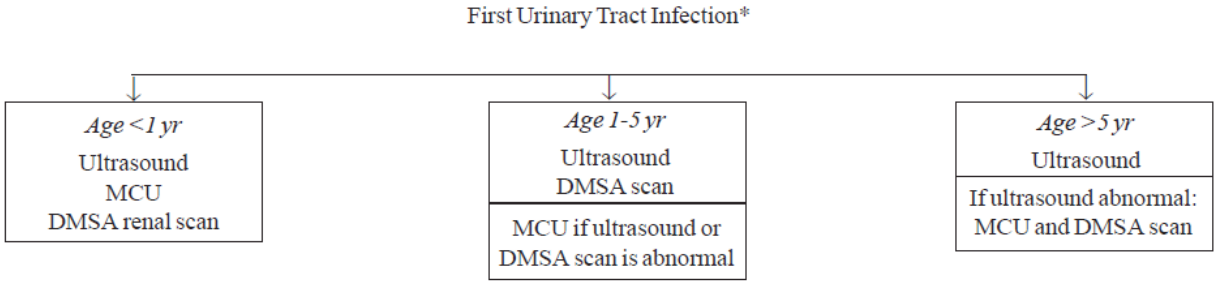
5. Feature/s of bowel bladder dysfuntion is/are:
   a. Thickened bladder wall >2 mm
   b. Post void residue >20 mL
   c. Voiding <3 or >8 times a day
   d. All of the above

TABLE V FEATURES SUGGESTIVE OF BOWEL BLADDER DYSFUNCTION

Recurrent urinary tract infections
Persistent high grade vesicoureteric reflux
Constipation, impacted stools
Maneuvers to postpone voiding (holding maneuvers, *e.g.*, Vincent curtsy, squatting)
Voiding less than 3 or more than 8 times a day
Straining or poor urinary stream
Thickened bladder wall >2 mm
Post void residue >20 mL
Spinning top configuration of bladder on micturating cystourethrogram

6. A 2 ½ year old girl presents with UTI. Culture is positive. What initial investigations would you suggest for her?

a. USG abdomen
b. USG + MCU
c. USG + DMSA
d. USG + MCU + DMSA



**All patients with recurrent UTI need detailed evaluation with ultrasonography, DMSA scan and MCU.*

FIG. 1 *Evaluation following initial urinary tract infection. MCU: micturating cystourethrogram; DMSA dimercaptosuccinic acid.*

7. Acute hemorrhagic cystitis is most commonly caused by:
   a. E.coli
   b. Adenovirus
   c. Klebsiella
   d. Proteus

Nelson : " Acute hemorrhagic cystitis often is caused by E.coli. It also has been attributed to adenovirus types 11 & 21."

8. Of the following,the statement **FALSE** about UTI prophylaxis is:
   a. Recommended for infants while awaiting imaging studies
   b. Recommended for children with urinary tract obstruction
   c. Recommended for recurrent febrile UTI even if there is no urinary tract abnormality
   d. Continue prophylaxis in severe VUR even after 5 years if there is bowel bladder dysfunction

Indications and Duration of Prophylaxis

The indications and duration of prophylaxis depend on patient age and presence or absence of VUR. Antibiotic prophylaxis is recommended for patients with *(i)* UTI below 1-yr of age, while awaiting imaging studies, (*ii*) VUR (see ***Table* VIII**), (*iii*) frequent febrile UTI (3 or more episodes in a year) even if the urinary tract is normal [14, 15]. Antibiotic prophylaxis is not advised in patients with urinary tract obstruction (*e.g.*, posterior urethral valves), urolithiasis and neurogenic bladder, and in patients on clean intermittent catheterization.

TABLE VIII MANAGEMENT OF VESICOURETERIC REFLUX

VUR grade	Management
Grades I and II	Antibiotic prophylaxis until 1 yr old. Restart antibiotic prophylaxis if breakthrough febrile UTI.
Grades III to V	Antibiotic prophylaxis up to 5 yr of age. Consider surgery if breakthrough febrile UTI. Beyond 5 yr: Prophylaxis continued if there is bowel bladder dysfunction.

9. Which of the following statements regarding UTI is **FALSE?**
   a. Repeat Urine culture if fever/toxicity+ > 72 hrs of antibiotics
   b. All patients with recurrent UTI need USG+DMSA+MCU
   c. Asymptomatic bacteriuria in a patient previously treated for UTI should be considered as recurrent UTI.
   d. Therapy of asymptomatic bacteriuria is not required.

10. The drug of choice for UTI Prophylaxis in a 2 month old infant is:
    a. Cefixime
    b. Cefadroxil
    c. Cotrimoxazole
    d. Cephalexin

TABLE VII ANTIMICROBIALS FOR PROPHYLAXIS OF URINARY TRACT INFECTIONS

Medication	Dose, mg/kg/day	Remarks
Cotrimoxazole	1-2*	Avoid in infants <3 mo, glucose-6-phosphate dehydrogenase deficiency
Nitrofurantoin	1-2	May cause vomiting and nausea; avoid in infants <3 mo, G6PD deficiency, renal insufficiency
Cephalexin	10	Drug of choice in first 3-6 mo of life
Cefadroxil	5	An alternative agent in early infancy

*Usually given as single bedtime dose; *of trimethoprim.*

REFERENCES: NELSON 19ed;
Revised guidelines in management of UTI by INDIAN SOCIETY OF PEDIATRIC NEPHROLOGY (IP Sept 2011).