



Urinary tract infections

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Course lecture at Medical Microbiology II

3rd January 2021

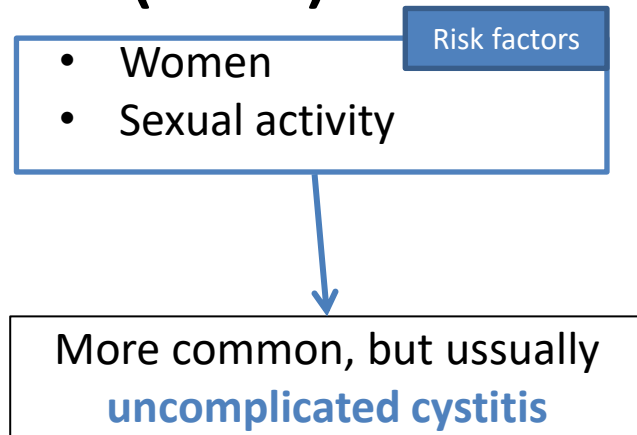


Urinary tract infection (UTI)

Group	Clinical diagnosis
Lower UTI	<i>Asymptomatic bacteriuria</i>
	Acute cystitis
Upper UTI	Acute pyelonephritis

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Complicated
cystitis or pyelonephritis

Risk factors

- Urine stagnation
- Diabetes
- Urine catheter
- Urine reflux

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- Women
- Sexual activity

More common, but usually
uncomplicated cystitis

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Risk factors

- Women
- Sexual activity

More common, but usually **uncomplicated cystitis**

Acute prostatitis or epidymitis

Recurrent pyelonephritis

Complicated
cystitis or pyelonephritis

Risk factors

- Urine stagnation
- Diabetes
- Urine catheter
- Urine reflux

Symptoms and lab findings

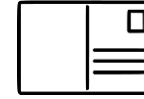
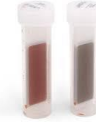


leukocyturia

PN: ↑CRP
and/or ↑WBC



Sample for microbiology



Until 2 hours!

Culture



Result

PRIMOKULTIVACE		
1	22.12.07.33	CLED agar ditto
	23.12.09.02	Identifikace Makd - tyčinky <i>Escherichia coli</i>
	23.12.09.02	celi zóny G-tyčinky (moče+gyn) JIP/ARO AMP- PSP+ COT- FUR+ CIP+ MEC+ CRX+ GEN+ CTX+ AMC- CTZ+ AMI+ PPT+ CPM+ COL+ ERT+ IMI+ MEM+
	23.12.09.02	kvanita kvant 10 ⁶ 7
	22.12.07.33	krevni agar (Columbia) ditto

Treatment



Symptoms and lab findings



**Weak, tired with elevated
body temperature**



**Goes to the bathroom
more often**



**It is painful when she
pees**



**Has lower abdominal
pain**

Symptoms and lab findings



Weak, tired with elevated body temperature



Goes to the bathroom more often



It is painful when she pees



Has lower abdominal pain

Goes to GP



GP



Symptoms and lab findings



Weak, tired with elevated body temperature



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GP



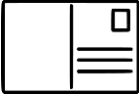

Leukocyturia,
erythrocyturia, nitrates

If \uparrow CRP and/or
 \uparrow WBC
think on PN

Sample for microbiology

- Urine in a sterile tube
 - First morning stream
 - Clean genital
 - Before ATB



- 1. Send it until 2 hrs 
- 2. Could be in fridge - max 24 hrs
- 3. Or use Uri-cult 



Culture

- **CLED agar plate**
 - 1 ml of urine
 - Overnight cultivation



Result

- **Mostly bacteria**
 - Uncomplicated UTI's: **80%** uropathogenic *E.coli* (UPEC)
 - Complicated UTI's: **40-50%** uropathogenic *E.coli* (UPEC)
- **Viruses**
 - After Tx: CMV or BKV
 - Haemorrhagic cystitis: adenoviruses
- **Parasites**
 - *Schistosoma haematobium*

Result

- **Mostly bacteria (+ candida)**
 - **Uncomplicated**
 - 80% UPEC
 - 20%: *Enterococcus spp.* (mostly *E. faecalis*), *Proteus mirabilis*, *Klebsiella pneumoniae*, *Enterobacter spp.*, *Staphylococcus saprophyticus*, *Candida spp*
 - **Complicated**
 - 40-50% UPEC
 - 50-60%: *Klebsiella pneumoniae*, *Proteus mirabilis*, *Enterobacter spp.*, *Providencia spp.*, *Pseudomonas aeruginosa*, *Enterococcus spp.*, *Serratia spp.*, *Acinetobacter spp.*

Quantity	Symptoms	Finding	Interpretation
$\geq 10^5$	No	One (or two) pathogen(s)	<i>Asymptomatic bacteriuria</i>
$\geq 10^5$	Yes	One (or two) pathogen(s)	Significant bacteriuria in any UTI
$\geq 10^5$	Yes	One, two or even more pathogen(s)	Significant bacteriuria in complicated UTI
$\geq 10^4$	Yes	One (or two) pathogen(s)	Significant bacteriuria in complicated UTI

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$\geq 10^3$	Yes	One (or two) pathogen(s)	From catheter: significant Otherwise: grey zone

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0	No	No growth	After ATB treatment

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0	No	No growth	After ATB treatment
0	Yes	No growth	Uncultivated agents OR Too early stage of infection

Treatment

- **Sampling first!**
- Empirically:

Works well on UPEC

UTI	
Uncomplicated cystitis	Nitrofurantoin, amoxicilin, cotrimoxazole
Uncomplicated pyelonephritis	Amoxicilin/clavulanate, 2nd or 3rd generation of cephalosporines
Complicated UTI	Amoxicilin/clavulanate, cephalosporines 2nd or 3rd generation and usually in combination with aminoglycosides

Enterococci - PR

E.g. Focal nephritis in children

- Then based on antibiogram

Treatment

- ***Asymptomatic bacteriuria***
 - Usually not treated with ATB
 - **ONLY in** pregnant women or immunocompromised patients

Take-home message

- Back pain + dysuria – think on UTI
- Send urine as fast as possible.
- Usually CLED agar is used
- *E.coli* would be the most common cause
- Nitrofurantion is most commonly used ATB