



Urinary tract infections

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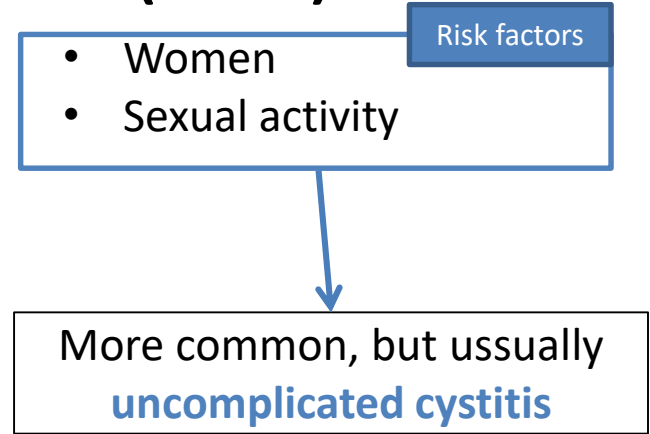


Urinary tract infection (UTI)

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

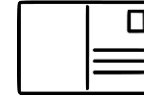
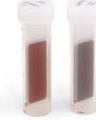


leukocyturia

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



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GP



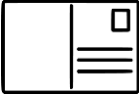
Leukocyturia,
erythrocyturia, nitrates

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

Empirical treatment (simplified)

- **SamplING first!**

Works well on
UPEC

IMC	ATB first choice	Meaning	Alternatives (problems)
Acute cystitis	Nitrofurantoin	High concentrations in urine, p.o. administration	Pivmecillinam, trimethoprim (resistance), fosfomycin
Acute pyelonephritis	3rd generation cephalosporins (possibly in combination with aminoglycosides)	i.v. distribution, high effect	Cotrimoxazole (resistance!!!), or Amoxicillin/clavulanate

Enterococci -
PR

Eg: Focal nephritis in children

- Then according to the antibiogram.

Empirical treatment

- Sample first!

CAVE! According to a 2016 SZU study, **cotrimoxazole** **should** no longer be used for the empirical treatment of UTI (24% of *E. coli* strains resistant).

- Then according to the antibiogram.

Targeted treatment of **ESBL+ Enterobacteriaceae**

- The problem of nosocomial infections
- Especially *E.coli*, *Klebsiella pneumoniae* (up to 50%)

IMC	ATB first choice	Meaning of	Alternatives
Acute cystitis	Carbapenems	Good efficiency	Aminoglycosides monotherapy (toxicity); ev. nitrofurantoin, fosfomicin if sensitive
Acute pyelonephritis	Carbapenems	Good efficiency	Aminoglycosides monotherapy (toxicity)

Treatment

- ***Asymptomatic bacteriuria***
 - Normally without ATB
 - **ATB definitely in** pregnant women and immunocompromised patients

Take-home message

- When: abdominal/back pain + dysuria (+ urinary findings)
- What to do: send the urine ASAP, then solve the ATB
- What we do with it: cultivation on CLED agar
- What will be there: most often *E.coli*, watch out for ESBL+
- What is given for empirical treatment:
 - Cystitis: nitrofurantion; pivmecillinam or fosfomycin
 - Pyelonephritis: cefotaxime (amoxicillin/clavulanate)
- For ESBL+ strains the drug of choice is carbapenems, alternative aminoglycosides