



# INFECÇÕES DO TRATO URINÁRIO

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# Potenciais Conflitos de Interesses

- MSD, Inc.

# IMPORTÂNCIA EPIDEMIOLÓGICA

- 1ª ou 2ª infecção bacteriana mais comum.
- Ocorrem cerca de 150 milhões de ITU sintomáticas/ano no mundo.
- Mulheres > Homens.
- > 100.000 hospitalizações/ano nos EUA.
- 40% das IRAS em hospitais norte-americanos;
- Custo anual EUA: US\$ 2,4 bilhões!



# MICROBIOLOGIA

- Infecções não complicadas:

- *E. coli* (75% - 95%);
- *Klebsiella pneumoniae*;
- *Proteus mirabilis*;

## O PERFIL DE RESISTÊNCIA MICROBIANA ESTÁ MUDANDO...

- Infecções complicadas:

- Também!
- *Pseudomonas*, *Enterobacter*, *Providencia*, *Enterococos*, fungos.

**Brief Report****Antimicrobial Susceptibility of Inpatient Urinary Tract Isolates of Gram-Negative Bacilli in the United States: Results from the Study for Monitoring Antimicrobial Resistance Trends (SMART) Program: 2009–2011**

Sam K. Bouchillon, MD<sup>1</sup>; Robert E. Badal, BS<sup>1</sup>;  
Daryl J. Hoban, PhD, FCCM, D(ABMM), F(AAM)<sup>1</sup>; and Stephen P. Hawser, PhD<sup>2</sup>

**Table II. In vitro susceptibilities of Gram-negative bacilli from inpatients with urinary tract infections stratified by hospital- and community-associated infections.\***

Organism <sup>†</sup>	Hospital-Associated/ Community-Associated	AK	A/S	CPE	CFT	CFX	CAZ	CAX	CP	ETP	IMP	LVX	P/T
<i>Escherichia coli</i>	HA (n = 253)	98.4	45.8	93.7	88.9	88.5	92.5	90.1	59.3	100	100	59.7	90.5
	CA (n = 723)	98.8	51.5	95.6	91.4	90.3	94.3	92.0	67.6	99.7	99.7	67.9	95.9
<i>E coli</i> , ESBL	HA (n = 19)	78.9	15.8	15.8	5.3	73.7	42.1	10.5	5.3	100	100	5.3	78.9
	CA (n = 43)	90.7	9.3	27.9	4.7	62.8	39.5	4.7	7.0	97.7	100	7.0	81.4
<i>E coli</i> , non-ESBL	HA (n = 234)	100	48.3	100	95.7	89.7	96.6	96.6	63.7	100	100	64.1	91.5
	CA (n = 680)	99.3	54.1	99.9	96.9	92.1	97.8	97.5	71.5	99.9	99.7	71.8	96.8
<i>Klebsiella oxytoca</i>	HA (n = 19)	100	36.8	84.2	78.9	94.7	94.7	73.7	89.5	100	100	89.5	73.7
	CA (n = 33)	100	63.6	97.0	78.8	93.9	90.9	72.7	87.9	97.0	100	87.9	84.8
<i>K oxytoca</i> ESBL	HA (n = 2)	100	0	0	0	100	50.0	0	50.0	100	100	50.0	50.0
	CA (n = 4)	100	25.0	75.0	0	75.0	50.0	0	50.0	75.0	100	50.0	75.0
<i>K oxytoca</i> , non-ESBL	HA (n = 17)	100	41.2	94.1	88.2	94.1	100	82.4	94.1	100	100	94.1	76.5
	CA (n = 29)	100	69.0	100	89.7	96.6	96.6	82.8	93.1	100	100	93.1	86.2
<i>Klebsiella pneumoniae</i>	HA (n = 123)	91.9	69.1	90.2	86.2	82.9	86.2	86.2	84.6	92.7	93.5	87.8	88.6
	CA (n = 167)	96.4	74.9	94.0	92.8	91.0	93.4	92.8	91.6	95.8	97.0	92.8	91.0
<i>K pneumoniae</i> , ESBL	HA (n = 17)	52.9	23.5	35.3	11.8	35.3	11.8	11.8	23.5	52.9	58.8	35.3	41.2
	CA (n = 12)	66.7	0	33.3	25.0	58.3	25.0	25.0	16.7	66.7	75.0	25.0	16.7
<i>K pneumoniae</i> , non-ESBL	HA (n = 106)	98.1	76.4	99.1	98.1	90.6	98.1	98.1	94.3	99.1	99.1	96.2	96.2
	CA (n = 155)	98.7	80.6	98.7	98.1	93.5	98.7	98.1	97.4	98.1	98.7	98.1	96.8
<i>Proteus mirabilis</i>	HA (n = 40)	100	87.5	97.5	95.0	97.5	100	95.0	75.0	97.5	22.5	80.0	100
	CA (n = 86)	100	75.6	98.8	98.8	97.7	97.7	98.8	51.2	100	30.2	60.5	100
<i>P mirabilis</i> , ESBL	HA (n = 1)	100	0	0	0	100	100	0	0	100	0	100	100
	CA (n = 4)	100	50.0	75.0	100	100	75.0	100	50.0	100	50.0	75.0	100
<i>P mirabilis</i> , non-ESBL	HA (n = 39)	100	89.7	100	97.4	97.4	100	97.4	76.9	97.4	23.1	79.5	100
	CA (n = 82)	100	76.8	100	98.8	97.6	98.8	98.8	51.2	100	29.3	59.8	100
<i>Pseudomonas aeruginosa</i>	HA (n = 77)	88.3	NA	67.5	NA	NA	80.5	NA	57.1	NA	68.8	58.4	72.7
	CA (n = 110)	89.1	NA	66.4	NA	NA	78.2	NA	49.1	NA	67.3	48.2	72.7



**Table 3 – Bacterial spectrum in 2927 female patients with bacteriuria<sup>a</sup>**

Species	Number (%)
<i>Escherichia coli</i>	2315 (76.70%)
<i>Klebsiella pneumoniae</i>	107 (3.54%)
<i>Proteus mirabilis</i>	104 (3.45%)
<i>Enterobacter species<sup>b</sup></i>	34 (1.13%)
<i>Citrobacter species<sup>c</sup></i>	29 (0.96%)
Other Enterobacteriaceae <sup>d</sup>	36 (1.19%)
Non-Enterobacteriaceae <sup>e</sup>	6 (0.20%)
<i>Staphylococcus aureus</i>	32 (1.06%)
<i>Staphylococcus saprophyticus</i>	108 (3.58%)
Other coagulase negative staphylococci <sup>f</sup>	68 (2.25%)
<i>Enterococcus species<sup>g</sup></i>	123 (4.08%)
<i>Streptococcus species<sup>h</sup></i>	56 (1.86%)
Total strains	3018 (100%)

**Infections**

**Surveillance Study in Europe and Brazil on Clinical Aspects and Antimicrobial Resistance Epidemiology in Females with Cystitis (ARESC): Implications for Empiric Therapy**

Kurt G. Naber<sup>a,\*</sup>, Giancarlo Schito<sup>b,1</sup>, Henry Botto<sup>c,1</sup>, Juan Palou<sup>d,1</sup>, Teresita Mazzei<sup>e,1</sup>

**Table 5 – Susceptibility and resistance (n,%) of *Escherichia coli* for oral antibiotics according to countries**

Country	Fosfomycin		Mecillinam		Nitrofurantoin		Ciprofloxacin		Amoxi-clavulanate	
	Susceptible ≤64 mg/l	Resistant ≥256 mg/l	Susceptible ≤8 mg/l	Resistant ≥32 mg/l	Susceptible ≤32 mg/l	Resistant ≥128 mg/l	Susceptible ≤1 mg/l	Resistant ≥4 mg/l	Susceptible <sup>a</sup> ≤8/4 mg/l	Resistant <sup>a</sup> ≥32/16 mg/l
Austria	62 (100.0%)		62 (100.0%)		62 (100.0%)		61 (98.3%)	1 (1.6%)	58 (93.5%)	1 (1.6%)
Brazil	363 (97.0%)	3 (0.8%)	352 (94.6%)	15 (4.0%)	353 (94.3%)	9 (2.4%)	333 (89.2%)	40 (10.7%)	298 (79.8%)	21 (5.6%)
France	404 (99.0%)	1 (0.2%)	397 (97.0%)	9 (2.2%)	398 (97.3%)	4 (0.9%)	402 (98.2%)	6 (1.4%)	371 (90.9%)	6 (1.4%)
Germany	238 (97.9%)	2 (0.8%)	235 (97.5%)	3 (1.2%)	225 (92.5%)	6 (2.4%)	234 (96.3%)	9 (3.7%)	215 (88.8%)	3 (1.2%)
Hungary	52 (100.0%)		50 (96.1%)	2 (3.8%)	51 (98.0%)		50 (96.2%)	2 (3.8%)	27 (51.9%)	5 (9.6%)
Italy	234 (97.9%)		225 (94.1%)	8 (3.3%)	233 (97.4%)		209 (87.9%)	28 (11.7%)	171 (71.5%)	16 (6.7%)
Poland	89 (98.8%)		88 (97.7%)	1 (1.1%)	83 (92.2%)	4 (4.4%)	84 (93.3%)	6 (6.7%)	78 (86.6%)	3 (3.3%)
Russia	300 (99.3%)	1 (0.3%)	293 (97.3%)	4 (1.3%)	286 (94.7%)	4 (1.3%)	261 (86.4%)	39 (12.9%)	251 (83.1%)	12 (3.9%)
Spain	501 (97.2%)	6 (1.1%)	485 (94.1%)	21 (4.0%)	485 (94.1%)	11 (2.1%)	458 (89.3%)	55 (10.7%)	417 (80.9%)	21 (4.1%)
The Netherlands	29 (100.0%)		28 (96.5%)	1 (3.4%)	29 (100.0%)		28 (96.5%)	1 (3.4%)	24 (82.8%)	1 (3.5%)
All countries	2272 (98.1%)	13 (0.5%) NS <sup>b</sup>	2215 (95.8%)	64 (2.7%) NS <sup>b</sup>	2205 (95.2%)	38 (1.6%) NS <sup>b</sup>	2120 (91.8%)	187 (8.1%) p < 0.0001 <sup>b</sup>	1901 (82.1%)	89 (3.8%) p < 0.0001 <sup>b</sup>

Country	Nalidixic acid		Cefuroxime		Co-trimoxazole		Ampicillin	
	Susceptible ≤16 mg/l	Resistant ≥32 mg/l	Susceptible ≤4 mg/l	Resistant ≥32 mg/l	Susceptible ≤2/38 mg/l	Resistant ≥4/76 mg/l	Susceptible <sup>c</sup> ≤8 mg/l	Resistant <sup>c</sup> ≥32 mg/l
Austria	57 (91.9%)	5 (8.0%)	48 (77.4%)	1 (1.6%)	44 (70.9%)	18 (29.0%)	27 (43.5%)	30 (48.3%)
Brazil	282 (75.4%)	92 (24.5%)	279 (74.5%)	13 (3.4%)	204 (54.5%)	170 (45.4%)	141 (37.7%)	211 (56.4%)
France	383 (93.6%)	26 (6.3%)	365 (89.2%)	4 (1.0%)	359 (87.7%)	50 (12.2%)	249 (60.8%)	145 (35.4%)
Germany	220 (90.5%)	23 (9.4%)	226 (93.0%)	1 (0.4%)	180 (74.0%)	63 (25.9%)	144 (59.2%)	85 (34.9%)
Hungary	35 (67.3%)	17 (32.6%)	38 (73.0%)	1 (1.9%)	31 (59.6%)	21 (40.3%)	17 (32.6%)	33 (63.4%)
Italy	176 (73.6%)	63 (26.3%)	186 (77.8%)	13 (5.4%)	170 (71.1%)	69 (28.8%)	103 (43.0%)	129 (53.9%)
Poland	76 (84.4%)	14 (15.5%)	73 (81.1%)	2 (2.2%)	72 (80.0%)	18 (20.0%)	36 (40.0%)	36 (40.0%)
Russia	250 (82.7%)	52 (17.2%)	259 (85.7%)	10 (3.3%)	209 (69.4%)	92 (30.5%)	127 (42.0%)	131 (43.3%)
Spain	379 (73.5%)	136 (26.4%)	407 (79.0%)	10 (1.9%)	341 (66.2%)	174 (33.7%)	182 (35.3%)	309 (60.0%)
The Netherlands	27 (93.1%)	2 (6.8%)	26 (89.6%)		23 (79.3%)	6 (20.6%)	19 (65.5%)	8 (27.5%)
All countries	1885 (81.4%)	430 (18.5%) p < 0.0001 <sup>b</sup>	1911 (82.5%)	55 (2.3%) p < 0.0001 <sup>b</sup>	1633 (70.5%)	681 (29.4%) p < 0.0001 <sup>b</sup>	1045 (45.1%)	1117 (48.2%) p < 0.0001 <sup>b</sup>

# CLASSIFICAÇÃO

## Baixa:

1. Bacteriúria assintomática
2. Cistite clássica (não complicada)
3. Cistite complicada
4. Uretrite

## Alta:

1. Pielonefrite não complicada
2. Pielonefrite complicada

## INFECÇÕES COMPLICADAS:

- ✓ Diabetes;
- ✓ Gravidez;
- ✓ Insuficiência renal;
- ✓ Obstrução do trato urinário;
- ✓ Dispositivos (SVD, duplo-J, etc);
- ✓ Anormalidade anatômica ou funcional;
- ✓ Transplante renal;
- ✓ Imunossupressão;
- ✓ Micro-organismos MDR.

# BACTERIÚRIA ASSINTOMÁTICA

## Definição:

- Mulheres: 2 amostras consecutivas de urina com  $\geq 100.000$  UFC/mL do mesmo patógeno, sem sinais ou sintomas de ITU.
- Homens: 1 amostra de urina com  $\geq 100.000$  UFC/mL de uma única espécie bacteriana, sem sinais ou sintomas de ITU.
- Pacientes com SVD/intermitente: 1 amostra de urina,  $\geq 100.000$  UFC/mL, com  $\geq 1$  espécie bacteriana, sem sinais ou sintomas de ITU.
- Urocultura  $\geq 100$  UFC/mL em amostra coletada por cateterismo, de uma única espécie bacteriana, sem sinais ou sintomas de ITU.



# BACTERIÚRIA ASSINTOMÁTICA

TRATAR	NÃO TRATAR
<b>Gestantes</b>	BA em pacientes com ITU recorrente
<b>Intervenções urológicas com risco de sangramento de mucosa</b>	DM
<b>Imunodeprimidos (?)</b>	Mulheres não grávidas
	Idosos da comunidade
	Idosos institucionalizados
	Bexiga neurogênica
	Pacientes com SVD ou intermitente

- ✓ Piúria em pacientes com BA não necessita de antibioticoterapia (All).
- ✓ Tratamento: 3 – 7 dias.

# BACTERIÚRIA ASSINTOMÁTICA

VOCÊ TRATA BACTERIÚRIA  
ASSINTOMÁTICA ANTES DA  
REALIZAÇÃO DE  
ARTROPLASTIAS?

# Proceedings of the International Consensus Meeting on Periprosthetic Joint Infection

Chairmen:

Javad Parvizi MD, FRCS

Thorsten Gehrke MD

**Question 9: What should be the antibiotic of choice for patients with abnormal urinary screening and/or an indwelling urinary catheter?**

**Consensus:** The presence of urinary tract symptoms should trigger urinary screening prior to TJA. Asymptomatic patients with bacteriuria may safely undergo TJA provided that routine prophylactic antibiotics are administered. Patients with acute urinary tract infections (UTI) need to be treated prior to elective arthroplasty

# Is Asymptomatic Bacteriuria a Risk Factor for Prosthetic Joint Infection?

Ricardo Sousa,<sup>1</sup> Ernesto Muñoz-Mahamud,<sup>4</sup> Jonathan Quayle,<sup>5</sup> Luis Dias da Costa,<sup>1</sup> Cristina Casals,<sup>4</sup> Philip Scott,<sup>6</sup> Pedro Leite,<sup>1</sup> Paz Vilanova,<sup>4</sup> Sebastian Garcia,<sup>4</sup> Maria Helena Ramos,<sup>2</sup> Joana Dias,<sup>3</sup> Alex Soriano,<sup>5</sup> and Andrea Guyot<sup>7</sup>

- 2.497 pacientes alocados.
- BA em 12.1% (303 pacientes).
- Grupo com BA com mais IPO(4.3% vs 1.4%; OR = 3.23; P = .001);
- Porém: TRATAMENTO DA BA NÃO DIMINUIU A FREQUENCIA DE IPO

**Conclusions.** ASB was an independent risk factor for PJI, particularly that due to gram-negative microorganisms. Preoperative antibiotic treatment did not show any benefit and cannot be recommended.

**With Asymptomatic Bacteriuria**

Characteristic	Patients, No. (%) <sup>a</sup>		P Value
	Treated ASB (n = 154)	Untreated ASB (n = 149)	
PJI	6 (3.9)	7 (4.7)	.78
Age, mean (range), y	71.6 (23–90)	70.1 (36–90)	.06
Female sex	139 (90.3)	118 (79.2)	.01
Knee location	82 (53.2)	80 (53.7)	>.99
Comorbid condition			
Obesity (BMI ≥ 30 kg/m <sup>2</sup> ) <sup>b</sup>	61 (45.9)	66 (48.2)	.72
Diabetes <sup>c</sup>	4 (18.2)	19 (19.8)	>.99
ASA score ≥3 <sup>d</sup>	27 (24.3)	34 (26.0)	.88
Postoperative UTI	1 (0.6)	4 (2.7)	.21

Patient	ASB Microorganism	PJI Microorganism
1	<i>Enterococcus faecalis</i>	<i>Escherichia coli</i>
2	<i>Klebsiella pneumoniae</i>	<i>Staphylococcus aureus</i>
3	<i>E. coli</i>	<i>Serratia marcescens</i> , coagulase-negative staphylococci
4	<i>E. coli</i>	<i>E. coli</i> , <i>S. marcescens</i> , <i>Proteus mirabilis</i> , <i>Pseudomonas aeruginosa</i>
5	<i>E. coli</i>	Coagulase-negative staphylococci
6	<i>S. aureus</i>	<i>P. aeruginosa</i>
7	<i>E. coli</i>	<i>S. aureus</i>
8	<i>K. pneumoniae</i>	<i>Citrobacter</i> spp.
9	<i>E. coli</i>	Coagulase-negative staphylococci
10	<i>E. coli</i>	Coagulase-negative staphylococci
11	<i>E. coli</i>	Coagulase-negative staphylococci
12	<i>E. coli</i>	Coagulase-negative staphylococci
13	<i>E. faecalis</i>	<i>E. coli</i>

# BACTERIÚRIA ASSINTOMÁTICA

VOCÊ TRATA BACTERIÚRIA  
ASSINTOMÁTICA EM PACIENTES  
COM TRANSPLANTE RENAL?

## Special Article

# Urinary Tract Infections in Solid Organ Transplantation

R. Parasuraman<sup>a,\*</sup>, K. Julian<sup>b</sup> and the AST  
Infectious Diseases Community of Practice

**Table 4:** Treatment of UTI in transplant recipients (52)

Clinical presentation	Suggested management
Asymptomatic bacteriuria	No consensus on management. Repeat culture with appropriate technique (consider straight catheterization) to rule-out contamination. In the first 1–3 months posttransplant, consider treatment for 5–7 days; beyond 3 months posttransplant, avoid treatment unless associated rise in creatinine. No need for empiric treatment—await culture susceptibility and select the most narrow-spectrum antibiotic available.
Symptomatic urinary tract infection—mild	Empiric oral therapy: ciprofloxacin +/- amoxicillin. Treatment duration 5–7 days.
Symptomatic urinary tract infection—moderately severe	Ciprofloxacin OR ceftriaxone OR ampicillin-sulbactam. Once culture susceptibility results available, complete 14 days of therapy with the most narrow-spectrum antibiotic available.
Symptomatic urinary tract infection—severe	Empiric piperacillin-tazobactam OR cefepime. Consider potential for multi-drug resistant organisms which may require a carbapenem or therapy for Vancomycin resistant enterococci. Once culture susceptibility results available, complete 14–21 days of therapy with the most narrow-spectrum antibiotic available.
Recurrent symptomatic urinary tract infection	Consider imaging to rule out structural causes or persistent foci of infection. Extend treatment to 6 weeks. (Review Fig. 2.)
Candiduria	Remove urinary catheters, stents. Avoid treatment of asymptomatic candiduria unless the patient is undergoing a urologic procedure or is neutropenic. If symptomatic or persistent candiduria, consider imaging of kidneys and collecting system to assess for fungal masses and request susceptibility testing; if fluconazole-susceptible, treat with fluconazole for 7–14 days. Note that voriconazole, posaconazole, caspofungin, and lipid-formulations of amphotericin attain only limited concentrations in urine but may achieve sufficient concentration in kidney tissue.

# CISTITE

- Disúria, polaciúria, dor suprapúbica;
- *E. coli* (75% - 95%);
- Diagnóstico clínico. Fita de leucocitúria se houver dúvida.
- Urocultura: persistência dos sintomas ao final do tratamento ou se recorrência em até 2 semanas.

# TRATAMENTO BAC.ASSINTOMÁTICA e CISTITE

## IDSA

**Table 4. Treatment Regimens and Expected Early Efficacy Rates for Acute Uncomplicated Cystitis**

Drug (dosage)	Mean percentage (range)			
	Estimated clinical efficacy <sup>ab</sup>	Estimated microbiological efficacy <sup>b</sup>	Common side effects	References
Nitrofurantoin monohydrate/ macrocrystals (100 mg twice daily for 5–7 days)	93 (84–95)	88 (86–92)	Nausea, headache	[36, 37, 39]
Trimethoprim-sulfamethoxazole (160/800 mg twice daily for 3 days)	93 (90–100)	94 (91–100)	Rash, urticaria, nausea, vomiting, hematologic	[36, 37]
Fosfomicin trometamol (3 g single-dose sachet)	91	80 (78–83)	Diarrhea, nausea, headache	[39, 40]
Pivmecillinam (400 mg twice daily for 3–7 days)	73 (55–82)	79 (74–84)	Nausea, vomiting, diarrhea	[29, 43]
Fluoroquinolones (dose varies by agent; 3–day regimen) <sup>c</sup>	90 (85–98)	91 (81–98)	Nausea/vomiting, diarrhea, headache, drowsiness, insomnia	[35, 43, 44, 46–52]
$\beta$ -lactams (dose varies by agent; 3–5 day regimen) <sup>d</sup>	89 (79–98)	82 (74–98)	Diarrhea, nausea, vomiting, rash, urticaria	[38, 52, 54]



# TRATAMENTO BAC.ASSINTOMÁTICA e CISTITE

## European Association of Urology 2015

Table 3: Recommended antimicrobial therapy in acute uncomplicated cystitis in otherwise healthy women

Antibiotics	Daily dose	Duration of therapy	Comments
<i>First choice</i>			
Fosfomicin trometamol	3 g SD	1 day	
Nitrofurantoin macrocrystal	100 mg bid	5 days	avoid in G6PD deficiency
Pivmecillinam	400 mg tid	3 days	
<i>Alternatives</i>			
Ciprofloxacin	250 mg bid	3 days	not during pregnancy
Levofloxacin	250 mg qd	3 days	not during pregnancy
Ofloxacin	200 mg bid	3 days	not during pregnancy
Cephalosporin (e.g. cefadroxil)	500 mg bid	3 days	Or comparable (see Appendix 4.5)
<i>If local resistance pattern is known (E. coli resistance &lt; 20%)</i>			
TMP	200 mg bid	5 days	TMP not in the first trimenon of pregnancy
TMP- SMX	160/800 mg bid	3 days	SMX not in the last trimenon of pregnancy

ANTIMICROBIAL RESISTANCE: George M. Eliopoulos, Section Editor

# Clinical Management of an Increasing Threat: Outpatient Urinary Tract Infections Due to Multidrug-Resistant Uropathogens

Emily Walker,<sup>1</sup> Alessandra Lyman,<sup>1</sup> Kalpana Gupta,<sup>2,3</sup> Monica V. Mahoney,<sup>4</sup> Graham M. Snyder,<sup>5</sup> and Elizabeth B. Hirsch<sup>1,4</sup>

Table 1. Characteristics of Oral Agents Used to Treat Urinary Tract Infections

Antimicrobial	Mechanism of Action	Pharmacokinetic Characteristics	Pharmacodynamic Characteristics	Standard Dosing Regimen for UTI	Resistance Rates for MDR Organisms (%)	Suggested Role in Empiric Therapy for UTI Caused by MDR Organism
Fosfomycin	Binds to and inhibits uridine diphosphate- <i>N</i> -acetyl-glucosamine-enol-pyruvyl-transferase, an enzyme involved in early stages of peptidoglycan synthesis [15]	38% renal elimination (unchanged); no dosage adjustments necessary in renal impairment or elderly populations	Bactericidal; inhibits bacterial cell wall synthesis [15]	3 g PO x1 dose	5–40 [16, 17]	First line
Nitrofurantoin	Complex and unique; inactivates or alters bacterial ribosomal proteins and other macromolecules	90% renal elimination (30%–40% unchanged)	Bactericidal or static, depending on concentration; damages bacterial DNA	100 mg PO BID x5 d	2–21 [6, 17]	First line
Trimethoprim-sulfamethoxazole	Sequentially inhibits steps in bacterial folate synthesis	Renal elimination (mostly unchanged); adjust dose when creatinine clearance < 30 mL/min	Bactericidal; inhibits folate synthesis	160/800 mg PO BID x3 d	60–77 [3, 6, 18, 19]	Not recommended, depending on local resistance data and/or patient-specific risk of MDR infection
Fluoroquinolones	Inhibit bacterial DNA synthesis by inhibiting functions of DNA gyrase and topoisomerase IV	Renal elimination; dose adjustments in renal dysfunction (except moxifloxacin) [20]	Bactericidal; inhibit formation of topoisomerase II and IV	Varies depending on agent	49–72 [3, 6, 16]	Not recommended, depending on local resistance data
Beta-lactams	Inhibit peptidoglycan synthesis	Renal elimination; dose adjustments in renal dysfunction	Bactericidal; inhibit cell wall synthesis	Varies depending on agent	Not well characterized (72%–75% in non-MDR organisms) [18]	Not recommended due to high rates of resistance and poorer clinical outcomes

# TRATAMENTO PIELONEFRITE AGUDA

- Solicitar urocultura com antibiograma;
- Casos graves: exames de imagem, hemocultura;
- Terapia inicial EV pode ser necessária inicialmente;
- Drogas clássicas: quinolonas;
- Observar taxa de resistência às quinolonas na população;
- Locais com > 10% de quinolona R -> **Betalactâmicos/aminoglicosídeos.**
- Sulfametoxazol/trimetoprim se sensível (14 dias).

# TRATAMENTO PIELONEFRITE AGUDA

## Pielonefrite leve ou moderada

Table 4: Recommended initial empiric oral antimicrobial therapy in mild and moderate acute uncomplicated pyelonephritis

Oral Therapy in mild and moderate uncomplicated pyelonephritis			
Antibiotics	Daily dose	Duration of therapy	Reference
Ciprofloxacin	500-750 mg bid	7-10 days	[85]
Levofloxacin	500 mg qd	7-10 days	[91]
Levofloxacin	750 mg qd	5 days	[86, 87]
Alternatives (clinical but not microbiological equivalent efficacy compared with fluoroquinolones):			
Cefpodoxime proxetil	200 mg bid	10 days	[89]
Ceftibuten	400 mg qd	10 days	[88]
Only if the pathogen is known to be susceptible (not for initial empirical therapy):			
Trimethoprim-sulphamethoxazole	160/800 mg bid	14 days	[84]
Co-amoxiclav <sup>1,2</sup>	0.5/0.125 g tid	14 days	

# TRATAMIENTO PIELONEFRITE AGUDA

## Pielonefrite grave

**Table 5: Recommended initial empirical parenteral antimicrobial therapy in severe acute uncomplicated pyelonephritis**

<b>Initial parenteral therapy in severe uncomplicated pyelonephritis</b>		
After improvement, the patient can be switched to an oral regimen using one of the agents listed in Table 4 (if active against the infecting organism) to complete the 1-2-week course of therapy. Therefore, only daily dose and no duration of therapy are indicated.		
<b>Antibiotics</b>	<b>Daily dose</b>	<b>Reference</b>
Ciprofloxacin	400 mg bid	[85]
Levofloxacin <sup>1</sup>	250-500 mg qd	[91]
Levofloxacin	750 mg qd	[86]
<b>Alternatives:</b>		
Cefotaxime <sup>2</sup>	2 g tid	
Ceftriaxone <sup>1,4</sup>	1-2 g qd	[92]
Ceftazidime <sup>2</sup>	1-2 g tid	[93]
Cefepime <sup>1,4</sup>	1-2 g bid	[94]
Co-amoxiclav <sup>2,3</sup>	1.5 g tid	
Piperacillin/tazobactam <sup>1,4</sup>	2.5-4.5 g tid	[95]
Gentamicin <sup>2</sup>	5 mg/kg qd	
Amikacin <sup>2</sup>	15 mg/kg qd	
Ertapenem <sup>4</sup>	1 g qd	[92]
Imipenem/cilastatin <sup>4</sup>	0.5/0.5 g tid	[95]
Meropenem <sup>4</sup>	1 g tid	[93]
Doripenem <sup>4</sup>	0.5 g tid	[96]

# ITU RECORRENTE

- $\geq 2$  ITU em 6 meses ou  $\geq 3$  ITU em 12 meses;
- 20% a 30% das mulheres com ITU terão recorrência;
- Recorrência: pode ser Recidiva ou Reinfecção;

## FATORES DE RISCO DE RECORRÊNCIA NAS MULHERES:

- Predisposição genética e familiar;
- ITU antes dos 15 anos;
- Relações sexuais;
- Uso de diafragma com espermicidas;
- Anatomia pélvica;
- Virulência do patógeno;
- Menopausadas: incontinência, cistocele e resíduo urinário;

# ITU RECORRENTE

## ESTRATÉGIAS DE PREVENÇÃO

### COM ANTIBIÓTICO

➤ Duração 6 – 12 meses

Nitrofurantoína 50-100mg/dia.

Fosfomicina 3g a cada 10 dias.

Cefalexina 125-250mg/dia.

Cefaclor 250mg/dia.

STX-TMP\* 400/80mg/dia.

Dose única na recorrência pós-coito.

\*Eficácia questionável devido ↑ cepas SULFA - R

### SEM ANTIBIÓTICO

- Comportamento.

- Reposição de estrógeno vaginal.

- Probióticos intravaginais: *L. crispatus*.

- Cranberry (proantocianidinas).

- D-Manose.

- Vacina oral e vaginal.

- Acupuntura.

# CONCLUSÕES

- Preocupação global sobre a **disseminação de uropatógenos resistentes**;
- É cada vez mais importante **conhecer a microbiota** da sua comunidade/instituição;
- A grande maioria dos indivíduos com BA **não necessitam** de tratamento;
- Cistite: **diagnóstico clínico**. Urocultura somente se falha terapêutica, casos complicados e pielonefrites;



# CONCLUSÕES

- Considere a **nitrofurantoína** e a **fosfomicina** como terapia de primeira linha para **cistites e BA**. SMX-TMP somente se urocultura permitir.
- **Quinolonas** ainda são as drogas de **primeira linha** para **pielonefrite aguda**; aminoglicosídeos ou beta-lactâmicos se necessários.
- ITU recorrente é **multifatorial**. Profilaxia **com e sem** antimicrobianos.

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