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Nationwide surveillance of bacterial pathogens from patients with acute uncomplicated cystitis in Japan

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Introduction

- Urinary tract infections (UTIs) are among the most common diseases caused by bacteria in adults and should be treated with effective antimicrobial chemotherapy.
- On the other hand, the treatment of UTIs is becoming more difficult because of increasing bacterial resistance to antimicrobial agents.

Objectives

- To investigate the antimicrobial susceptibility of the pathogens isolated from acute uncomplicated cystitis (AUC) by a nationwide survey.
- To record the data for future comparison with antibiotic-resistant organisms obtained by periodic surveillance.

Methods

- The Surveillance Committee of Japanese Society of Chemotherapy, *JSC*, *JAID* and *JSCM* conducted the first nationwide surveillance of antimicrobial susceptibility patterns of uropathogens.
  - for female AUC
  - at 43 hospitals throughout Japan
  - from April 2009 to November 2010
- The causative bacteria (*Escherichia coli* and *Staphylococcus saprophyticus*) and their susceptibility to various antimicrobial agents were investigated by isolation and culturing of bacteria from urine samples.

JSC: Japanese Society of Chemotherapy
JAID: Japanese Association for Infectious Diseases
JSCM: Japanese Society for Clinical Microbiology

Background of patients

	N	(%)
Gender: Female	461	100
Age(years)		
16-19	14	3.0
20-29	91	19.7
30-39	69	15.0
40-49	50	10.8
50-59	70	15.2
60-69	68	14.8
70-79	64	13.9
80-	35	7.6
Collection of urine samples		
via catheter	21	4.6
midstream urine	427	92.6
Menopausal status		
premenopausal	240	52.1
postmenopausal	218	47.3

The stratified analysis on the detection rate of pathogens by menopausal status

		Bacterial strains	
		E. coli	*S. saprophyticus*
Age: years old	mean ±SD	50.7 ± 19.9	30.7 ± 12.3
	median	53	24.5
	range	16 - 89	18 - 56
menopausal status : no. (%)	premenopausal	147 (49.2)] NS	17 (89.5)] *
	postmenopausal	152 (50.8)	2 (10.5)

NS indicates *P*-value >0.05, *: P=0.00095

Causative organisms isolated from patients with AUC

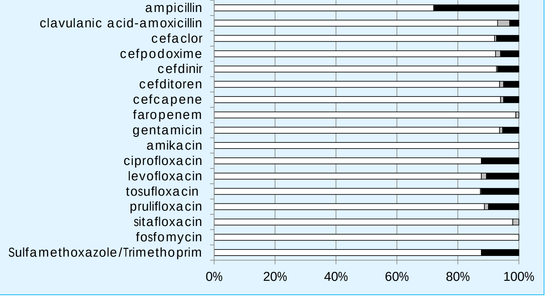
Organisms	N	(%)
Gram-negative bacteria	334	86.3
Escherichia coli	301	77.8
Klebsiella pneumoniae	13	3.4
Proteus mirabilis	6	1.6
Citrobacter koseri	4	1.0
Enterobacter aerogenes	3	0.8
Pseudomonas sp.	2	0.5
Citrobacter freundii	1	0.3
Proteus vulgaris	1	0.3
Proteus sp.	1	0.3
Morganella morganii	1	0.3
Pseudomonas aeruginosa	1	0.3
Gram-positive bacteria	52	13.4
Staphylococcus saprophyticus	20	5.2
Enterococcus faecalis	11	2.8
Streptococcus agalactiae	8	2.1
Staphylococcus sp.	7	1.8
Staphylococcus aureus	4	1.0
Streptococcus sp.	2	0.5
Candida sp.	1	0.3

Distribution of minimal inhibitory concentration (MICs) of *Escherichia coli*. (N=301)

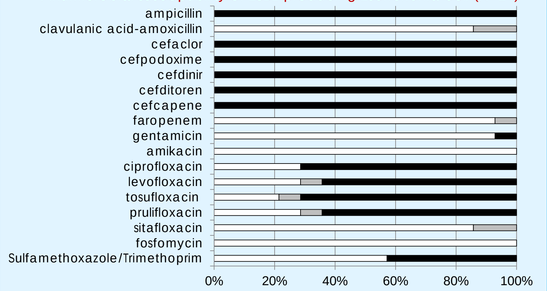
Antibacterial agent	MIC(μg/mL)														
	≦0.06	0.125	0.25	0.5	1	2	4	8	16	32	64	128	≧256	MIC_{50}	MIC_{90}
ampicillin					9	104	94	10		4	3	5	72	4	≧256
clavulanic acid-amoxicillin				2	9	136	81	52	12	5	4			4	8
cefaclor			16	107	113	32	6	3	2	3	4	1	14	1	4
cefpodoxime		26	193	54	3	2	5	3		1	5	3	6	0.25	0.5
cefdinir	24	167	73	11	4	1	6			3	7	5*		0.125	0.5
cefditoren	10	156	100	12	4	4			1	2	4	8*		0.125	0.5
cefcapene	3	34	179	61	6	3		2	3	8	1	1		0.25	0.5
faropenem			57	198	43	3								0.5	1
gentamicin			116	152	13	1		3	5	8	2	1		0.5	1
amikacin				6	151	130	14							1	2
ciprofloxacin	225	20	13	5	1		3	4	18	10	1	1		≦0.06	8
levofloxacin	198	29	11	17	9		5	21	10	1				≦0.06	8
tosufloxacin	227	23	10	2	1	1		2	1	34**				≦0.06	≧32
prulifloxacin	234	25	3	1	4	4	23	5	1	1				≦0.06	2
sitafloxacin	258	6		5	26	6								≦0.06	1
fosfomycin		2	60	152	55	18	3	5	3	3				0.5	2
Sulfamethoxazole/Trimethoprim	173	71	9	8	2	1		1	36***					0.063	≧16

*: ≧128 μg/mL, **: ≧32 μg/mL, ***: ≧16 μg/mL

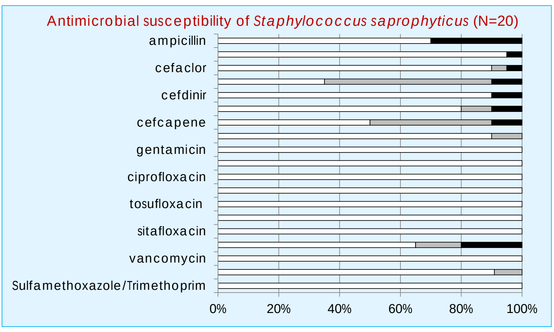
Antimicrobial susceptibility of *Escherichia coli* (N=301)



Antimicrobial susceptibility of ESBL-producing *Escherichia coli* (N=14)



Antimicrobial susceptibility of *Staphylococcus saprophyticus* (N=20)



Susceptible | Intermadiate | Resistant

Conclusions

- It is important to confirm the susceptibility of causative bacteria for optimal antimicrobial therapy, and empiric antimicrobial agents should be selected by considering patient characteristics and other factors.
- The number of isolates of fluoroquinolone-resistant or ESBL-producing strains in gram-negative bacilli are increasing in patients with UTIs in Japan.
- These data present important information for the proper treatment of UTIs and will serve as a useful reference for future surveillance studies.

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