Multi-Drug Resistance Bacteria in Qom Hospitals, Central Iran

Dear Editor,

Determination of sensitivity of isolated bacteria to consuming antibiotics could help clinician use appropriate antibiotics because due to unavailability of appropriate alternative antibiotics for hospitalized patients, it may be life-threatening in some cases.¹ This study was performed to determine the most common bacteria isolates from hospitalized patients in Qom, Central Iran and to evaluate their antibiotic susceptibility patterns.

From June 2004 to March 2007, 2400 nonduplicate blood, CSF, urine, wound and other body secretion samples from hospitalized patients admitted at six hospitals in Qom city were enrolled. These hospitals serve patients in different fields including surgery, internal, gynecology and pediatrics wards.

The sensitivity of the identified bacteria to different antibiotics was determined according to standard diffusion discs (Kirby-Bauer; Mast Co, Merseyside, UK) and interpreted as recommended by National Committee for Clinical Laboratory Standard.² American Typing Culture Collection isolates of *E. coli* (ATCC 25923) and *S. aureus* (ATCC 25922) were used as controls for antibiotics susceptibility testing. The panel of antibiotics was used to evaluate the in-vitro susceptibility of Gram positive and negative bacteria (Table 1 and 2).

Various pathogenic bacteria were isolated from the patients' samples ranging from *E. coli* to *Yersinia spp. E. coli* with 46%, *Kelbsiella spp.* with 17% and *S. aureus* with 13.2% frequencies were the most isolated bacteria. Antibacterial susceptibility patterns of Gram negative bacteria to the tested antibiotics revealed that the three antibiotics were effective *in vitro* including ciprofloxacin, nitrophurantoin and norfloxacin while cefazolin, gentamicin and co-trimoxazol were the least effective antibiotics, respectively. Regarding the susceptibility of Gram positive bacteria to the tested antibiotics, nitrophurantoin, norfloxacin and ciprofloxacin were the most active ones while naldixic acid, co-trimoxazol and gentamicin were the least active antibiotics, respectively when *in vitro* tests were undertaken (Table 1 and 2).

Urinary tract infections were noticed in 79.4% of the urine samples, which is in agreement with many reports in Iran³⁻⁵ and worldwide.^{6,7} Therefore, correct preparation of samples, their processing and interpretation are important in positive results,⁸ indicating the

importance of educating women to promote their personal genital hygiene. Ciprofloxacin, nitrophurantoin (40%), and norfloxacin (38%) exhibited the lowest resistance against Gram negative bacteria while these figures for Gram positive isolates were 38% and 24%. Therefore, it would be wise to initiate treatment of patients with more effective antibiotics. The wide range of antibiotics resistance observed in this study may imply that different mechanisms of resistance are involved. Surely, extensive application of inappropriate antibiotics in our clinics and hospitals could facilitate the emergence of antibiotic resistant bacteria.9,10 In this study, the failure to determine the sensitivity of the isolated bacteria to carbapenems (imipenem meropenem) is noticeable. Carbapenems and (imipenem and meropenem) were shown to have a low resistance for Gram positive and negative bacteria.¹¹

Considering the above-mentioned findings, we can conclude that ciprofloxacin and nitrophurantoin were the most effective antibiotics to treat hospitalized patients in Qom city. Implication of new strategies for antibiotic therapy of hospitalized patients with higher effective antibiotics such as linezolid and imipenem and application of stronger control measures are warranted.

Keywords: Qom; Antibiotic sensitivity; Ciprofloxacin; Nitrophurantoin; Bacterial resistance

Conflict of interest: None declared.

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 Table 1: Antibacterial resistance patterns of Gram negative bacteria isolated from 2400 hospitalized patients in 6 hospitals of Qom city

Bacteria										
No. (%)	E. coli	P. aerugi- nosa	Kleb- siella spp.	Entero bacter spp.	P. vulgaris	Citro- bacter spp.	S. typhi	Serratia spp.	Yersi nia spp.	Total
Ciprofloxacin										
Resistant	151 (27.1)	12 (21.4)	92 (35.8)	71 (41.5)	0	3 (33.3)	1 (33.3)	0	0	330 (30.9)
Nitrophurantoin										
Resistant	34 (6.3)	28 (90.3)	54 (29.3)	36 (34.6)	3 (42.9)	4 (40)	-	1 (25)	-	160 (18.1)
Norfloxacin										
Resistant	62 (24.3)	12 (33.3)	70 (47.3)	36 (40.4)	1 (25)	2 (28.6)	0	0	-	183 (33.4)
Ceftizoxime					_			_	_	
Resistant	76 (17.6)	24 (60)	80 (40.8)	73 (57.9)	2 (40)	1 (16.7)	0	3 (60)	2 (100)	261 (32)
Amikacin										
Resistant	38 (5)	3 (4.2)	28 (9.2)	21 (13.4)	1 (6.3)	2 (14.3)	0	0	0	93 (7)
Cefotaxime										
Resistant	92 (23.9)	17 (44.7)	68 (46.3)	64 (52.5)	1 (33.3)	6 (60)	1 (50)	3 (75)	2 (100)	254 (35.6)
Ceftriaxone										
Resistant	266 (35.7)	27 (50)	124 (45)	85 (57.8)	5 (35.7)	4 (40)	0	1 (25)	-	515 (41.1)
Naldixic Acid										
Resistant	295 (34.5)	29 (70)	76 (31)	59 (49.6)	6 (37.5)	6 (66.7)	0	2 (28.6)	-	473 (36.6)
Co-trimoxazol										
Resistant	485 (59)	40 (65.6)	145 (50.2)	87 (55.4)	5 (33.5)	7 (58.3)	1 (50)	3 (37.5)	2 (100)	775 (56.7)
Gentamicin										
Resistant	132 (21.5)	14 (23.3)	79 (30.7)	79 (47)	0	3 (23.1)	1 (33.3)	6 (75)	2 (100)	316 (28)
Cefazolin				- 4	•					
Resistant	230 (44.8)	24 (96)	96 (64)	71 (77.2)	8 (57.1)	-	-	1 (33.3)	1 (100)	366 (50)

Values in parenthesis show percentage

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Bacteria								
	Staphylo- coccus aureus	Strepto- coccus viridans	Strepto- coccus pneumonia	Staphy- lococcus epider- mis	β hemo- lytic group B strepto- coccus	Non group A strepto- coccus	Staphylo- coccus sapro- phiticus	Total
Nitrophurantoin Resistant	12 (14.6)	0	1 (50)	1 (3.7)	0	1 (20)	3 (21.4)	18 (13.5)
Norfloxacin Resistant	14 (20.6)	-	-	3 (30)	-	-	0	17 (21.3)
Ciprofloxacin Resistant	36 (25.9)	1 (20)	1 (20)	17 (37.8)	1 (25)	0	1 (25)	57 (27.8)
Cefotaxime Resistant	28 (35)	0	1 (50)	16 (38.1)	0	0	0	45 (34)
Amikacin Resistant	23 (24)	4 (66.7)	2 (50)	6 (15.8)	1 (100)	1 (100)	1 (8.3)	38
Vancomycin Resistant	18 (8.3)	0	3 (50)	7 (7.4)	1 (20)	0	0	29 (0.5)
Ceftriaxone Resistant	34 (30.4)	0	2 (16.7)	15 (26.8)	1 (33.3)	0	5 (29.4)	(0.5) 57
Cefazolin Resistant	37 (37)	1 (11.1)	2 (28.6)	9 (22.5)	0	1 (14.3)	2 (15.4)	(27.4) 52
Ceftizoxime Resistant	39 (42.4)	-	1 (33.3)	10 (41.7)	1 (25)	2 (33.3)	2 (66.7)	(29.2) 55
Gentamicin Resistant	56 (33.9)	0	3 (50)	15 (24.2)	1 (50)	6 (85.7)	1 (16.7)	(41.6) 82
Co-trimoxazol Resistant	71 (54.2)	4 (40)	3 (42.9)	26 (44.1)	1 (20)	3 (37.5)	10 (58.8)	(32.8) 118 (49.8)
Naldixic Acid Resistant	53 (72.6)	6 (75)	4 (57.1)	1 (5.3)	1 (100)	4 (80)	29 (100)	98 (69)

Table 2: Antibacterial resistance patterns of Gram positive bacteria isolated from 2400 hospitalized patients in 6 hospitals of Qom city

Values in parenthesis show percentage

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