

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 non-duplicate 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, nitrofurantoin 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, nitrofurantoin, 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, nitrofurantoin (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 and meropenem) is noticeable. Carbapenems (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 nitrofurantoin 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; Nitrofurantoin; 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	<i>E. coli</i>	<i>P. aeruginosa</i>	<i>Klebsiella spp.</i>	<i>Entero bacter spp.</i>	<i>P. vulgaris</i>	<i>Citro-bacter spp.</i>	<i>S. typhi</i>	<i>Serratia spp.</i>	<i>Yersi nia spp.</i>	Total
No. (%)										
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)
Nitrofurantoin 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)
Nalidixic 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 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

References

- Japoni A, Kalani M, Farshad Sh, Ziyaeyan M, Alborzi A, Mehrabani D, Razaatpour N. Antibiotic-resistant bacteria in hospitalized patients with bloodstream infections: Analysis of some associated factors. *Iran Red Crescent Med J* 2010;**12**:163-171.
- National Committee for Clinical Laboratory Standards, Performance Standards for Antimicrobial Susceptibility Testing; 13th Informational Supplement. NCCLS document M100-S13. NCCLS, Wayne, PA, USA, 2003.
- Aminzadeh Z, Sadat Kashi M, Sha'bani M. Bacteriuria by extended-spectrum Beta-lactamase-producing *Escherichia coli* and *Klebsiella pneumoniae*: isolates in a governmental hospital in South of tehran, Iran. *Iran J Kidney Dis* 2008;**2**:197-200. [19377237]
- Hadadi A, Rasoulinejad M, Maleki Z, Yonesian M, Shirani A, Kourorian Z. Antimicrobial resistance pattern of Gram-negative bacilli of nosocomial originate in 2 university hospitals in Iran. *Infect Dis* 2008;**60**:301-5. [18036759]
- Khameneh ZR, Afshar AT. Antimicrobial susceptibility pattern of urinary tract pathogens. *Saudi J Kidney Dis Transpl* 2009;**20**:251-3. [19237813]
- Hosseini-Mazinani SM, Eftekhar F, Milani M, Ghandili S. Characterization of beta-lactamases from urinary isolates of *Escherichia coli* in Tehran. *Iran Biomed J* 2007;**11**:95-9. [18051951]

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

Bacteria	<i>Staphylococcus aureus</i>	<i>Streptococcus viridans</i>	<i>Streptococcus pneumoniae</i>	<i>Staphylococcus epidermidis</i>	β hemolytic group <i>B streptococcus</i>	Non group A streptococcus	<i>Staphylococcus saprophyticus</i>	Total
Nitrofurantoin 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 (24)
Vancomycin Resistant	18 (8.3)	0	3 (50)	7 (7.4)	1 (20)	0	0	29 (8.5)
Ceftriaxone Resistant	34 (30.4)	0	2 (16.7)	15 (26.8)	1 (33.3)	0	5 (29.4)	57 (27.4)
Cefazolin Resistant	37 (37)	1 (11.1)	2 (28.6)	9 (22.5)	0	1 (14.3)	2 (15.4)	52 (29.2)
Ceftizoxime Resistant	39 (42.4)	-	1 (33.3)	10 (41.7)	1 (25)	2 (33.3)	2 (66.7)	55 (41.6)
Gentamicin Resistant	56 (33.9)	0	3 (50)	15 (24.2)	1 (50)	6 (85.7)	1 (16.7)	82 (32.8)
Co-trimoxazol Resistant	71 (54.2)	4 (40)	3 (42.9)	26 (44.1)	1 (20)	3 (37.5)	10 (58.8)	118 (49.8)
Nalidixic Acid Resistant	53 (72.6)	6 (75)	4 (57.1)	1 (5.3)	1 (100)	4 (80)	29 (100)	98 (69)

Values in parenthesis show percentage

7 Ding JG, Sun QF, Li KC, Zheng MH, Miao XH, Ni W, Hong L, Yang JX, Ruan ZW, Zhou RW, Zhou HJ, He WF. Retrospective analysis of nosocomial infections in the intensive care unit of a tertiary hospital in China during 2003 and 2007. *BMC Infect Dis* 2009;**25**;9:115. [19630992]

8 Parvin US, Hossain MA, Musa AK, Mahamud C, Islam MT, Haque N, Muhammad N, Khan SI, Mahmud

NU. Pattern of aerobic bacteria with antimicrobial susceptibility causing community acquired urinary tract infection. *Mymensingh Med J* 2009;**18**:148-53. [19623138]

9 Japoni A, Vazin F, Hamadi M, Davarpanah MA, Alborzi A, Razaatpour N. Multidrug-Resistant Bacteria Isolated from Intensive-Care-Unit Patient Samples. *Braz J Infect Dis* 2009;**13**:82-86. [20140355] [doi:10.

1590/S1413-86702009000200009]

10 Japoni A, Farshad S, Alborzi A. *Pseudomonas aeruginosa*: Burn infection, treatment and antibacterial resistance. *Iran Red Crescent Med J* 2009;**11**:244-253.

11 Loeb M. Antibiotic use in long-term facilities: many unanswered questions. *Infect Control Hosp Epidemiol* 2000;**21**:680-683. [11083187] [doi:10.1086/501713]