

CHRONIC KIDNEY DISEASE IS ASSOCIATED WITH ANTIMICROBIAL MULTIDRUG RESISTANCE OF URINARY PATHOGEN

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Patients with chronic kidney disease (CKD) have increased risk of urinary tract infections (UTIs). The recent emergence of multidrug-resistant (MDR) uropathogens is an alarming public health issue which complicate therapeutic strategies for UTIs. The present study aimed to determine the association between CKD and MDR among inpatients with UTI.

Method

- We assessed 1135 urine samples obtained from inpatients with UTI during the period of January 2012 to January 2013. Isolated bacteria were identified by standard tests, and antibiotic susceptibility was determined by disk diffusion method. An MDR UTI was defined as an infection caused by a uropathogen resistant to three or more classes of drugs and identified by a clinician to require therapy. CKD was defined according to KDIGO guideline

Results

- The most frequently isolated microorganism were Escherichia coli (52.95%), Klebsiella spp (21.49%), Proteus mirabilis (7.13%), Candida species (4.75%) and Pseudomonas aeruginosa (4.49%) (Table 1).
- Three hundred forty seven (30.57%) isolates were MDR
- Pseudomonas aeruginosa had the highest percentage of MDR isolates (55%).
- Univariate analysis showed an increased risk of MDR among males (odds ratio[OR]=3.21, p<0.001) and in patients with diabetes mellitus (OR=1.64, p=0.0002), chronic obstructive pulmonary disease (OR=5.13, p<0.001), indwelling catheters before admission (OR=2.79, p<0.001), previous UTIs (OR=2.22, p<0.001) and CKD (OR=2.76, p<0.001).
- In multivariable analysis, CKD remained an independent risk factor associated with MDR (OR=3.05, 95%CI: 2.24 to 4.14, p<0.001) (Nagelkerke R²=0.258)

Parameter	All urinary pathogen (n=1135)	MDR-urinary pathogen (n=347)	Non MDR-urinary pathogen (n=788)	p
Age (years)	66 [20]	66 [19]	66 [19]	0.79
Gender -male, n (%)	370 (32.59)	177 (51)	193 (24.49)	< 0.0001
Diabetes mellitus, n (%)	414 (36.47)	155 (44.66)	193 (24.49)	0.0002
Arterial hypertension, n (%)	625 (55.06)	174 (50.14)	451 (57.23)	0.02
Chronic kidney disease, n (%)	365 (32.15)	167 (48.12)	198 (25.12)	< 0.0001
Chronic obstructive pulmonary dis., n(%)	75 (6.66)	50 (14.41)	25 (3.17)	<0.0001
Cirrhosis, n (%)	64 (5.63)	25 (7.20)	39 (4.94)	0.16
Previous UTIs, n (%)	231 (20.35)	104 (29.97)	127 (16.11)	< 0.0001
Indwelling catheters, n (%)	119 (10.48)	62 (17.86)	57 (7.23)	<0.0001
Nephrolithiasis, n (%)	137 (12.07)	27 (7.78)	110 (13.95)	0.003
Benign prostate hypertrophy, n (%)	68 (5.99)	13 (3.74)	55 (6.92)	0.04
Gram negative bacteria, n (%)	1017 (89.60)	329 (94.81)	688 (87.31)	< 0.0001
E.coli, n (%)	601 (52.95)	121 (34.87)	480 (60.91)	< 0.0001
K pneumoniae, n (%)	244 (21.49)	118 (34.00)	126 (15.98)	< 0.0001
Proteus mirabilis, n (%)	81 (7.13)	37 (10.66)	44 (5.58)	0.003
P aeruginosa, n (%)	51 (4.49)	28 (8.06)	23 (2.91)	0.0003
Serratia marcescens, n (%)	10 (0.88)	6 (1.72)	4 (0.5)	0.07
Acinetobacter baumannii, n (%)	12 (1.05)	8 (2.30)	4 (0.5)	0.01
Enterobacter species, n (%)	9 (0.79)	5 (1.44)	4 (0.5)	0.14
Morganella morganii, n (%)	4 (0.35)	3 (0.86)	1 (0.12)	0.16
Citrobacter species, n (%)	4 (0.35)	2 (0.57)	2 (0.25)	0.59
Providencia rettgeri, n (%)	1 (0.08)	1 (0.28)	0 (0)	0.30
Gram positive, n (%)	64 (5.63)	14 (4.03)	50 (6.34)	0.12
Enterococcus speciae, n (%)	50 (4.40)	11 (3.17)	39 (4.94)	0.21
Staphylococcus aureus, n (%)	6 (0.5)	3 (0.86)	3 (0.38)	0.37
Streptococcus grup B, n (%)	1 (0.08)	0 (0)	1 (0.12)	0.50
Viridans streptococi, n (%)	7 (0.61)	0 (0)	7 (0.88)	0.10
Candida species, n (%)	54 (4.75)	4 (1.15)	50 (6.3)	<0.0001

Table 1. Demographic and clinical characteristics of Patients with UTIs

Parameter	Beta	Wald	OR [95% C.I.]	P
Gender	4.159	87.358	3.085 to 5.608	<0.0001
Diabetes mellitus	1.377	4.522	1.025 to 1.849	0.035
Chronic kidney disease	3.050	50.941	2.245 to 4.142	<0.0001
Chronic obstructive pulmonary disease	3.615	22.033	2.114 to 6.183	<0.0001
Indwelling catheters	2.245	13.071	1.448 to 3.481	<0.0001
Previous UTI	2.239	21.381	1.591 to 3.151	<0.0001
Constant	0.104	246.908		<0.0001

Table 2. Multivariate regression analysis of independent risk factors for MDR

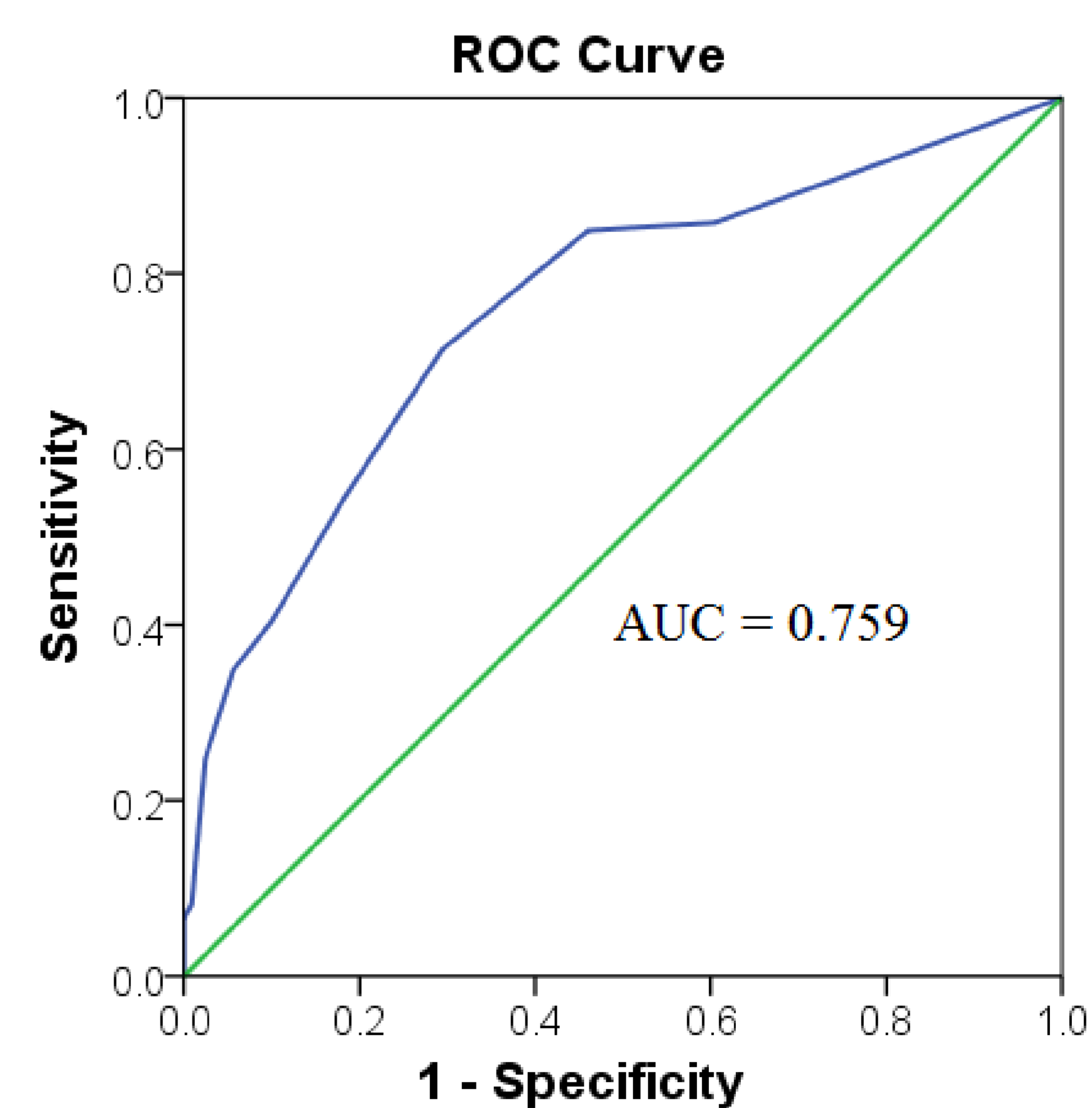


Figure - the ROC curve c-statistic for predicting a MDR pathogen was 0.759. Considering sensitivity and specificity for clinical utility, a score ≥ 1 was selected as the threshold value for predicting MDR UTI, with a sensitivity of 85.8% and specificity of 60.5%

Conclusions

The high prevalence of MDR in urinary pathogens was observed. Particularly, resistance patterns were alarmingly higher for Pseudomonas. CKD is an independent risk factor associated with MDR. The risk score for prediction of MDR may help the clinicians in an early recognition of patients with UTI due to MDR uropathogens.

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