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Novia Sundari Riadi

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Dr. Dr. Soroy Lardo, Sp.PD, K-PTI

KEPANITERAAN KLINIK DEPARTEMEN ILMU PENYAKIT DALAM FAKULTAS KEDOKTERAN

UNIVERSITAS PEMBANGUNAN NASIONAL "VETERAN" JAKARTA

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"Risk factors and prognosis of complicated urinary tract infections caused by *Pseudomonas aeruginosa* in hospitalized patients: a retrospective multicenter cohort study"

Aina Gomila,1,2 J Carratalà,1–3
Eliakim-Raz,4 E Shaw,1,2 I Wiegand,5 L Vallejo-Torres,6 A Gorostiza,2 JM Vigo,7 S Morris,6 M Stoddart,8 S Grier,8 C Vank,5 N Cuperus,9 L Van den Heuvel,9 C Vuong,5 A MacGowan,8 L Leibovici,4 I Addy,5 M Pujol1,2

Introduction

- Urinary tract infections (UTIs) are among the most frequent infections in both the outpatient and inpatient setting
- UTIs were estimated to be the third-most common infection after surgical site infections and pneumonia, accounting for 19% of cases
- The aim of this study was to gain insight into the risk factors for developing cUTI caused by *P. aeruginosa* and MDR *P. aeruginosa* among hospitalized patients and to assess the prognosis associated with these infections.

Methods

Design

study was an international, multicenter, retrospective, observational cohort study involving hospitalized patients with cUTI between January 1, 2013, and December 31, 2014

Setting and patients

- The study was conducted at 20 hospitals
- patients with a diagnosis of cUTI as the primary cause of hospitalization and patients hospital-ized for another reason but who developed cUTI during their hospitalization
- 50–60 patients were included at each hospital

Methods

Inclusion criteria

- indwelling urinary catheter. urinary retention, neurogenic bladder obstructive uropathy renal impairment, renal transplanta-tion UT modifications
- chills or rigors associated with fever or hypothermia, flank pain or pelvic pain, dysuria, urinary frequency, or urinary urgency, and costovertebral angle tenderness
- urine culture with at least $\geq 10^5$ colony-forming units/mL or at least one blood culture growing possible uropathogens (no more than two species)

Exclusion criteria

- Age under 18 years
- Diagnosis of prostatitis
- Polymicrobial infec-tions that included *Candida* spp

Result

A total of 1,007 cUTI episodes from 981 patients were included. Differences between episodes of *P. aeruginosa* cUTI and episodes of cUTI caused by other etiologies

Table 1 Epidemiological characteristics and outcomes of episodes of *Pseudomonas aeruginosa* cUTI and cUTI due to other etiologies

Risk factors	*P. aeruginosa* cUTI (n=97)	Other cUTI (n=910)	OR (95% CI)	ICC
Male sex, n (%)	69 (71.1)	393 (44.2)	3.29 (2.06–5.25)	0.072
Age (years), mean, SD	66.1, 18.1	65.9, 17.9	1.00 (0.99–1.01)	0.072
Diabetes mellitus, n (%)	27 (27.8)	239 (26.3)	1.11 (0.69–1.79)	0.072
Lymphoma, n (%)	2 (2.1)	11 (1.2)	1.76 (0.38–8.21)	0.072
Solid tumor, n (%)	18 (18.6)	102 (11.2)	1.83 (1.04–3.21)	0.072
Liver disease, n (%)	6 (6.2)	47 (5.2)	1.39 (0.56–3.43)	0.074
Admission: urgent, n (%)	83 (85.6)	722 (84.8)	0.92 (0.48–1.74)	0.074
Admission reason: UTI, n (%)	45 (46.4)	606 (66.6)	0.46 (0.29–0.73)	0.038
Admission from medical care facility, n (%)	21 (21.6)	157 (17.3)	1.32 (0.79–2.21)	0.080
Charlson score, mean, SD	3.18, 2.46	2.65, 2.51	1.09 (1.00–1.18)	0.074
Organ transplantation, n (%)	9 (9.3)	60 (6.6)	1.85 (0.84–4.08)	0.082
Immunosuppression, n (%)	11 (11.3)	88 (9.7)	1.43 (0.71–2.86)	0.078
Steroid therapy, n (%)	13 (13.4)	56 (6.2)	2.97 (1.46–6.05)	0.087
Functional capacity: independent (%)	44 (45.4)	492 (54.2)	0.42 (0.23–0.75)	0.087
Chronic renal impairment, n (%)	18 (18.6)	236 (26)	0.66 (0.37–1.15)	0.068
UTI within 1 year, n (%)	29 (29.9)	234 (25.7)	1.38 (0.85–2.24)	0.080
Antibiotic within 30 days, n (%)	32 (33)	171 (18.9)	2.30 (1.44–3.68)	0.072
Acquisition of cUTI at a medical care facility, n (%)	61 (62.9)	390 (42.9)	2.17 (1.38–3.41)	0.055
Urinary retention, n (%)	24 (24.7)	179 (19.7)	1.22 (0.72–2.10)	0.067
Neurogenic bladder	3 (3.1)	44 (4.8)	0.64 (0.20–2.12)	0.077
Obstructive uropathy	20 (20.6)	197 (21.7)	0.96 (0.56–1.65)	0.071
Source of cUTI, n (%)				0.038
Indwelling urinary catheter	57 (58.8)	284 (31.2)	2.75 (1.73–4.35)	
Pyelonephritis (normal urinary tract)	4 (4.1)	196 (21.5)	0.17 (0.05–0.55)	
Others	36 (37.1)	430 (47.3)	0.58 (0.24–1.40)	
Severity of infection: severe sepsis/septic shock, n (%)	18 (20.2)	131 (15.4)	1.30 (0.66–2.56)	0.083
Adequate empiric antibiotic treatment, n (%)	33/81 (40.7)	483/759 (63.6)	0.39 (0.24–0.62)	

Abbreviations: cUTI, complicated urinary tract infection; ICC, intraclass correlation; UTI, urinary tract infection.

Result

Table 2 Microbiological features of cUTI episodes with or without *Pseudomonas aeruginosa*

Microorganisms	*P. aeruginosa* cUTI (n=97), n (%)	Other cUTI (n=910), n (%)	*P*-value
Polymicrobial infection,[a] n (%)	38 (39.2)	88 (9.7)	<0.001
Escherichia coli	8 (8.2)	557 (61.2)	<0.001
Klebsiella pneumoniae	7 (7.2)	161 (17.7)	0.009
Proteus mirabilis	1 (1)	78 (8.6)	0.009
Enterococcus spp.	14 (14.4)	55 (6)	0.002

Note: [a]Comprised no more than two bacterial species.

Abbreviation: cUTI, complicated urinary tract infection.

Table 3 Antibiotic-resistance profile of *Pseudomonas aeruginosa* complicated urinary tractinfection episodes (n=97)

Antibiotics	Resistance (n)	(%)
Antipseudomonal cephalosporins	35	36.1
Aminoglycosides	30	30.9
Piperacillin–tazobactam	21	21.6
Fluoroquinolones	43	44.3
Carbapenems	28	28.8
Multidrug resistance	28	28.8
Extensive drug resistance	12	12.3

Result

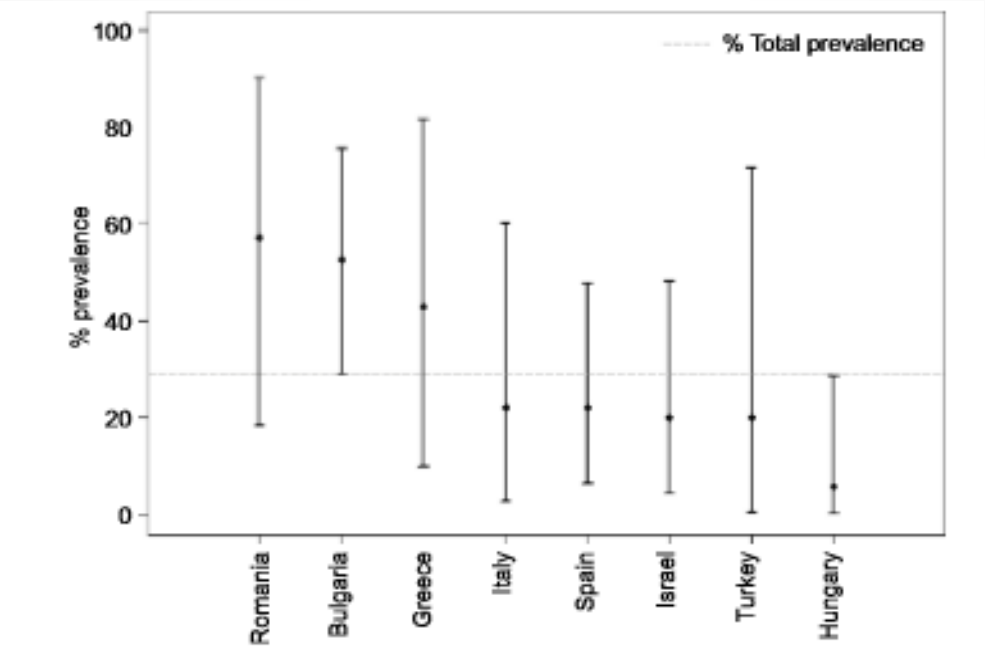

Table 6 Outcomes of episodes of *Pseudomonas aeruginosa* cUTI and episodes of cUTI caused by other etiologies

Risk factors	Entire cohort (n=1,007), n (%)	*P. aeruginosa* cUTI (n=97), n (%)	Other cUTI (n=910), n (%)	*P*-value
Symptom improvement at 5–7 days, n (%)	756 (75)	74 (76.5)	682 (75)	0.7
Symptom recurrence within 30 days, n (%)	81 (8)	11 (11.6)	70 (7.7)	0.2
Mortality at 30 days, n (%)	84 (8.3)	7 (7.2)	77 (8.5)	0.6
Readmission within 60 days after discharge, n (%)	167 (16.5)	23 (23.7)	144 (15.8)	0.04
Readmission due to cUTI, n (%)	81 (8)	10 (10.3)	71 (7.8)	0.4

Abbreviation: cUTI, complicated urinary tract infection.

Discussion

- factors associated with P. aeruginosa were:
  - Male sex
  - Steroid therapy
  - Low functional capacity
  - Having had antibiotics
  - **Manipulation of the cUTI**
- Interestingly, although hospital readmission was higher in patients with P. aeruginosa cUTI, mortality was not higher than other etiologies
- The lack of differences observed in mortality between *P. aeruginosa* and other etiologies was probably due to the low frequency of severe sepsis or septic shock and mortality

Conclusion

- Study reveals that resistance rates of P. aeruginosa cUTI isolates to antipseudomonal cephalosporins and carbapenems
- Risk factors for P. aeruginosa cUTI were related to more serious baseline condition and manipulation of the UT
- Mortality was not higher than that of patients with cUTI caused by other etiologies

Thank You