Factors associated with 30-day Mortality in Carbapenems-resistant Enterobacteriaceae Infections

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Background

- Carbapenem-resistant Enterobacteriaceae (CRE) infections are the serious conditions and provide high mortality. The studies of risk factors of death in CRE infection have been limited. Hence, the study was conducted for evaluating mortality and factors associated with CRE infection.

Methods

- A retrospective cohort study was conducted between January 1st, 2015, and December 31st, 2019, in single center medical university. All patients diagnosed CRE infections who aged ≥ 18 years were included and reviewed. The multivariate logistic regression was used for evaluating the factors associated with 30-day mortality.

Results

- The 30-day mortality occurred in thirty-five patients (37.6%). The non-survive patients had significantly higher simplified acute physiology (SAP) II score, sepsis at the time of diagnosis, and pneumonia ($p<0.05$) than survive patients. The most common pathogen was *Klebsiella pneumoniae, Escherichia coli* and *Enterobacter* spp. The independent factors associated with 30-day mortality were having simplified acute physiology (SAP) II score > 30 [adjusted odds ratio (aOR) of 12.98 (95% confidence interval (CI), 2.84-59.34, p=0.001)], sepsis at the time of diagnosis [aOR of 4.77 (CI 1.19-19.20, p=0.03)], pneumonia [aOR of 4.64 (CI 1.31-16.47, p=0.01)], and improper empiric antibiotic [aOR of 7.83 (CI 1.84-33.37, p=0.01)].

Discussion

- Mortality rate of CRE infection is significantly higher in patients with multiple comorbidities.
- Fosfomycin-based combination therapy had had the better clinical outcomes

Table 1. Baseline Characteristics

Parameters	Survive N=58	Non-survive N=35	P-value
Mean Age in year (SD)	62.1 (15.6)	58.5 (17.7)	0.34
Male (n, %)	37 (63.8%)	23 (65.7%)	0.30
Comorbidity (n, %)	57 (98.3%)	32 (91.4%)	0.15
• **Diabetes mellitus (n, %)**	18 (31.0%)	6 (17.1%)	0.14
• **Hypertension (n, %)**	23 (39.7%)	9 (25.7%)	0.17
• **Dyslipidemia (n, %)**	6 (10.3%)	1 (2.9%)	0.19
• **Neurological disease (n, %)**	16 (27.6%)	3 (8.6 %)	0.03
• **Cardiovascular disease (n, %)**	7 (12.1%)	5 (14.3%)	0.75
• **Lung disease (n, %)**	1 (1.7%)	3 (8.6%)	0.15
• **Liver disease (n, %)**	7 (12.1%)	8 (22.9%)	0.17
• **Renal disease (n, %)**	7 (12.1%)	3 (8.6%)	0.60
• **Solid organ malignancy (n, %)**	19 (32.8%)	9 (25.7%)	0.47
Sepsis*	15 (25.9%)	18 (51.4%)	0.01
SAP II score* [mean (SD)]	30.8 (11.9)	47.5 (16.2)	<0.001
Source of infections			
• **Pneumonia**	21 (36.2%)	25 (71.4%)	0.001
• **Urinary tract infection**	18 (31.0%)	3 (8.6%)	0.01
• **Cholangitis**	9 (15.5)	3 (8.6%)	0.33
• **SSI**	5 (8.6%)	3 (8.6%)	0.34

BMI: body mass index, SAP: simplified acute physiology, SSI: skin and soft tissue infection

*Status at the time of diagnosis

Declaration of Interest: all authors have nothings to declare

Table 2. Treatment regimen

Regimen	Survive (N=58)	Non-survive (N=35)	P-value
Monotherapy	31 (53.5%)	25 (71.4%)	0.08
• **Meropenem/imipenem**	13 (22.4%)	8 (22.9%)	0.96
• **Colistin**	11 (19.0%)	14 (40.0%)	0.02
• **Fosfomycin**	0 (0.0%)	1 (2.9%)	0.38
• **Amikacin**	7 (12.1%)	1 (2.9%)	0.25
• **Tigecycline**	1 (1.7%)	1 (2.9%)	0.99
Combination therapy	27 (46.5%)	10 (28.9%)	0.08
• **Fosfomycin/colistin**	9 (15.5%)	4 (11.4%)	0.58
• **Fosfomycin/others***	10 (17.2%)	1 (2.9%)	0.04
• **Tigecycline/others§**	0 (0.0%)	3 (8.6%)	0.05
• **Meropenem/colistin**	7 (12.1%)	2 (5.7%)	0.48

*Fosfomycin combined meropenem (N=1 in survive group and N=1 in non-survive group), fosfomycin combined tigecycline (N=3 in survive group), fosfomycin combined sitafloxacin (N=2 in survive group), fosfomycin combined gentamicin (N=1 in survive group), Fosfomycin combined co-trimoxazole (N=1 in survive group), Fosfomycin combined amikacin (N=2 in survive group)

§Tigecycline combined meropenem (N=2), Tigecycline combined amikacin (N=1)

Conclusion

- The mortality of CRE infections were high. The factors associated with 30-day mortality were having SAP II score > 30, sepsis at the time of diagnosis, pneumonia, and improper empiric antibiotic.

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