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Effectiveness of Diagnosis and Antimicrobial Susceptibility Testing in the Treatment of Patients with CRE Infections: A Retrospective Analysis from Lerdsin Hospital

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Background

Carbapenem-resistant Enterobacterales (CRE) are a major clinical threat due to limited treatment options and high mortality. Rapid diagnosis and reliable antimicrobial susceptibility testing (AST) are essential to guide effective therapy[1].

Method

A retrospective study was conducted using laboratory data and multivariate analysis to evaluate risk factors for 14-day mortality.

Results

The predominant CRE pathogens were *Klebsiella pneumoniae* (CRE-*KP*) and *Escherichia coli* (CRE-*EC*).

CRE-*KP,* n=31: *OXA*-48 (22.9%), *NDM* (6.3%)

CRE-*EC,* n=17: *NDM* (14.6%), *OXA*-48 (2.1%)

In 2024, susceptibility rates were:

CRE-*KP*: tigecycline 47.64%, colistin 79.12%, ceftazidime-avibactam (Cef/Avi) 49.07%

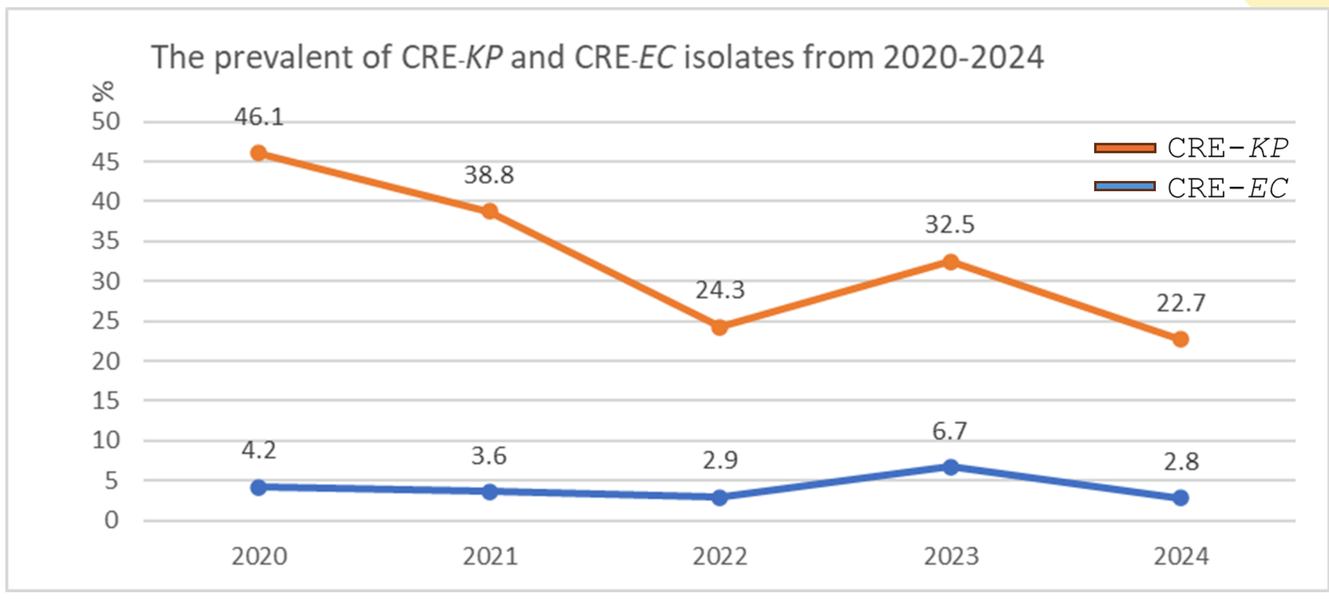
CRE-*EC*: tigecycline 100%, colistin 100%, Cef/Avi 86%

Colistin showed the highest in vitro activity. Among 61 patients with CR-GNB bacteremia, those receiving colistin-based therapy had lower 14-day mortality (OR = 2.11; 95% CI; p = 0.057).

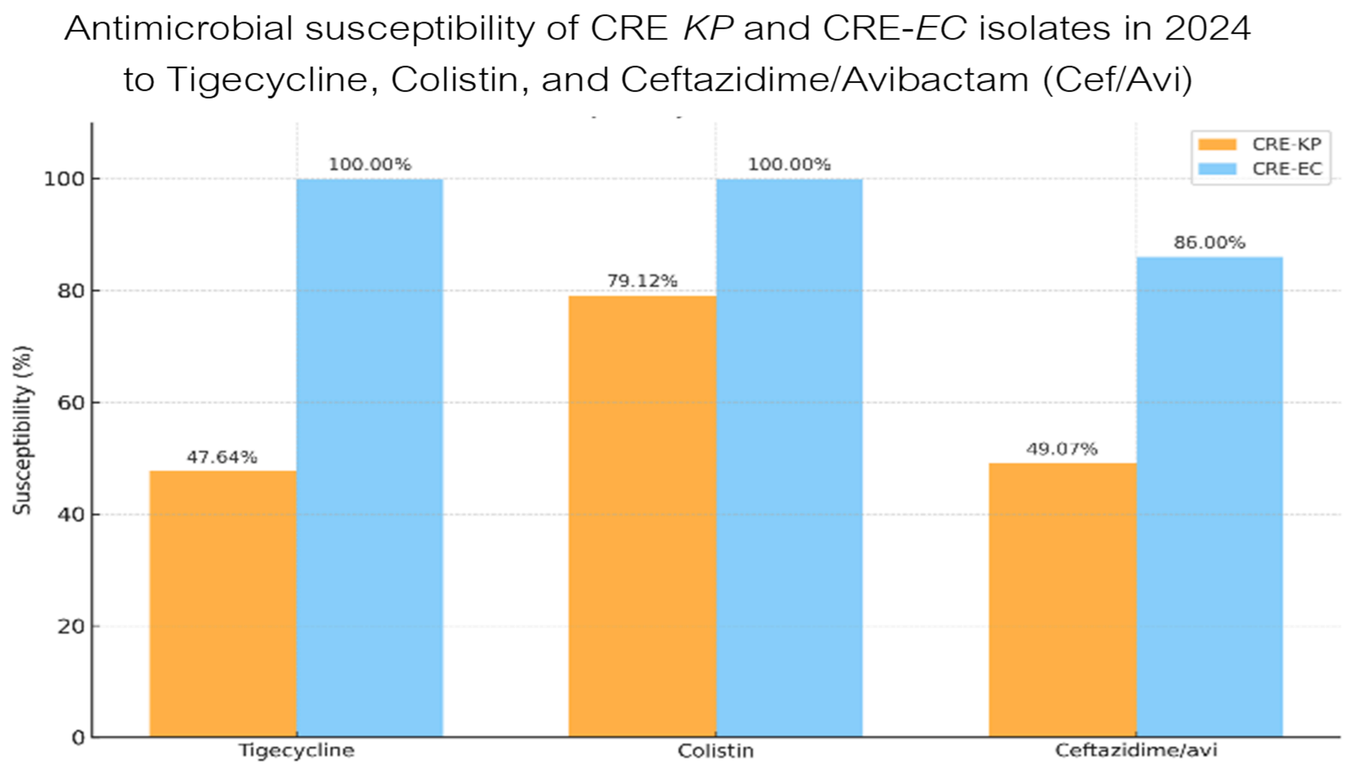
Early administration of appropriate empirical antibiotics (<4 h) or adjustment within 48 hours significantly improved survival.

Conclusions

Timely laboratory diagnosis and AST are crucial for CRE management. Local antibiograms should guide empirical treatment, while early antimicrobial adjustment or novel agents can improve outcomes. Continued surveillance and stewardship remain essential.



The most common CRE pathogens were *Klebsiella pneumoniae* (CRE-*KP*) and Escherichia coli (CRE-*EC*).



Discussion

In this study, tigecycline, colistin and Cef/Avi showed higher susceptibility in CRE-*EC* more than CRE-*KP.* Cef/Avi susceptibility in CRE-*KP* is similar to previous data from Phramongkutklao Hospital[2]. Although Cef/Avi is generally active against *OXA*-48-like producers, reduced susceptibility may result from mechanisms such as *NDM* co-production, porin loss, efflux pump overexpression, or gene mutations, which can increase MIC values and cause of resistance[3,4]. Colistin remained highly active, in line with national surveillance reports indicating a low prevalence of *mcr*-mediated resistance among CRE in Thailand[5,6].

Key Points :

- ✅ CRE-*KP* exhibits carbapenem resistance primarily due to *OXA*-48 genes, while CRE-*EC* is mainly associated with *NDM*.
- ✅ Colistin remains the most effective in vitro, but caution is required due to toxicity and side effects.
- ✅ Utilizing local antibiogram data to guide early antibiotic therapy and ensuring appropriate therapy within 48 hours significantly improves patient survival.
- ✅ Antimicrobial stewardship is crucial for managing CRE infections and optimizing antibiotic use.

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