

Impact of Inappropriate Empirical Antibiotic (EAB) Therapy on Clinical and Healthcare Outcomes in Patients with Enterobacterales Bacteraemia: A Retrospective Cohort Study from a Sri Lankan Tertiary Care Hospital

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1. BACKGROUND

- Enterobacterales bacteraemia causes significant morbidity and mortality.
- Early empirical antibiotic (EAB) therapy is critical in sepsis management.
- Increasing antimicrobial resistance complicates empirical antibiotic selection.
- Limited local data exist regarding the impact of inappropriate EAB therapy in Sri Lanka.

2. OBJECTIVE

To assess the impact of inappropriate empirical antibiotic therapy on clinical and healthcare outcomes among patients with Enterobacterales bacteraemia.

3. METHODS

Study design: Retrospective cohort study
Setting: Sri Jayewardenepura General Hospital, Colombo, Sri Lanka
Study period: March 2022 – April 2024

Inclusion criteria

- In-ward patients with blood culture positive for Enterobacterales
- Received empirical antibiotics before susceptibility results

Group classification

- Appropriate EAB group:** isolate susceptible to initial antibiotic
- Inappropriate EAB group:** isolate non-susceptible to initial antibiotic

Outcomes assessed

- 7-day, 14-day and 30-day all-cause mortality
- Length of hospital stay
- Healthcare cost
- Readmission within 30 days of discharge

4. RESULTS

Total patients: n = 326
Appropriate EAB group: 55.2%
Inappropriate EAB group: 44.8%
Third-generation cephalosporin non-susceptibility: 59.2%
Meropenem non-susceptibility: 15.3%
Commonest organism: *E. coli*
Commonest source: urinary tract infection (69.3%)

5. DISCUSSION

- Nearly half of patients received inappropriate EAB.
- 3GC resistance was high.
- Despite significant unadjusted associations, regression analysis did not show independent adverse outcome associations.

Possible explanations

- High urinary source proportion
- Clinical effectiveness despite in-vitro non-susceptibility
- Source control
- Subsequent antibiotic optimisation

6. LIMITATIONS

- Retrospective design
- Single-centre study
- Incompleteness of medical records
- Difficulty in contacting patient party after discharge
- Hospital bill may not show actual cost of hospitalization because professional charges are not included
- Recall bias

7. CONCLUSION

Inappropriate EAB therapy was common among patients with Enterobacterales bacteraemia but was not independently associated with worse clinical or healthcare outcomes.

CONFLICT OF INTEREST

Authors declare no conflicts of interest.

Figure 1. Distribution of groups

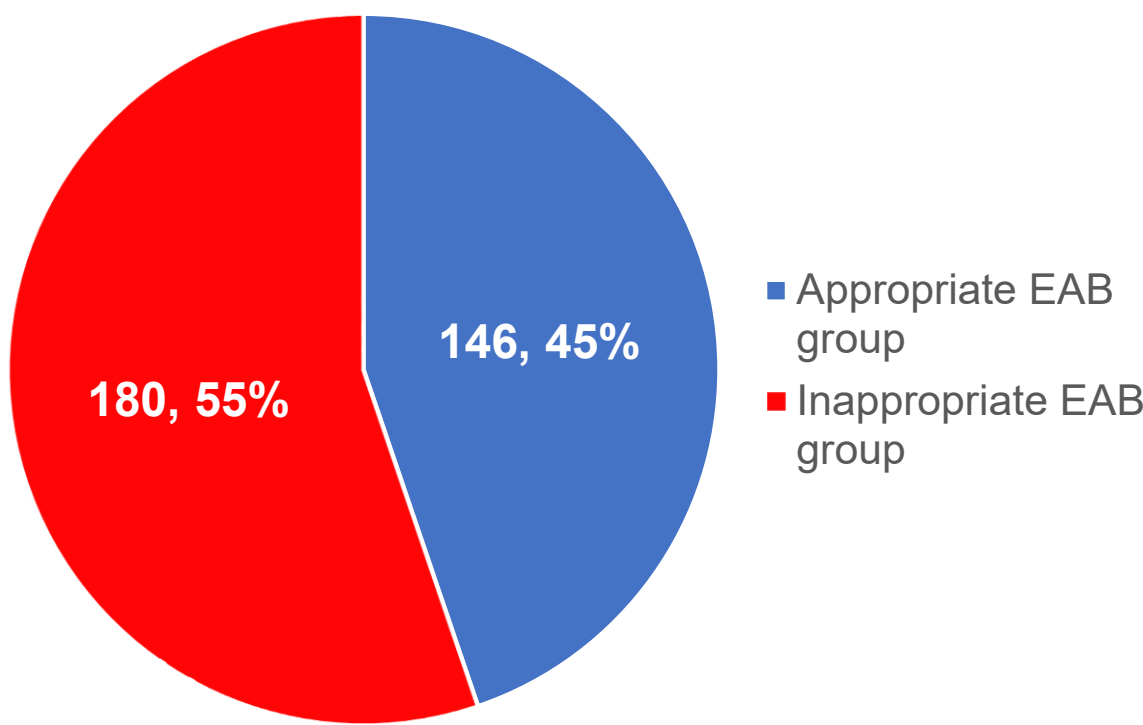


Figure 2. Causative organisms

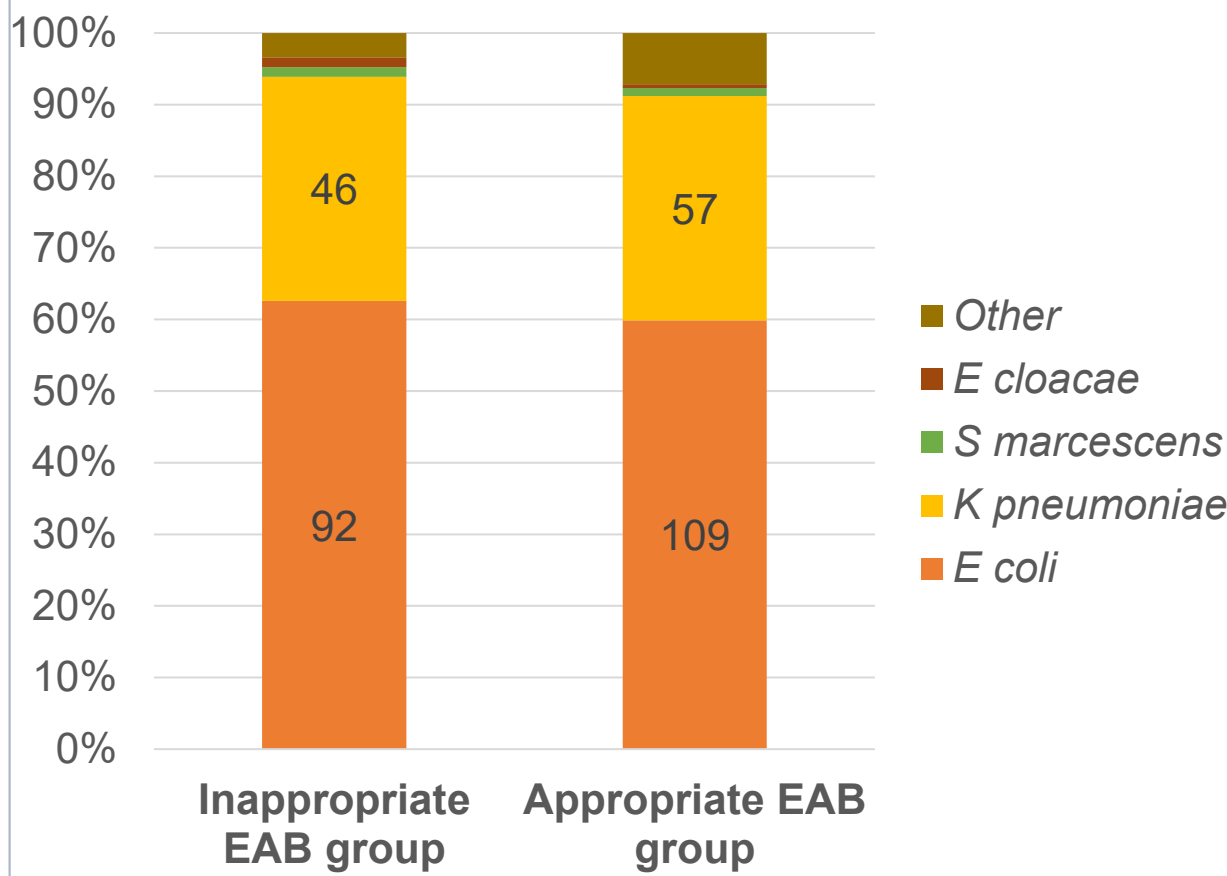


Figure 3. Source of infection

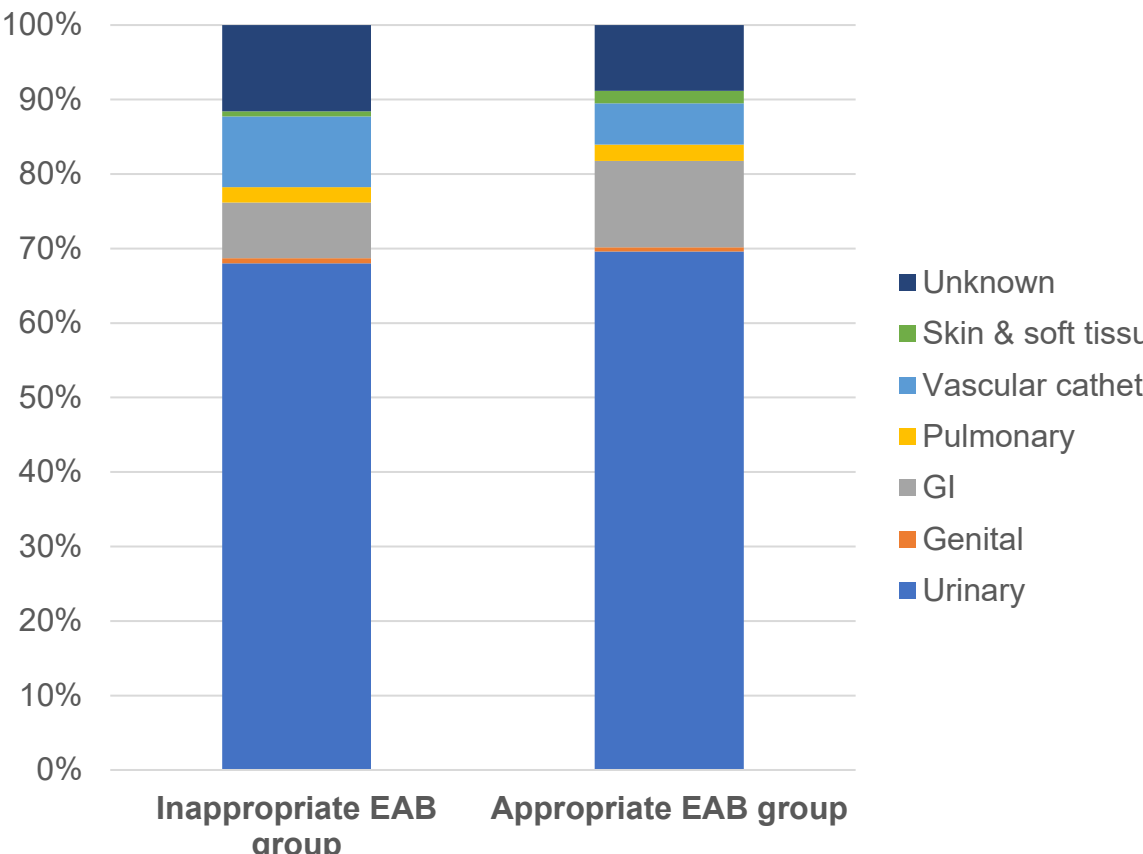


Figure 4. Empirical antibiotic choice

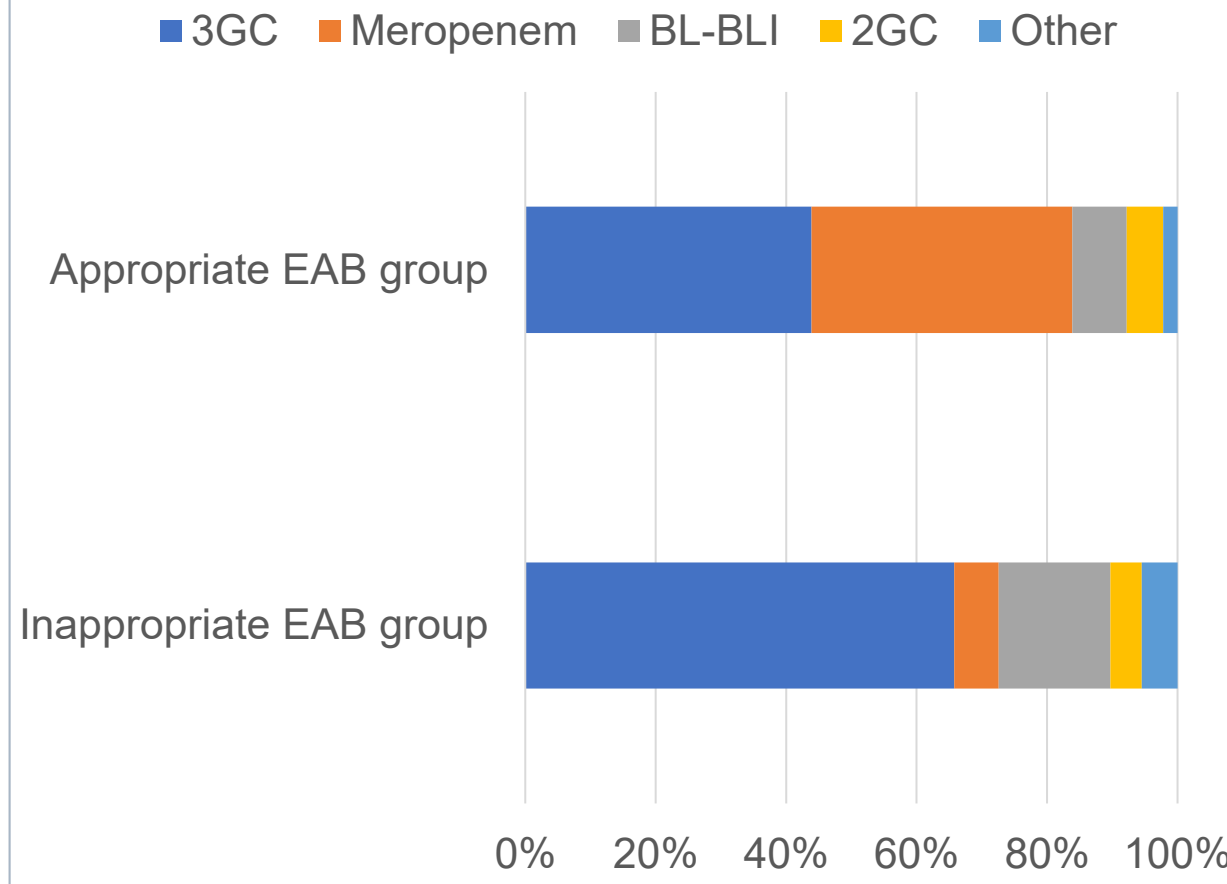


Table 1. Comparison of outcomes by Chi-square test

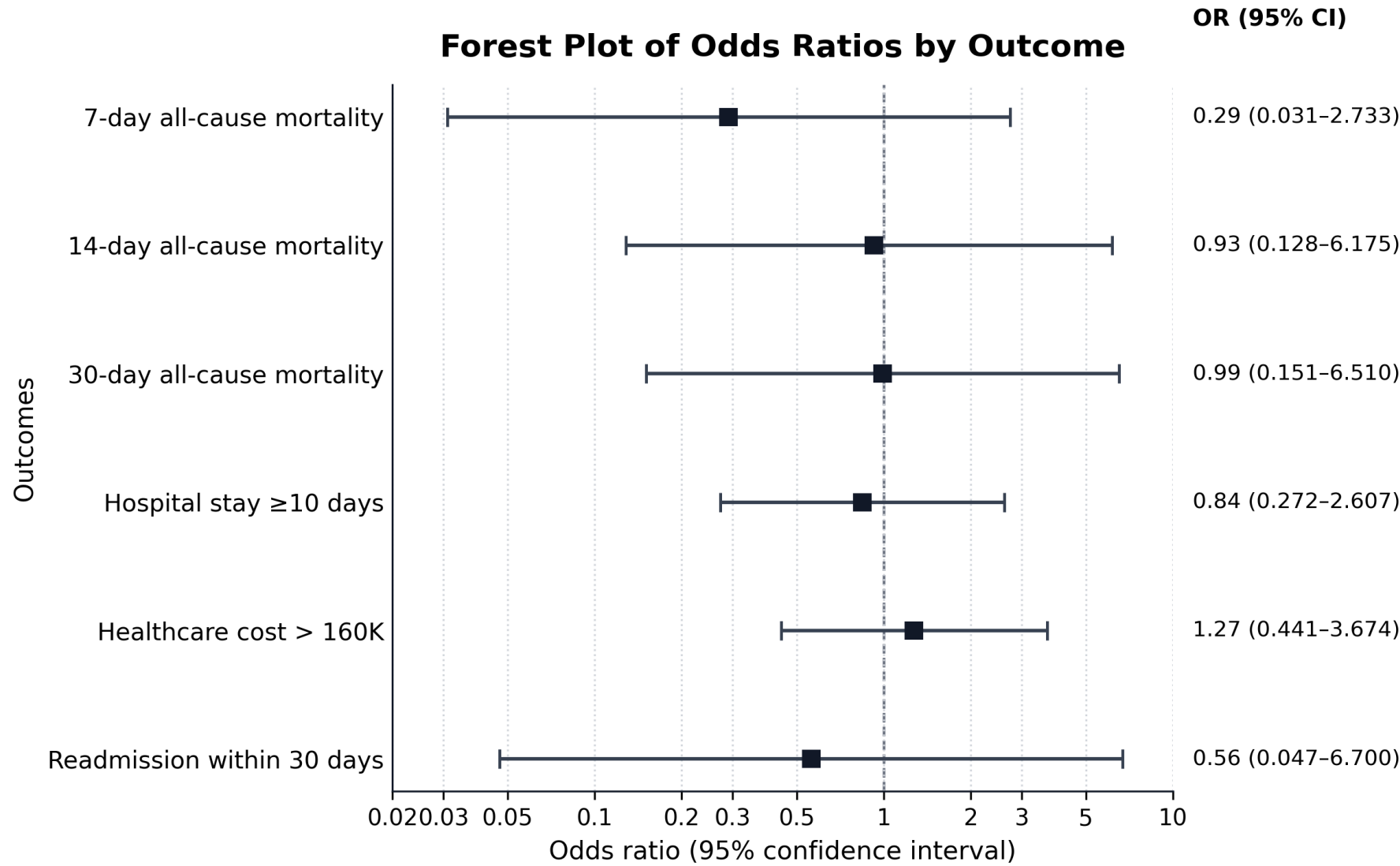
Outcome	Appropriate EAB group n=180 (55.2%)	Inappropriate EAB group n=146 (44.8%)	p value
All-cause mortality			
7-day mortality, n (%)	15 (8.3%)	26 (17.8%)	0.010
14-day mortality, n (%)	20 (11.1%)	28 (19.2%)	0.041
30-day mortality, n (%)	21 (11.7%)	29 (19.9%)	0.041
Cost of healthcare* (n=301)			
High (>160K), n (%)	78 (47.3%)	77 (56.6%)	0.106
Low (<=160K), n (%)	87 (52.7%)	59 (43.4%)	
Readmitted within 30 days of discharge (n=276)			
Yes, n (%)	7 (4.4%)	11 (9.4%)	0.096
Duration of hospital stay (n=301)			
>=10 days, n (%)	69 (41.8%)	83 (61%)	0.001
<10 days, n (%)	96 (58.2%)	53 (39%)	

*Cost is in Sri Lankan rupees (LKR)

REGRESSION ANALYSIS

After adjustment for clinically relevant confounders, inappropriate empirical antibiotic therapy was **not independently associated with adverse clinical outcomes** among patients with Enterobacterales bacteraemia.

Figure 6. Adjusted odds ratios by outcome



CONFOUNDING FACTORS USED

- Age
- Co-morbidities (diabetes mellitus, malignancy, kidney disease, genito-urinary disorder, chronic liver cell disease, transplant recipient, dialysis recipient)
- Presence of foreign devices (urinary catheters, vascular catheters, endotracheal tube, feeding tube)
- Hospitalization within last 1 year
- Initial empirical antibiotic received at the hospital
- Source of infection
- Pitt bacteraemia score
- Causative organism
- 3GC and meropenem susceptibility of isolate

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