INPLASY

Comparative Effectiveness of Antimicrobial Regimens for Pneumonia Caused by Drug-resistant Acinetobacter baumannii: A Network Meta-Analysis Including Cefiderocol and Inhaled Therapies

Corresponding author:
Ming-Ying Ai

m120103008@tmu.edu.tw

Author Affiliation:
Department of Pharmacy, Far-Eastern Memorial Hospital, New Taipei City, Taiwan.

AI, MY; Chang, WL.

ADMINISTRATIVE INFORMATION

Support - N/A.

Review Stage at time of this submission - Data analysis.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 10 August 2025 and was last updated on 10 August 2025.

INTRODUCTION

Review question / Objective Given the increasing prevalence of resistant strains, identifying optimal treatment strategies is crucial for pneumonia caused by drug-resistant Acinetobacter baumannii.

Rationale Acinetobacter baumannii, especially drug-resistant strains, has emerged as a major cause of hospital-acquired pneumonia, particularly in critically ill patients. Treatment is challenging due to limited antibiotic options and high mortality rates. Novel agents such as cefiderocol and inhaled antibiotics have shown promise, but their comparative effectiveness with traditional regimens remains unclear. A network meta-analysis (NMA) can provide a comprehensive comparison by integrating direct and indirect evidence across multiple treatment arms. Therefore, we aim to evaluate and compare the effectiveness of various antimicrobial regimens, including cefiderocol and inhaled therapies, in the treatment of pneumonia caused by drug-resistant A. baumannii.

Condition being studied The PICO setting of the current network meta-analysis is as follows:
P: Human participants diagnosed with pneumonia caused by drug-resistant Acinetobacter baumannii, I: Antimicrobial regimens including cefiderocol and inhaled antibiotics, C: Other active antimicrobial regimens used for A. baumannii pneumonia, O: All-cause mortality and clinical cure rates.

METHODS

Search strategy Two authors (MY, Ai and WL, Chang) independently performed electronic searches in PubMed, Embase, Cochrane CENTRAL, and ClinicalTrials.gov using combinations of keywords: ("Acinetobacter baumannii" AND "pneumonia" AND "antibiotics" OR "antimicrobial therapy" OR "cefiderocol" OR "inhaled antibiotics"). The search was conducted through April 1, 2025.

Participant or population Human participants with confirmed pneumonia caused by drug-resistant Acinetobacter baumannii.

Intervention Antimicrobial regimens including cefiderocol and/or inhaled antibiotics.

Comparator Standard antimicrobial regimens for A. baumannii pneumonia.

Study designs to be included Randomized controlled trials and observational comparative studies.

Eligibility criteria Studies involving human subjects diagnosed with pneumonia caused by drug-resistant A. baumanniiStudies comparing at least two antimicrobial regimens (e.g., cefiderocol, inhaled therapy, standard treatments). Studies that report at least one of the following outcomes: all-cause mortality, clinical cure, microbiological eradication.

Information sources Electronic searches were conducted independently by two authors (MY, Ai and WL, Chang) in PubMed, Embase, Cochrane CENTRAL, and ClinicalTrials.gov using the defined keywords. The search included all publications until April 1, 2025.

Main outcome(s) Primary outcomes include all-cause mortality and clinical cure rate associated with different antimicrobial regimens. Odds ratios (ORs) and 95% confidence intervals (CIs) will be calculated for comparative effects.

Additional outcome(s) Secondary outcomes include microbiological eradication rates, incidence of adverse drug reactions.

Data management Two independent authors (M.-Y. Ai and W.-L. Chang) will extract relevant data including study characteristics, patient demographics, treatment regimens, and outcomes. Discrepancies will be resolved by consensus or by a third reviewer.

Quality assessment / Risk of bias analysis The risk of bias in randomized trials will be assessed using the Cochrane RoB 2 tool. For observational studies, the Newcastle–Ottawa Scale (NOS) will be applied. Domains such as selection bias, outcome measurement, and reporting bias will be evaluated.

Strategy of data synthesis Due to study heterogeneity, a random-effects network meta-analysis was performed using MetaInsight (v4.0.2) within a frequentist framework. Forest and network plots visualized outcomes, and odds ratios for mortality, clinical success, microbiological eradication, and renal toxicity were calculated. Regimens were ranked, inconsistency tested, and significance set at $p < 0.05$.

Subgroup analysis Subgroup analyses will be conducted based on regiments patterns.

Sensitivity analysis In order to validate the robustness of the meta-analysis, sensitivity analyses were conducted through the one-study removal method. This approach involved systematically assessing whether the removal of a specific trial from the analysis resulted in a substantial alteration of the summary effect size.

Language restriction No language limit.

Country(ies) involved Taiwan.

Keywords Acinetobacter baumannii; pneumonia; cefiderocol; inhaled antibiotics.

Contributions of each author
Author 1 - Ming-Ying Ai.
Author 2 - Wei-Lun Chang.
Email: m120103008@tmu.edu.tw