International Platform of Registered Systematic Review and Meta-analysis Protocols

INPLASY

Efficacy and safety of continuous versus intermittent meropenem infusion for sepsis treatment: A systematic review and meta-analysis

INPLASY202570057
doi: 10.37766/inplasy2025.7.0057
Received: 14 July 2025
Published: 14 July 2025

Corresponding author:
Rui Liu

925444781@qq.com

Author Affiliation:
Department of Intensive Care Unit, The Second Affiliated Hospital of the PLA Air Force Military Medical University.

Liu, R; Bao, JT; Yao, LN.

ADMINISTRATIVE INFORMATION

Support - Shaanxi Province Key Research and Development Program Projects.

Review Stage at time of this submission - Piloting of the study selection process.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202570057

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 14 July 2025 and was last updated on 14 July 2025.

INTRODUCTION

Review question / Objective Objectives The aim of this systematic review is to evaluate the effectiveness of continuous infusion (CI) versus intermittent infusion (II) of meropenem in adult patients (≥18 years) with sepsis or septic shock. Specifically, this review will address the following questions:
1. In adult patients with sepsis or septic shock, how does CI of meropenem compare to II in terms of mortality rates?
2. What are the differences in clinical cure rates between CI and II of meropenem in this patient population?
3. Are there any significant adverse effects associated with either infusion method that may impact clinical decision-making?
By systematically reviewing the available evidence, this study aims to provide insights that can inform clinical guidelines and improve patient outcomes in the management of sepsis and septic shock.

Rationale healthcare burdens. The choice of antibiotic administration method can influence patient outcomes, yet the optimal delivery strategy for meropenem, a commonly used carbapenem antibiotic, remains unclear. Continuous infusion (CI) and intermittent infusion (II) of meropenem have been proposed as potential methods to enhance therapeutic efficacy and improve clinical outcomes. Previous studies have suggested that CI may lead to better pharmacokinetic and pharmacodynamic profiles, potentially resulting in improved mortality rates and clinical cure rates in adult patients with sepsis or septic shock. However, the existing literature presents mixed findings, necessitating a systematic review to clarify the comparative effectiveness of these two infusion strategies. Understanding the impact of infusion methods on patient outcomes is crucial for guiding clinical practice and optimizing treatment protocols in this vulnerable population.

Condition being studied Sepsis management is challenging in critical care, being a leading cause

of ICU mortality that requires prompt antimicrobial therapy. Meropenem, a carbapenem antibiotic, is vital for treating various bacteria, including multidrug-resistant ones. Traditionally, it is administered via intermittent infusion every 8 hours, but continuous infusion may provide better clinical outcomes.

METHODS

Search strategy The search strategy for PubMed will include the following keywords and MeSH terms: ("sepsis" OR "septic shock") AND ("meropenem" OR "continuous infusion" OR "intermittent infusion") AND ("mortality" OR "clinical cure rates").
The search will be limited to studies published in English. The search will include studies published from the inception of each database up to the cutoff date of June 18, 2025.

Participant or population The study will include adult patients (≥18 years) diagnosed with sepsis or septic shock.

Intervention Continuous infusion (CI) of meropenem.

Comparator Intermittent infusion (II) of meropenem.

Study designs to be included The study designcan be randomized controlled trials, cohort studies, or case-control studies.

Eligibility criteria The study will include adult patients (≥18 years) diagnosed with sepsis or septic shock. Eligible studies must compare continuous infusion (CI) of meropenem with intermittent infusion (II) of meropenem, focusing on outcomes such as mortality and clinical cure rates. The study design can be randomized controlled trials, cohort studies, or case-control studies. The setting will be limited to hospital environments, and the time frame for included studies will be from the inception of the databases up to the cutoff date of June 18, 2025. Studies published in English will be considered for inclusion.

Information sources The search will include studies published from the inception of each database up to the cutoff date of June 18, 2025. Information sources will consist of electronic databases such as PubMed, Cochrane Library, and Embase. Additionally, trial registries and grey literature sources will be consulted. Contact with study authors may be initiated to obtain unpublished data or clarify study finding.

Main outcome(s) The primary outcomes will be mortality rates and clinical cure rates among patients receiving CI versus II of meropenem.

Additional outcome(s) Secondary outcomes may include length of hospital stay and adverse events related to treatment. The rationale for prioritizing mortality and clinical cure rates is based on their direct relevance to patient survival and recovery in sepsis management.

Data management Data will be sought on the following variables: patient demographics (age, sex), clinical characteristics (severity of sepsis, comorbidities), intervention details (type of infusion, dosage), outcomes (mortality rates, clinical cure rates), and funding sources. Pre-planned assumptions include that all studies will report mortality and clinical cure rates, and simplifications may be made for studies with incomplete data.

Quality assessment / Risk of bias analysis Risk of bias will be assessed using the Cochrane Risk of Bias Tool for randomized controlled trials and the Newcastle-Ottawa Scale for observational studies. This assessment will be conducted at both the outcome and study level. The information will be used to inform the synthesis of data, with studies deemed to have a high risk of bias being considered with caution in the overall analysis.

Strategy of data synthesis Data will be quantitatively synthesized if appropriate, using random-effects meta-analysis to account for variability among studies. Summary measures will include odds ratios for dichotomous outcomes and mean differences for continuous outcomes. The I 2 statistic will be used to explore consistency across studies. Additional analyses may include sensitivity analyses to assess the robustness of findings and subgroup analyses based on patient characteristics or study design. If quantitative synthesis is not appropriate, a narrative synthesis will be provided.

Subgroup analysis Subgroup analyses were planned for:
(1)Study design (RCTs vs. observational studies)
(2)Infection source (pneumonia vs. intra-abdominal vs. bloodstream infections)
(3)Severity of illness (APACHE II/SOFA score stratification)
(4)Dosing regimens (different CI/II meropenem dosages).

Sensitivity analysis Sensitivity analyses were conducted by excluding high-risk-of-bias studies.

Publication bias was assessed via funnel plots and Egger's test if ≥10 studies were included. A *p*-value <0.05 was considered statistically significant.

Country(ies) involved China.

Keywords meropenem; sepsis; continuous infusion; mortality; meta-analysis.

Contributions of each author

Author 1 - Rui Liu - Author 1 drafted the manuscript.
Author 2 - Jiating Bao.
Author 3 - Linong Yao.