

INPLASY

Comparison of catheter-related bloodstream infection between peripherally inserted and centrally inserted central venous catheters in home parenteral nutrition: a meta-analysis

INPLASY2025120072

doi: 10.37766/inplasy2025.12.0072

Received: 19 December 2025

Published: 19 December 2025

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ADMINISTRATIVE INFORMATION

Support - N/A.**Review Stage at time of this submission** - Completed but not published.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY2025120072**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 19 December 2025 and was last updated on 19 December 2025.

INTRODUCTION

Review question / Objective Catheter-related bloodstream infection (CRBSI) remains one of the most severe complications in patients receiving home parenteral nutrition. Central venous catheters (CVCs) and peripherally inserted central catheters (PICCs) are the most used home parenteral nutrition. However, their relative risk of CRBSI remains controversial. This meta-analysis aimed to compare the incidence of CRBSI between PICCs and CVCs in patients receiving home parenteral nutrition. In recent years, peripherally inserted central catheters (PICCs) have been increasingly adopted due to their relatively easy insertion, cost-effectiveness, and suitability for long-term use. Nevertheless, the risk of CRBSI associated with PICCs compared with conventional central venous catheters (CVCs) remains controversial. Some observational studies have suggested that PICCs may be associated with similar or even higher infection rates than CVCs, while others have

reported a lower risk of CRBSI with PICCs. These inconsistencies highlight the need for a systematic evaluation to clarify the relative risk between PICCs and CVCs in HPN patients. Therefore, this study aimed to conduct a comprehensive meta-analysis to compare the incidence of CRBSI between PICCs and CVCs in home parenteral nutrition patients.

Condition being studied In recent years, peripherally inserted central catheters (PICCs) have been increasingly adopted due to their relatively easy insertion, cost-effectiveness, and suitability for long-term use. Nevertheless, the risk of CRBSI associated with PICCs compared with conventional central venous catheters (CVCs) remains controversial. Some observational studies have suggested that PICCs may be associated with similar or even higher infection rates than CVCs, while others have reported a lower risk of CRBSI with PICCs. These inconsistencies highlight the need for a systematic evaluation to clarify the relative risk between PICCs and CVCs in HPN

patients. Therefore, this study aimed to conduct a comprehensive meta-analysis to compare the incidence of CRBSI between PICCs and CVCs in home parenteral nutrition patients.

METHODS

Search strategy The search terms included combinations of the following keywords and Medical Subject Headings (MeSH): “peripherally inserted central catheter”, “PICCs”, “central venous catheter”, “CVCs”, and “home parenteral nutrition”.

Participant or population Adult patients (≥ 18 years) receiving home parenteral nutrition.

Intervention Received peripherally inserted central catheters versus central venous catheters.

Comparator Received central venous catheters.

Study designs to be included Cohort study or case-control study.

Eligibility criteria Studies that met the following criteria were included: adult patients (≥ 18 years) receiving home parenteral nutrition; Intervention and comparison: comparison of peripherally inserted central catheters versus central venous catheters; Outcomes reported the rate of CRBSI; Study design was cohort study or case-control study.

Information sources A systematic literature search was conducted in PubMed, Embase, and the Cochrane Library from their inception to June 3, 2025.

Main outcome(s) The rate of CRBSI.

Quality assessment / Risk of bias analysis The methodological quality of the included cohort and case-control studies were independently assessed by two reviewers using the Newcastle-Ottawa Scale (NOS). An accumulated score of ≥ 6 points were considered high-quality studies. The certainty of evidence and strength of recommendations were evaluated using the GRADE approach, which rates confidence in summary effect estimates across four levels: very low, low, moderate, and high.

Strategy of data synthesis Stata 12.0 (STATA Corp, College Station, TX, USA) was applied for meta-analysis. Pooled risk ratios (RR) with 95% confidence intervals (CI) were calculated to estimates of CRBSI incidence using either the

fixed-effect model or random-effect model depending on the degree of heterogeneity. Heterogeneity was assessed with Cochran's Q test and quantified by the I^2 statistic, with $I^2 > 50\%$ considered substantial heterogeneity.

Subgroup analysis Subgroup analyses were conducted based on available variables.

Sensitivity analysis Sensitivity analysis was conducted by sequentially removing one studies to assess the robustness of the results.

Country(ies) involved China.

Keywords peripherally inserted central catheters, central venous catheters, CRBSI, home parenteral nutrition, meta-analysis.

Contributions of each author

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