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Clinical Features and Management of Renal Replacement Therapy After LVAD Implantation: A Scoping Review Protocol

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We use this protocol and it's working

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Keywords: adults with lvad implantation, rhf status in lvad recipient, lvad implantation, dialysis selection, available evidence on renal replacement therapy, dialysis modality, dialysis decision, including peritoneal dialysis, requiring dialysis, renal replacement therapy, hemodialysis via different access route, vascular access selection in patient, peritoneal dialysis, lvad recipient, hemodialysi, management of renal replacement therapy, dialysis, renal dysfunction, vascular access selection, vascular access type, course of lvad, left ventricular assist device, lvad, right heart failure, ventricular assist device, stage kidney disease, choice of rrt modality, rhf status, supported patient, clinical outcome

Abstract

Objective:

To map the available evidence on renal replacement therapy (RRT) modality and vascular access selection in patients who require dialysis after left ventricular assist device (LVAD) implantation, with particular attention to the impact of right heart failure (RHF).

Introduction:

Renal dysfunction frequently complicates the course of LVAD-supported patients, with some progressing to end-stage kidney disease requiring dialysis. The choice of RRT modality—whether peritoneal dialysis or hemodialysis via different access routes—is influenced by RHF-related congestion, ascites, and infection risk. Despite the clinical relevance, there is currently no comprehensive synthesis addressing how dialysis decisions and outcomes vary by modality, access, and RHF status in LVAD recipients.

Inclusion criteria:

This review will include English-language studies (2015–2025) involving adults with LVAD implantation who subsequently required RRT, including peritoneal dialysis, hemodialysis (AVF/AVG/CVC), or CRRT. Studies examining the influence of RHF on dialysis selection or outcomes will be prioritized.

Methods:

A scoping review will be conducted following the Joanna Briggs Institute (JBI) methodology and PRISMA-ScR framework, with searches performed in PubMed, Scopus, and Cochrane Library. Two independent reviewers will conduct title/abstract screening, and data will be charted to map dialysis modality, vascular access type, RHF status, and clinical outcomes. The second screening follows the same inclusion criteria, thoroughly examining full texts.

Introduction

- 1 Renal dysfunction is a common and clinically significant complication following left ventricular assist device (LVAD) implantation, with acute kidney injury (AKI) occurring in up to 50% of patients in the early postoperative period [1,2]. Among these, a substantial subset progresses to end-stage kidney disease (ESKD), requiring renal replacement therapy (RRT), which introduces new challenges in hemodynamic management, vascular access, and infection control [3]. The risk of right heart failure (RHF), which occurs in approximately 21.7% of LVAD recipients, further complicates RRT selection, given its association with venous congestion, liver dysfunction, and ascites [4].
Current guidance for dialysis in the context of LVAD support relies largely on expert opinion or isolated case reports, with peritoneal dialysis (PD) being proposed as a hemodynamically stable option despite concerns over peritonitis and ascitic leakage [3]. Hemodialysis (HD), while widely used, may further increase central venous pressure or provoke access-related infections when central venous catheters (CVCs) are employed. To our knowledge, no scoping review has yet synthesized the available evidence regarding RRT modality and vascular access selection in LVAD recipients, particularly in relation to RHF status.
This protocol outlines a scoping review to map the current state of evidence, identify knowledge gaps, and inform future research and clinical decision-making.

Review question

- 2 To map and summarize the existing evidence on renal replacement therapy modality and vascular access selection in patients who require dialysis after left ventricular assist device implantation, with a focus on the influence of right heart failure on clinical outcomes.

Inclusion & exclusion criteria

- 3 **Population (P)**
 - Adult (≥ 19 years) patients who required RRT during the perioperative and long-term period after LVAD implantation.
Concept (C)
 - Renal replacement therapy modality (e.g., peritoneal dialysis, hemodialysis via AVF/AVG/CVC, or continuous RRT).
 - Vascular access type and dialysis-related outcomes in the context of RHF.
Context (C)
 - All clinical settings (ICU, outpatient, rehabilitation).
 - All geographical regions and healthcare systems.

- English-language studies published between Jan 2015 and Oct 2025.

Considering the possibility that the pattern of renal complications may have changed due to advances in LVAD technology, the study focused on literature published after 2015, when the HeartMate III, the device with the largest market share in the world, obtained the CE mark in the EU.

4 **Exclusion criteria**

- Studies focusing exclusively on ECMO, RVAD, BiVAD, or heart transplantation.
- Basic science, fluid dynamics simulations, or animal models.
- Editorials, commentaries, or letters without original data.
- Studies in languages other than English.
- Studies with non-retrievable abstracts or published before 2015.
- Pediatric populations (<19 years).

Methods

- 5 This scoping review will be conducted following the Joanna Briggs Institute (JBI) methodology for scoping reviews [5], and the results will be reported in accordance with the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews) [6]. Searches will be performed in PubMed, Scopus, and Cochrane Library using database-specific strategies. Two independent reviewers will perform title/abstract screening with discrepancies resolved by a third reviewer. Data will be charted to extract study characteristics, dialysis modality, vascular access, RHF status, and clinical outcomes. The second screening follows the same inclusion criteria, thoroughly examining full texts.

References

- 6
1. Yunus CY, et al. Acute kidney injury following left ventricular assist device implantation: Contemporary insights and future perspectives. *J Heart Lung Transplant*. 2019;38:797-805.
 2. Daniel WR, et al. Left Ventricular Assist Devices and the Kidney. *Clin J Am Soc Nephrol*. 2018;13:348-355.
 3. Mette HF, et al. Ramp Study Hemodynamics, Functional Capacity, and Outcome in Heart Failure Patients with Continuous-Flow Left Ventricular Assist Devices. *ASAIO J*. 2016;62:442-446.
 4. Soliman OI, et al. Derivation and Validation of a Novel Right-Sided Heart Failure Model After Implantation of Continuous Flow Left Ventricular Assist Devices: The EUROMACS Right-Sided Heart Failure Risk Score. *Circulation*. 2018;137:891-906.
 5. Peters MDJ, et al. Updated methodological guidance for the conduct of scoping reviews. *JBI Evid Synth*. 2020;18(10):2119-2126.
 6. Tricco AC, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med*. 2018;169(7):467-473.

Appendix

7 Search strategy

PubMed (MEDLINE): (("Left Ventricular Assist Devices"[Mesh]

OR "ventricular assist device*" [tiab]

OR "left ventricular assist device*" [tiab]

OR LVAD [tiab]

OR "HeartMate II" [tiab] OR "HeartMate 3" [tiab] OR HVAD [tiab])

AND

("Renal Replacement Therapy" [Mesh]

OR "dialysis" [tiab]

OR "hemodialysis" [tiab]

OR "peritoneal dialysis" [tiab]

OR "renal replacement therapy" [tiab]

OR RRT [tiab]))

NOT

(RVAD [tiab] OR "right ventricular assist device" [tiab] OR BiVAD [tiab])

Scopus: TITLE-ABS-KEY(("left ventricular assist device" OR LVAD OR "HeartMate II" OR "HeartMate 3" OR HVAD)

AND ("renal replacement therapy" OR dialysis OR hemodialysis OR "peritoneal dialysis")

AND (AKI OR "acute kidney injury" OR "renal failure" OR "renal dysfunction" OR ESRD OR CKD OR "chronic kidney disease"))

AND NOT TITLE-ABS-KEY(RVAD OR BiVAD OR "right ventricular assist device")

AND PUBYEAR > 2014 AND PUBYEAR < 2026

AND (LIMIT-TO(LANGUAGE, "English"))

Cochrane: (("left ventricular assist device" OR LVAD OR "ventricular assist device*" OR "HeartMate II" OR "HeartMate 3" OR HVAD)

AND

("renal replacement therapy" OR dialysis OR hemodialysis OR "peritoneal dialysis" OR RRT))

NOT

(RVAD OR "right ventricular assist device" OR BiVAD)



Protocol references

1. Yunus CY, et al. Acute kidney injury following left ventricular assist device implantation: Contemporary insights and future perspectives. *J Heart Lung Transplant*. 2019;38:797-805.
2. Daniel WR, et al. Left Ventricular Assist Devices and the Kidney. *Clin J Am Soc Nephrol*. 2018;13:348-355.
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6. Tricco AC, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med*. 2018;169(7):467-473.