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SUMMARY WITH CRITICAL APPRAISAL

Patient Positioning During a Hypotensive Episode for Adults Undergoing Hemodialysis: A Review of Clinical Effectiveness and Guidelines

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Authors: Yan Li, Mary-Doug Wright

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About CADTH: CADTH is an independent, not-for-profit organization responsible for providing Canada's health care decision-makers with objective evidence to help make informed decisions about the optimal use of drugs, medical devices, diagnostics, and procedures in our health care system.

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Questions or requests for information about this report can be directed to **Requests@CADTH.ca**

Abbreviations

CRD	Centre for Reviews and Dissemination
IDH	Intradialytic hypotension
MeSH	Medical Subject Headings
mm Hg	Millimetre of mercury
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses

Context and Policy Issues

Renal disease affects one in ten Canadians with approximately 50,000 Canadians who received treatment for renal failure in 2019.[1] In 2014, 20,690 Canadians were on dialysis costing approximately $1.9 billion annually.[2] Dialysis is typically indicated for patients with end stage renal failure who have about 15% of renal function remaining.[3] On average, patients receiving dialysis have a life expectancy of five to ten years unless they undergo kidney transplantation.[3] By filtering waste and removing excess fluid from a patient's blood, hemodialysis helps to maintain electrolyte balance and blood pressure.[4] Nonetheless, hemodialysis may be associated with intradialytic complications such as nausea, vomiting, cramps, headache, itching, and hypotension.[5]

Intradialytic hypotension (IDH) is defined as a decrease of ≥20 millimetres of mercury (mm Hg) in systolic blood pressure or a decrease of ≥10 mm Hg in mean arterial pressure accompanied by clinical manifestations requiring intervention.[6] IDH may be caused by cardiac factors, a reduction in fluid volume, and inability to vasoconstrict.[5] Risk factors for IDH may include high body mass index, female sex, pre-dialysis systolic blood pressure < 100 mm Hg, age > 65 years, and comorbidities such as diabetes and ischemic heart disease.[7] Strategies to help prevent recurrent episodes of IDH may include target weight reassessment, food avoidance during dialysis sessions, limiting sodium intake to minimize interdialytic weight gain, and using cool dialysate.[7,8] During an acute episode of IDH, interventions may include slowing or stopping ultrafiltration, administering intravenous fluids and oxygen, and placing the patient in the Trendelenburg position where their feet are raised higher than their head.[8] By promoting blood flow from the legs to the heart through gravity and increasing venous return, this patient position may help increase cardiac output and blood pressure.[6]

The aim of this report is to summarize and critically appraise the relevant clinical evidence and evidence-based guidelines regarding the effectiveness and use of Trendelenburg patient positioning during a hypotensive episode for adults undergoing hemodialysis.

Research Questions

1. What is the clinical effectiveness of Trendelenburg patient positioning during a hypotensive episode for adults undergoing hemodialysis versus neutral supine patient positioning?

2. What are the evidence-based guidelines regarding Trendelenburg patient positioning during a hypotensive episode for adults undergoing hemodialysis?

Key Findings

No relevant literature was identified regarding the clinical effectiveness of Trendelenburg patient positioning during a hypotensive episode for adults undergoing hemodialysis versus

neutral supine patient positioning. Additionally, no evidence-based guidelines were identified regarding Trendelenburg patient positioning during a hypotensive episode for adults undergoing hemodialysis.

Methods

Literature Search Methods

A limited literature search was conducted by an information specialist on key resources including MEDLINE, the Cochrane Library, the University of York Centre for Reviews and Dissemination (CRD) databases, the websites of Canadian and major international health technology agencies, as well as a focused internet search. The search strategy was comprised of both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concepts were Trendelenburg patient positioning and adults undergoing hemodialysis with dialysis induced hypotension. No filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2010 and August 27, 2020.

Selection Criteria and Methods

One reviewer screened citations and selected studies. In the first level of screening, titles and abstracts were reviewed and potentially relevant articles were retrieved and assessed for inclusion. The final selection of full-text articles was based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria

Population	Adults (18 years or older) undergoing hemodialysis with dialysis induced hypotension
Intervention	Trendelenburg position (i.e., t-position, including all variations of t-position that involves the legs being elevated higher than the heart)
Comparator	Q1: Neutral supine position Q2: Not applicable
Outcomes	Q1: Clinical effectiveness and safety (e.g., maintenance of normotension, dizziness, fainting, patient comfort/discomfort during and after procedure) Q2: Guidelines and recommendations regarding optimal patient positioning when a patient experiences dialysis-induced hypotension
Study Designs	Health technology assessments, systematic reviews, randomized controlled trials, non-randomized studies, evidence-based guidelines

Exclusion Criteria

Articles were excluded if they did not meet the selection criteria outlined in Table 1, they were duplicate publications, or were published prior to 2010. Guidelines with unclear methodology were also excluded.

Summary of Evidence

Quantity of Research Available

A total of 310 citations were identified in the literature search. Following screening of titles and abstracts, 299 citations were excluded and 11 potentially relevant reports from the electronic search were retrieved for full-text review. Six potentially relevant publications were retrieved from the grey literature search for full-text review. Of these potentially relevant articles, all 17 publications were excluded for various reasons, and no publications met the inclusion criteria and were included in this report. Appendix 1 presents the PRISMA[9] flowchart of the study selection. References of potential interest are provided in Appendix 2.

Summary of Findings

No relevant literature was identified regarding the clinical effectiveness of Trendelenburg patient positioning during a hypotensive episode for adults undergoing hemodialysis versus neutral supine patient positioning. Furthermore, no evidence-based guidelines were identified regarding Trendelenburg patient positioning during a hypotensive episode for adults undergoing hemodialysis; therefore, no summary can be provided.

Limitations

The primary limitation of this report was that there was no relevant evidence identified to answer the research questions.

Conclusions and Implications for Decision or Policy Making

No relevant studies were identified regarding the clinical effectiveness of Trendelenburg patient positioning during a hypotensive episode for adults undergoing hemodialysis versus neutral supine patient positioning. Furthermore, no evidence-based guidelines were identified regarding Trendelenburg patient positioning during a hypotensive episode for adults undergoing hemodialysis. Future studies may help reduce uncertainty in the clinical effectiveness and inform the development of evidence-based guidelines regarding the use of Trendelenburg patient positioning during a hypotensive episode for adults undergoing hemodialysis.

References

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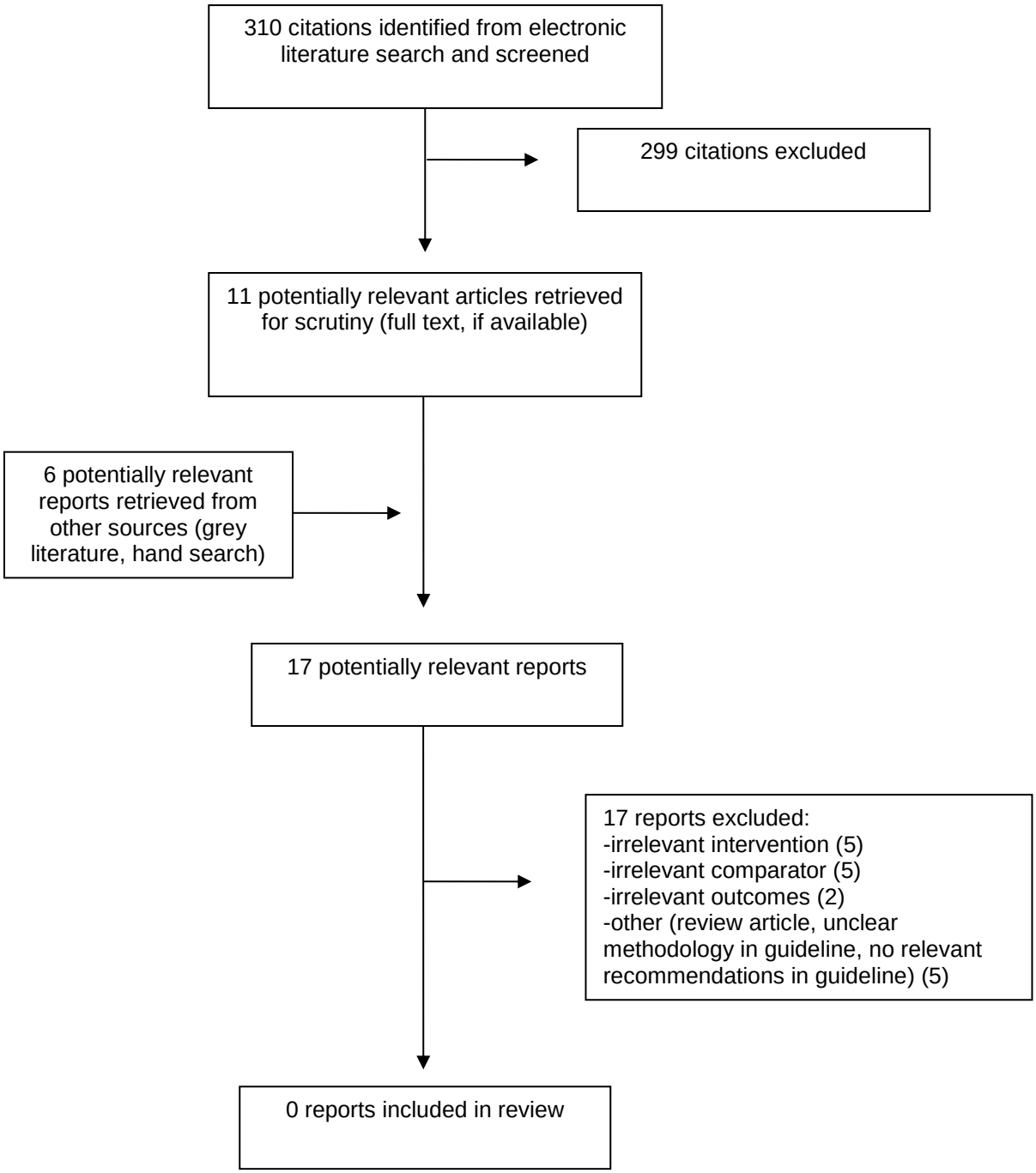
Appendix 1: Selection of Included Studies



Appendix 2: Further Information

Previous CADTH Report

Management of complications during hemodialysis: guidelines. (*CADTH rapid response report: reference list)*. Ottawa (ON): CADTH; 2018: https://www.cadth.ca/sites/default/files/pdf/htis/2018/RA0965%20Management%20of%20Complications%20During%20Hemodialysis%20Final.pdf. Accessed 2020 Sep 24.

Non-Randomized Studies

Alternative Comparator

Kesik G, Özdemir L. Examination of the effects of nursing interventions used for intradialytic hypotension. *Turkish J Nephrol.* 2020; 29(1): 33-8.

https://www.turkjnephrol.org/Content/files/sayilar/420/33-38.pdf. Accessed 2020 Sep 25.

Erdem E. The effects of passive leg raising and ultrafiltration stopping on blood pressure in hemodialysis patients. *Int Urol Nephrol*. 2016 Jun;48(6):877-882.
PubMed: PM26992937

Alternative Intervention

Ookawara S, Miyazawa H, Ito K, et al. Blood volume changes induced by low-intensity intradialytic exercise in long-term hemodialysis patients. *ASAIO J*. 2016 Mar-Apr;62(2):190-196.
PubMed: PM26720736

Guidelines and Recommendations

No Relevant Recommendations

Clinical Practice Guideline Haemodialysis. Bristol (GB): Renal Association; 2019: https://renal.org/wp-content/uploads/2019/10/FINAL-HD-Guideline.pdf. Accessed 2020 Sep 24.

The Management of Chronic Kidney Disease Work Group. VA/DoD clinical practice guideline for the management of chronic kidney disease. Arlington (VA): Department of Veterans Affairs and Department of Defense; 2019: https://www.healthquality.va.gov/guidelines/CD/ckd/VADoDCKDCPGFinal5082142020.pdf. Accessed 2020 Sep 25.

National Kidney Foundation. KDOQI clinical practice guideline for hemodialysis adequacy: 2015 update. Am J Kidney Dis. 2015;66(5):884-930. https://www.ajkd.org/article/S0272-6386(15)01019-7/fulltext. Accessed 2020 Sep 25.

Unclear Methodology

Standard Operating Procedures (SOPs) for the management of a patient's haemodialysis care. Birmingham (GB): University Hospitals Birmingham NHS; 2014: https://www.thinkkidneys.nhs.uk/kquip/wp-content/uploads/sites/5/2017/12/SopPatientHaemodialysisCare.pdf Accessed 2020 Sep 25.