

Peer Review

Review of: "Upgrading Renal Replacement Therapy Machines in the ICU: A Comparative Observational Study of Heparin vs. Regional Citrate Anticoagulation"

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This is a well-written and logically structured analysis of the impact of regional citrate anticoagulation (RCA) compared to heparin anticoagulation in continuous renal replacement therapy (CRRT). Here's a breakdown of its strengths and weaknesses:

Strengths:

- **Clear Structure:** The paper follows a standard format (Introduction, Methods, Results, Discussion, etc.), making it easy to read and understand.
- **Compelling Results:** The findings are clearly presented and show significant improvements with RCA in terms of CRRT duration, filter lifespan, cost-effectiveness, and blood transfusion requirements. The use of p-values strengthens the presentation of these results.
- **Good Discussion:** The discussion section effectively connects the findings to existing literature, acknowledging both supporting and contradictory studies (e.g., the Doidge et al. study). It also explores the clinical implications, economic considerations, and nursing perspectives.
- **Emphasis on Nursing Perspective:** Highlighting the benefits for nursing staff (reduced interventions, increased direct patient care time, enhanced patient mobility) is a valuable addition and strengthens the argument for RCA.
- **Acknowledges Limitations:** The authors honestly acknowledge the limitations of their study (retrospective, single-center) and suggest avenues for future research.

- **Strong Conclusion:** The conclusion succinctly summarizes the key findings and their implications, advocating for the incorporation of RCA in CRRT.
- **Clinically Significant Section:** This section effectively summarizes the importance of the findings for clinical practice, emphasizing patient care, resource utilization, and cost-effectiveness.

Weaknesses:

- **Retrospective Design:** As acknowledged, the retrospective nature of the study introduces potential biases and limits the ability to establish causality. This is the biggest weakness.
- **Single-Center Study:** The single-center design also limits the generalizability of the findings. Different institutions may have different protocols, patient populations, and resources, which could affect the results.
- **Limited Patient Outcome Data:** While the study focuses on filter lifespan, cost, and transfusions, it lacks detailed information on important patient outcomes like mortality, renal recovery, and other complications. The mention of these outcomes in the "Limitations" section suggests they were not measured or analyzed in this study, which is a significant omission.
- **"No Apparent Reasons" for Higher Transfusions with Heparin:** The statement about no apparent reasons for higher transfusion requirements with heparin is weak. It would be better to speculate on potential reasons (e.g., heparin-induced thrombocytopenia, increased bleeding risk due to heparin) or acknowledge that this requires further investigation.
- **Missing Methods Details:** While the methods are briefly mentioned, more detail is needed. For example, what were the specific criteria for initiating CRRT? How was RCA implemented (specific protocol)? What were the patient demographics? More detail would improve the rigor of the study.
- **Small Sample Size (Implied):** While the number of patients isn't explicitly stated, the p-value of 0.037 for CRRT duration suggests a potentially small sample size. This should be explicitly stated.

Suggestions for Improvement:

- **Future studies should be prospective and multi-center:** This is the most important recommendation.
- **Include more comprehensive patient outcome data:** Mortality, renal recovery, and other relevant clinical outcomes should be included in future research.
- **Provide more detail on the methods:** A more thorough description of the study design, patient population, CRRT protocols, and data collection methods is needed.

- **Address the higher transfusion requirements with heparin more thoroughly:** Either speculate on potential reasons or acknowledge the need for further investigation.
- **Clearly state the sample size:** This is essential for evaluating the statistical power of the study.

Overall:

This is a promising study that highlights the potential benefits of RCA in CRRT. However, the limitations, particularly the retrospective and single-center design, need to be addressed in future research. Strengthening the methodology and including more comprehensive patient outcome data will provide a more robust evaluation of the clinical and economic impact of RCA.

Declarations

Potential competing interests: No potential competing interests to declare.