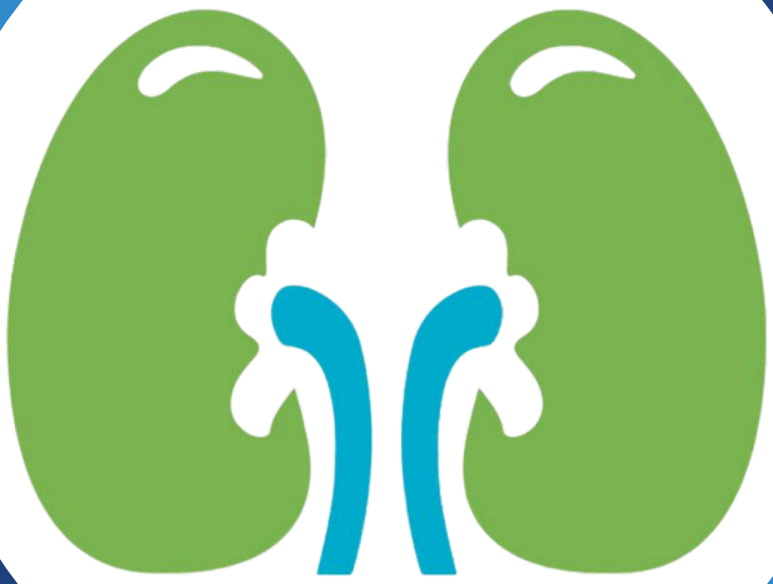
How-to Guide

Reverse Osmosis (RO) Water Reclaim in Haemodialysis



Published in November 2025 by :

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How-to Guide: Reverse Osmosis (RO) Water Reclaim in Haemodialysis

Project: Sustainable Kidney Care – Implementing Best Practice

Collaboration: UK Kidney Association and Centre for Sustainable Healthcare

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Although this guide has been developed by experts in sustainability and sustainable kidney care, local teams should use their discretion in its implementation according to local context and requirements

Purpose

To provide practical guidance on implementing reverse osmosis (RO) reject water reuse systems in dialysis settings

Background

Haemodialysis is a resource-intensive treatment that uses large volumes of high-quality water. Standard RO systems discard approximately 25-30% of incoming (pre-purified) water as reject (or waste) water. This reject water is not suitable for dialysis but is of potable quality and can be repurposed, reducing both water wastage and environmental impact. Newer dialysis unit designs or smaller, stand-alone buildings are especially well-suited for implementing RO reject water reuse systems, as their simplified plumbing infrastructure and greater design flexibility facilitate the routing, storage, and safe repurposing of non-potable water.

Benefits

- Reduces water consumption significantly.
- Minimises liquid waste disposal.
- Supports sustainability targets (e.g. NHS Net Zero).
- Cost savings on water supply, wastewater processing, and energy bills can be achieved if the reject water is reused for purposes such as steam production.
- In these cases, reusing relatively warm reject water (compared to mains water) can reduce the energy required to heat water in boilers, thereby lowering overall energy consumption.

Management and Reuse of RO Reject Water

Reject water from RO systems, while containing higher concentrations of salts and ions, can still be repurposed for various non-potable applications, depending on local regulations and the specific quality of the reject water:

- **Toilet flushing:** Utilising reject water for flushing can significantly reduce mains water consumption.
- **Laundry:** In some cases, reject water can be used for washing clothes, especially if the water's hardness is within acceptable limits.
- **Irrigation:** Plants that are tolerant to higher salinity levels can be irrigated with RO reject water

It's essential to assess the chemical composition of the reject water before repurposing to ensure it is suitable for the intended application.
To optimize the use of reject water, systems can be designed or retrofitted with features such as:

- **Storage tanks:** Collecting reject water in dedicated tanks allows for its reuse in various applications.
- **Blending systems:** Mixing reject water with other water sources can dilute the salts, making it suitable for specific uses.

Implementation Steps

1. Feasability Assessment

- Review the dialysis water treatment system and reject water output.
- Conduct a water quality analysis of RO reject water.
- Identify potential uses for reclaimed water (e.g. steam production, toilet flushing, irrigation).

2. Stakeholder Engagement

- Involve estates and facilities teams early.
- Discuss with sustainability officers, clinical engineers, estate department or facilities management and infection prevention and control.

3. Technical Design

- Route RO reject water from the dialysis unit to a storage tank.
- Ensure the tank and pipes are compliant with water safety regulations.
- Design connection to the target system (e.g. boiler feed for steam production).

4. Regulatory and Safety Considerations

- Confirm compliance with HTM 04-01 Health Technical Memorandum 04-01: Safe water in healthcare premises. Part A: Design, installation and commissioning and local water safety group.
- Implement backflow prevention.
- Ensure maintenance and monitoring plans are in place.

5. Installation and Commissioning

- Install piping, valves, storage, and delivery system.
- Test water quality and flow.
- Validate system performance with end users.

6. Monitoring and Maintenance

- Regularly inspect reclaimed water systems.
- Monitor for contamination or stagnation.
- Maintain documentation of water quality and usage.

7. Communication and Reporting

- Share results with Green Plan leads and sustainability teams.
- Consider including water savings in annual reporting.
- Educate staff and patients about the initiative.

Conclusion

Reclaiming RO reject water is a practical, cost-effective, and environmentally responsible intervention. With multidisciplinary support and careful planning, dialysis units can play a leading role in conserving one of healthcare's most precious resources: water.

Further Reading

- Conserving Water in Haemodialysis – Case Study (2010): https://networks.sustainablehealthcare.org.uk/resources/case-study-reuse-ro-reject-water-two-haemodialysis-units
- HTM 04-01 Safe Water in Healthcare Premises
- Agar JW. Reusing and recycling dialysis reverse osmosis system reject water. Kidney Int. 2015 Oct;88(4):653-7. doi: 10.1038/ki.2015.213. PMID: 26422618.
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