Reducing unnecessary carbon in haemodialysis by optimising dialysate acid concentrates

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INTRODUCTION

Reducing carbon emissions from in-centre haemodialysis (ICHD) is one of the key priorities for the **Yorkshire and Humber Kidney Network (YHKN).** In partnership with the **UK Kidney Association (UKKA) Kidney Quality Improvement Partnership (KQIP),** a regional project was set up. This project was named **Trying to Reduce UnNecessary Carbon in Haemodialysis (TRUNC_HD).**



Our centre made efforts to reduce the carbon emissions associated with haemodialysis, focusing on **switching from a 1:34 to a 1:44 dialysate acid concentrate in a 10 station dialysis unit, running three shifts, 6 days per week.**

Image X Y&H TRUNC-HD Programme

Jan – March 2024	March	April – June	June	July – Sept	Sept	Oct – Dec	May 2025
Unit face to face QI training and support	Y&H virtual sharing progress meeting	Unit face to face QI training and support	Y&H virtual sharing progress meeting	Unit face to face QI training and support	Y&H virtual sharing progress meeting	Unit face to face QI training and support	Y&H face to face celebration event

METHODS

Project leads were identified and participated in the **Y&H TRUNC-HD programme (see image below). Stakeholder analysis**, **process mapping**, and a **prioritisation matrix** were used to identify impactful changes. **Plan-Do-Study-Act testing tool** was used to implement changes. Data was collected to calculate the **environmental, and financial impact.**

Plan:

- **Clear communication, coordination, Confirm machine compatibility, ordering 1:44 acid and ceasing 1:34 orders, updating HD prescriptions,**

Do:

- **Technicians preparing the system for the new acid and redistribution of leftover 1:34 acid canisters to other units.**

Study:

- **Weekly acid usage was tracked, and a target date set for the switch to minimise 1:34 acid wastage**

Act:

- **After-action review was conducted to refine processes and integrate lessons learned before implementation in the next chosen haemodialysis unit.**

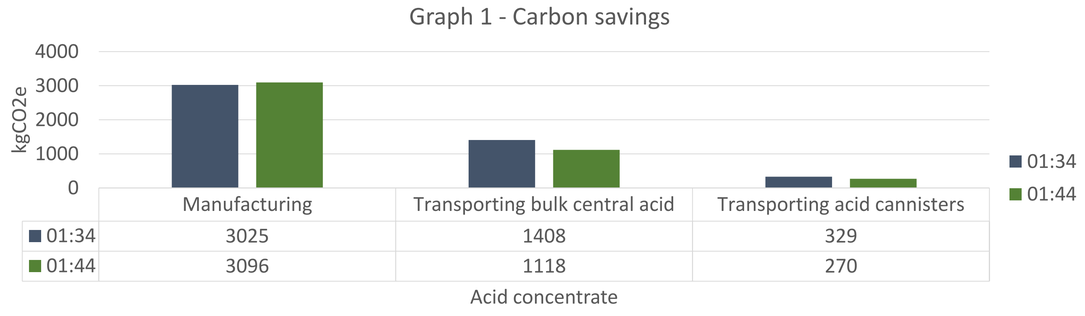
RESULTS

- Our satellite unit carries out 162 dialysis sessions/ week (average blood flow rate of 350ml/min, dialysate flow rate of 420ml/min, average duration of 4 hours)
- To produce enough dialysate per dialysis session, **2.88L of 1:34 or 2.24L of 1:44 acid concentrate is needed**; approximately 466L and 362L weekly, respectively.
- **Weekly acid usage consumption was monitored and averaged at 500L on 1:34 central acid (CA) for the unit. Weekly acid usage averaged at 350L on 1:44 CA after the changeover**
- Impact would equate to annual reduction in central acid usage by 5,391L which **lowers delivery weight by 5315kg.**
- Switching to 1:44 CA and canisters reduces greenhouse gas emissions by 278kgCO_2e (Graph 1).
- Delivery frequency is also expected to decrease from weekly 500L deliveries of 1:34 CA to 3000L deliveries of 1:44 CA every two months.
- While bulk 1:44 acid is costlier per litre (£500/1000L vs. £420/1000L for 1:34 acid), reduced volume requirements result in projected savings of £1000 annually (Graph 2).
- Six patients who were on 1:34 acid canisters were switched to appropriate 1:44 formulations. As 1:44 canisters are cheaper (£2.85 vs. £3.00 for 1:34), this saves £140.40 annually.

RESULTS

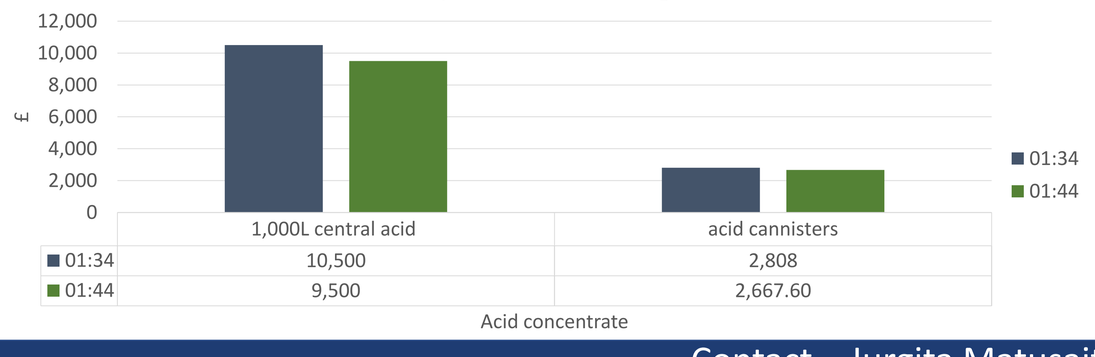
TOTAL CARBON SAVING (one satellite unit) = 278kgCO2e

Graph 1 - Carbon savings



TOTAL FINANCIAL SAVING (one satellite unit) = £1,140

Graph 2 - Financial savings



CONCLUSION

- This initiative is **currently being rolled out** to seven additional haemodialysis units in our organisation
- **Challenges in monitoring and implementation** include limited accuracy in assessing tank levels as tanks are marked in 500L increments and restricted access to CAD storage areas in some units.
- Improved access and awareness have facilitated **better monitoring of tank levels.**
- In addition, **baseline assessment uncovered wastage** at one unit due to over-ordering, highlighting the importance of adjusting orders to match demand.
- This project highlights the environmental and financial savings of switching to 1:44 acid concentrate and provides a replicable model for carbon reduction for in-centre haemodialysis.
- Lessons learnt include the **importance of baseline assessments, continuous process improvements** and **stakeholder engagement** to achieve sustainable practices in healthcare.

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