Carbon and financial savings from reducing dialysate flow rate from 800-500ml/min in a single centre satellite unit

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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).**

It has been standard practice in our unit to use dialysate flow rate (Qd) of 800ml/min for a haemodialysis prescription, irrespective of the blood flow rate (Qb). Fresenius dialysis machines now have an autoflow feature which sets Qd to 1.5times Qb. A systematic review and meta-analysis[1] found increasing Qd to 500 to 800ml/min was associated with a small increase in spKt/V by 0.08 and urea reduction rate (URR) of 3.38%. After reviewing spKt/V and URR data for patients dialysing at a single satellite unit the project team assessed the impact of reducing Qd from 800 to 500ml/min.

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

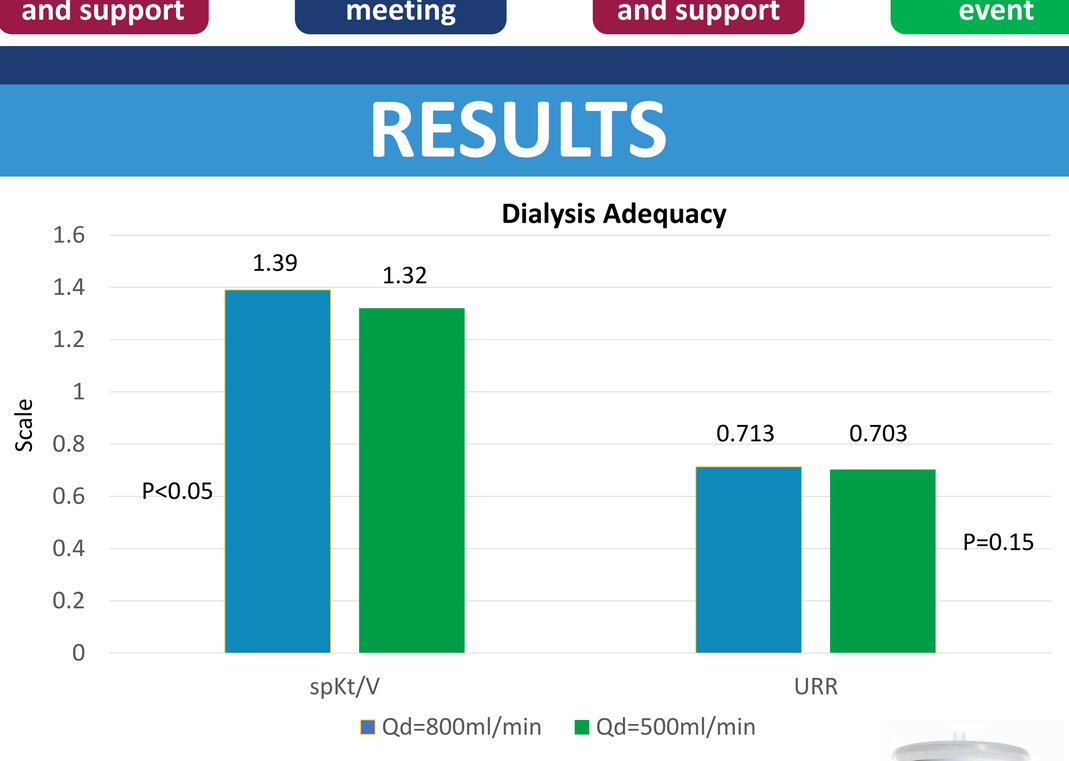
METHODS

Project leads were identified and participated in the **Y&H TRUNC-HD programme.**

Calculate mean URR and spKt/V over a period of 12 months → **Trial agreed by senior clinicians and nursing team** → **Letter sent to all patients with rationale and opportunity to speak to clinicians**

Data was collected for the 12month period before and 4 month period after the implementation of change, to calculate the **environmental, financial and social impact** of the project. Dialysis adequacy data (spKt/V and URR) was assessed each month.

RESULTS



Smaller (760g) bicarbonate cartridges used in 8 patients instead of the larger (1100g) cartridges

37.5% reduction in water and acid usage

Mean Qb = 382 ml/h
Mean dialysis duration = 216 minutes



RESULTS

kgCO2e = Kilogram of carbon dioxide gas equivalent*

Description	Estimate savings per session	Estimate savings per annum	Annual greenhouse gas emission savings (kgCO2e*)	Annual financial savings (£)
Water	0.063m^3	646m^3	219	2,308.61
Dialysate acid concentrate	1.44L	14676L	2272	7,338.24
Electricity	0.60kWh	6136kWh	1689	1,503.22
Sodium bicarbonate	0.34kg*	424.32kg*	997	1,716.62
Total			**5,177**	**12,866.68**

CONCLUSION

4 months following reduction of Qd from 800 to 500ml/min, there was modest reduction in Kt/V and minimal reduction URR in patients dialysing at the satellite unit. Both parameters still meet the recommended targets for dialysis adequacy.

The intervention is likely to result in a significant reduction in carbon emission, **contributing both to environmental sustainability and cost effectiveness** of delivering a dialysis service without causing negative short-term effects in haemodynamically stable patients.

Our next step is to implement the intervention at other dialysis units in the trust if further evaluation of data in 6 months remains supportive of the change.

[1] The impact of dialysate flow on haemodialysis adequacy: a systematic review and meta-analysis Clin Kidney J. 2024