Reducing dialysis flow rate

Title

Trying to reduce unnecessary carbon emissions in incentre haemodialysis by reducing dialysate flow rate

Authors and Affiliations

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Theme

Sustainability

Introduction

Our centre has partnered with the Kidney Quality Improvement Partnership (KQIP) and the regional sustainable quality improvement project, Trying to Reduce UnNecessary Carbon in Haemodialysis (TRUNC-HD) to try and reduce the carbon footprint of in-centre haemodialysis. A key interventions in the project was reducing dialysate flow rate. This was trialled at a single satellite unit in our organisation.

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 a autoflow feature which sets Qd to 1.5times Qb. A systematic review and meta-analysis 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.

Methods

Mean URR and spKt/V over a period of 12 months was calculated for all patients dialysing at the unit. As these results were well above the recommended targets by UKKA, plans to trial reducing Qd to 500ml/min was agreed by senior haemodialysis clinicians and nursing teams. Patients received a letter communicating the rationale for the proposed intervention and were given opportunity to speak to the clinicians involved prior to implementing the change.

In October 2024, Qb was reduced from 800 to 500ml/min for all patients dialysing at the satellite unit. Dialysis adequacy data (spKt/V and URR) was assessed each month.

Results

A total of 66 patients dialysed at the unit of which 2 patients were on twice weekly dialysis. In the 12 months prior to reducing Qd, mean spKT/V and URR was 1.44 and 0.728 respectively. Mean Qb was 382ml/min and mean dialysis duration was 216 minutes.

In the 2 months since reducing Qd, there has been no significant change in the dialysis adequacy data with a mean Kt/V of 1.52 and URR of 0.710. In addition, we observed that the smaller (760g) bicarbonate cartridges could be utilised instead of the larger (1100g) cartridges due to reduction in bicarbonate consumption in 8 of our patients. The estimated

reduction in dialysate acid concentrate, as well as water and electricity saved to produce the dialysate is detailed in table 1.

Discussion

2 months following reduction of Qd from 800 to 500ml/min, there has been no detrimental impact on dialysis adequacy in patients dialysing at the satellite unit. 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. Our next step is to analyse the results after a further 2 months and implement the intervention at other dialysis units in the trust.

Table 1: Estimated annual greenhouse gas (GHG) and financial savings from reducing dialysate flow from 800ml/min to 500ml/min

Description	Estimated savings per session	Estimated savings per annum	Annual greenhouse gas emission savings (kgCO2e)	Annual financial savings (£)
Water	0.063m^3	646m^3	219	2308.61
Dialysate acid concentrate	1.44L	14676L	2272	7338.24
Electricity	0.60kWh	6136kWh	1689	1503.22
Sodium bicarbonate	0.34kg*	424.32kg*	997	1716.62
Total			5177	12866.68

*This reduction only affected the dialysis session of 8 patients where 1100g bicarbonate cartridges were reduced to 760g cartridges.

Costs estimates used: £3.575 per m^3 of water (£1.6081 per m^3 of water supply, £1.9669 per m^3 of sewerage); £0.245 per kWh of electricity; £0.5 per litre of dialysate acid concentrate

For more information

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