

Title: Reducing unnecessary carbon in haemodialysis by reducing pharmaceutical waste in a dialysis unit

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Abstract:

Introduction:

As part of its ongoing efforts to promote environmental sustainability, the Bradford Renal Sustainability Group has partnered with the *Trying to Reduce UnNecessary Carbon in Haemodialysis (TRUNC-HD)* project in Yorkshire and Humber to further reduce the carbon footprint of its renal care practices. One of our unit's projects is focused on pharmaceutical waste as a key area for improvement, guided by insights from the in-centre haemodialysis (ICHHD) online carbon calculator and by observing pharmaceutical waste in the unit.

Methodology:

The trust sustainability manager used the online ICHHD Carbon Calculator to estimate the carbon footprint of the unit. Upon reviewing the findings, the group initiated targeted interventions, particularly in pharmaceutical waste management. Nurses observed frequent disposal of expired medications and redundancies in the pharmacy stock list. A review of expired medications and the stock list was conducted in collaboration with the renal pharmacist, identifying and removing medications that were no longer required. Previously, a pharmacy technician managed medication top-ups using a predefined list. This was revised, and unit sisters were tasked with reviewing pharmacy orders weekly, a process taking approximately 20 minutes. Medications nearing expiry are now highlighted to ensure they are used first, minimising wastage. A top-down approach was applied to estimate the carbon footprint of discarded medications. The calculation used the 2021 UK Government standard industrial classification conversion factor of 0.581 kgCO₂e per pound (£), as robust carbon footprinting life cycle analyses for individual medications were not available.

Results:

In April 2024, the nursing staff reviewed all medications that were discarded due to being over their expiry date. This included ten glucose 50% solution for infusion 50ml vials, 20 boxes containing ten vials each of Tinzaparin 7500 IU/0.3mls ampoules, four hydrocortisone 100mg powder for solution for injection vials, a box of carbocysteine 375mg capsules (120 capsules), ten ferric carboxymaltose 100mg/2ml solution for injection vials, a bottle of Gaviscon liquid and a box containing 10 ampoules of ondansetron 4mg/2ml solution for injection (Figure 1).

The total financial impact of these discarded medications alone was measured at approximately £1,260 and 732 kgCO₂e (Table 1). [Quantitative data comparing pharmacy](#)

ordering trends from January–April 2024 (pre-intervention) with May–August 2024 (post-intervention) are being collected to assess the longer-term impact of these changes.

Commented [CS(THNT1)]: Data fro Shiraz

The additional benefit of the project is that haemodialysis staff now have greater autonomy over stock control, allowing adjustments based on usage trends. Subjectively, the nursing staff also felt that there was a reduced risk of medication errors as (?REMOVAL OF) redundant medications from stock decreases the risk of errors.

Discussion:

Maintaining the revised system will be crucial to sustaining these improvements. Regular reviews of the stock list and the necessity of medications will ensure the system remains effective. By implementing these changes, the unit is taking meaningful steps toward reducing waste and improving efficiency, contributing to a more sustainable healthcare system.

Figure 1: Image of the discarded, expired medications



Table 1: Financial and environmental impact of the discarded medications

Item	Price per unit	Number of items	Total cost of medication discarded	Carbon emissions (kgCO ₂ e)
Glucose 50% solution for infusion 50ml vials	£3.40	10	£34	19.75
Tinzaparin 7500 IU/0.3mls ampoules	£5.00	200	£999.8	580.88
Hydrocortisone 100mg powder for solution for injection vials	£0.92	4	£3.68	2.14
Box of carbocisteine 375mg capsules (120 capsules)	£2.30	1	£2.3	1.34
Ferric carboxymaltose 100mg/2ml solution for injection vials	£19.10	10	£191.00	110.97
Gaviscon liquid	£9.05	1	£9.05	5.26
Box of ondansetron 4mg/2ml solution for injection	£20	1	£20.00	11.62
Total			1259.83	731.96

CO₂e = carbon dioxide equivalent

[For more information](#)

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