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Reducing Waste in the Dialysis Unit Queen Margaret Hospital, Dunfermline

By: NHS Fife

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Positive outcome(s) of project:

Reduced clinical waste, 21.5 tonnes per year

Savings per year:

£14907.10 (Actual)

CO2 savings per year:

26.847 tonnes CO2e / year (Estimated)

Description:

The dialysis unit at the Queen Margaret Hospital, Dunfermline, has 20 stations and provides over 13,000 treatments per year. Mary Thompson, a dialysis nurse in unit, ran a series of Waste Watch Weeks there in 2009, and identified opportunities to improve practice.

The unit has recently moved towards providing online haemodiafiltration (HDF) using 15 Fresenius 5008 machines. Mary noted that, for every dialysis session, a one litre bag of normal saline was used to re-infuse the patient's blood at the end of the treatment. This bag would be opened and attached to a giving set at the start of the treatment (ready for use should the patient suffer a hypotensive episode during their dialysis treatment), despite the fact that the newer haemodiafiltration machines were able to prepare ultrapure sterile substitution fluid directly from the dialysate by directing it through an ultrafilter.

When it came to re-infusing the patients blood at the end of the treatment, only 200 mls of this fluid would typically be required. The remaining 800mls of normal saline, the plastic bag containing it, and the plastic giving set were then all placed in an orange bag – along with the extracorporeal circuit and bicarbonate bag - and disposed of through the clinical waste stream. Mary realised that there were a number of opportunities to **reduce**...

REDUCTION 1

The use of saline and giving sets was reduced by stopping the unnecessary practice of hanging a bag for emergencies in favour of using the online facilities for emergencies and re-infusion. This saved not only the carbon embodied in their manufacture, but also the emissions associated with their disposal.

A bag of normal saline was costing the dialysis unit £0.52, whilst a single giving set was costing £0.35. During the course of the 10,764 treatments provided per year, the use of online substitution fluid saves £9,364 (minus the small but less quantifiable cost of producing the exact fluid volumes online) in procurement costs alone (waste disposal savings are outlined below).

REDUCTION 2

The amount of clinical waste was further reduced by improving segregation at source. The first measure had already removed a partially filled bag of normal saline and giving set from the waste stream, but the bicarbonate bag could also be diverted away from the clinical waste stream to domestic waste.

Bicarbonate is added to the dialysate throughout the treatment. Although it is sometimes supplied in plastic containers (see the Recycling Case Study), in Mary's unit the bicarbonate is provided in bags (often referred to as B-Bags). Mary realised that these bags could be placed in the domestic waste stream after each treatment (as ongoing efforts to find a facility willing to recycle them have proven unsuccessful).

These two initiatives had reduced the clinical waste from a single treatment by 2 kg through the removal of one bag of reperfusion saline (usually with 800 mls remaining in it), one giving set and the bicarbonate bag. Over the annual 10,764 treatments provided by the unit using Fresenius 5008 machines, this would result in a reduction in clinical waste of 21,528 kg – or 21.5 tonnes. As a relatively large producer of clinical waste, the Queen Mary Hospital was charged at £300 per tonne of clinical waste, leading to an annual saving of £6458.40. This saving was offset by the increased cost of the domestic waste (£85 per tonne) attributable to the addition of the bicarbonate bag to this waste stream. The annual 10,764 treatments produce 10,764 bicarbonate bags, with a total weight of 10.764 tonnes and a disposal cost of £914.90, resulting in an overall annual saving of £5543.10.

Quantifying carbon savings (section added October 2012)



Greenhouse gas (GHG) conversion factors for procurement of pharmaceuticals and medical equipment were obtained from the 2012 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting (Table 13). Using these factors we estimated the GHG savings per year from avoided procurement of saline bags and giving sets:

Reduction in pharmaceutical procurement (saline bags): $\text{£}0.52 \times 10764 \text{ treatments} = \text{£}5597.28 / \text{year}$. $\text{£}5597.28 \times 0.43 \text{ kg CO}_2\text{e}/\text{£} = 2.407 \text{ tonnes CO}_2\text{e}$

Reduction in medical equipment procurement (giving sets): $\text{£}0.35 \times 10764 \text{ treatments} = \text{£}3767.40 / \text{year}$. $\text{£}3767.40 \times 0.30 \text{ kg CO}_2\text{e}/\text{£} = 1.130 \text{ tonnes CO}_2\text{e}$

Greenhouse gas (GHG) conversion factors for waste disposal were obtained from the 2011 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting (Table 9d). The GHG for incineration of clinical waste was taken as 1,833 kg CO₂e emitted per tonne of waste (DEFRA emissions factors for incineration do not specifically account for clinical waste, which is commonly undertaken at higher temperatures. To reflect the increased emissions that are likely to result from the incineration of clinical waste, the highest available emissions factor for incineration was applied). The GHG for landfill of plastic waste was taken as 34 kg CO₂e per tonne.

Previous GHG emissions from disposing saline bags + giving sets + bibags as clinical waste, per year: Saline bag + giving set + bibag - 800ml residual saline = 1.2kg. $1.2\text{kg} \times 10764 \text{ treatments} = 12.917 \text{ tonnes}$. $12.917 \text{ tonnes} \times 1833 \text{ kg CO}_2\text{e}/\text{tonne} = 23.676 \text{ tonnes CO}_2\text{e} / \text{year}$

Current GHG from disposing bibags (1kg) as domestic waste, per year: $1\text{kg} \times 10764 \text{ treatments} = 10.764 \text{ tonnes} / \text{year}$. $10.764 \text{ tonnes} \times 34 \text{ kg CO}_2\text{e}/\text{tonne} = 0.366 \text{ tonnes CO}_2\text{e} / \text{year}$

Net savings from waste disposal = $23.676 - 0.366 = 23.310 \text{ tonnes CO}_2\text{e} / \text{year}$

Combined GHG savings (procurement and waste) = $1.130 + 2.407 + 23.310 = \mathbf{26.847 \text{ tonnes CO}_2\text{e} / \text{year}}$

Location:

Queen Margaret Hospital, Whitefield Road, Dunfermline, Fife, KY12 0SU

Status:

ongoing

Report published:

<http://sustainablehealthcare.org.uk/nephrology-resources/reduce-reuse-re...>

Reasons for project:

To reduce waste and its associated disposal costs

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[Green nephrology](#)

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