

The Impact of Disposables Towards More Eco-Friendly and Less Costly Haemodialysis

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Introduction

In Europe, more than 50 million dialysis treatments are carried out annually, producing substantial amounts of contaminated and eco-damaging plastic waste. In line with the green dialysis concept, there is a need to develop sustainable and cost-effective dialysis practices that reduce consumption of energy, water and plastic materials.

Addressing the environmental impact of dialysis to help minimise the carbon footprint and costs associated with disposal of used equipment is the responsibility of the entire dialysis community and an important global goal.^{1,2}

Objectives

The primary objective of this study was to examine the amount of plastic waste being produced per dialysis treatment and the equipment disposal costs when using three different haemodialysis (HD) machines

- 5008 CorDiax (haemodiafiltration [HDF] mode)
- 6008 CAREsystem (HDF mode)
- Gambro Artis (HD mode)

Methods

In a standard 3 times per week, double-needle HD/HDF setting, we analysed the weight of the disposable equipment associated with the three machines being examined before treatment (blood line) and after treatment and re-infusion (used blood lines and dialysers). The weight was then correlated with the average cost for disposal of contaminated waste. The mean cost of waste disposal from 17 European countries is 1.56 € per kg; range: 0.47–9.08 € per kg (Table 1).

Table 1: Contaminated waste disposal cost by country

Country	Waste price (€ per kg)	Country	Waste price (€ per kg)
Bosnia and Herzegovina	1.86	Romania	0.68
Czech Republic	0.47	Russia	1.34
Estonia	1.59	Serbia	1.33
France	0.88	Slovak Republic	1.13
Hungary	0.86	Slovenia	9.08
Ireland	2.14	Spain	1.09
Italy	1.13	Turkey	0.68
Poland	0.49	United Kingdom	0.93
Portugal	0.79		
	Mean		1.56

Results

The weight of disposable waste differed considerably between the three machine systems (Table 2)

- The unused blood cassette from 6008 CAREsystem was the lightest component (Figure), and was 0.111 kg lighter than the blood line system from its precursor 5008 CorDiax
- After treatment and re-infusion, the blood cassette from 6008 CAREsystem weighed 0.189 kg less than the blood line system from 5008 CorDiax
- The weight of disposable waste for the Gambro Artis in HD mode was less than that of 5008 CorDiax in HDF mode, but more than that of the 6008 CAREsystem in HDF mode
- Of note, application of Gambro Artis in HDF treatments necessitated the use of the ArtiSet ULTRA, which is approximately 0.120 kg heavier (dry weight) than the standard ArtiSet, making it even more costly to dispose of than the equivalent components from 6008 CAREsystem

Table 2: Individual weights of blood lines and dialysers before and after treatment and re-infusion from three dialysis systems

Dialysis system	Weight of unused blood lines (without packaging)	Weight of blood lines after re-infusion	Weight of blood lines & dialyser after re-infusion	Weight of dialyser after re-infusion
5008 CorDiax (n=16)	0.308 kg (AV-set 5008 incl. Safeline)	0.487 kg	0.897 kg	0.410 kg (2.0m ² , FX800 CorDiax)
Gambro Artis (n=12)	0.298 kg (ArtiSet HD DH HC)	0.514 kg	0.834 kg	0.320 kg (1.4m ² , Revaclear 300)
6008 CAREsystem (n=13)	0.197 kg (6008 CareSet Blood Cassette)	0.298 kg	0.698 kg	0.400 kg (2.0m ² , FX800 CorDiax)

Projecting the overall cost difference between 5008 CorDiax and 6008 CAREsystem:

- 0.2 kg less disposable waste per treatment is produced with 6008 CAREsystem vs 5008 CorDiax
- The typical number of treatments in most clinics is approximately 10,000 per year; this results in 2,000 kg less waste being produced annually with 6008 CAREsystem, equating to a cost reduction of approximately 3120 € when applying a mean of 1.56 € per kg (Table 1). However, the cost of waste disposal varies between countries, and can be as high as, for example, 9.08 €/kg in Slovenia

Figure: The 6008 CAREsystem and blood cassette



Conclusions

Dialysis with 6008 CAREsystem, when compared with both 5008 CorDiax and Gambro Artis, resulted in the lowest weight of disposable waste, even in HDF mode.

Of note, the weight of disposable waste can be further reduced after treatments with 6008 CAREsystem, due to its automatic blood cassette and dialyser drainage feature, which allows full emptying of the dialyser and cassette.

In line with the green dialysis concept, there is a need for dialysis practices that are eco-friendly and which reduce energy consumption, and the use of water and plastic materials; the 6008 CAREsystem helps to support these aims while also helping to support cost-effective dialysis.

References

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Dialysis. Extracorporeal dialysis: techniques and adequacy.

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