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Making Dialysis Green (er).

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Abbrevations: UNFCCC: United Nations Framework Convention on Climate Change

Introduction

Control of carbon emissions, which reached a historic high in 2017, the generation of waste or refuse and the increased pollution of the oceans by plastic debris all affect the way that we live and have implications for future generations. Such concern paved the way for the United Nations Framework Convention on Climate Change (UNFCCC) dealing with among others green house gas emissions mitigation and due to commence in 2020. Under the convention, each country determines plans and regularly reports its own contribution to mitigate global warming. Not all countries have signed, and in June 2017, U.S. President Donald Trump announced his intention to withdraw the United States from the agreement.

The treatment of renal disease by dialysis is considered one of the major success stories of of modern medicine. Globally over 2 million patients are receiving treatment, with each treatment generating between 2.5–2.9 kg of waste/treatment, depending upon consumables used [1,2]. Over the past three decades, treatment has shifted from the use of a mix of non disposable and disposable devices, to using only disposable devices. These arrive at the hospital extensively packaged, to protect their integrity and sterility. At the point of use the packaging is discarded, and after use the dialyser, blood tubing set and fistula needles are disposed of via the clinical waste stream as are all other consumables used in the treatment. Dialysis is also a heavy user of water and electricity. An average four hour dialysis uses more than 400 litres of treated water, with a further 200 litres being discarded in the production of water that meets the quality requirements in terms of chemical contaminant levels [3]. Treatment also uses around 1.6 KW/h of electricity to power the dialysis machine over a four hour period, with additional electricity use from the reverse osmosis system [4].

Despite its success, questions must surely be asked about whether the current approach is fit for the 21st century notably in respect of its environmental impact. Academic research programs in nephrology, have failed to focus extensively on environmental aspects of the treatment, although some work in this field has been undertaken [2,5]. This has led to the development of approaches to enhance environmental sustainability. In the case of buildings, a reduction in power consumption and/or use alternative power options. For new build renal units the approach has focused on designing smart buildings that work with and for their environment. One example of such an approach has been the use of reject water from the reverse osmosis system for non drinking applications in such buildings [6]. Improved water recovery, can also be achieved using a recirculation configuration, in which some of the reject water is recycled back into the feed water stream. The reverse osmosis can also be configured as a two-stage or double-pass system. In such configuration, the product water from the first stage is used as the feed water for the second stage. Because the feed water to the second stage is already of high quality, it can be operated at a much higher recovery rate than the first stage, thereby reducing the amount of water used, an emerging issue in haemodialysis [7].

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Dialysis units can also minimize the amount of waste produced by segregation of waste at source or collecting waste such as cardboard which is then compacted and disposed via commercial contractors. Segregation of waste at source has the potential to reduce waste away from the clinical stream, and can also be used for bicarbonate containers or bi-bags. There are however issues with such an approach, namely that they can only be used for a single stream of material, and can only be used if the material has not been in contact with any biological products. It also needs someone to sort the waste.

Materials that have been in contact with blood represent a potential biohazard. The current approach is to send such items to incineration, which is expensive. Reduction in the amount of waste sent to incineration can be achieved by the introduction of anon site sterilizing and granulation system. This reduces the bulk of the waste and also means that the waste may be sent to landfill sites at a lower cost. The practicality of using such an approach is complex and many units may not have the space for the introduction of such an approach.

Dialysis units as high users of disposables need to address their impact on the environment and take appropriate steps to minimize the impact. One thing is certain: as legislative effort efforts to combat climate change, reduce carbon emissions, minimize plastic and other waste increase the environmental impact of dialysis practice will come under increasing regulatory focus. It is far preferable for the sector to take proactive steps, rather than to await the government or administration to force compliance.

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