Case Study

Sustainable Development Unit

Technology and Models of Care

Central Manchester University Hospitals NHS Foundation Trust

Reducing the carbon footprint of haemodialysis

Dialysis is a process for removing waste and excess water from the blood, and is used primarily as an artificial replacement for lost kidney function in people with kidney failure. There are several dialysis methods- this case study focuses on haemodialysis.

In haemodialysis blood is passed through a mechanical device known as a dialyser, which in simple terms is a large semi-permeable membrane with blood on one side and a specially formulated liquid on the other. This liquid is known as dialysate and is specifically prepared according to the individual patient's needs.

What was the issue / problem being addressed?

Addressing delivery miles
Many dialysis centres buy ready-to-use dialysate in canisters or containers. A medium size dialysis centre requires approximately 60,000 – 80,000 litres of this yearly. Close to 90% of this is simply water.

This means that NHS Trusts across the country are collectively freighting around thousands of tonnes of fresh water, which they have readily available on site.

Energy and water consumption
A significant source of energy and water use in haemodialysis is to heat-disinfect the system to ensure it is sterile.

Dialysis machines were set to disinfect themselves in the morning before patients arrive, after every dialysis session, and again by the operator if a 72 hour time limit has been exceeded since the last heat disinfection. This is an undeniably important process, however staff at CMFT identified that the historic practice has been to over-do this.

What action was taken to overcome the issue?

Delivery miles
The new dialysis unit in Altrincham switched to a concentrate system. Using dry dialysate powder and a mixing system to automatically produce sterile dialysate mixed to the exact required specification.

Whilst this is effectively cost neutral compared to bulk purchase of liquid dialysate, it has significant benefits in terms of logistics and in the embedded carbon footprint of freight transport.

Energy and water use
The decision was made that disinfection after every dialysis, and again if a 72 hour time limit has been passed, is sufficient to ensure the equipment is sterile. Subsequently the automatic morning disinfection was stopped.

What was the impact / result?

Delivery miles
The delivery of 3,000 litres of dialysate, every week is reduced to a 200kg of dry mix. Now a single bulk delivery will last a month. For the Trust this has effectively reduced deliveries by 75%.

This reduces delivery mileage by approximately 7,000 miles per year, resulting in a carbon saving of 8.3 tonnes annually.

For further information contact:

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The total annual savings from this for our Trust were measured and calculated to be:

- 3,057 litres of disinfectant (Citrosteril)
- 24,461 kWh of electricity
- 428,064 litres of water
- £13,400 per year.

"Historically inefficient processes come from an era of less reliable machines and less reliable water quality production. These changes are a benefit all round; saving time, energy, water, waste and money for the Trust that can be put back into patient care"

– Ian Wilde, Technical Service Manager for Renal Dialysis at CMFT

Scaling up

Delivery miles
This system has been widely adopted abroad. When scaled up and adapted across the NHS the savings would be enormous, and a more developed UK production network for the dry mix would allow even further embodied CO2 savings.

Energy and water use
The disinfectant, energy, water and associated cost savings are replicable across the NHS wherever such unnecessary scheduled disinfections can be dropped. Whilst the Trust's renal dialysis unit is relatively large, an estimated saving of £5,000+ per year per Trust is likely possible.