

KitNewCare Case Study: Improving Waste Segregation Practices

Site: Università degli Studi di Modena e Reggio Emilia (UNIMORE)

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Life Cycle Assessment Support

Life Cycle Assessments were conducted by Dr James Larkin, Postdoctoral Researcher and Sustainability Officer at Trinity College Dublin.

Why did you start?

Problem Description

Hospital waste is divided into hazardous waste (materials contaminated with blood or bodily fluids) and non-hazardous waste. Hazardous waste requires incineration in Italy, whereas non-hazardous waste can be managed through general waste or recycling streams where appropriate. Haemodialysis generates substantial quantities of waste, and inappropriate segregation can increase both disposal costs and environmental impact.

Despite an existing waste segregation system in UNIMORE, a significant portion of general or recyclable waste was still discarded as hazardous, particularly during busy dialysis workflows where convenience or uncertainty overrides correct disposal practices.

Specific Aims

- Reduce misclassification of non-hazardous waste as hazardous waste.
- Achieve a 20% reduction in hazardous waste volume within 12 months.
- Improve staff knowledge and confidence in waste segregation.

What did you do?

Context

This project took place in the Nephrology, Dialysis and Renal Transplant Department at a large tertiary centre managing a complex patient population across chronic and acute

dialysis pathways. The centre provides approximately 40,000 haemodialysis treatments per year.

Intervention

Waste practices were optimised through a combination of baseline assessment, workflow redesign, staff training, and ongoing monitoring, supported by a multidisciplinary team including nephrologists, nursing staff, and technical personnel.

Baseline assessment

Structured observations and a staff questionnaire were conducted to assess baseline practices and understanding of waste segregation within the dialysis centre. These activities identified variation in waste segregation practices and gaps in staff knowledge, particularly relating to differentiation between hazardous and non-hazardous waste streams. Findings from the observations and survey informed the design of subsequent interventions.

Waste mapping and classification

A waste mapping exercise was conducted to identify all waste types generated during dialysis sessions. Based on this, a waste classification guide was developed to distinguish between hazardous and non-hazardous waste streams in the dialysis setting.

Visual aids and staff reminders

Visual materials were developed to support correct waste segregation. Posters displaying common dialysis waste items and their appropriate disposal routes were placed at point of care and in staff work areas, providing quick-reference guidance during clinical practice.

Staff training and engagement

Nursing staff participated in educational sessions focused on waste segregation and recycling practices, with an emphasis on improving the appropriate classification of waste.

Training sessions included:

- the current status of waste management within the centre
- updates on hospital waste collection processes
- medical-legal aspects of waste disposal
- environmental implications of incorrect waste classification

Hands-on workshops were delivered using items from dialysis sessions to support practical understanding of correct waste disposal. Brief refresher discussions were incorporated into routine workflows, including during shift handovers, to reinforce learning and maintain engagement.

Photos taken at a waste education session

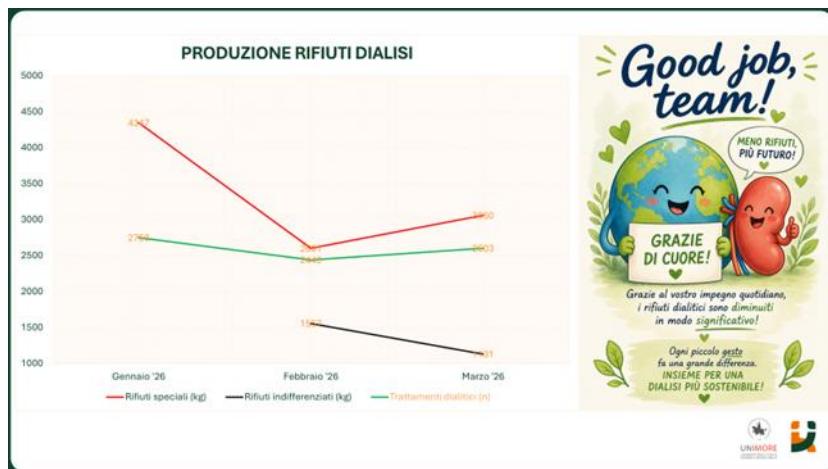


Monitoring and feedback

Baseline data on hazardous waste production within the dialysis centre were collected. Waste production was subsequently monitored over time to assess changes following implementation of the intervention.

Educational sessions were adapted based on findings from observations and ongoing feedback, addressing areas of uncertainty or variation in practice.

To support ongoing staff engagement, visual feedback is provided through a monthly updated graph displayed within the department, showing trends in waste generation. An example that was displayed in April 2026 can be seen below:



Measures

Patient outcomes

This project focused on waste management practices and did not introduce changes to clinical treatment or patient-facing care.

Environmental sustainability

Environmental impact was assessed using waste generation data obtained from the waste management company serving the dialysis centre.

Economic sustainability

Financial outcomes for waste optimisation were estimated based on the reduction in hazardous waste generated per haemodialysis treatment.

Social sustainability

Social impact was assessed using the KitNewCare modelling framework, including estimates of forced labour risk hours. Staff feedback and engagement with the intervention were also considered.

Relevant insights were also drawn from the patient focus group study conducted with patient representatives, in which waste-related changes were specifically discussed.

What did you find?

Results

Environmental sustainability

Optimisation of waste segregation reduced hazardous waste by approximately 0.34 kg per haemodialysis treatment. Associated carbon emissions reduced by an estimated 0.89 kg CO₂e per treatment. When normalised at patient level, this corresponds to an annual reduction of approximately 138.81 kg CO₂e, based on three treatments per week. The overall annual saving for the service based on approximately 40,000 treatments per year is 35,592.3 kg CO₂e.

Water use impact also decreased following the intervention. The reduction was estimated at approximately 0.060 m³ world-equivalent per haemodialysis treatment, corresponding to 2,388.3 m³ annually at service level. When normalised at patient level, this equates to an annual saving of approximately 9.31 m³ of water use impact per patient.

Economic sustainability

Based on local waste disposal costs, the reduction in hazardous waste is estimated to generate annual cost savings of approximately €23,229 through the reduction of waste requiring hazardous waste disposal.

Social sustainability

Estimated social impact, expressed as forced labour medium-risk hours, decreased following the changes. The estimated reduction in medium risk hours is 0.0031 hours per treatment, or an estimated 124.2 hours annually based on 40,000 treatments per year. When normalised at patient level, this corresponds to an estimated reduction of approximately 0.48 hours of medium-risk forced labour per haemodialysis patient per year.

Findings from the patient focus group study, indicated that changes to improve waste segregation, such as those implemented in this change project, were generally perceived as low risk and acceptable to patients.

Approximately 20 staff attended the educational sessions. Feedback suggested that staff were previously unaware of some recycling opportunities but welcomed the guidance provided. Posters and monthly waste charts were viewed positively and helped reinforce correct waste segregation practices.

What does it mean?

Summary

The change project successfully reduced hazardous waste volume from the dialysis centre through improved waste segregation practices supported by staff education,

visual aids, and feedback mechanisms. This resulted in consistent reductions across environmental and social indicators, including carbon emissions, water use, and estimated forced labour risk hours.