

Towards environmentally sustainable healthcare: using quality improvement to deliver a net zero NHS

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Abstract

The healthcare industry is a major contributor to climate change globally. There is growing interest in using quality improvement methods to improve the sustainability of healthcare. East London NHS Foundation Trust uses quality improvement as its approach to solving complex problems. This article uses a case study methodology to describe how the trust's programme of sustainability used quality improvement at both systemic and local levels to support the organisation to reduce direct greenhouse gas emissions by 40% by 2025 and indirect emissions by 40% by 2036. Using quality improvement in a structured way enabled staff and service users to consider their contribution to sustainability and develop, test and measure ideas that were within their control. This led to an organisational reduction in gas emissions of 37% and CO₂ emissions by 14% in winter months. At a local level, three case studies showcase the accomplishments of teams who successfully reduced medication waste by 66.2kg CO₂e per year, reduced spending on single-use plastics by 54% and lowered CO₂ emissions by 10 798kg per year through the return of walking aids. Supporting structures for the programme included active and visible participation from senior stakeholders, with service users and carers involved at both strategic and operational levels, and tracking data over time. Future work should focus on creating a change package of ideas to serve as a blueprint to scale up these initiatives across the organisation.

Key words: Environmental sustainability; Healthcare; Net zero; Quality improvement

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Introduction

Globally, the healthcare industry has a substantial environmental impact, particularly in developed countries (Pichler et al, 2019; Lenzen et al, 2020; van Daalen et al, 2022). This impact has increased in recent years, with healthcare-related emissions reaching 2.7 gigatons of CO₂ equivalent, constituting 5.2% of the global emissions (van Daalen et al, 2022). The NHS accounts for 4% of England's total carbon footprint (NHS England and NHS Improvement, 2020).

In 2022, the NHS became the first healthcare system to embed net zero into legislation, aiming to reach net zero directly controllable emissions by 2040 (NHS England and NHS Improvement, 2020). Achieving this in such a large, complex system is challenging, and can only be done through collective action across the NHS.

The Royal College of Physicians (2011) has added environmental sustainability to the Institute of Medicine's six domains of quality, highlighting the importance of the environment for health. Environmental degradation contributes to a range of poor health outcomes, including cardiovascular disease (Lelieveld et al, 2019), some types of cancer (Huang et al, 2021; Smotherman et al, 2023) and asthma (Gowers et al, 2012).

Given the complex nature of healthcare, it is easy for frontline staff to feel detached from the impact of their practice on the environment and their ability to implement changes (Spooner et al, 2023). Several studies have reported that, although frontline staff understand the importance of sustainability to their patient's wellbeing, they often lack the confidence and knowledge to tackle this issue in practice (Kotcher et al, 2021; Müller et al, 2023).

Quality improvement is a practical approach to addressing complex issues, using a systematic method that involves the people closest to the issue, developing and testing creative ideas through rapid cycles of testing and learning, and measuring improvement over time (Shah, 2020). It has been used to improve a range of different areas in healthcare,

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including medication errors (Cottney, 2015), population health outcomes (Aurelio et al, 2023), safety on inpatient mental health wards (Taylor-Watt et al, 2017), access and demand across a system (Roughan and Stafford, 2019) and staff wellbeing (Aurelio et al, 2022). There has been growing interest in using quality improvement to increase sustainability (Mortimer et al, 2018), with some attempts to use a systematic approach to quality improvement, focusing mainly on the provision of care in acute hospital and paediatric NHS settings in England (Goel et al, 2020; Spooner et al, 2023). The quality of methods reporting used in these studies is limited and there are few examples from mental health, community and primary care provider organisations. To ensure consistency and clarity, it can be useful for organisations to choose one model and closely adhere to it.

Since 2014, East London NHS Foundation Trust has used quality improvement to empower its staff and service users to address complex problems. The trust provides community health, primary care and specialist health services to a population of 1.8 million people across east London, Bedfordshire and Luton. The trust has over 120 different sites and employs around 6500 members of staff.

In June 2021, East London NHS Foundation Trust declared a climate and ecological emergency and committed to taking action to raise awareness of the climate crisis and drive down emissions created by the organisation. This included a plan to use quality improvement methodology, working with all stakeholders, including patients, carers, staff, communities and partners. First, a ‘green plan’ was developed, with the overarching aim to reduce direct greenhouse gas emissions by 40% by 2025 and indirect emissions by 40% by 2036. Direct emissions include areas such as fuel and electricity used for hospital buildings, while indirect emissions include those from the production of pharmaceuticals and medical devices, as examples. Alongside this central planning approach, teams from across the trust used quality improvement to tackle issues of sustainability at a local level.

This article aims to provide a framework for how quality improvement can be used to tackle issues relating to environmental sustainability in healthcare, and set out a measurement plan that can accurately measure the impact of these efforts over time. The authors also make recommendations for teams or organisations that wish to use quality improvement to improve environmental sustainability.

Methods

A case study methodology was used to describe how East London NHS Foundation Trust have used quality improvement methodology at both a system level and local level. A collective approach is used to present multiple cases, with the aim of generating a broad understanding of the issue being considered.

East London NHS Foundation Trust uses the Model for Improvement for all quality improvement work. This model encourages teams to think about what they are trying to accomplish, how they will know that the change is an improvement and what changes can be made that will result in an improvement (Langley et al, 2009). These changes are then tested iteratively on a small scale, using plan-do-study-act cycles. The standard sequence of improvement is shown in **Figure 1**.

Teams begin by using available data (such as routinely collected service data, staff or service user feedback) to identify a quality issue. To address environmental sustainability, teams considered issues such as the environmental impact of using certain medications or dressings, or emissions from patient transport. Once an issue has been identified, the teams spent time deeply understanding the problem using a range of well-defined tools, such as fishbone diagrams, to help identify the different contributing factors (Renger et al, 2016).

Teams then developed an aim and driver diagram for their quality improvement project to tackle the identified environment-related problem. Aims specified what needed to improve, how much it should be improved by and in what timeframe (Langley et al, 2009). A driver diagram, or theory of change, was then created – this is a one-page visual description of the key drivers and change ideas that are believed to help the work achieve its aim (Provost and Bennet, 2015). Drivers are broken down into primary drivers (the large, overarching factors that impact an aim) and secondary drivers (more specific factors that impact the primary

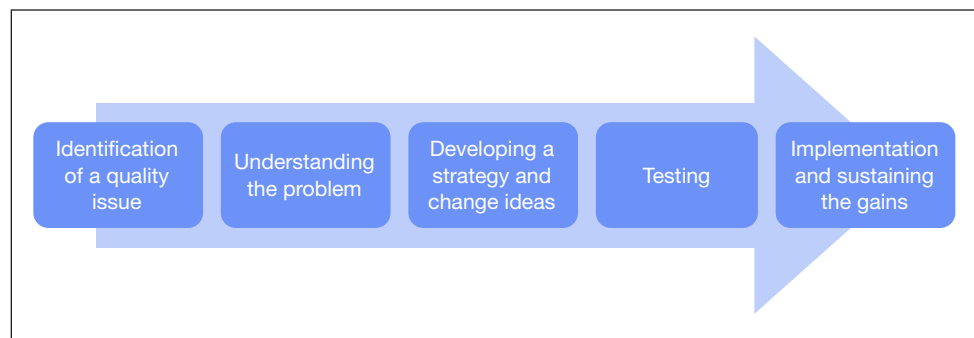


Figure 1. East London NHS Foundation Trust's standard sequence of improvement.

drivers), describing the key structures, processes and culture that need to be influenced to meet an aim (Provost and Bennet, 2015).

Once the driver diagram was created, the teams prioritised change ideas for testing. This process was often based on the ease of testing vs the potential impact that the idea may have on the system. The ideas were then tested using plan-do-study-act cycles. To evaluate whether the changes made had resulted in an improvement, quantitative data were displayed over time using statistical process control charts. Standard rules developed by the Institute for Healthcare Improvement were used to analyse the charts and determine whether the change being tested had resulted in an improvement (Provost and Murray, 2022). Qualitative data were also used to provide insights into how the change had been experienced (Shah, 2019).

Planning at system level

The quality improvement programme conducted at East London NHS Foundation Trust was governed by a senior programme sponsor, with a senior member of the team acting as a quality improvement coach, offering specialist methodological advice and oversight. A 'green team' oversaw the daily running of the programme. This team included a people participation lead for environmental sustainability, two consultant psychiatrists and an assistant director of estates.

To understand the source of the biggest greenhouse gas emissions, Greener NHS (the sustainability arm of NHS England) supported the team to calculate the trust's overall carbon outputs in 2019. This was put into a Pareto chart (**Figure 2**), showing that the largest proportion of emissions came from sources classified as 'other supply chain'. This was followed by personal travel, non-medical equipment, medicines and chemicals, and building energy.

This information informed the 'green plan', with the aim of reducing direct and indirect carbon emissions by 40%, by 2025 and 2036 respectively. Based on the data shown in **Figure 2**, six key areas were identified as essential to achieving the plan's aim: workforce and system leadership; travel and transport; sustainable models of care; procurement; medicines; estates and facilities. Six team-based workshops were held (one for each of the six areas) to develop more detailed individual theories of change for each area. Key stakeholders for each workstream, including staff, senior managers and team leaders, used the nominal group technique (a structured brainstorming and consensus-building approach; Manera et al, 2019) to generate ideas that they believed would influence the aim. Grouping these ideas formed the initial basis of the primary and secondary drivers for each workstream (**Appendix 1**).

The Greener NHS national programme (NHS England, 2021) provided a 2019 carbon footprint baseline to all NHS organisations, from which progress could be understood. This was used as a baseline for carbon reduction in this quality improvement project. Several meetings between the green team members and the quality improvement coach were held, where a set of measures were developed to track improvement across the six workstreams. The outcome measures are shown in **Table 1**.

The programme consisted of large-scale system-wide changes, alongside individual quality improvement projects at a local level. Some examples of these are shown in **Table 2**.

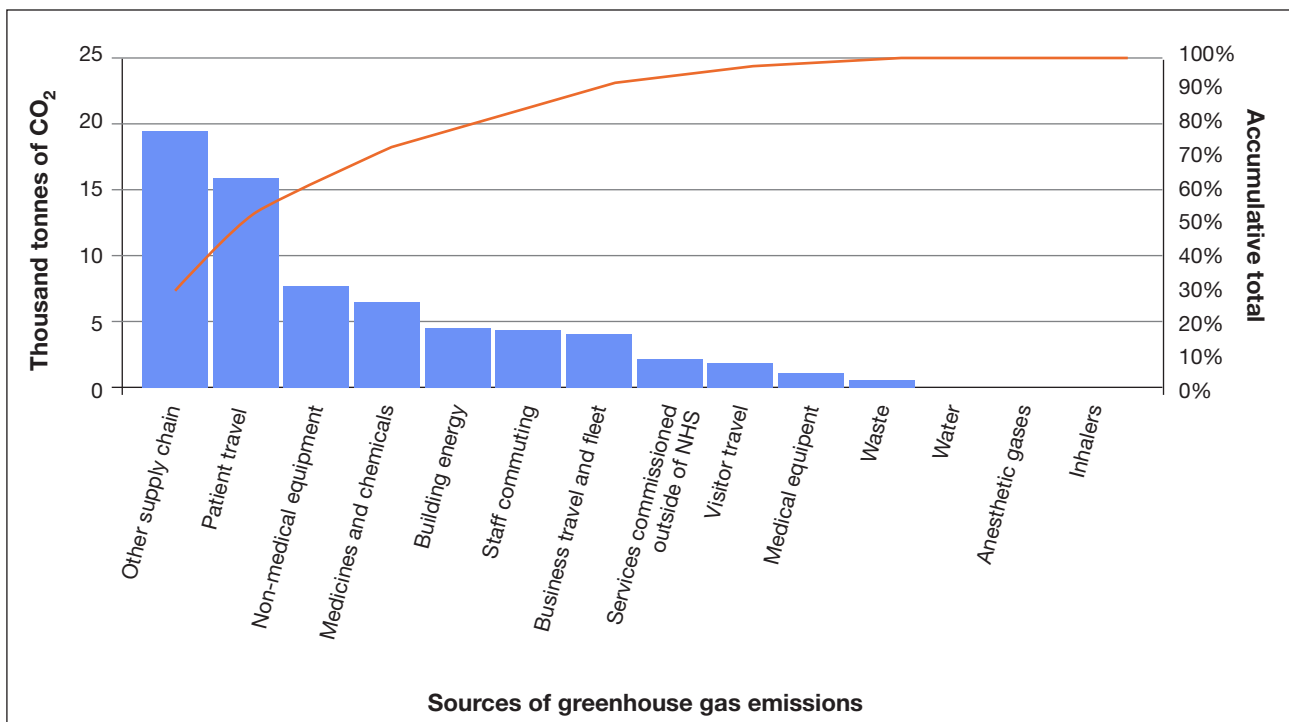


Figure 2. East London NHS Foundation Trust’s estimated emissions profile in 2019, shown using a Pareto chart. Blue bars=thousand tonnes of CO₂; orange line=accumulative total.

Table 1. Outcome measures for the East London NHS Foundation Trust quality improvement programme

Measure	Operational definition
Energy consumption (kWh)	Amount of energy used across the trust per month for specified utilities (gas, electricity, water)
CO ₂ (tonnes)	Tonnes of CO ₂ created from using utilities (gas and electricity) across the trust per month
Mileage	Total miles that staff claimed per month across the trust, divided by total days claimed for in that month, depending on which month the claim was made

Ensuring active and equitable participation from service users and carers in improvement work lies at the core of East London NHS Foundation Trust’s operational strategy. The advantages of this approach have been extensively documented, with projects featuring service user involvement being four times more likely to reach their aim (Kostal and Shah, 2021). East London NHS Foundation Trust already had a well-established people participation team at the start of this project, and a collaborative effort was prioritised throughout the programme. This began with a service user who had a particular interest in environmental sustainability being invited to governance meetings, with trust employees actively seeking their input on priorities. In June 2023, a service user was appointed as people participation lead for environmental sustainability to further facilitate service user involvement in the climate network. By December 2023, 37 service users and carers had actively contributed to the trust’s sustainability initiatives, participating in various capacities across workstreams, climate network meetings and quality improvement projects.

Results

The team tracked improvement across the programme measures. From beginning of the programme in April 2022 to December 2023, gas consumption has been reduced by 37% in the winter months (Figure 3), while carbon dioxide emissions have been reduced by 14% (Figure 4).

Table 2. System-wide changes and associated quality improvement projects implemented to improve environmental sustainability

Workstream	System-wide changes	Associated quality improvement project	Measures
Medicines	<ul style="list-style-type: none"> • Use of cargo bikes for delivering small quantities of medicine to London sites • Switch from plastic to paper bags to supply medicines on inpatient wards 	<ul style="list-style-type: none"> • Reduce medication waste in the Bedford crisis service 	<ul style="list-style-type: none"> • Total CO₂ by medication used • Medication waste disposed (kgs)
Procurement	<ul style="list-style-type: none"> • Adoption of the social value model, where all NHS tenders must include a minimum of 10% scoring criteria in all procurements to assess how suppliers will contribute to the NHS net zero targets 	<ul style="list-style-type: none"> • Decrease the use of single-use cutlery in forensics sites • Increase recycling of walking aids in community health services • Reducing the use of inappropriate nonsterile gloves across the trust 	<ul style="list-style-type: none"> • Percentage of contracts and suppliers adhering to 10% social value weighting • Number of projects reducing waste from single-use items
Estates and facilities	<ul style="list-style-type: none"> • Adoption of agile working such as working from home when possible • Estates optimisation, such as vacating building spaces that were not fully used and moving these teams to other existing spaces to reduce the use of heating • Improvement of insulation and windows across estates • Switch to 100% renewable energy for all sites directly managed by the trust 	<ul style="list-style-type: none"> • Increasing the provision of energy data at each trust site 	<ul style="list-style-type: none"> • Consumption of gas, electricity and water (Kw/h)
Travel and transport	<ul style="list-style-type: none"> • Establishment of a cycle-to-work scheme • Installation of cycling infrastructure across several sites 	<ul style="list-style-type: none"> • Reducing mileage claims across the trust • A quality improvement project to reduce the emissions of vehicles used by forensic services 	<ul style="list-style-type: none"> • Total CO₂ use for transport (kg) • Staff miles used
Workforce and leadership	<ul style="list-style-type: none"> • Appointment of a board lead for environment and sustainability • Employment of a people participation lead for environmental sustainability • Sustainability messages sent across trust communications and intranet, with information and opportunities for action 	<ul style="list-style-type: none"> • Environmental sustainability training to increase awareness and understanding, made available to all staff and service users across the trust 	<ul style="list-style-type: none"> • Number of people attending training sessions • Number of teams adopting a green plan
Sustainable models of care	<ul style="list-style-type: none"> • Increasing offer of remote consultations where appropriate • Commitment to working as an anchor institution in local communities, including increasing the number of functional green spaces or gardens across the trust and increasing the number of apprenticeships offered in the estates team 	<ul style="list-style-type: none"> • Reducing printing across the trust 	<ul style="list-style-type: none"> • Number of remote consultations • Number of nature-based interventions • Number of apprenticeships offered

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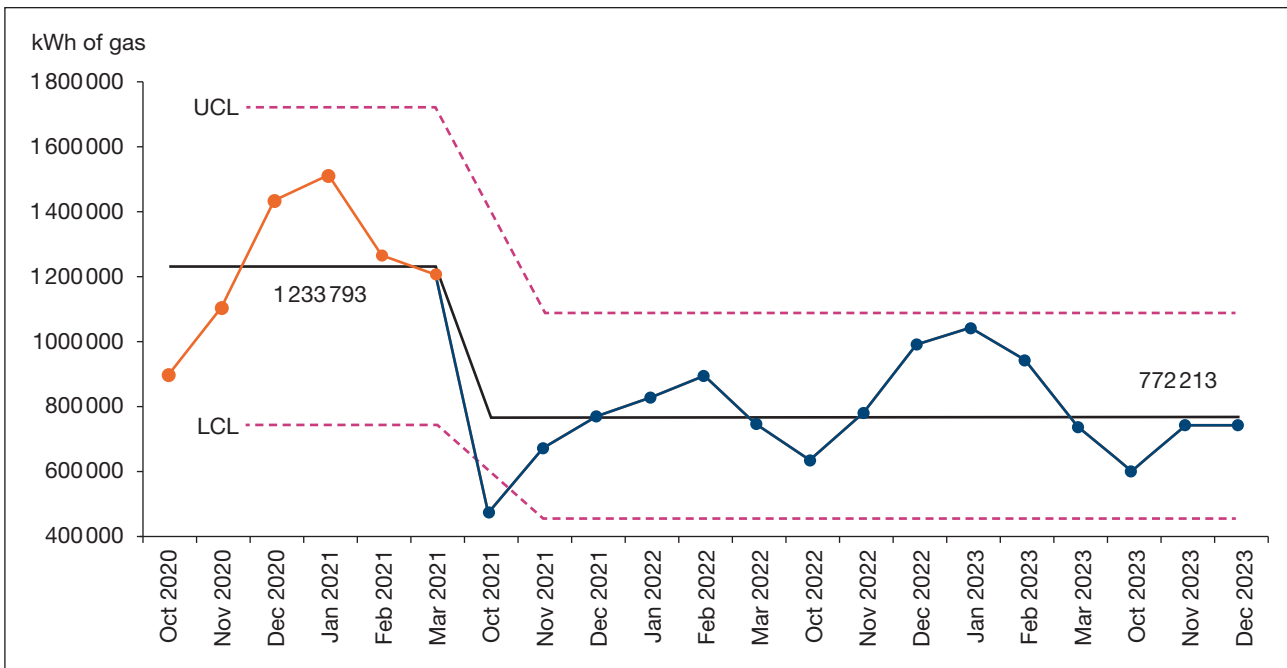


Figure 3. Statistical process control chart showing the trust’s gas consumption in the winter months from October 2020 to December 2023. Interventions to reduce consumption began in April 2022. LCL=lower control limit; UCL=upper control limit; orange solid line=baseline data; blue solid line=testing data; solid black line=mean.

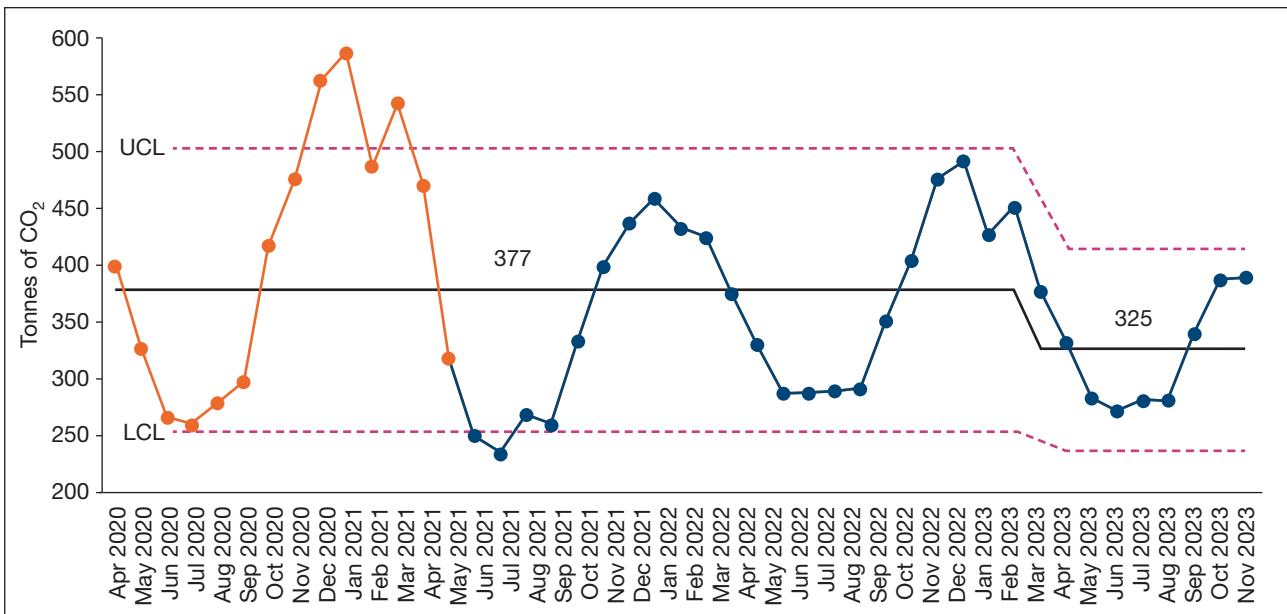


Figure 4. Statistical process control chart showing the trust’s monthly CO2 emissions from April 2020 to November 2023. Interventions to reduce emissions began in April 2022. LCL=lower control limit; UCL=upper control limit; orange solid line=baseline data; blue solid line=testing data; solid black line=mean.

No improvements were seen in the trust’s water and electricity consumption during the project. This programme of work is ongoing, with many other system- and local-level changes due to be tested. These include providing education around switching computers off at night, installing sensor lighting in the trust’s estates and repurposing empty floors and relocating employees from underused floors to save energy costs. The team will continue to track and monitor their measures to understand which ideas will result in improvement.

Case study one: a forensic ward service user-led quality improvement project

A team from a 16-bed male forensic rehabilitation unit carried out a service user-led quality improvement project from May 2022 to May 2023. The service provides care for people

recovering from a mental health crisis, with a focus on supporting their rehabilitation back into the community, rather than treating acute illness. As a result, the average length of stay is longer than in other wards on the unit.

The team identified that single-use cutlery is a global challenge for healthcare systems, leading to plastic pollution and putting strain on hospital waste management systems (Hahladakis et al, 2018). This exacerbates the environmental burden of healthcare and often undermines hospitals’ sustainability efforts (Rizan et al, 2020). The team’s initiative aimed to reduce the use of single-use cutlery, cups and plates by 80% in 1 year. The project was driven by service users, who had highlighted the excessive plastic waste during meal times and beverage consumption. The quality improvement team was led by a service user and supported by the ward manager and staff nurse. A driver diagram showing the theory of change for this project is shown in **Figure 5**.

Several change ideas were tested, aiming to foster sustainable practices and personal responsibility. The changes focused on purchasing unbreakable cups, plates and cutlery for each service user. There were plans to personalise the plates and cups, but unfortunately this was not possible because of the strict safety regulations on the ward. Each day, service users were verbally encouraged to bring their non-disposable plates and cutlery to meals. Those who did not were prompted to retrieve them from their rooms, emphasising the importance of reducing disposable items. To foster personal responsibility, each day one service user was assigned to collect and wash the reusable items. As the project progressed, service users extended this practice to medication rounds, opting to use their reusable cups instead of disposables.

The project encountered challenges, including the loss of cutlery, necessitating additional purchases. However, over time, the service users adapted and the habit of bringing and washing reusable items became business as usual. This transition highlighted both the capacity for behavioural change and the positive impact of consistent reinforcement.

The ward reduced their monthly ordering costs of single-use cups, cutlery and plates by 54% during the project, from an average of £173 per month at baseline (May 2022) to £79 per month at the end of testing in May 2023 (**Figure 6**).

Case study two: reducing medication waste in a mental health crisis pathway team

A mental health crisis pathway team carried out a quality improvement project to reduce medication waste from their service. This team provides services for individuals experiencing a mental health crisis, such as psychosis, severe self-harm or attempted suicide, aiming to support them to remain at home, rather than being admitted to a psychiatric inpatient setting.

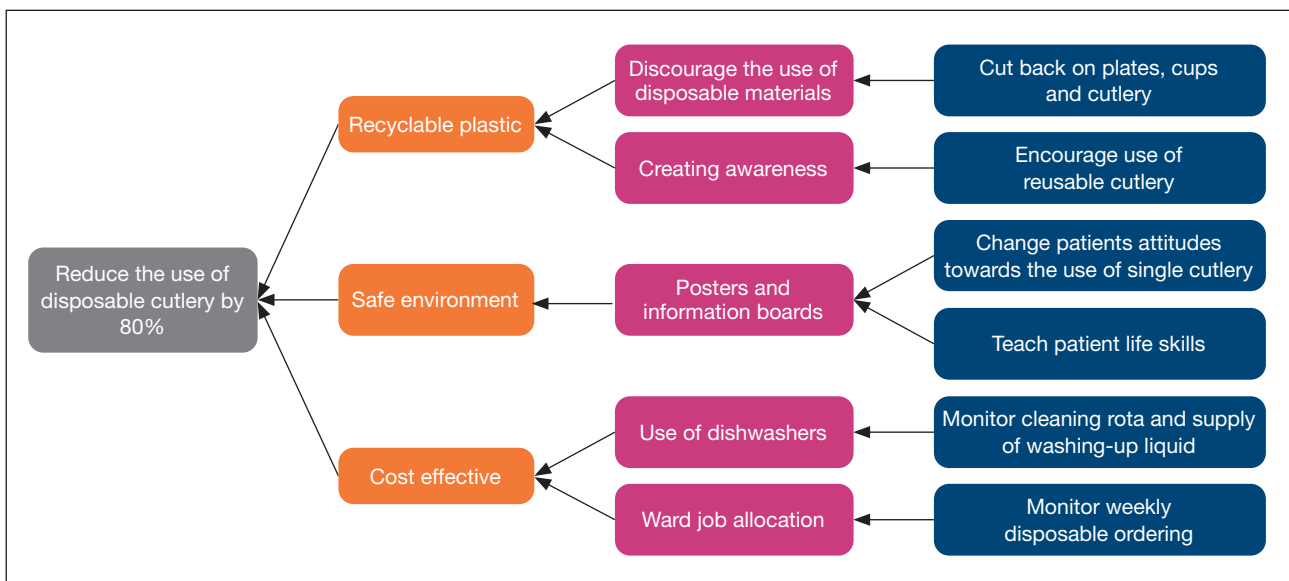


Figure 5. Driver diagram for the disposable cutlery quality improvement project carried out on a male forensic rehabilitation ward from May 2022 to May 2023.

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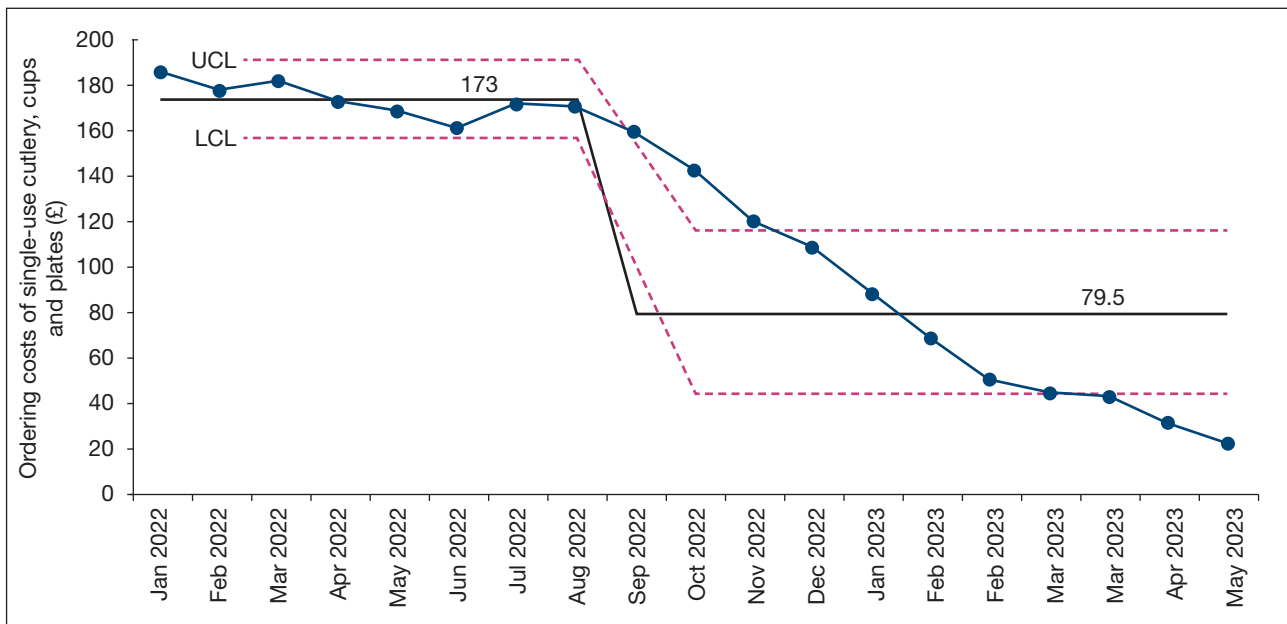


Figure 6. Statistical process control chart showing the monthly ordering costs of single-use cutlery, cups and plates on the forensic rehabilitation ward. The quality improvement project began in May 2022. LCL=lower control limit; UCL=upper control limit; orange solid line=baseline data; blue solid line=testing data; solid black line=mean.

The team identified that medicines can be harmful to the environment (Paut Kusturica et al, 2022) and are estimated to make up 25% of all NHS carbon emissions, mainly from the production, procurement, transport and use of drugs (NHS England and NHS Improvement, 2020). Financially, medication waste costs the NHS an estimated £300 million per year (NHS England, 2015). A quality improvement project team was formed, including pharmacists, registered mental health nurses, clinical leads and support staff. The project began in November 2022 and aimed to reduce medication waste in the crisis team by 25% by August 2023. The driver diagram showing the theory of change for this project is shown in **Figure 7**.

Several change ideas were tested using plan-do-study-act cycles. Ideas included:

- Adding more information about medication to the team's home visit templates (used to structure home visits)
- Contacting patients who did not pick up their medication in the allocated time by telephone or text message to prompt them to complete the collection before destroying the medication
- Training staff to only order medication when they received confirmation that the service user needed it, rather than pre-emptively.

Data were collected on the number of tablets destroyed every 2-week period by the service. During the baseline period (November 2022 to January 2023), an average of 119 tablets were destroyed every 2 weeks. By the end of the project in October 2023, this had reduced to an average of 4.4 tablets every 2 weeks, representing a 95% reduction (**Figure 8**). The team felt that the change ideas that may have had the biggest impact were the changes to the home visit template and calling patients to collect medication before destroying it.

The reduction in the number of tablets destroyed led to cost savings calculated at £517 per year. Although calculating reductions in carbon emissions is challenging (Booth, 2022), the National Institute for Health and Care Excellence (2024) has estimated that for every £1 spent on pharmaceuticals, 0.1558kg CO₂ of greenhouse gas emissions per year are generated. Using these assumptions, the reduction in medication waste was calculated as saving approximately 66.2kg of CO₂ equivalent per year. This roughly equates to the emissions from travelling 210 miles in a car or charging 9797 smartphones (United States Environmental Protection Agency, 2024).

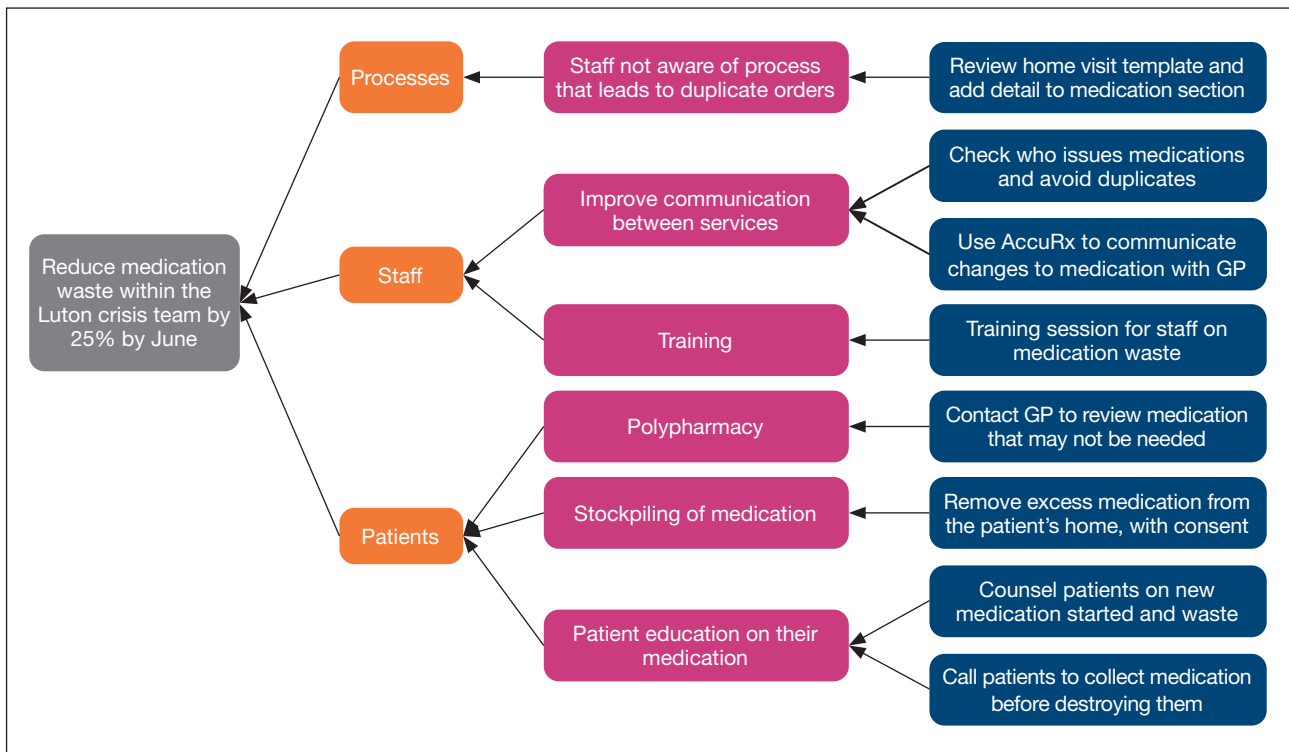


Figure 7. Driver diagram for the medication waste reduction quality improvement project carried out by a mental health crisis pathway team.

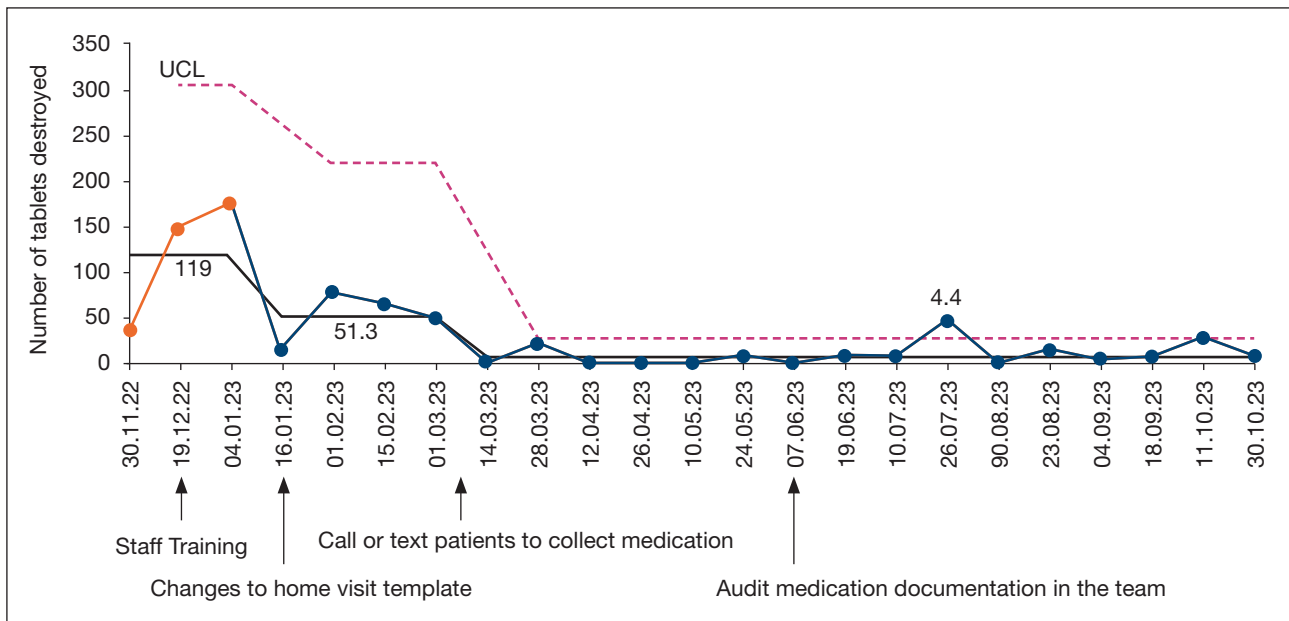


Figure 8. Statistical process control chart showing the number of tablets destroyed each fortnight by the mental health crisis pathway service, with arrows indicating implementation of change ideas. UCL=upper control limit; orange solid line=baseline data; blue solid line=testing data; solid black line=mean.

Case study three: reducing waste from single-use walking aids

The trust’s community musculoskeletal physiotherapy service, located in Newham, carried out a quality improvement project aiming to reduce the number of single-use walking aids among their service users. This service provides treatment and support for people experiencing a range of conditions, including neck pain, osteoarthritis, lower back pain, sporting injuries, and wrist, elbow and shoulder pain. Walking aids, such as crutches, walking sticks and walking frames, are often provided to these service users, with

crutches costing the service £10 each. The team noted that patients were not expected to return the walking aids they were issued and there was no process in place for receiving, inspecting, or recycling used walking aids. Although relatively cheap to manufacture, the aids thus contributed significantly to the service’s carbon emissions. NHS England’s (2024) recommendations on the safe and sustainable management of healthcare waste noted that many disability aids are recyclable and can be donated for reuse, refurbishment or recycling. The guidance also suggested that the suitability of items should be assessed for reuse before they are redistributed.

The quality improvement project began in July 2022, with the aim of recycling an average of 16 walking aids each month by March 2023. The driver diagram for the project is shown in Figure 9.

The team initially created 72 change ideas, but chose to focus on eliminating waste through reusing and recycling. The project team tested the idea of asking service users to return their walking aids when they no longer needed them, which represented a shift in thinking and practice for both staff and service users. The team tested several methods, including sending text message reminders to service users with walking aids and putting up posters in clinics.

Throughout the project, the team collected data on the number of walking aids returned to the department each week (Figure 10). During the baseline period (July 2022) no walking aids were returned. This increased to an average of six aids being returned each week (equating to a total of 341) by the end of testing in December 2023. Using the Greener NHS Walking Aids Carbon Calculator, this was calculated as a saving of over 10 798kg of CO₂ equivalent, which roughly equates to the annual emissions of two cars. The trust’s account also indicated a cost saving for the service of approximately £3474.

However, the team saw a large amount of variation in the number of walking aids returned across the period, with a sustained low number of returns in June and July 2023. The team were unable to identify a clear reason for this.

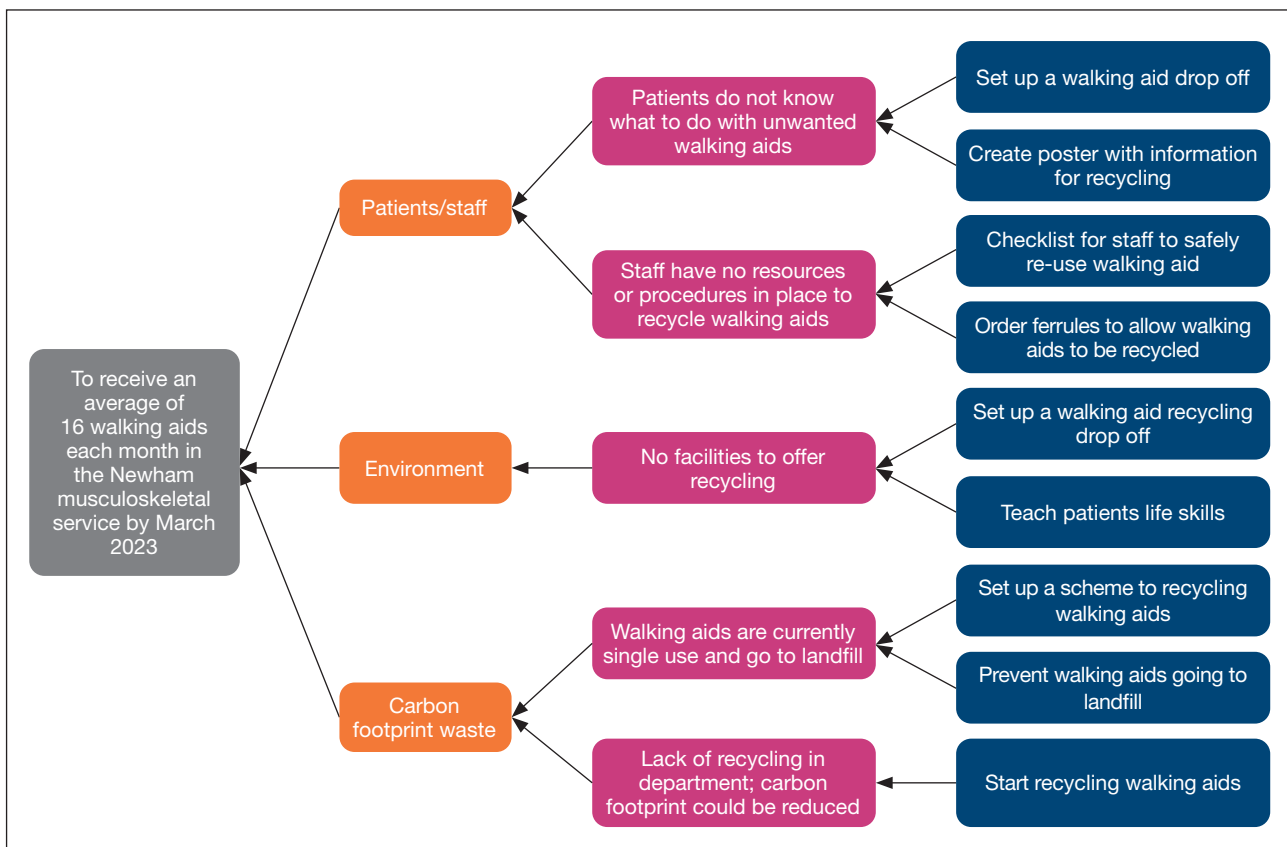


Figure 9. Driver diagram for the walking aid quality improvement project at the Newham musculoskeletal service.

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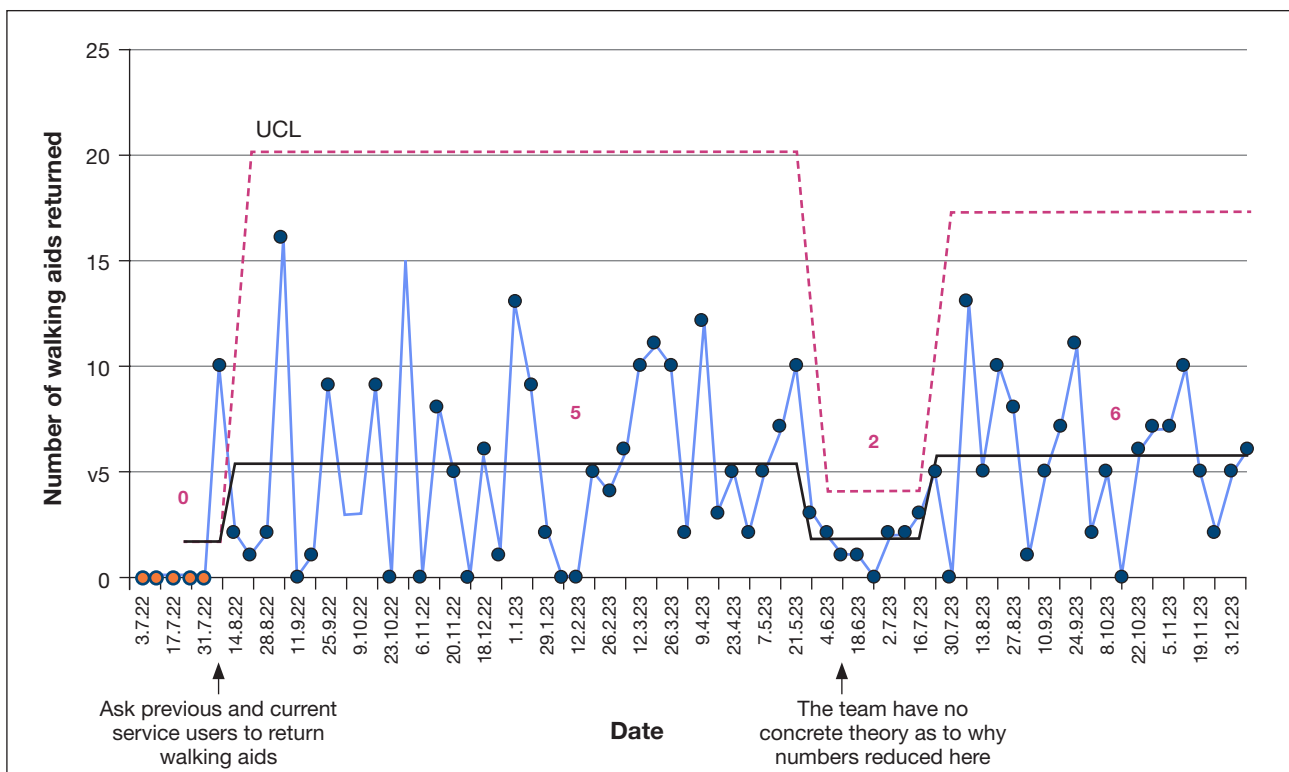


Figure 10. Statistical process control chart showing the average number of walking aids returned each week between July 2022 and October 2023. Interventions to encourage the return of aids began in August 2022. UCL=upper control limit; orange solid line=baseline data; blue solid line=testing data; solid black line=mean.

Discussion

Using quality improvement methods to enhance the environmental sustainability of healthcare systems has been recognised as a priority for healthcare organisations (Mannion et al, 2015). The programme carried out at East London NHS Foundation Trust used a systematic approach that incorporated both system-level changes and targeted projects at a local level, with work following the trust’s sequence of improvement. This approach is consistent with established quality improvement frameworks (Langley et al, 2009) and aligns with large-scale organisational change management principles, which can increase the likelihood of sustained improvement (Braithwaite et al, 2017).

The trust developed their green plan to guide strategic decision making and provide a framework to ensure alignment with broader organisational goals. Delineation of workstreams within the green plan aimed to facilitate targeted change ideas at both systemic and local levels. Tailoring initiatives in this way can enhance operational efficiency and resource allocation, while facilitating accountability (United Nations Framework Convention on Climate Change, 2022).

Measuring data over time played a pivotal role in tracking the organisation’s progress and assessing the impact of change ideas at systemic and local level. Despite this, it is widely acknowledged that the accurate attribution of reductions in carbon emissions in complex healthcare systems is difficult (Royal College of Psychiatrists, 2021). As a result, the programme team used proxy outcomes with the expectation that the application of sustainability principles would result in reduced emissions, as well as contributing to the wider goal of developing a more sustainable healthcare service. The Pareto chart created at the start of the system-wide project showed that a large proportion of emissions were coming from personal travel, other supply chain activities and estates, which informed the decision to monitor energy consumption, CO₂ emissions and mileage. This emphasis on data-driven decision making aligns with the principles of continuous improvement and can enable healthcare organisations to identify further areas for refinement and improvement (Nolan et al, 2000).

The overall reductions in CO₂ emissions and gas consumption at the trust highlights tangible progress towards the programme's overarching aim. Establishing a dedicated sustainability steering group, appointing a board lead for environmental sustainability and recruiting clinical leads and a people participation lead for climate action were done to demonstrate commitment and foster a culture of sustainability throughout the organisation. Ensuring the active and visible participation of senior stakeholders is key to providing clear leadership and direction, enhancing the legitimacy of change efforts and fostering employee trust (Greenhalgh and Papoutsi, 2018). However, the hierarchical nature of senior stakeholder involvement may inadvertently stifle innovation and creativity (NHS England, 2017). Therefore, it was important to give teams the local autonomy to use quality improvement methods to test ideas that were within their control. The authors believe that these team-level changes made the organisation more sustainable. Bridging the gap between the different levels of an organisation is important for motivation, ownership and creativity, all of which are needed to move systems towards a sustainability goal (Greenhalgh and Papoutsi, 2018). The three case studies discussed in this article all achieved a level of success towards their sustainability aims, but also show how this approach can foster a culture of continuous improvement towards environmental sustainability.

Involving service users in the improvement work was a key consideration throughout this programme. Engaging service users and carers at both strategic and operational levels not only enhances transparency and accountability, but also ensures that sustainability efforts are aligned with the needs and values of the communities served (Batalden, 2018). By participating in environmental sustainability work, service users gained insight into the environmental impact of healthcare, which may empower them to adopt more sustainable behaviours in their daily lives. That said, healthcare organisations wishing to adopt this approach must be mindful that engagement with service users is meaningful and productive. This includes paying people for their time, ensuring transparent communication and facilitating active involvement in decision making, as opposed to the more traditional approaches like consultation (Ocloo et al, 2017).

Future environmental sustainability work at the trust will focus on creating a change package comprised of the ideas shown to have resulted in improvement. This will serve as a blueprint for driving improvement and spreading ideas across the organisation. Change packages have been used previously as part of quality improvement initiatives at the authors' trust and in other healthcare settings (Scottish Government, 2022), and aim to provide a standardised framework, offer guidance to teams and enhance the consistency and effectiveness of their improvement efforts (Barker et al, 2016).

Evidence suggests that embedding sustainability into healthcare strategy poses challenges such as competing priorities, lack of awareness among stakeholders and resource limitations (Walugembe et al, 2019), all of which were encountered during the sustainability work carried out at East London NHS Foundation Trust. To overcome these issues, strong leadership, stakeholder engagement and using a systematic approach to integrate sustainability into organisational culture is imperative (Ramirez et al, 2013). At East London NHS Foundation Trust, continuous efforts were made to ensure that sustainability measures were incorporated into the organisation's annual plans. The green team regularly attended annual planning events and supported the organisation to think about their environmental sustainability commitments and include these in their plans.

Limitations

This programme of work was conducted at just one NHS trust, which may represent a possible limitation to the generalisability of the findings and recommendations. Another limitation of the work is the ongoing challenge of collecting accurate mileage data. The current system allows staff to submit mileage claims years after their journey was made, making it difficult to determine whether reductions in mileage were observed. Historically, healthcare organisations have relied on manual methods to collect and track mileage, such as spreadsheets or paper logs. Manual methods of data collection in healthcare are prone to error (Dixon-Woods et al, 2012). Linking mileage data with patient records or billing systems can be an effective way to reduce reporting inaccuracies (Lorenz et al, 2001). Further system-level work is required to address this limitation.

Key points

- Using quality improvement in a structured way can enable staff and service users to consider their contribution to environmental sustainability and develop, test and measure ideas for improvement.
- It is crucial to leverage existing structures and processes, such as visible and engaged senior leadership, and involve service users at both strategic and operational levels in quality improvement sustainability work.
- Developing and monitoring a comprehensive measurement plan at both systemic and local levels is important to evidence the impact of efforts to reduce greenhouse gas emissions in healthcare organisations.

Although improvements were seen in the trust's gas consumption, no improvements were seen in electricity and water consumption. Therefore, from the case studies discussed in this article, it is not possible to conclude whether the approach taken could also lead to improvements in these elements of environmental sustainability. However, this work is ongoing, with specific change ideas being tested to target these elements.

Conclusions

Despite the wide range of methods used to improve sustainability in healthcare, this programme has shown the importance of using an established organisational approach to quality improvement. Leveraging existing structures and processes, such as visible and engaged senior leadership, involving service users at both strategic and organisational level, and developing and monitoring a comprehensive measurement plan at systemic and local level, enabled the programme to make positive changes to areas with a high environmental impact, achieving reductions in greenhouse gas emissions.

While these results represent a promising step forward, work to reduce the trust's environmental impact is ongoing and requires continued effort. Systematically documenting and sharing lessons learned, best practice and successful change ideas in the form of a change package could facilitate the spread and scale up of effective strategies across the organisation. This will be a pivotal component of East London NHS Foundation Trust's ongoing approach.

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Conflicts of interest

The authors declare that there are no conflicts of interest.

Declaration of funding

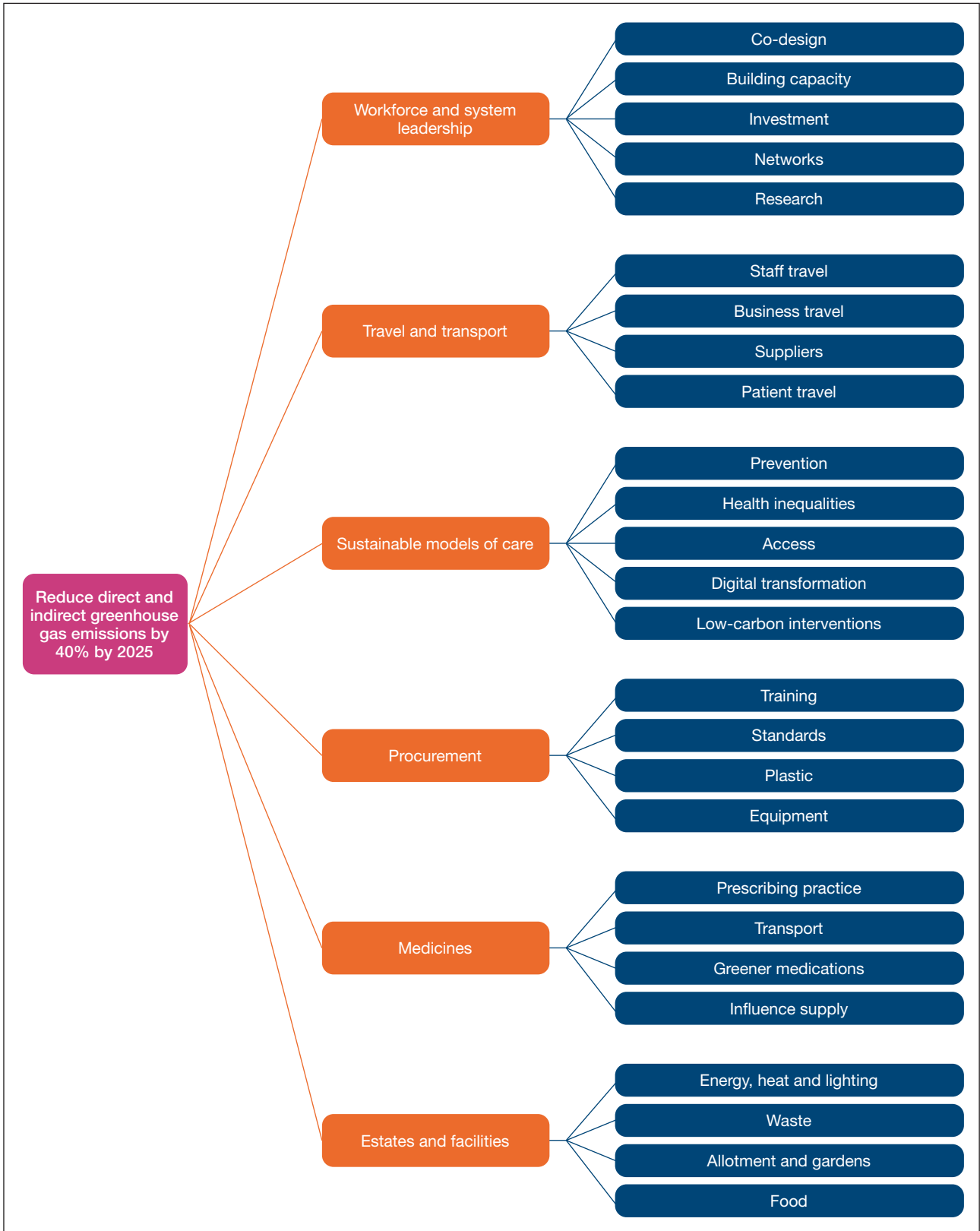
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Appendix 1. Green plan driver diagram for system-level improvement to sustainability.

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