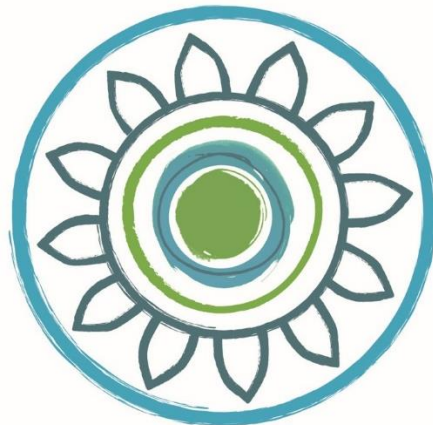




GREEN TEAM COMPETITION

CENTRE FOR SUSTAINABLE HEALTHCARE



2023 IMPACT REPORT

South Warwickshire University

NHS Foundation Trust

GREEN TEAM COMPETITION

POTENTIAL YEARLY SAVINGS FROM GREEN WARD COMPETITION PROJECTS



£116,194



7,032 CO₂e

CENTRE FOR SUSTAINABLE HEALTHCARE

CARBON SAVINGS EQUIVALENT TO



The same amount as 281 mature trees absorb on average per year



20,768 miles in an average car
(32 return trips between South Warwickshire and Glasgow)

CENTRE FOR SUSTAINABLE HEALTHCARE

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REDUCING CONTINENCE PRODUCTS WASTE, NEURO-REHAB TEAM

Team Members:

- Kathy Wagstaff, Clinical Lead Nurse.
- Abbie Cooke and Gill Turberfield, Ward Coordinators.
- Babitta Rani, Sandra Timms Ward Clerks.
- Avril Baker, Nicola Compton & Fiona Franklin, Housekeepers



Background:

Continence is important for maintaining health, dignity and wellbeing. For many patients in the neurorehabilitation setting, they will have varied levels of incontinence and require continence products and support. While individual continence products are relatively low in cost, as a team we observed many products to be wasted and disposed of without patient use, contributing unnecessarily to our Trust carbon footprint.

Leamington Spa Hospital houses the Central England Rehabilitation Unit (CERU), which offers neuro rehabilitation to adults following acquired brain injury. 3 of 4 wards from the Neurorehabilitation service contributed to this project, 2 Acquired Brain injury rehabilitation wards (42 beds) and 1 stroke rehabilitation ward (20 beds). Our team included the Clinical Lead Nurse, Housekeepers, ward coordinators and ward clerks.

Specific Aims:

The aim of the project was to understand how many vernicare continence items were being disposed of unused, and to reduce this wastage via education to the clinical team.

Methods:

We first studied our current practice to identify the amount of items that were being wasted. Initially, we reviewed waste associated with continence pads and wipes (Tena and Conti brands) believing this to be a large issue. However, we established that additional stock left with patients was routinely given to patients at discharge. Assuming patients would go on to use this stock, there would be no unused products wasted. While a reduction in stock sent home with patients would lead to a financial saving for the trust, we switched our focus to products that are being disposed of unused to increase our environmental impact and plan to target this area of financial waste at another time.

We next targeted our Vernicare, or 'pulp' products which we often observed to be left in non-patient identifying or secured areas (e.g. windowsill, bathroom). When left out, these items would need to be disposed of either via macerator or incineration.

The 6 items targeted include:

- Male urinal
- Female urinal
- Bed pan holder
- Bed pan liner
- Vomit bowl
- Wash bowl

An observational audit was completed for six weeks. The ward Housekeepers were engaged to carry out these observations as a) they are responsible for stock management and ideally placed to know what items were being overused or wasted and b) to ensure our data was accurate, as clinical members of the team may

change their behaviour if audits were carried out by the clinical leads and coordinators who are familiar faces and leads to of the clinical staff. Our audit captured how many products were not assigned to an individual patient and required disposal with the ward admin teams engaged to collate and input project data for the team.

Changes implemented

After 4 weeks we presented our findings to the clinical staff in the form of posters that were displayed next to the products, providing a visual reminder when reaching for a product.

Planned changes

We plan to continue observations weekly to keep an up to date record of the number of items that have been wasted. This will support us to ensure that our change is embedding into everyday practice for the team.

We plan to continue to remind staff to be mindful of how they manage stock at nursing handover meetings 3 times a day. We will do this by providing information on how many items were wasted (either during the 6 week period or with more up to date data) and asking them to think about how they could reduce this number.

We also plan to shadow staff when responding to a patient call, to ensure that when a patient rings the call bell or has scheduled personal care, the responding staff are following our policy to check the patients' personal supply at the bedside before collecting more stock.

Measurement:

Patient outcomes:

Patients will still receive the continence products they require, so this project will not impact on patient outcomes and clinical care.

Environmental sustainability:

We completed a process based (bottom up) carbon footprint for each of the six continence products included in the project to identify the CO₂e emissions of each product. This included weighing and applying emission factors to the materials of the products and layers of packaging, disposal and transport of products from the manufacturer to our hospital site. Carbon emissions associated with disposal via the macerator were estimated based on macerator energy and water consumption per item disposal.

We estimated the following carbon emissions per item:

- Male urinal: 0.08 kgCO₂e
- Female urinal: 0.08 kgCO₂e
- Bed pan holder: 0.06 kgCO₂e
- Bed pan liner: 0.06 kgCO₂e
- Vomit bowl: 0.09 kgCO₂e
- Wash bowl: 0.1 kgCO₂e

To calculate our savings we used an average emission factor per item of 0.07833 kgCO₂e.

Economic sustainability:

The cost of each Vernacare product was obtained from our procurement system. As multiple products are delivered in one box, we divided the total cost by the number of items for a cost per item as demonstrated below

- Male urinal 0.25p
- Female urinal 0.71p
- Bed pan holder 0.24p
- Bed pan liner 0.17p

- Vomit bowl 0.14p
- Wash bowl 0.24p

We anticipate a financial saving from waste disposal as our macerator will require less cycles per day.

Social sustainability:

Social sustainability was not formally measured as part of the project.

Results:

Patient outcomes:

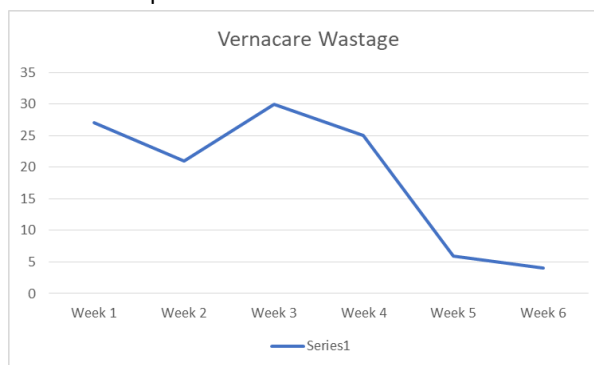
Patients will still receive the continence products they require, so this project will not impact on patient outcomes and clinical care.

Environmental sustainability:

Based on our 6 week audit across 3 wards, an average of 8.5 products per day were being disposed of unused per ward, equating to 25.5 items a day, 178.5 items a week, or 9,282 items per year.

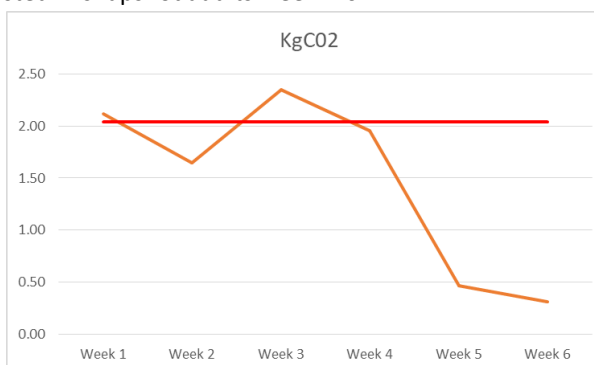
Our data demonstrates that following our change implementation at week 4, the number of items wasted reduced from an average of 25.5 items per day to 5 items per day, a saving of 20.5 items per day.

Table 1: Number of items wasted in snapshot audits week 1-6.



A reduction of 20.5 items per day equates to 1.61 kgCO₂e per day. Projected across a year, this is an anticipated saving of 588 kgCO₂e, equivalent to driving 1,725 miles in an average car.

Table 2: CO₂e of items wasted in snapshot audits week 1-6.



This is a reduction of 80% of total Vernacare product wastage since the project began.

Economic sustainability:

It will take time to see a reduction in ordering reflected in our procurement system however expect to see a significant reduction in the number of Vernacare products being ordered in the near future. Based on an average cost of 0.29p per item, a reduction in 20.5 items per day is calculated at £5.95 per day. Projected across a year, this is an anticipated annual saving of £2,172.

An additional £50.37 would be saved per year from a reduction in macerator electricity and water consumption.

Total annual saving = £2,222.37

Social sustainability:

While our green team was formed by members of staff who regularly raised areas of wastage and were seeking to reduce waste, the project enabled us to engage the wider neuro rehab team, increasing awareness of how wastage not only impacts on the clinical budget but also the environment. It is too early yet to see the real long term cost savings but it has set the team thinking about other areas where they can make improvements.

Our long term aim is to create a working environment where the team considers carbon reduction alongside their everyday clinical work. This can bring additional benefits to our team, such as reducing time taken from over-ordering of stock, keeping stock levels at a manageable level and creating a tidier work environment.

Discussion:

Our data demonstrates that our intervention has successfully caused a decrease in the wastage of Pulp products across 3 wards by staff taking onboard the information shared and making wiser choices when collecting stock to take to the patient's bedside.

The main challenge of the project was to keep the data collection secret so the clinical staff did not make any changes before the baseline data results were published and shared with them.

We plan to continue to monitor usage using snapshot audits and if the trend continues as per the current results we are aiming to roll this method out across other continence products to increase our savings.

Conclusions:

This project has given us the opportunity to look at reducing our carbon footprint in Neurorehabilitation and look at cost improvement areas. We are proud that we have been able to make a significant change in only 6 weeks and will continue to apply the methodology to other areas to make financial savings and reduce our carbon footprint and have already identified some items to target including dressing and wound care products.

IMPROVING THE ENVIRONMENTAL IMPACT OF PATIENTS WITH DIABETES AND ON INSULIN, DIABETES TEAM

Team Members:

- Angela Cross - Diabetes Dietitian
- Hayley Allsopp - Diabetes Specialist Nurse
- Georgia Homer - Diabetes Dietitian
- Nicky Suddick - Diabetes Specialist Nurse
- Claire Bird - Diabetes Specialist Nurse



Background:

Diabetes is a condition that causes a person's blood sugar level to become too high due to lack of insulin production from the pancreas or insulin resistance. In 2021, the number of people living with diabetes in the UK hit an all-time high at over 4.9 million, with an additional 13.6 million people at increased risk of type 2 diabetes (1). A common medication for diabetes management of blood sugar levels is insulin, required by all people with type 1 diabetes and many with type 2 diabetes (as well as other types such as gestational diabetes) (1). If left uncontrolled diabetes can lead to serious long-term health problems.

Individuals with diabetes taking insulin will use a pen device with an insulin cartridge inside, administered by the individual or by a third party (e.g. nurse). The majority of insulin pens are single use (with 300 units of insulin per pen), and it isn't possible to know when or how much insulin was last given. Once the 300 units are finished, the needle is removed and the pen disposed of in general waste, therefore creating significant plastic and medication waste, contributing to carbon emissions and climate change. Patients with diabetes are particularly vulnerable to effects of climate change such as extreme weather events and air pollution (2), due to factors such as impaired responses to heat stress, diabetes-related comorbidities, insulin resistance and chronic low-grade inflammation.

At present, we are facing a shortage of a single-use pen device and insulin cartridge provided by Tresiba (called Flex touch). The shortages are due to demand with other products across the world and the companies cannot keep up with this demand and increase in manufacturing. We therefore have no choice but to change all our patients using this product onto a different one. While some options available would bring no environmental or cost benefit such as flex touch pens with more concentrated U200 insulin (usually U100), this provides an opportunity to consider if a change could also bring environmental and cost benefits to our service by making a switch to 'smart pens'.

'Smart Pens' are reusable pens developed by Novo Nordisk, who have been more proactive in tackling the environmental impact of insulin pens. The pens last 5 years and require much smaller (still single use) cartridges compared to single use pens. Smart pens also provide the time and dose of insulin given on the pen. This record provides practical benefits, as it offers reminders to patients regarding their latest insulin dose. When a third party (e.g., a district nurse) is giving insulin, they may not need to be present for all doses if the device memory supports a person to be more independent. Novo Nordisk has also set up and advertised a recycling system for single use insulin pens called PenCycle (3), aiming to reduce the impact when single use pens are still required.

As a team, we identified an opportunity to improve our practice through the above initiatives. In our roles we run community diabetes clinics, see patients in their own homes and support district nursing teams, therefore the initiatives need to be approached differently in each setting.

Specific Aims:

To reduce the environmental impact of insulin pens by

- 1) Switching appropriate patients from single use pens to reusable 'Smart Pens'.
- 2) Raising awareness of and promoting use of the 'Pen Cycle' recycling scheme for single use insulin pens

Methods:

Studying the system:

We reviewed our community and clinic caseloads, identifying 286 patients on Novo Nordisk insulins eligible to switch to reusable smart pens or recycle their current pens. As some patients are on multiple products, a total of 343 prescribed Novo Nordisk insulin products were identified. All 286 people would be eligible to recycle their single-use pens, and a large proportion of 343 prescriptions could be changed to smart pens to reduce the need for disposable pens. Not all will be changed, as some will benefit from staying on the same insulin in a different strength disposable pen or swapping to a new insulin. This will be assessed by clinical judgement.

Aim 1: Reusable 'smart' pens

Currently, Novo Nordisk provides reusable insulin pens for free, as the concept is new and they are wishing to promote their new product. There is also a shortage of insulin in one product Tresiba starting from early August, forcing more urgent review to ensure individuals will not be left without this insulin. The shortage as well as free smart pens has caused us to move faster with the planned change. The eligibility criteria for change to smart pens is being on an appropriate insulin (i.e. Novo Nordisk) and being able to manage the smart pen (understanding the change). Most individuals will be eligible. In order to change to smart pens, we must also engage the patients GP surgery to make a change to their prescription.

We have kept a list of those patients we have trained and transferred to smart pens.

While not possible in the competition timeframe, we have plans to deliver training on smart pens to district nurses and have allocated the correct number of reusable pens to distribute to each district nursing base to change those on Tresiba insulin (the one in short supply) to smart pens. Assessment of caseload will be required to consider changes of other insulins. We can track the changes on our caseload but would need to ask district nurses for their numbers to be able to track the environmental future impact.

Aim 2: Recycling via PenCycle

Only Novo Nordisk products can be recycled using the PenCycle scheme, however within our service, this is the majority of the insulin we use. Pencycle works by ordering small cardboard boxes from the Novo Nordisk dedicated ordering website. Each box holds 12 pens and once full, the box is posted either by the patient or participating pharmacies via letterbox to the freepost address. Novo Nordisk then sends the pens to a specialist facility in Denmark and the pens are recycled into other products e.g. furniture and repurposed lamps.

At insulin safety week 15th - 19th May 2023 we promoted insulin safety to the four community district nursing teams within north Warwickshire. This engagement presented a good opportunity for us to introduce insulin pen recycling. We ran a competition between the district nursing teams, providing Novo Nordisk 'pencycle' recycling boxes (which fit 12 pens per box), and encouraging teams to collect as many disposable insulin pens as possible in a set timeframe. A prize would be offered to the district nursing team who collected the most, encouraging recycling and building awareness of the scheme to recycle pens on a larger scale in the future. Pencycle data was collected by e-mail with total numbers of pens collected at the end of the specified time frame.

We also identified that we could promote the pencycle project with clinic patients and individuals at home. We have started to do this by discussing in the clinic and handing out pencycle recycling boxes and leaflets.

Measurement:

Patient outcomes:

Aim 1: Reusable 'smart' pens

In the 10 week competition timeframe we have not had time to measure patient outcomes. In the future we could measure the number of visits from district nursing to patients and quality of life for the individuals as Smart pens may increase independence and reduce reliance on others to monitor doses.

High quality care continues in accordance with guidelines and continues to be provided as we have not changed the doses or types of insulin being used when switching to reusable Smart Pens. We have highlighted potential and/or expected outcomes in the results section

Aim 2: Recycling via PenCycle

Recycling will have no impact on patient care or outcomes.

Environmental sustainability:

Aim 1: Reusable 'smart' pens

Novo nordisk provided the following data for carbon footprinting via email. Based on 1000 people using pens for a year

- Disposable pen – i.e. flexpen = 15,000kgCO₂e
- Durable (smart pen) = 8,200 kgCO₂e lasting 5 years

We have therefore assumed a carbon footprint of 15 kgCO₂e per patient per year using a disposable pen, and 8.2 kgCO₂e per year for a patient using reusable pens. However, we do not know what assumptions were used to calculate this data, such as how many pens are used by a patient per year. We also do not have information on what was included or excluded in the carbon footprint (e.g. raw materials, insulin medication, waste disposal, etc).

There is a possibility that use of smart pens will reduce the number of appointments required by some patients and therefore CO₂e associated with travel, however measurement of this was outside the scope of this project.

Aim 2: Recycling via PenCycle

The pencycle system returns the pens for recycling in Denmark. Novo Nordisk is in the process of completing a full life cycle assessment report for their PenCycle programme which will measure the CO₂e from Pencycle (pen collection and the recycling process) vs. the best-case alternative (disposal in clinical waste - incineration). Once we have this data, this report and savings estimations will be updated.

As the company data is not currently available, we completed a processed based carbon footprinting analysis including the weight and types of materials used for the pens and packaging, and transport. For current waste disposal methods we used an emission factor for domestic waste from the UK Gov database (4). For recycling, we excluded emissions associated with the manufacturing and delivery and return posting of the pencycle boxes. We assumed patients would walk to post their return pens. We excluded recycling of the pens as the CO₂e from this process would be attributed to the new product developed from the recycled materials.

Economic sustainability:

Aim 1: Reusable 'smart' pens

The 'smart pen' devices for use with insulin cartridges were supplied directly by Novo Nordisk without charge at this stage. We do not know for how long Novo Nordisk will be providing these pens free of charge. The financial data to compare single use vs reusable pens in the future has been obtained from the insulin company.

Smart pens last for 5 years, so at this point a new pen will need to be issued at the cost of the patient's GP surgery. We have assumed only one pen is required every 5 years (however some pens may break or be lost).

Financial data for district nursing time has been obtained from the Trust.

Aim 2: Recycling via PenCycle

The pencycle boxes were also supplied free of charge by Novo Nordisk and the return postage was pre-paid so there were no charges incurred to the Trust when posting the empty pens back for recycling.

Social sustainability:

We did not formally measure social sustainability however have detailed potential impacts in the results section.

Results:

Patient outcomes:

Aim 1: Reusable 'smart' pens

Use of reusable smart pens may improve patient care as the pens remind patients of when the last dose was given and the time given, providing reassurance when they gave their last insulin dose and how many units were administered. This is helpful for patients who are unsure if they took their insulin, preventing duplicate or omission of insulin doses. This may be useful for vulnerable groups such as the frail or elderly but also for the younger population with busy lives.

Some patients will be more safe due to the insulin memory in the smart pen device helping assist individuals and carers provide the last insulin dose details preventing double dosing or no insulin given. Ensuring the correct insulin doses can optimise management of blood sugar levels and therefore reduce the long term complications of poorly controlled diabetes such as heart attack, stroke, neuropathy and retinopathy among others, reducing hypoglycaemic episodes, high sugars and possible DKA or even hospital admissions.

The above may lead to more independence as individuals, as if appropriate patients can be left to give their own insulin at times carers/district nurses were previously required to perform checks. This has been the case for one patient. The patient has twice daily insulin and previously required a district nurse to visit for both doses as there was uncertainty about him remembering to give the dose. The SmartPen allows district nurses to see when the last insulin injection was given and to visit once per day as the earlier dose could be checked. This could also improve the effectiveness of his insulin and diabetes control as he can give insulin at meal time instead of when the nurse arrives.

Aim 2: Recycling via PenCycle

Recycling of insulin pens does not have any direct outcomes for the patient.

Environmental sustainability:

At baseline, we identified 286 people who could recycle disposable pens and 343 prescriptions which could be changed to reduce the need for disposable pens.

Aim 1: Reusable 'smart' pens

Of the 343 eligible patients, we have changed 6 to smart pens. We have a further 23 patients planned to change their Tresiba from single use pens to reusable pens.

Based on Novo Nordisk's data, we will save 6.8 kgCO₂e per year for each patient that we switch to reusable pens. Based on switching 29 patients, we will save 197.2 kgCO₂e. As we step up the changeover to smart pens, we aim to switch 100 people in the next 4-6 weeks, with a reduction of 680kgCO₂e for the trust. If we switched 80% of suitable prescriptions in the next year (274 patients), we could save 1,863.2 kgCO₂e per year.

Aim 2: Recycling via PenCycle

Whilst we did not record the number of recycling boxes or leaflets handed out, the number of disposable pens collected by the district nurses as part of the competition for insulin safety week was 143 in 8 weeks.

We calculated the following:

- Disposing of one pen at home (black bag, energy from waste): 0.004128 kgCO₂e
- Sending one pen back to Denmark to be recycled: 0.0041347 kgCO₂e
- Difference = 0.00001 kgCO₂e (almost carbon neutral).

Therefore, 143 pens recycled is an increase of 0.00143 kgCO₂e. This means there is no real benefit for the Trust in using pencycle with an aim to reduce the Trust's carbon footprint.

However, there is a wider environmental benefit in recycling and use of less virgin materials. According to the Government factors database, using 1 tonne of recycled plastic rather than 1 tonne of virgin plastic saves on average 780 kgCO₂e. Novo Nordisk is in the process of completing a full life cycle assessment report for their PenCycle programme and we are told by contacts at NovoNordisk that preliminary results show that from a CO₂e perspective PenCycle has lower emissions, however more data could not be shared at present.

Economic sustainability:

Aim 1: Reusable 'smart' pens

Some of the insulins have a cost saving attributed when swapping from pre-filled pens to insulin cartridges. Other insulins such as Tresiba and Levemir are the same price regardless of format so are cost neutral.

Estimated financial savings per month from switching to reusable pens, assuming 5 boxes of pens used per month (usual prescription).

Insulin	Monthly saving £	Number of patients on caseload	Theoretical saving if all patients changed	Actual savings number changed/monthly cost saving (£)
Tresiba	0	97	0	28/0
Novorapid	3.82	113	431.66	3/ 11.46
Fiasp	2.29	11	25.19	2/4.48
Novomix 30	1.10	117	128.70	1/1.10
Levemir	0	5	0	0/0
Total		343	585.55	36/£17.04

If we switched 80% of suitable prescriptions in the next year (274 patients), there would be a cost saving of £468.44. This excludes the cost of the Smart Pen (£26.86 per pen lasting 5 yrs) with a monthly cost of £0.45p. Including this would still be a cost saving for Novomix, Novorapid and Fiasp.

There has been a reduction in district nursing costs observed for one patient as mentioned in the patient outcomes section. Estimated costs of district nursing time saved.

- Smart Pen 30 minute training for district nurses from band 7 specialist nurse at £24.33 per hour - £12.16 per nurse attending training for 30 minutes, this is one off training.
- District Nurse costs are £45 per visit for insulin administration.

Assuming 28 appointments reduced a month, there is potential saving of £1,260 per month, or £15,120 per year for one patient alone.

Aim 2: Recycling via PenCycle

There have been small costs attributable to postage of smart pens (held by ourselves and posted to patients not handed over in the clinic setting) in small numbers, mostly these are provided in person in clinics or home visits.

Social sustainability:

Aim 1: Reusable 'smart' pens

As per the example in the above sections, Smart Pens may support a decrease in the frequency of district nursing visits and specialist nursing input required to administer insulin. This could have benefits for patients, carers and staff. For patients and carers, It can provide reassurance and reduce concern and anxiety that doses are given correctly. It may allow patients and carers to have more independence and freedom to be out of the house for longer as no need to wait for nursing appointments. It could reduce hospital admissions for severe hypo or DKA for under or overdosing.

For staff, this could help improve the efficiency of district nursing care and reduce the amount of visits required, mileage undertaken, reducing staff stress. We have two upcoming dates for wider training and distribution of smart pens to the district nursing bases, this will enable us to work on reducing nursing visits further.

There may be an initial time cost for establishing this change including requests to GPs to change prescriptions and training district nurses on the new pen device.

Aim 2: Recycling via PenCycle

The use of PenCycle will possibly improve individuals' well-being by making them feel positive about reducing the environmental impact of their care, by seeing their medical device repurposed into a new product. Actively encouraging patients to recycle their insulin pens, this could increase awareness around recycling and encourage them to be more mindful with waste elsewhere in their lives.

Discussion:

One of the main challenges encountered was the time required for multiple aspects of the project, including

- to find everyone on the caseload on Novo Nordisk insulin and establish if they would be suitable to change to reusable pens or more suitable to encourage recycling with pencycle boxes. (We cannot use our EMIS patient electronic record to filter insulins as this is not recorded in our EMIS templates in a way this could be filtered).
- time to write letters to the GPs to change prescriptions once established who could be swapped to reusable pens and cartridges.
- training of district nurses as we will be working collaboratively to distribute the reusable pens and train patients on how to use them
- pressure to change patients on Tresiba due to their insulin going out of stock.

We identified that for some patients a switch to Smart Pens may improve their independence and reduce the number of district nursing visits they require. However, this may be a risk to other patients. Some patients may live alone, with nurse visits their only social contact in the day providing an opportunity for a wider wellbeing

check. Reducing district nursing visits may therefore impact the mental wellbeing of some individuals. Reduction in visits needs to be considered holistically and in decisions made jointly with patients on a case by case basis.

Whilst many of our patients use Novo Nordisk insulin products, many use other brands. Novo Nordisk recycling is only available for Novo Nordisk pens. Whilst we cannot recycle other brands' insulin products as yet, successful use of the PenCycle boxes could demonstrate to other brands the benefits of this initiative. Additionally, achieving high numbers of filled PenCycle boxes could encourage other Trusts to recycle more themselves.

With the PenCycle scheme, it could be possible that motivation to continue recycling decreases with time. We may need to consider ways to remind and encourage people to continue doing this. We used insulin safety week this year to educate staff on the PenCycle project so we could continue to use this as an annual reminder. We plan to continue to encourage the district nurses to obtain their own PenCycle boxes, and will encourage individuals in clinic and on home visits with a conversation about the benefits and providing a leaflet on how to obtain their own. We need to develop a method for recording the number of boxes and leaflets (advertising PenCycle) out so we can monitor the impact of changes of PenCycle.

This project focussed on the community diabetes team in North Warwickshire which patients predominantly have type 2 diabetes. By informing our acute diabetes colleagues in George Eliot Hospital and other teams within the foundation group eg colleagues in South Warwickshire and Warwick Hospital, we could expand this work and have greater environmental benefits. This would be particularly relevant as our colleagues in secondary care have a greater number of patients on their caseload with type 1 diabetes so will have much larger numbers of insulin prescriptions they can influence.

Conclusions:

A key learning point in this project was understanding the numbers of patients we were dealing with and the scale of influence that could be possible. Whilst we did not recycle or swap large numbers during this project, we only had a short space of time so it has helped us recognise the amount of change possible going forward and the beneficial environmental, social and financial impacts this may have.

One changed onto a smart pen, the environmental benefits of the reduced waste of cartridges compared to disposable pens will be ongoing and provide benefits for every prescription changed. It is difficult to estimate the potential savings on a larger scale, however we do know 8% of the diabetes population have Type 1 diabetes and therefore will be on insulin. While not specifically Novo Nordisk insulin, we can still assume the financial and environmental benefits are huge if scaling up across the whole UK.

References and Resources

1. [Diabetes and climate change: current evidence and implications for people with diabetes, clinicians and policy stakeholders - PubMed \(nih.gov\)](#)
2. [Diabetes diagnoses double in the last 15 years | Diabetes UK](#)
3. <https://www.pen-cycle.co.uk/healthcare-professionals.html>
4. [Greenhouse gas reporting: conversion factors 2023 - GOV.UK \(www.gov.uk\)](#)

EFFECT OF REDUCING PHYSIOTHERAPY REFERRALS FROM CARE HOMES ON WAITING LISTS THROUGH HEALTH PROMOTION, PHYSICAL ACTIVITY, AND FALLS PREVENTION, PHYSIOTHERAPY TEAM

Team Members:

- Sophie Knight – Band 7 Clinical Specialist Physiotherapist
- Oluwadamilola Asaju – Band 6 Physiotherapist, Urgent Therapy
- Lakshmi Krishnaswamy – Band 6 Occupational Therapist, Urgent Therapy
- Alison Harbon – Professional Lead
- Rachael King – Professional Lead
- Aathira Shaji – Band 5 Physiotherapist, Routine Therapy
- Rebecca Draper – Band 4 Therapy Assistant, Falls Pathway

Background:

Physiotherapy is common following injury, surgery, illness, or disability. Physiotherapists promote health and well-being using excellent knowledge and skills to restore movement, mobility, function, and self-confidence through exercise, education, and other evidence-based treatments (1). The Community Therapy Team of the South Warwickshire University Foundation NHS Trust (SWFT) offers Physiotherapy and Occupational Therapy assessment and treatment to patients across three pathways:

- Urgent Therapy: covers acute deterioration leading to a high risk of falls, non-complex respiratory conditions, and urgent assessment of mobility, transfer, and equipment.
- Routine Therapy: manages housebound patients with chronic musculoskeletal and neurological conditions, including patients with reduced mobility and balance issues.
- Community Recovery Service (CRS): Enables patients to return home confidently post-discharge from the hospital.

Long waiting lists for appointments within the NHS have been an ongoing issue for some time, and it remains an essential aspect of service improvement (2). The NHS long term plan (3) aims to shift the model of care further upstream with a focus on preventive care, closer integration of services within the community for people with chronic conditions and reduce outpatient visits by a third. There are strong links between improved public health and reduced need to access healthcare and the NHS carbon footprint. This presents an opportunity to our physiotherapy service, to promote improved care and outcomes for patients, while minimising the environmental, social and financial costs of our care.

Specific Aims:

Our long-term aim is to reduce physiotherapy referrals from care homes by 35% through engaging care home residents in home exercise programmes. We anticipate several benefits including improved quality of life for residents, reduce waiting times for referrals, reduced carbon emissions associated with appointment travel as well as save money and staff time.

In the short term, we aim to

- identify reasons for referrals
- identify a suitable programme for care homes
- engage care home staff and residents
- Consider long term measurement and estimate benefits across the triple bottom line (social, environmental and financial).

Methods:

Studying the system and baseline data collection

Data analysis of the Routine Therapy waiting list revealed that 20% of referrals are from care homes in Stratford-Upon Avon and Warwick localities.

A review of referrals from care homes within Stratford-Upon-Avon and Warwick over three months (February – May 2023) detailing the number of and reasons for referrals, waiting times to first appointment, average number of appointments per patient, name and postcode of care home, average distance travelled by the physio team, and staff time attributed to travel to/from appointments. Most referrals were related to injury from falls and mobility issues.

Anecdotally, it was considered as the waiting list accumulated, other comorbidities emerged for some patients, including decreased functional mobility, and leading to additional appointments. This can negatively impact patients' psychological and physiological well-being (4).

Identifying change ideas

Falls prevention is vital to the success of this project. Based on our referral data, the average age of patients referred from care homes for Physiotherapy assessment is greater than 65, for which there is a 30% chance of falling (5), with approximately half the population of people older than 80.

To consider the most suitable interventions for preventing falls and need for physiotherapy referral related to falls in our care home patient population, the trust library staff supported us with a comprehensive literature review, finding the following

- A meta-analysis (6) identified research in which the risk of recurrent falls fell by 21% when individual and group interventions such as strength and resistance training, general physical activity, gait, balance, flexibility, and functional training were put in place for at least 20 – 75 mins, 3 – 5 times weekly, for about 3 – 8 months. Additionally, a 33% reduction in falls owing to multifactorial interventions such as assessment and advice on correction of orthostatic hypotension, medication review and recommendation to General Practitioner (GP), review of appropriateness of psychotropic drug use, optician referral, fluid or nutrition therapy, management of urinary incontinence, proper use and maintenance of walking aids, staff training, support, and feedback, furnishings and adaptations, including providing written materials, videos, lectures, and resident education.
- NICE (2013) guidelines (5) recommend strength and balance training are incorporated into exercise program, owing to its benefit for frequent fallers with balance and gait issues.
- According to a systematic review's (7) finding, exercise is effective in falls prevention with a highly significant effect when practiced 2 - 3 times weekly over six months. However, strength and balance training should be adequately combined to achieve this.
- there is little or no evidence showing efficacy for walking in minimizing falls (5).

We are in the process of developing a home exercise programme (HEP) that will target strength and balance training to improve static and dynamic sitting and standing balance to minimize the risks of falls.

Ideally initiatives would be person-centred, addressing patients' specific needs, including promoting social values (5). Individualised assessments for all residents would likely create additional work for the physiotherapy team and therefore to implement the programme, we will up-skill care home staff, increasing their confidence manual handling and in encouraging and supporting residents to practise the HEP. Inclusion criteria were developed to ensure a more generalised programme would be safe for all participants. The criteria include residents over 65 years old, who are cared for out of bed and able to maintain a seated upright

position, who can follow simple commands with no unstable physical conditions and mild or no cognitive impairment.

Stakeholder engagement

The Programme Manager for the Aging Well program, Elaine Hodges, and the Warwickshire County Council Occupational Therapist in Quality Assurance, Jane Clark, welcomed the idea and are willing to support the project. One Physiotherapist was invited to an enhanced home and care home development plan meeting involving care home managers, where discussions took place regarding this project.

We received an average of 2.5 referrals per care home per month. Two care homes were selected (one per district council) for trial based on receiving a higher number of referrals from these homes (5 per month in Warwick, and 7 per month in Stratford). We met with the Managers of the selected care homes, who were pleased to participate in this project.

There are several options we can explore with care home staff, such as

- creating social exercise groups (seated weekly program)
- staff completing fall risk assessment and providing patient advice on fall prevention
- involve postural instability trainers living locally to support weekly sessions with residents in care homes
- encouraging care home staff to undertake more formal training such as the postural instability (FAME) and Otago programs, however these come with a cost.

Following agreement of the intervention and practicalities for this, our trial care home manager will receive comprehensive written information about the intervention's aims to disseminate to all staff, as demonstrated by Dyer et al, 2004 (8). In addition, participating care homes will receive training and information packs detailing the exercise programs and fall prevention strategies. The plan in the coming weeks is to attend one of the physical activity sessions held in the care home to observe, analyse and disseminate the ideas of this project. Following that, a structured plan would be drawn up in conjunction with the care home on how to incorporate these activities into the weekly itinerary of the residents.

Our long-term plan would aim to implement a similar prevention service across all interested care homes however two care homes were selected (one per district council) for trial based on receiving the most referrals from these homes. We would aim to implement the programme remotely via virtual meetings as much as possible, empowering care home staff. When face to face meetings is required, we would aim to link these to a patient visit to maximise our savings as detailed below.

Measurement:

Patient outcomes:

The evidence base suggests similar programs run for at least six to twelve months, so we cannot measure patient outcomes for our cohort within the 10-week competition window. However, we plan to measure clinical impacts long term. Koskela et al. 2017 (9) state that it is unclear what outcome measures are most appropriate for assessing activity levels, health, and quality of life among older care home residents (with and without cognitive impairment). Instead, these researchers tested several measures for practicability and appropriateness for this population. Therefore, we have selected the Berg Balance Scale (BBS) (Appendix 1), Oxford muscle grading scale (OGS) (Appendix 2) and Falls Efficacy Scale (FES) (Appendix 3) assessments for before the intervention, at 6 months, and at 12 months to measure the clinical impact of this initiative. A reduction in referral numbers would also indicate improved patient outcomes. We have projected potential clinical impacts for care home residents based on the evidence base in our results section.

Environmental sustainability:

We calculated the miles driven by the physiotherapy team to each appointment for 3 months of referrals. Based on the evidence base, we have assumed that a 35% reduction in referrals is feasible within a 9-12 month time-frame. Once our average mileage was confirmed, we converted a 35% reduction into CO2e to estimate potential savings. We used the emission factor 0.3386 kgCO2e per mile driven in an average car of unknown fuel taken from the Government Greenhouse Gas reporting 2023 conversion factors dataset. This accounts for fuel and well to tank emissions.

Emission factors for PPE use were taken from Rizan et al 2021 (10).

Economic sustainability:

We have estimated financial savings in terms of physiotherapy time gained back from a 35% reduction in referrals. The costs of physiotherapist time were obtained from the 2022 costs for NHS and social healthcare, with the average cost of a one-to-one physiotherapy session of £144, and a group session at £92.

Social sustainability:

Patients and care home residents: The falls efficacy scale (Appendix 3) will be administered with patients before and after the 9-12 month programme. This would highlight any improvement or decline in confidence for activities of daily living (ADL).

Physiotherapy Staff: Average time to travel to and complete an appointment has been collected and we have estimated time gained back from a 35% reduction in referrals. It is not possible to measure social outcomes for this project within a 10-week project timeframe, however we plan to collect qualitative data via staff surveys on an ongoing basis and have detailed potential impacts in the results section.

Care home staff: A survey would be carried out at the beginning, at 6 months and 12 months, to assess the social impact of this project on care home staff (including managers), assisting us to identify needs and opinions of for change initiative and ensuring it is maintained. Additionally, this would highlight further benefits of this initiative to the care homes (e.g., reduced falls and costs relating to falls, reduced care hours per patient).

Results:

Patient outcomes:

There are projected potential clinical impacts for care home residents based on evidence-based studies, including improved overall wellbeing, reduced fall-related referrals, and improved quality of life. There is also potential for wider population benefit as change would be implemented across other care homes within Stratford-Upon-Avon and Warwick. A reduction in referrals may improve waiting times for other patients.

Environmental sustainability:

Table 1 shows a summary of average appointments per patient and staff travel data*

	Stratford	Warwick
Total number of referrals per month	13	17
Waiting time to first appointment (days)	21.33 (range 1-59)	18.04 (range 0-65)
Appointments per month		
- with primary physiotherapist	21.7	55.6
- with second staff member attending (travelling separately)	8	24.3

Total journeys for physiotherapy team per month	29.7	79.9
Return distance per appointment per staff member (miles)	9.37 (range 1.8-23.6)	6.38 (range 1.4-18.4)
Total return miles travelled per month	278.3	509.8
35% reduction in total return miles driven per month	97.4	178.43
35% reduction in total miles driven per year	1,168.8	2,141.2
Carbon savings per year (kgCO ₂ e)	395.8	725

*At time of calculations patients remained on the caseload (6 in Stratford and 14 in Warwick), so the number of appointments per patient may be underestimated. Some patients were excluded from calculations as they were awaiting their first appointment, or discharged unseen.

With a 35% reduction in appointments, we would reduce our miles driven by 3,318.4 miles per year, equivalent to 1,120.8 kgCO₂e per year.

We will have an additional small saving from a reduction in PPE use. Assuming one pair of gloves and an apron are worn by each staff member for each appointment, with a total of 38.36 appointments reduced per month, this equates to a saving of approximately 2 kgCO₂e per month in gloves and 2.5 kgCO₂e in aprons, a potential saving of 54 kgCO₂e per year.

Potential annual impact

With the programme implemented across all care homes and a 35% reduction in referrals achieved, we anticipate a saving of 1,175 kgCO₂e per year, equivalent to driving 3,470 miles in an average car. This saving may be overestimated as it does not consider travel required to implement our interventions.

We would aim to implement the programme remotely via virtual meetings as much as possible, empowering care home staff however a visit may be required to demonstrate and teach exercises. When face to face meetings are required, we would aim to link these to a patient visit to maximise our savings as detailed below.

Economic sustainability:

There is a projected reduction in cost of physiotherapy appointments to care homes due to referrals associated with falls.

Table 4 shows our time saved, assuming 90 minutes is required for each appointment (1 hour + 30 minutes travel) calculations:

	Stratford	Warwick
Number of appointments per month including double up	29.7	79.9
Time spent total (hrs)	44.5	119.8
Time saved with 35% reduction in appointments (hrs)	15.6	42

With a 35% reduction in appointments (38.36 appointments per month) the physiotherapy team would save 57.6 hours, or 7.7 days of staff time per month to dedicate to higher value activity. This may exclude time taken for receiving and triaging referrals, scheduling appointments, and any time dedicated to writing patient notes and programmes.

Based on a cost of £144 per one-to-one appointment, this equates to a saving of approximately £5,524 per month, or £66,286 per year. There would be an additional saving from the cost of fuel which has not been calculated.

These potential cost savings are likely overestimated as they do not account for physiotherapy team time to implement the intervention programme.

Social sustainability:

Care home staff:

With a health improvement for patients, care home staff may save time as residents require less support and referrals. Seeing patients engage more in exercise and build confidence may improve staff wellbeing. With care home staff implementing HEP's there are potential positive or negative impacts – staff may enjoy learning, empowerment and taking on a new role/responsibility, or may feel this is a task added to already demanding workloads.

Physiotherapy staff:

As above, with a 35% reduction in appointments the physiotherapy team would save 57.6 hours, or 7.7 days of staff time per month to dedicate to higher value activity and implementing our preventative interventions. This reduction could increase the efficiency of the physiotherapy service more broadly.

Discussion:

Fall prevention programs, strength and balance training, and patient education are the bedrock of this project. Moving forward, empowerment and inclusion of care home staff will be critical to success and achieving projected savings as outlined in this report. With successful implementation in the two areas, we will reduce both environmental and financial costs associated with travel to and from care homes for physiotherapy sessions, hourly rates of physiotherapists' visit, as well as improving overall wellbeing for both staff and residents of care homes. We also anticipate these projections would reduce waiting times for other housebound patients awaiting physiotherapy input.

Potential barriers may include staff retention in care homes and the feasibility of expanding this initiative to other care homes in the selected areas. Co-development of programmes with care home staff will be essential to address and aim to mitigate these barriers. Physiotherapists will carry out initial assessments, and review outcomes at 6 months and 12 months to measure the impact of the project.

A limitation to this project is that we have not calculated the time, financial costs and CO2e that will be attributed to our interventions. This has not been possible as we are still collaborating with care homes to identify the best way forward to ensure success of a preventative programme. As above, we would aim to implement the programme remotely via virtual meetings as much as possible, empowering care home staff. When face to face meetings is required, we would aim to link these to a patient visit to maximise our carbon and financial savings.

Conclusions:

This project aims to enhance residents' participation in physical activity, in turn improving their health, quality of life, and well-being through system-wide changes to care home organizational, environmental, and working practices. Although there are challenges associated with working in care homes, this project promises significant benefits and is affordable. With a growing number of elderly residents in residential care homes, this project is not only important for environmental sustainability, but financial, social, and clinical sustainability.

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Appendices

Appendix 1: Berg Balance Scale

Berg Balance Scale (with instructions)

SITTING TO STANDING

INSTRUCTIONS: Please stand up. Try not to use your hand for support.

- 4 able to stand without using hands and stabilize independently
- 3 able to stand independently using hands
- 2 able to stand using hands after several tries
- 1 needs minimal aid to stand or stabilize
- 0 needs moderate or maximal assist to stand

STANDING UNSUPPORTED

INSTRUCTIONS: Please stand for two minutes without holding on.

- 4 able to stand safely for 2 minutes
- 3 able to stand 2 minutes with supervision
- 2 able to stand 30 seconds unsupported
- 1 needs several tries to stand 30 seconds unsupported
- 0 unable to stand 30 seconds unsupported

If a subject is able to stand 2 minutes unsupported, score full points for sitting unsupported. Proceed to item #4.

SITTING WITH BACK UNSUPPORTED BUT FEET SUPPORTED ON FLOOR OR ON A STOOL

INSTRUCTIONS: Please sit with arms folded for 2 minutes.

- 4 able to sit safely and securely for 2 minutes
- 3 able to sit 2 minutes under supervision
- 2 able to sit 30 seconds
- 1 able to sit 10 seconds
- 0 unable to sit without support 10 seconds

STANDING TO SITTING

INSTRUCTIONS: Please sit down.

- 4 sits safely with minimal use of hands
- 3 controls descent by using hands
- 2 uses back of legs against chair to control descent
- 1 sits independently but has uncontrolled descent
- 0 needs assist to sit

TRANSFERS

INSTRUCTIONS: Arrange chair(s) for pivot transfer. Ask subject to transfer one way toward a seat with armrests and one way toward a seat without armrests. You may use two chairs (one with and one without armrests) or a bed and a chair.

- 4 able to transfer safely with minor use of hands
- 3 able to transfer safely definite need of hands
- 2 able to transfer with verbal cuing and/or supervision
- 1 needs one person to assist
- 0 needs two people to assist or supervise to be safe

STANDING UNSUPPORTED WITH EYES CLOSED

INSTRUCTIONS: Please close your eyes and stand still for 10 seconds.

- 4 able to stand 10 seconds safely
- 3 able to stand 10 seconds with supervision
- 2 able to stand 3 seconds
- 1 unable to keep eyes closed 3 seconds but stays safely
- 0 needs help to keep from falling

STANDING UNSUPPORTED WITH FEET TOGETHER

INSTRUCTIONS: Place your feet together and stand without holding on.

- 4 able to place feet together independently and stand 1 minute safely
- 3 able to place feet together independently and stand 1 minute with supervision
- 2 able to place feet together independently but unable to hold for 30 seconds



Muscle Strength Grading Scale

The Oxford Scale is a quick method of assessing and grading muscle power. A detailed knowledge of muscle anatomy is required to carry out an assessment appropriately. The Oxford Scale is a 0-5 scale which is then recorded as 0/5 or 2/5, sometimes with a + or - sign to indicate more or less power but not sufficient to reduce or increase the number. The physiotherapist should position the patient in the appropriate posture to allow accurate assessment and allow good vision and palpation of the appropriate structures.

Oxford Scale

0/5 No contraction

1/5 Visible/palpable muscle contraction but no movement

2/5 Movement with gravity eliminated

3/5 Movement against gravity only

4/5 Movement against gravity with some resistance

5/5 Movement against gravity with full resistance

Falls Efficacy Scale

Name: _____

Date: _____

On a scale from 1 to 10, with 1 being very confident and 10 being not confident at all, how confident are you that you do the following activities without falling?

Activity:	Score: 1 = very confident 10 = not confident at all
Take a bath or shower	
Reach into cabinets or closets	
Walk around the house	
Prepare meals not requiring carrying heavy or hot objects	
Get in and out of bed	
Answer the door or telephone	
Get in and out of a chair	
Getting dressed and undressed	
Personal grooming (i.e. washing your face)	
Getting on and off of the toilet	
Total Score	

A total score of greater than 70 indicates that the person has a fear of falling

Adapted from Tinetti et al (1990)

REDUCING ROUTINE BLOOD TESTING, FRAILITY AND CARE OF THE ELDERLY WARDS

Team Members:

- Ellie Berry, Advanced Clinical Practitioner (Frailty), Green Team Project Lead
- Lorna Bannan, Assistant Service Manager, Care of the Elderly & Frailty



Background:

Many elderly inpatients are subject to regular (up to daily) blood tests during their inpatient stay to help monitor their condition and guide their treatment. However, it has been recognised that an overuse of testing is commonplace in this population of patients which can negatively impact multiple aspects of the process and decrease patient satisfaction.

Routine blood testing has adverse environmental impacts due to consumable use (many of which are single use plastics), test processing and waste disposal involved in the blood testing process. In addition to improving environmental sustainability, reducing the number of tests taken would bring benefits for patients and staff. This patient group can find excessive blood tests distressing, patient discharges and hospital flow can be delayed if waiting for blood test results as part of the decision-making process. There is also a financial impact from excessive testing and more staff time is needed to carry out the testing.

Both overuse and underuse of healthcare are now seen as markers of an ineffective and iniquitous healthcare system. Besides the benefits of laboratory testing in terms of setting a diagnosis and deciding upon the best treatment strategy, these tests may offer wider benefits to patients, for example in terms of reducing diagnostic uncertainty or offering reassurance (Wallace and Fahey, 2018). However, laboratory testing is (inevitably) also associated with patient discomfort, and a plethora of test results may divert the physician's attention away from the clinically relevant information. In addition, it may lead to overdiagnosis, which may result in unnecessary, potentially harmful or costly downstream activities. Indeed, previous studies suggest that, depending on the definition used, 30–70% of all laboratory tests may be considered potentially inappropriate (Kip *et al.* 2020).

Unnecessary and overuse of blood sampling substantially contributes to healthcare expenses, potentially exposes patients to unnecessary harm and leads to excessive healthcare 'waste'. Healthcare waste contributes massively to the NHS and the UK's carbon footprint and the waste produced from excessive blood sampling is no exception.

Specific Aims:

The aim of the project is to reduce low value and unnecessary blood testing on Care of the Elderly inpatients.

Methods:

We completed a process map (Appendix 1) to identify resources used within the blood testing pathway. We identified two potential areas of waste;

- 1) How many inpatient routine phlebotomist requests were conducted on care of the elderly inpatients and were some requests unnecessary?
- 2) For each routine request, several blood tests may be requested. How many blood tests did each patient have carried out per request, and were these all necessary?

A decision-making tool was developed (Appendix 2) to aid clinicians in deciding if blood testing was necessary at all, and if so, which tests were necessary for each patient to guide their treatment.

To achieve a reduction we raised awareness of negative impacts of inpatient routine blood testing amongst the care of the elderly clinicians and individuals who would be making the blood test requests. A specific focus on this patient population and the environmental impact of unnecessary blood testing has influenced the need for this project to be conducted.

Education for clinicians was needed to aim to create a change in culture and challenge their thought-process when requesting these tests, and this was developed and provided to the relevant staff by the Project Lead. Additionally, we developed a comms campaign (Appendices 3, 4 and 5) and disseminated this across our 6 care of the elderly wards as well as presenting to wider staff and primary care colleagues at a Trust event.

Measurement:

Patient outcomes:

We collected data on the number of phlebotomist request forms submitted before and after the project change. We also collected data on the volume of tests that were requested per patient before and after the change.

We do not anticipate any negative outcomes related to patient outcomes, and patient safety was not compromised. We have highlighted anticipated impacts in our results section.

Population outcomes:

It was not possible to measure broader population outcomes in the competition timeframe, however, we have hypothesised potential impacts in the results section.

Environmental sustainability:

To estimate the carbon footprint of the three types of blood tests, data from an Australian study estimating the life cycle assessment (LCA) of pathology tests (McAlister et al 2021) was used as it was assumed that the tests were undertaken in a similar way. However, the carbon intensity of the Australian electricity grid is a lot higher than the UK, and to account for this, UK electricity emission factors were taken from The UK Government BEIS 2023 database and substituted into the calculations. Some consumables were also removed where appropriate.

To estimate the carbon footprint of the consumables, a hybrid carbon footprinting methodology was used. The carbon footprint of the tourniquet, blood bottle, clinell wipe, butterfly needle and plastic specimen bag were estimated using a process based analysis. The carbon footprint of the gauze was estimated based on a top-down method and the carbon footprint of the gloves were taken from Rizan et al 2021.

Emission factors used:

- Taking blood (consumables + blood bottle): 0.356 kgCO₂e
- A full blood count blood test: 0.03 kgCO₂e
- Urea and electrolytes test: 0.07 kgCO₂e
- CRP test: 0.04 kgCO₂e
- 1x extra blood bottle: 0.041 kgCO₂e

As it was not always possible to know which tests had been reduced, we also used an emission factor of 0.087 kgCO₂e for an 'average' test, which was an average of the three tests plus one blood bottle.

To identify savings from a reduction in phlebotomist requests, we included the consumables, relevant tests and blood bottles per patient. To identify savings from a reduction in tests per phlebotomy request (when bloods are still requested), we excluded consumables as the patient still required some blood to be taken.

Economic sustainability:

The costs of the following consumables were calculated:

- Gold bottle (this tests CRP, urea and electrolytes): £0.28
- Purple bottle - (this tests full blood count): £0.18
- Consumables including butterfly needle, tourniquet, cleaning wipes (x2), gauze (x3), gloves, specimen bag and labels: £0.85
- The cost of running each blood test;
 - full blood count - £3.92
 - urea and electrolytes - £1.55
 - CRP - £1.55

As we don't always know which tests have been reduced, we have taken a cost of £2.34 per 'average' test (the average cost of the three known tests).

Social sustainability:

Qualitative data was collected via conversations and surveys with staff. The staff surveyed were doctors, consultants and advanced clinical practitioners who requested blood tests for the care of the elderly patient group.

Results:

Patient outcomes

Before our interventions, 234 phlebotomist request forms were submitted in a 7 day period across the 6 care of the elderly wards. After our intervention, this was reduced to 211 phlebotomist request forms in the same timeframe across 6 wards. This is a 9.8% reduction in phlebotomy requests and testing on the care of the elderly wards.

In the same 7 day period, an average of 4.2 tests were requested per request form before our intervention. Following our intervention, the average number of tests was reduced to 4.0 tests per request form.

Our elderly population group who are subject to multiple inpatient blood tests often have poor skin integrity with vulnerable skin tissue, meaning excessive blood testing leaves them with a high level of bruising and skin damage. In addition, many of our patients are suffering from permanent or temporary cognitive impairment meaning that they may not fully understand the need for repeated blood tests and can find the process distressing and painful.

Population outcomes:

While not possible to measure in the competition timeframe, a reduction in testing may reduce delays in discharge for this patient group, as clinicians are not waiting for routine blood results to guide their decision making on a patient's suitability for discharge. Patients agreed that being discharged sooner in the day was preferable over a late discharge whilst awaiting test results. This also meant improved patient flow within the hospital and freeing up a bed for another patient.

Environmental sustainability:

Our data showed a reduction in 23 phlebotomist requests ordered per week (with an average of 4.2 blood tests requested per order). This is a reduction in 0.624 kgCO₂e per order. With an average of 23 less requests per week, our anticipated savings are 14.35 kgCO₂e per week, or 746.2 kgCO₂e per year.

The average number of tests requested per phlebotomy order also reduced from 4.2 to 4 (0.2 test reduction). As it is not possible to know which tests have no longer been requested, we have taken an average emission factor of 0.087 kgCO₂e from the three tests (FBC, urea and CRP) and 1 blood bottle to estimate savings. With an average of 211 orders still requested, this is a saving of 3.67 kgCO₂e per week, or 190.9 kgCO₂e per year.

In total, our anticipated annual saving is 937.1 kgCO₂e per year, equivalent to driving 2,767.57 miles in an average car.

Economic sustainability:

There is a saving of £1.31 per order for the consumables used by the phlebotomist to take bloods, and of £9.82 for processing of 4.2 tests per order (a full blood count, urea and electrolytes, CRP and 1.2 'average' tests). With an average reduction of 23 orders per week, we will therefore save £256 per week, or £13,312 per year.

For continued orders, a reduction in 0.2 tests per order saves £2.34 per order. With 211 orders per week, this is a saving of £98.70 per week. Projected across a year, this is a potential saving of £5,132.4 per year.

Our total anticipated financial savings are £18,444 per year.

Our financial savings do not include staff time saved for ward staff, phlebotomy staff and lab processing time, which is highlighted in the social sustainability results below.

Social sustainability:

Less testing will likely improve patient and staff satisfaction. Patients were in agreement that less blood tests were preferable during an inpatient stay and staff agreed that this patient population find testing distressing leading to excessive bruising, pain and anguish particularly for those with cognitive impairment (which is common in our patient group).

As mentioned above, patients who are awaiting results of routine blood tests may be delayed from discharge. If discharge decisions are made based on clinical assessment rather than waiting for test results, this can expedite the discharge process meaning patients return to their own homes sooner and a hospital bed is freed up for another patient, improving flow throughout the hospital.

Less testing meant that nursing or medical staff were carrying out less tests that phlebotomy were unable to obtain, meaning they had more time to focus on clinical tasks and patient assessments.

The average time taken to run the blood tests was 4 hours. By reducing the number of tests being conducted within Frailty and Care of the Elderly Wards, 92 hours of laboratory time was saved in a 1 week period, which enabled the laboratory to prioritise patients that required tests. Based on this data, we can assume that over a 1 year period, this would equate to 4,784 hours saved by one department actively reducing unnecessary blood testing.

The staff surveyed all agreed that we carried out too many blood tests on our care of the elderly population. Many of them had not previously considered the environmental impact excessive blood testing could have, but they all commented that they felt a lot of waste was created during routine blood testing.

Staff feedback:

100% of staff surveyed prior to the project launch felt that too many blood tests were taken on our patient group

"I think we need to consider the impact of multiple blood tests that our frailty patients are exposed to. So many times our patients are left with bruising and discomfort from numerous attempts of blood taking".

- (ACP survey response)

"A lot of waste is created in the sampling process, especially when patients are hard to bleed and multiple needles etc taken to patients bedside and even if not used often still go to waste".

- (ACP survey response)

"Thank you for your work in reducing unnecessary blood tests across the frailty wards. The benefits of this project for our patient group are considerable –unnecessary blood tests cause pain and distress and they can result in delays to discharge which can be very detrimental to this patient group. In addition reductions in blood testing will provide both environmental benefits reducing waste and a number of cost savings".

- (Consultant feedback)

Discussion:

The results of the project have been fed back to the department and the project team have received a positive response from those in the department who have been involved. The biggest challenge was around changing culture with this group of clinicians and encouraging them to change or evaluate their practice. Many clinicians agreed that there was an overuse of testing in this patient group, but some felt that their practice was justified and challenging this was difficult. Overall, staff feel that the impacts of this project are only positive and the wider trust are now interested in the project being extrapolated across the whole Trust.

To ensure the project is embedded into the Trust, education will be provided and PDSAs conducted to identify benefits for all areas with a view to change the culture.

The challenges around high staff turnover and junior doctors rotation will mean the project needs to be re-launched at regular intervals to ensure the message is reiterated for new staff (as well as existing staff). However, the junior doctor rotation offers a new opportunity each time a rotation takes place to provide teaching on this matter as part of induction to ensure it is embedded within the culture of our department. Due to the nature of patients and environment, there will always be fluctuations in testing resulting from factors such as clinical outbreaks and winter pressures.

Interest from other specialties including A+E and the primary care setting allows for opportunities to expand the project wider and make an impact to other patient populations. The project team is in talks with other

specialties to provide the same campaign and training that was carried out within the care of the elderly department.

There is a huge carbon and financial cost saving for the hospital trust when the amount of blood tests carried out is reduced. The trust estimated that last year they had 272,000 haematology requests carried out across the hospital. Any reduction in this number of tests carried out would have a significant saving for the trust, in keeping with their green plan and financial targets.

Conclusions:

Unnecessary or excessive routine blood testing in care of the elderly inpatients creates waste, has a negative detrimental impact on the environment and contributes to the overall carbon footprint of the Trust

From the project, we can conclude that the following areas were achieved

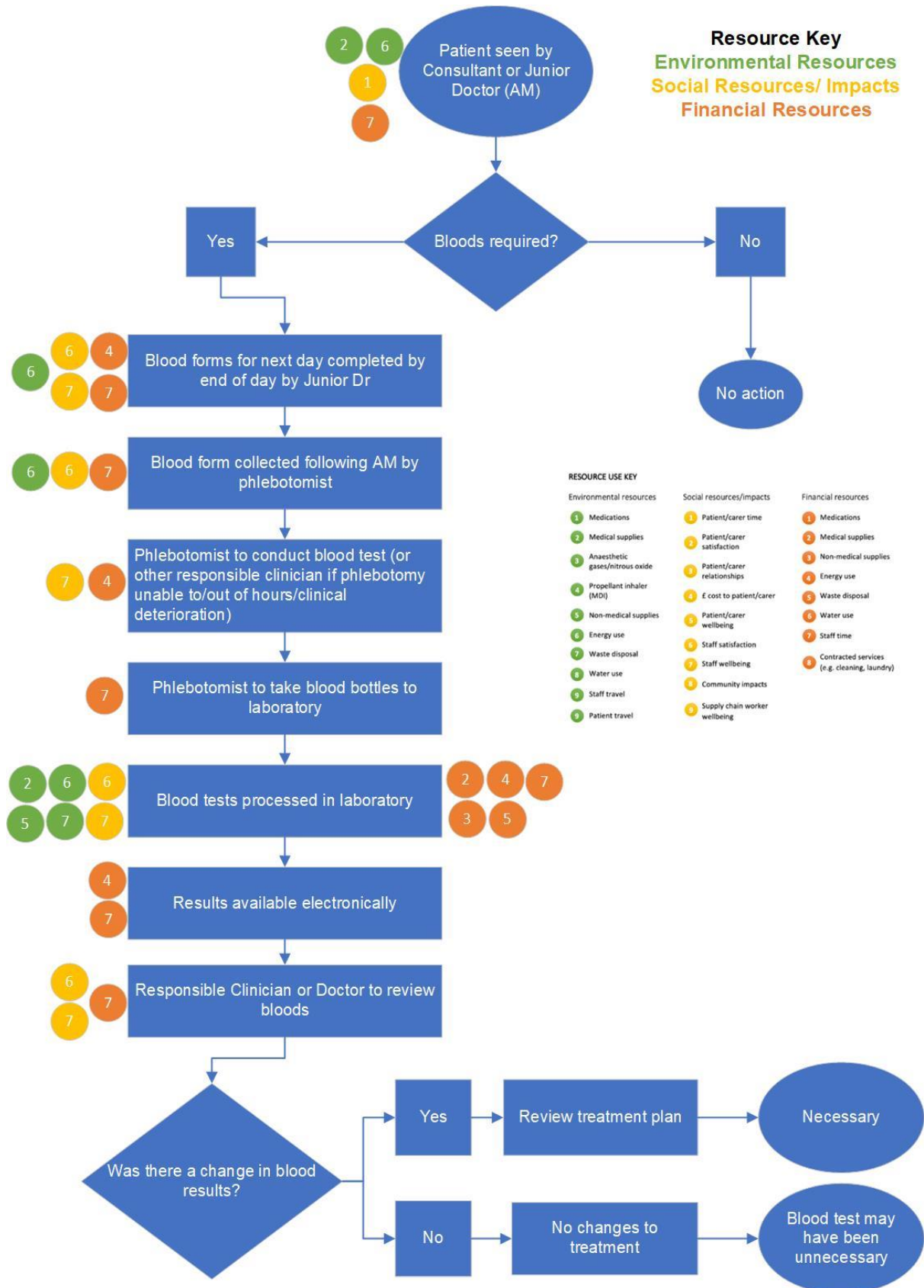
- Cost saving
- Time saving
- Improved staff satisfaction
- Increased patient satisfaction and clinical care (e.g. by protecting skin integrity, excessive bruising and undue distress to frail patients)
- Reduction in un-sustainable practices, and improved carbon footprint
- Possibility of reduction in length of stay, as well as timely discharges
- Actively working towards achieving lean pathways
- Reduction in phlebotomy workload in turn, a reduction in laboratory testing time

References and Resources

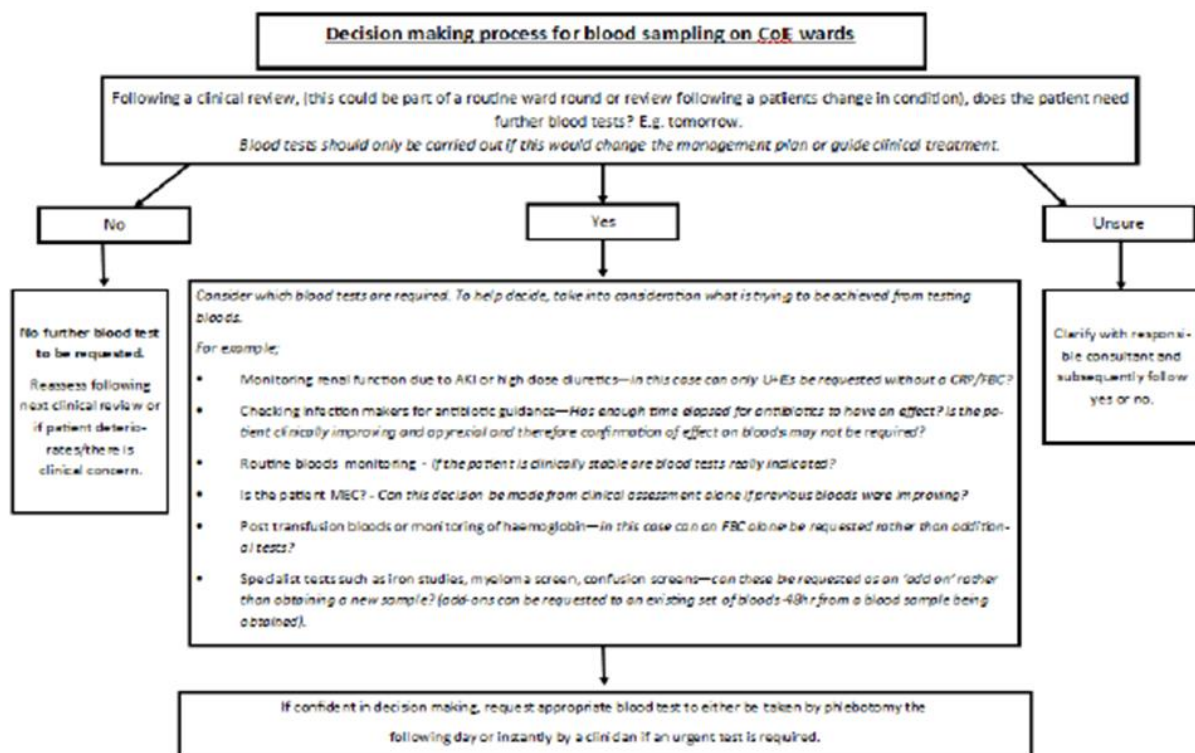
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Appendices

Appendix 1



DECISION MAKING PROCESS FOR BLOOD SAMPLING



Please contact Ellie Berry (ACP) or Lorna Bannan (OPMU) for more information



OPMU AND CARE OF THE ELDERLY

Sustainability PDSA

Reducing blood testing across Care of the Elderly Wards

Please contact OPMU or Ellie Berry for additional information

→ Aims

- Reduce unnecessary activity via lean pathways which in turn will benefit a reduction in carbon intensity
- Achieve SWFT's sustainability pledge to embed prevention into every service
- Work to achieve SWFT's goal in leading the NHS carbon reduction
- Work to change the culture and lead the way in conducting necessary blood tests only
- Reduce plastic usage for unnecessary tests
- Reduce use of surgical gloves for unnecessary tests

→ Why?

<p>HEALTH CARE'S CLIMATE FOOTPRINT</p> <p>Carbon footprint of global healthcare sector is 2 Gt CO₂e</p>	<p>Supply chain workers paid less than US\$1 per day, no health and safety, many are children</p>	<p>2% global plastic production is medical plastic; increases by 6.3% per year</p>
<p>Deforestation: rubber plantations for surgical gloves</p>	<p>Scarcity of resources: conflict minerals in medical equipment</p>	<p>Antibiotics found at 65% of 711 river sites worldwide</p>

→ Patient Benefits

- Improved patient satisfaction

→ Other Benefits

- Reduction in phlebotomy waiting times
- Reduction in plastics, paper and other resources
- Improved staff satisfaction
- Cost savings
- Workload reduction

→ Resources used within the blood testing process

RESOURCE USE KEY

Environmental resources

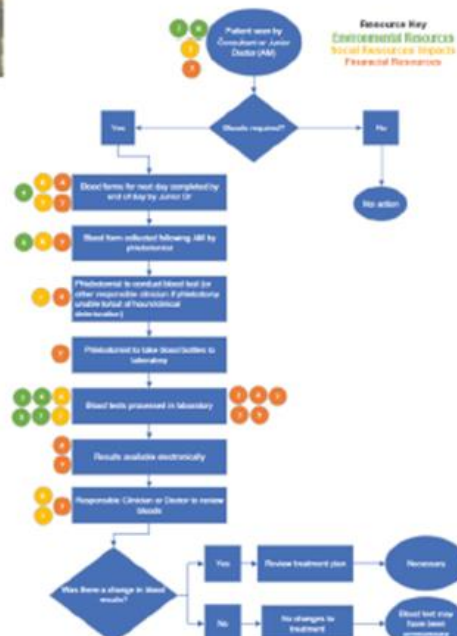
- 1 Medications
- 2 Medical supplies
- 3 Anaesthetic gases/introus oxide
- 4 Propellant inhaler (MDI)
- 5 Non-medical supplies
- 6 Energy use
- 7 Waste disposal
- 8 Water use
- 9 Staff travel
- 0 Patient travel

Social resources/impacts

- 1 Patient/carer time
- 2 Patient/carer satisfaction
- 3 Patient/carer relationships
- 4 £ cost to patient/carer
- 5 Patient/carer wellbeing
- 6 Staff satisfaction
- 7 Staff wellbeing
- 8 Community impacts
- 9 Supply chain worker wellbeing

Financial resources

- 1 Medications
- 2 Medical supplies
- 3 Non-medical supplies
- 4 Energy use
- 5 Waste disposal
- 6 Water use
- 7 Staff time
- 8 Contracted services (e.g. cleaning, laundry)



Frailty and OPMU REDUCING UNNECESSARY BLOOD TESTING



Working to create sustainable practices within the NHS

Frailty are working with OPMU to run a PDSA focusing on sustainability within the Trust from **Wednesday 14th June 2023**. The aim is to actively reduce unnecessary blood testing by following the revised Decision Making for Blood Sampling process.

The PDSA will run for 2 weeks, with the view of embedding the sustainable practices into the department once all benefits have been realised.

What will be studied?

- Environmental impacts and carbon foot-printing
- Departmental costs
- Patient satisfaction
- Staff satisfaction
- Volumes of blood testing across Frailty and CofE Wards
- Education and culture



Why?

- Climate change is both a health and environmental crisis, with wide-ranging impacts on patient's health and care
- 2% of global plastic production is medical plastic
- The NHS is responsible for 4% of the UK's carbon footprint - equivalent to total emissions of Croatia
- The NHS is set to reach Net Zero by 2024



DID YOU KNOW



- 2% of global plastic production is medical plastic, increasing 6.3% per year
- The NHS is responsible for 4% of the UK's carbon footprint - equivalent to total emissions of Croatia!

Routine blood testing on inpatients has a huge environmental impact, produces excess waste and contributes to NHS carbon emissions.

By reducing the amount of tests carried out, Frailty can improve patient satisfaction, reduce departmental costs and improve sustainability within our department.

For more information, please speak to Ellie Berry (ACP) or Lorna Bannan (OPMU)

LEAN PATHWAY AND LOW CARBON ALTERNATIVES IN CURETTE AND CAUTERY SKIN SURGERY, DERMATOLOGY TEAM

Team Members:

- Simon Tso, Consultant Dermatologist
- Tracey Williamson, Staff Nurse
- Mi Joo Choi, IMT1
- Becky Seeley, GP ST3
- Enenche Edache, GP ST3



Background:

There is a paucity of national guidance specifying how skin surgery should be conducted. This led to significant heterogeneity in the set-up, conduct and delivery of minor skin surgery services in the United Kingdom (1), including the environment of procedure rooms (2,3), practitioner selection of equipment and consumables (4) as well as procedure steps (5).

The British Society for Dermatological Surgery (BSDS) sustainability guidance 2022 (6) provided the first United-Kingdom wide recommendations on environmentally sustainable skin surgery that compliments existing national guidance on safe skin surgery. The BSDS recommendations could be broadly categorised under reducing activities, low carbon alternatives, optimising operational resource usage, and research and innovation. Transforming to sustainable skin surgery practices as per BSDS sustainability guidance could have implications on the environmental, social and financial aspects of the skin surgery service.

Curette and cautery minor skin surgery procedure is one of the most commonly performed procedures at the Dermatology Department at the South Warwickshire University NHS Foundation Trust (estimated up to 1,000 procedures per year). It is standard practice for practitioners to perform this procedure using sterile gloves (same as in all other minor skin surgeries such as excisions and diagnostic biopsies). This type of procedure has been identified by the project team (following consultation with stakeholders) as having the most potential scope for transformation to more sustainable practice and with the least perceived barriers (out of all types of skin surgery procedures) for practitioners to change their behaviours.

A new lean pathway with low carbon alternatives for curette and cautery procedures has been proposed and evaluated in this project (i.e. 'the change' in our practice).

In addition, the project team clinical lead, Dr Simon Tso, is a named contributor to the BSDS sustainability guidance 2022. Dr Tso also leads the Dermatology Sustainability UK Group ('the Group') which has undertaken national scale sustainability projects including a recently completed 12 sites study across all 4 nations of the UK to investigate baseline set up, resource consumption, waste management and recycling rate in skin surgery (1). The project team will disseminate findings and learning from our transformation to sustainable skin surgery practices at the South Warwickshire University NHS Foundation Trust to the Group (i.e. dermatology staff from 12 Trusts across the UK that actively participated in the Group's activities) with the aim of influencing other dermatology departments across the UK and other specialities that perform the same type of procedure to adopt new sustainable practices.

Specific Aims:

The aims of the project are:

- 1) Develop consensus on a lean pathway (including adoption of low carbon alternatives) for curette and cautery skin surgery procedures, and evaluate outcomes of this lean pathway clinically and across the triple bottom line (social, environmental and financial).
- 2) Educate dermatology staff (clinical, nursing and support staff) who undertake and assist with minor skin surgery at the South Warwickshire University NHS Foundation Trust about the BSDS sustainability guidance 2022 for skin surgery.

Methods:

1. Staff involvement in the development of the project

The project team conducted informal discussion with staff (clinicians, nursing and support staff) within and outside of the South Warwickshire University NHS Foundation Trust to explore their views and perceived barriers on transformation to sustainable skin surgery practices. Members of the Dermatology Sustainability UK Group were also consulted.

2. To understand current practice at South Warwickshire University NHS Foundation Trust and suggest leaner options

The dermatology department's standard practice is to perform all types of minor skin surgery procedures using sterile gloves regardless of infection control risks. The project team informed the dermatology department on the recommendations from the British Society of Dermatological Surgery Sustainability Guidance (BSDS) 2022 at a departmental meeting on 5 May 2023. The department discussed and debated about the evidence and recommendations stated in the guidance. The department discussed and defined an area of skin surgery that they would be amenable to change.

The project team examined the procedure steps involved in performing curette and cautery procedure with the aid of the Healthcare Environmental Performance Tool (8) - a prototype performance based decision tool). Process mapping was conducted to describe the existing common practices amongst departmental staff when performing curette and cautery skin surgery and proposed a new lean pathway for staff to consider as their standard practice. The historical and proposed lean pathway are shown below in Table 1.

Table 1. Historical pathway and new lean pathway to perform curette and cautery procedures, colour coded where the same colour refers to the same step. In the new lean pathway, one of the steps (step 3 from historical pathway) was eliminated and this has reduced the use of consumables (i.e. one Clinel 2% chlorhexidine in 70% alcohol skin wipe). In the process map steps 2, 3 and 5 (as stated in the new lean pathway) involved a reduction on the use of consumables (i.e. reuse one surgical marker pen over one skin surgery list, if deemed appropriate) or the use of a low carbon alternative (i.e. switch from sterile gloves to clean nitrile gloves; and switch from using 2.2ml glass vial to 20ml glass vial of local anaesthetic). For the purpose of this report, the new lean process of performing curette and cautery procedure, including the use of low carbon alternatives, constitutes 'the change' in our practice being evaluated for its clinical, environmental, financial and social impact.

Step	Historical Pathway	New Lean Pathway
1	One clinician wear relevant PPE (1x single use plastic apron, 1x Type IIR fluid resistant mask worn through a surgical list of 5 patients); one support staff wear 1x Type IIR fluid resistant mask through a surgical list of 5 patients)	One clinician wear relevant PPE (1x single use plastic apron, 1x Type IIR fluid resistant mask worn through a surgical list of 5 patients); one support staff wear 1x Type IIR fluid resistant mask through a surgical list of 5 patients)
2	Mark Surgical Site with 1x surgical marker pen (single use)	Mark Surgical Site with 1x surgical marker pen (reuse throughout a surgical list of 5 patients)
3	Disinfect skin (surgical site) with one Clinel 2% chlorhexidine in 70% alcohol skin wipe	Hand disinfection with soap and water prior to procedure Wear non-sterile nitrile gloves
4	Local Anaesthetic drawn from 2.2ml glass vial of lignocaine and applied to surgical site using BD Safety Glide insulin syringe (also require 1/5 pack of non-women swab	Disinfect surgical site with Sterets solution 1pack
5	Hand disinfection with soap and water prior to procedure Wear sterile gloves	Local Anaesthetic drawn from 20mls glass vial of lignocaine and applied to surgical site using BD Safety Glide insulin syringe (also require 1/5 pack of non-women swab
6	Disinfect surgical site with Sterets solution 1pack	Perform Procedure using 1x 7mm curette (sharp), 1x hyficator tip (sharp), 1x non-woven swab, 1x single use surgical pack
7	Perform Procedure using 1x 7mm curette (sharp), 1x hyficator tip (sharp), 1x non-woven swab, 1x single use surgical pack	

3. Proposed lean pathway changes

Departmental consensus was reached in relation to curette and cautery skin surgery procedures performed under local anaesthetic is suitable for change to more sustainable practice. Departmental consensus was reached that, based on practitioner's risk assessment, they can choose to use clean non-sterile nitrile gloves (a low carbon alternative) or sterile gloves to perform this type of procedure. Consensus was further reached to conduct a clinical audit to examine patient outcome in terms of the surgical site infection rate of curette and cautery procedures performed under clean nitrile gloves versus sterile gloves.

Measurement:

Social sustainability:

To explore staff perception about transformation to sustainable skin surgery including perceived barriers (qualitative data generated from discussions and field notes) and identifying an area of skin surgery practices that has lower perceived barriers for sustainable transformation.

Patient outcomes:

In order to determine the clinical impact of 'the change' in our practice, we examined the surgical site infection rate of curette and cautery procedures in our department. We have registered the clinical audit with the Trust's audit and clinical effectiveness department. Data collection period was 8 May to 7 July 2023. A convenience sample of patients who underwent curette and cautery procedures that were performed with clean nitrile gloves or sterile gloves were included into the audit. A member of the clinical team conducted telemedicine consultation with patients within a week of their procedure to determine if there are surgical site infections. It is noted that meta-analysis of surgical site infection rate from skin surgery (4 randomised controlled trials and 5 comparative observational studies) reported a surgical site infection rate of 2.2% from procedures undertaken with non-sterile gloves and 2.2% with sterile gloves (7). Thus, a surgical site infection rate of 2.2% or below was set as our local audit standard.

Economic sustainability:

To identify the commercial (non-NHS) costs of consumables used to perform curette and cautery procedures before and after 'the change' in practice.

Environmental sustainability:

To estimate the carbon footprint of the items being replaced a hybrid methodology was used. For the non sterile and sterile gloves and clinell wipe data was taken from existing life cycle assessment (LCA) studies (9). For the rest of the consumable including the skin marker pen and the pharmaceuticals, an environmentally extended input output analysis (EEIOA) was undertaken based on cost using emission factors taken from GreenerNHS. Emissions associated with waste were based on weight using factors taken from Rizan et al 2021 (10) and water and electricity emission factors were taken from the UK Government BEIS database 2023.

Results:

Social sustainability:

Outcome from the service user involvement in the development of the project

The emerging themes from the discussions included: strong staff interests to transform to sustainable skin surgery practices, lack of awareness of the BSDS sustainability guidance 2022 and its evidence base, the need to comply with local infection control processes, and perceived conflict between sustainable skin surgery practices (especially low carbon alternative such as clean nitrile gloves instead of sterile gloves) and management of surgical site infection risks. Curette and cautery procedures were perceived as of lower infection risks and practitioners would be more prepared to transform to sustainable skin surgery practices as per BSDS sustainable guidance.

Patient outcomes:

The surgical site infection rate post curette and cautery procedure performed with nitrile gloves was (0/8; Table 2) 0% and with sterile gloves was (0/12; Table 3) 0%, indicating no increased risk of infection with the lean pathway.

Table 2. Post-operative outcome of 6 patients following 8 curette and cautery minor skin surgery procedures. Surgical site infection rate was (0/8) 0%. Note: one case is one patient, and one patient may have undergone more than one procedure.

Curette and cautery procedures performed with nitrile gloves		
Case number	Site	Post-operative surgical site infection requiring antibiotics?
1	Scalp	No
2	Scalp	No
	Chest	No
3	Face	No
4	Lower limb	No
5	Face	No
	Face	No
6	Face	No

Table 4. Post-operative outcome of 9 patients following 12 curette and cautery minor skin surgery procedures. Surgical site infection rate was (0/12) 0%. Note: one case is one patient, and one patient may have undergone more than one procedure.

Curette and cautery procedures performed with sterile gloves		
Case number	Site	Post-operative surgical site infection requiring antibiotics?
1	Face	No
2	Face	No
3	Upper limb	No
4	Face	No
	Torso	No
5	Lower limb	No
6	Face	No
	Neck	No
7	Lower limb	No
	Torso	No
8	Scalp	No
9	Upper limb	No

Economic sustainability:

The commercial (non-NHS) costs for performing a single curette and cautery skin surgery procedure using the historical pathway is estimated at £12.87 (excl VAT) and £8.79 (excl VAT) using the new lean pathway. Thus, the change in practice resulted in £4.08 (excl VAT) per procedure of cost savings.

The dermatology department at South Warwickshire University NHS Foundation Trust is estimated to conduct up to 1,000 curette and cauterisation procedures per year. If the change in practice is embedded into standard practice, this could potentially lead to £4,075.45 (excl VAT) per annum of cost savings.

Note: Itemised raw data of all cost calculations are available on request.

Environmental sustainability

The carbon footprint for performing a single curette and cauterisation procedure (inclusive of consumables, electricity and water; but excluding travel) using the historical pathway is estimated at 5.78 kgCO₂e and 4.54 kgCO₂e using the new lean pathway. Thus, the change in practice resulted in a reduction of 1.24 kgCO₂e per procedure. This is achieved through reduction of one Clinel 2% chlorhexidine in 70% alcohol skin wipe, reuse one surgical marker pen over one skin surgery list before disposal instead of single usage, switch from sterile gloves to clean nitrile gloves and switch from using 2.2ml glass vial to 20ml glass vial of local anaesthetic.

The dermatology department at South Warwickshire University NHS Foundation Trust is estimated to conduct up to 1,000 curette and cauterisation procedures per year. If the change in practice is embedded into standard practice, this could potentially lead to a reduction of 1,240 kgCO₂e per annum, equivalent to driving 3,662.14 miles in an average car.

Note: Itemised raw data of carbon footprint estimation are available on request.

Discussion:

Our study identified curette and cauterisation skin surgery procedures to have lower perceived barriers for practitioners to adopt sustainable transformation of practices. We succeeded in reaching departmental consensus to enable staff (based on their risk assessment) to adopt low carbon alternatives and lean pathway (as described in Table 1) when performing curette and cauterisation procedures. Our surgical site infection rate audit to date has a small sample, but it has provided valuable initial data to inform staff there are no significant infection control concerns in the new lean pathway. It is anticipated that following completion of a larger scale surgical site infection rate audit this will give all staff the confidence to embed the new lean pathway (including low carbon alternatives such as wearing non-sterile nitrile gloves) as their standard practice and encourage staff to contemplate about adopting lean pathways for other types of skin surgery .

This study has limitations. This is a single site study with a small study sample. Carbon footprint calculations are partly based on EEIOA estimates due to limited life cycle assessment data for most of the consumables used to perform curette and cauterisation procedures. The scope of this project focused on the performance of curette and cauterisation procedure alone. Our project has not implemented changes targeting additional hotspots within dermatology such as hand disinfection technique, travel and how skin surgery appointments are organised.

We have disseminated our findings to the Dermatology Sustainability UK Group which generated interests and discussions from staff in different sites to consider adopting a more sustainable way to perform curette and cauterisation procedures. The Group has 12 active sites. Assuming each site delivers 1,000 procedures per annum, the change in practice could potentially result in £48,905.40 (excl VAT) annual savings and reduction of 14.88 tonne CO₂e per annum.

It should be further noted that curette and cauterisation procedures are also performed by other specialties such as ENT, Maxillofacial Surgery, Plastics Surgery team, General Practitioners, etc. The volume of curette and cauterisation procedures performed by other specialties are currently unknown - disseminating the findings and learning from this project to other specialties would further increase the impact of this project. Potential methods of disseminating our project findings could include direct discussion with colleagues in other

specialties, presentation at multidisciplinary surgical conferences and publication in multidisciplinary surgical peer reviewed publications.

Future studies could evaluate the triple bottom line impact of introducing one-stop skin surgery services and artificial intelligence to triage referral directly for skin surgery.

Conclusions:

Our study demonstrated that transforming to sustainable practices for curette and cautery procedures can lead to significant triple bottom line benefits with no obvious adverse postoperative infection risks. We encourage dermatology staff from the public and private sector, as well as staff from other specialties, to consider adopting the recommendations from the BSDS sustainability guidance when performing curette and cautery procedures.

References and Resources

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Team Members:

- Tessa Dadley (Lead Technician - Procurement & Goods-Receipt)
- Colin Foy (Pharmacy Operations Manager)
- Louise Foy-Coley (Lead Technician - Dispensary, Distribution & Training)
- Sarah Welsby (Lead Technician - Ward-Based Medicines Management)



Background:

The medicines pathway from manufacture to administration and wastage contributes a significant amount of plastic waste which, due to environmental waste handling regulations, are sent for incineration. The production and use of pharmaceuticals contributes more than 12% of carbon emissions in Health & Social Care. While solutions to recycle plastic waste produced in the medicines pathway are being explored nationally, our experience has suggested that there is room to reduce the amount of medicines dispensed in the first place.

With these challenges in waste management alongside the aim to reduce financial expenditure on medicines, we have for some time been looking to reduce waste production from medicines. The Pharmacy Department currently undertakes an assessment and reuse process for all medicines returned from clinical areas, assessing fitness for use and checking that they have not left the controlled storage parameters of the hospital. Through this programme, pharmacy achieved a financial saving of £61,682 by reusing medicines which would otherwise have been discarded. This equates to a reduction in CO₂ emissions of 7895kg (converted using the Greener NHS formula).

While this is a significant achievement, this has led us to question why this volume of unnecessary dispensing is happening in the first place. Professional experience has shown that some proportion of medicine supplies are in fact unnecessarily re-dispensed items. This can happen for a variety of reasons (damaged medicines, increased dosage/frequency) but one of the more impactful from the perspective of patient care is to do with transfer. When patients move bed space or ward, it is not always the case that medicines are transferred with them. This not only leads to items being requested again, but it also leaves the patient in the new location without the medicines that we have dispensed for them, which in turn may lead to missed doses. Depending on the medicines in question, this could have a significant detrimental impact on the patient (e.g. when doses of medicines for the treatment of Parkinson's disease are missed).

We therefore concluded that there would be value in exploring our suspicions further, with the aim of reducing the volume of medicines entering the pathway (and therefore the waste stream) and ensuring that medicines are available for patients when they need them.

Specific Aims:

Short term (during competition period): Explore the scope of dispensed items and use this data to propose initiatives/changes to working practices to reduce the number of items unnecessarily dispensed.

Long term: To implement proposed initiatives/changes to working practices to reduce the number of items unnecessarily dispensed, saving money, carbon, staff time and reducing the number of inpatient missed doses.

Methods:

Studying the system

We collected data over a one month period. Data gathering was driven by dispensers to identify requests for unnecessary resupply which can be seen on pharmacy systems. This enabled us to understand the extent of the problem and reasons for redispensing, and to inform **plans for** change ideas.

Measurement:

Patient outcomes:

This is a data-gathering/fact finding project at this stage, so we do not anticipate any measurable impact on patient outcomes as medications that are needed by patients will still be provided as usual. While the aim of this project at this stage is essentially to investigate the issue, we anticipate that missed doses are being caused by failure to transfer medicines with patients and if this is found to be the case, any future projects/cycles would look to reduce incidents of missed doses through the reduction of this, which would have an assumed positive impact on patient outcomes.

Environmental sustainability:

Carbon emissions for reduced medicine waste were calculated using the 2020/21 Greener NHS Database emission factor for Pharmaceutical (0.128 kgCO₂e / £ spent).

Economic sustainability:

The costs of medications were already available within our team.

Future projects/cycles will look to capture the value of avoiding re-dispensing, however this is a demand/supply relationship so any reduction in re-dispensed items would ultimately result in reduced purchasing.

Social sustainability:

We did not measure social sustainability however have detailed some potential impacts in the results section.

Results:

Patient outcomes:

As described above, actual missed-dose data is available and will be measured in future projects/cycles to assess the impact of any interventions made. There is anecdotal evidence in the data showing a gap of more than 24 hours between dispensing for MAU and dispensing for another ward during the same episode.

Environmental sustainability:

In the month there were 243 re-dispensed items. Projected across a year this equates to 12,288 kgCO₂e.

As a conservative estimate, if we reduced our re-dispensing by 10% in the next year, we would save 1,228.8 kgCO₂e per year, equivalent to driving 3,629 miles in an average car.

Economic sustainability:

In the month there were 243 re-dispensed items accounting for 4% dispensing undertaken and with a total drug-cost value of £8k (extrapolated to £96k annually). This represents approximately 12 hours of dispensing time and 4 hours of accuracy checking time per month, at a staffing cost of approximately £2.5k per year.

As a conservative estimate, if we reduced our re-dispensing by 10% in the next year, we would save £9,600 per year.

Social sustainability:

We did not specifically measure social sustainability, however a saving of 16 staff hours per month may have positive implications for staff with heavy workloads who will be able to redirect this time to higher value activity.

Discussion:

In summary, the data collected does support the hypothesis that some medicines wastage in the Trust is driven by unnecessary re-dispensing. The results suggest that failure to transfer medicines with patients is one factor in this. This is, however, an early stage of a potentially wider project, in which further investigation into the root-cause of this is required before identifying a potential action plan to address.

Further data on missed doses would be valuable, though there are limitations in attempting to map any reduction in these to improved patient outcomes directly. To understand this better, qualitative data on specific medicines pre vs. post intervention would be useful, as there are cases where the impact of one to the other is particularly clear e.g. in Parkinson's disease.

The key limitation of this project so far is that it does not include any dispensing undertaken by SWFTCS outpatient Pharmacy, which covers all TTO dispensing in the Trust. There is anecdotal evidence of a high rate of returned TTOs, data gathering on which has recently commenced to assess the size of the problem. The causes for this are likely to be different to that of re-dispensed inpatient medicines, and it will require further investigation to understand this - this work is currently underway.

In the current staffing climate, this project has been quite difficult to prioritise for those involved, and it is clear that further investigation of, and action to address, these findings will require some support and free engagement from ward staff.

Conclusions:

This has been a worthwhile project, from which we have drawn some key conclusions:

1. The availability of medicines for patients at the time they are needed is, at least some of the time, compromised by failure to transfer those medicines when the patient moves to another ward.
2. The cost associated with re-dispensing is somewhat recovered by returns management processes, however this has several flaws:
 - a. Dispensing medicines unnecessarily, and then returning those medicines for reuse, is a waste of pharmacy time which could be better spent on patient-facing work as part of the clinical and technical pharmacy ward service.
 - b. Depending on the medicine/patient presentation, failure to transfer medicines with patients may impact on patient experience and outcomes and, by extension, length of stay and flow; regardless of whether the financial cost is recovered through returns processes.
 - c. Dispensing medicines unnecessarily results in increased stockholding, which is known to increase waste through expired/damaged medicines (see Carter Review).
3. Not all medicines dispensing carried out in the Trust was in scope for this project. Notably, TTO returns are known to be high in volume. This is under scrutiny in a separate project currently.

The findings of this project go hand-in-hand with the work being undertaken to investigate TTO returns. The next steps will be to present this work to the TTO project group with a view to incorporating this data, further drill-down and actions to address into the same project. While the specific actions require more investigation, initial suggestions include:

1. A communications campaign to share these findings with ward staff, to increase awareness and promote medicines transfer.
2. A change to patient transfer procedures to include 'empty bed, open lockers' initiative, which would ensure transfer of all locker contents including medicines.
3. Addition of a check for porters when handing over medicines in admissions areas, to ascertain if the patient has moved in the time taken to dispense the requested medicines and facilitate transfer.

References and Resources

- [Productivity in NHS hospitals - GOV.UK \(www.gov.uk\)](http://www.gov.uk)

AWARDS



WINNERS: Care of the Elderly Team

Congratulations to the winning team, led by Ellie Berry, Advanced Clinical Practitioner (Frailty), for their project to reduce low value blood testing in care of the elderly and frailty wards. The project team were praised by the judges for their long-term thinking to ensure longevity of staff behaviour change and the beneficial impacts their project brings across the full sustainable value equation.

“It is fantastic that clinicians from across the organisation are committed to embedding environmental and sustainable practices into their areas of work. As a large organisation, we recognise the role we and the wider NHS, need to play in tackling the climate crisis and clinical and operational involvement is key to this. All the projects we have seen are brilliant examples of how big or small changes can make an impact. The enthusiasm shown by the teams is great, and I can’t wait to work with more teams across the organisation.”

Dr Charles Ashton, Chief Medical Officer

NEXT STEPS

Having run these pilot projects, we encourage the teams to build on this initial phase by embedding their projects into everyday practice, and considering opportunities to scale and spread their work. The SusQI Academy Leads will continue to offer internal support. We encourage SWFT as an organisation to support spread of suitable projects to other areas and for teams to continue to look at their work through a ‘Sustainability Lens’.

ACKNOWLEDGEMENTS

CSH would like to thank our 6 Green Teams for their enthusiasm, dedication and creativity in devising and completing their projects.

Thank you to Cristina Calleja, Senior Sustainability Manager and Caroline Lloyd, Sustainability Officer at SWFT for partnering with us in the competition and supporting the teams.

Thank you to the judging panel for your time, thoughtful questions and encouraging comments:

- Charles Ashton, Medical Director, SWFT
- Sophie Gilkes, Chief Strategy Officer, SWFT
- Siobhan Parslow Williams, QI Education Lead, Centre for Sustainable Healthcare (CSH)

Thank you to our SWFT SusQI Academy members who supported the Green Teams alongside their SusQI Academy work.

- Lorna Bannan, OPMU project officer
- Cristina Calleja, Sustainability Manager
- Faye Kenning, Service improvement Manager
- Emma Rowan, Service improvement Manager
- Joanne DulsonCox, Quality Assurance Manager

Thank you to Rosie Hillson - Carbon Modelling Assistant (CSH) for their careful and highly skilled work in carbon footprinting. Rosie supported the teams in carrying out their own carbon footprinting and equipped teams with the knowledge and tools to carry out future calculations for projects in the future. Carbon calculations are essential to 'triple bottom line' integrated project reporting and make plain the true cost and impacts of services to allow better, safer and more responsible decisions to be made in healthcare organisations.

POTENTIAL ANNUAL SAVINGS

The following table provides detail on the **annual** savings available to the Trust from the 2023 Green Team Competition.

Savings in black text are based on actual changes made or commenced during the 10-week competition. Savings in blue text are based on planned or potential changes that require longer to implement.

Project	Financial Outcomes (£)	Environmental Outcomes (kgCO2e)	Social Outcomes	Clinical Outcomes
Reducing continence products waste, Neuro-rehab Team	£2,222	588	<ul style="list-style-type: none"> Increasing awareness of how waste impacts on the environment. Wider team engaged and thinking about other areas where they can make improvements. 	<ul style="list-style-type: none"> No negative impacts on patient care.
Improving the environmental impact of patients with diabetes and on insulin, Diabetes team	Reusable insulin pens: £468 £15,120 for reducing 1 patient's nurse visits PenCycle - £3	Reusable insulin pens 1,863 Pencycle CO2e neutral	<ul style="list-style-type: none"> Staff: There may be an initial time investment to write to GPs and request prescription changes to reusable pens. Long term there will likely be improved efficiency and the potential to reduce appointments which would lead to larger time savings. For patients: Reusable pens may provide reassurance as pens have memory of the most recent dosage and time given. While PenCycle was cost and carbon neutral, engagement in the programme brings wider environmental benefits and it may be encouraging to staff and patients to know they are taking positive actions. 	<ul style="list-style-type: none"> Smart Pens could improve independence, as some patients may be able to give their own insulin at times carers/district nurses were previously required to perform checks. This has been the case for one patient as detailed in the full report.
Effect of reducing physiotherapy referrals from care homes, Physiotherapy team	£66,286	1,175	<ul style="list-style-type: none"> Care home staff: May save time with improved mobility / reduced injury in residents, build patient confidence and improve staff wellbeing. Physiotherapy staff: With a 35% reduction in appointments the physiotherapy team would save 57.6 hours of staff time per month to dedicate to higher value activity. 	<ul style="list-style-type: none"> Research suggests similar initiatives improved overall wellbeing, reduced fall-related referrals, and improved quality of life – patient empowerment and prevention are the most sustainable forms of care. A reduction in referrals may improve waiting times for other patients.
Reducing routine blood testing, Frailty and Care of the Elderly Wards Team	£18,444	937	<ul style="list-style-type: none"> Positive staff and patient feedback who agreed excessive testing was a problem Time gained back to phlebotomy staff Estimated 92 hours of laboratory time was saved in a 1-week period which may improve work flow in the lab. 	<ul style="list-style-type: none"> Reducing risks associated with excessive blood testing in an elderly population such as high levels of bruising and skin damage. Reduced distress and pain during procedures for patients who are vulnerable and/or have cognitive impairment. Potential to reduce discharge delays and improve patient flow (not possible to measure in project period)

Lean pathway and low carbon alternatives in curette and cautery skin surgery, Dermatology Team	£4,075	1,240	<ul style="list-style-type: none"> strong staff interest to transform to sustainable skin surgery practices increased awareness of dermatology sustainability guidance 2022 and its evidence base 	<ul style="list-style-type: none"> no increased risk of infection with the lean pathway. Infection rates will continue to be monitored.
Reducing wastage in the Medicines Pathway, Pharmacy Team	£9,600	1,229	<ul style="list-style-type: none"> 16 staff hours per month may have positive implications for staff with heavy workloads who will be able to redirect this time to higher value activity. 	<ul style="list-style-type: none"> Potential to prevent missed doses of medications, which will be monitored longer term.
Total Savings	£116,194	7,032 kgCO2e		