GREEN TEAM COMPETITION

CENTRE FOR SUSTAINABLE HEALTHCARE

IMPACT REPORT

HYWEL DDA UNIVERSITY HEALTH BOARD

GIG CYMRU NHS WALES

Bwrdd Iechyd Prifysgol
Hywel Dda
University Health Board

CENTRE *for* SUSTAINABLE HEALTHCARE

inspire • empower • transform

GREEN TEAM COMPETITION

POTENTIAL ANNUAL SAVINGS

£26,399

2,340,950 kgCO2e

CENTRE FOR SUSTAINABLE HEALTHCARE

CARBON SAVINGS EQUIVALENT TO

The same amount of carbon absorbed by 92,638 mature trees in one year

6,742,367.5 miles driven in average car

14,345 return trips between Bronglais Hospital, Aberystwyth, and Kings Cross, London

CENTRE FOR SUSTAINABLE HEALTHCARE

COMPETITION ENTRIES

INTRODUCTION

Climate change is having far reaching consequences for planetary health, including within the United Kingdom, and is accepted as one of the greatest threats to the health of global populations. In addition to climate change, the integrity of our environment, on which we depend, is threatened by pollution (air, plastic and chemical pollution), water scarcity, soil degradation, deforestation, and loss of biodiversity.

Whilst healthcare systems have a key part to play in maintaining health in the face of the threat of climate change, the delivery of healthcare is also undermining the health of our populations, by contributing to the problem. If healthcare were a country, it would be the 5th largest carbon emitter in the world[2].

However, climate change can also be viewed as 'the greatest global health opportunity'. The NHS was the first health service globally to commit to net zero carbon. In 2019, the Welsh Government declared a Climate Emergency supported by Members of the Senedd and have since set out an ambition for the public sector to be net zero by 2030. As the largest public sector organisation in Wales, the NHS has an important role to play in contributing towards this ambition. The NHS Wales Carbon Footprint 2018/19 was estimated to be 1,001,378 tCO2e which has informed the approach set out in the NHS Wales Decarbonisation Strategic Delivery Plan published on March 2021.

Clinicians have intimate knowledge of a vast range of medications, resources and equipment used for their daily practice to provide best, evidence-based care for their patients. Non-clinical teams are too essential to ensure that resources and patient care pathways are effective. The combined knowledge and understanding across of all aspects of care is vital when making the carefully nuanced decisions on how to maintain or improve clinical care whilst reducing environmental, social and financial cost.

The Green Team Competition is a clinical leadership and engagement programme for NHS Trusts wishing to improve their sustainability practice. The Centre for Sustainable Healthcare (CSH) has worked directly with six teams across Hywel Dda University Health Board to develop, run and measure projects that add sustainable value within their service, by considering the 'triple bottom line' of reduced environmental harm, reduced financial waste, and adding social value.

$$\text{Sustainable Value} = \frac{\text{Outcomes for patients and populations}}{\text{Environmental + social + financial impacts (the 'triple bottom line')}}$$

Running the competition in an organisation also builds a community of clinical staff who are empowered, enthused, and equipped to further improve their services for the future, guided by the concepts of the triple bottom line and sustainable healthcare.

1. **PATHOLOGY SAMPLE TRANSPORT**, PATHOLOGY TEAM

TEAM MEMBERS:

- John Markham
- Huw Davies
- Susan Prosser
- Lee Peters (lee.peters@wales.nhs.uk)

Background:

There are four blood science laboratories in Hywel Dda University Health Board (HDUHB); Bronglais, Withybush, Glangwili and Prince Phillip hospitals. Each of these laboratories process most of the samples sent to them, however, there are some specialised or rarer tests that require analysis elsewhere. Some of these will be done within the health board, but at another hospital site, while others will be sent to specialist centres for analysis.

The routine transport between hospital sites for these tests produces 52.4 tonnes of carbon emissions, with 119,500 miles travelled per year.

There are some cases when samples are sent via an urgent form of transport (taxi) as they cannot wait for the next day routine collection. These ad-hoc requests are for transport of pathology samples and blood products between hospital in Hywel Dda University Health Board, as well as to locations in other health boards. The secondary locations, outside of the health board, are the specialist centres for testing.

A review was conducted of the number of samples transported outside of routine health board transport between hospital sites.

Specific Aims:

To reduce ad-hoc transport by 5-10% in a 12-month period. This will save cost and reduce the environmental impact of unnecessary transport.

Methods:

An audit was conducted of historic ad-hoc transport (taxi service) requests between Oct 21- Sep 22. In this 12-month period, 1,261 samples or products were transported over 93,555 miles, at a cost of £103,673.

To try and reduce this several interventions were planned.

Phase 1: Unnecessary urgent processing and team education

It was considered that not all tests sent via ad hoc ‘urgent’ transport would be urgent for clinical patient care. Use of ad-hoc urgent transport was discussed with some of the main authorisers of the transport within the team. This educational intervention highlighted potential waste in terms of transport and cost and encouraged all to think about why ad-hoc transport was used and if it was always needed. Further educational discussions are planned to embed this into our system.

Phase 2: Review of in-house versus external testing

A review from our laboratory information system on samples sent to external specialist centres is on-going exploring if any tests can be;

a) sent to different specialist centres where transport is more readily available between the HB and specialist site. There is a myriad of transport being used in the HB for a range of services. There may be regular transport routes that our service can utilise/share instead of using Taxis.
b) taken in-house and analysed in HB. This would mean less samples having to be transported outside of the health board however may require some initial investment costs for equipment required for specific tests.

Measurement:

Patient outcomes:

There wasn't always detail on why or what was sent other than "sample" so further auditing about true clinical need for urgent request was difficult.

Environmental and Economic sustainability:

Data was collected via the HB logistics team for the period Oct 21-Sept 22. Data included authoriser and transport journey, including mileage and cost (£). The emissions factor for miles driven in a taxi was taken from the BEIS database[1].

We re-audited our travel distance and cost following phase 1 and will continue to re-audit over the coming 12 months as we continue with phase 2 of the project.

Social sustainability:

Feedback from staff was obtained via informal conversations and during meetings.

Results:

At present, there is insufficient information to grade the urgency of each ad hoc request, so gauging accurately what journeys are considered non-urgent and therefore avoidable is challenging. We have made an assumption that a 5-10% reduction in the next 12 months is reasonable and achievable when calculating our CO2e and financial savings.

Patient outcomes:

This wasn't measured during this project as any urgent samples will continue to be transported due to clinical need. There will therefore be no impact on patients.

Environmental sustainability:

Table 1 shows a summary of our current transport emissions.

21/22 Total for pathology transportation		
	Miles per year	**kgCO2e per year**
Daily runs	119,500	52,373
Ad hoc	93,555	39,012
Total	**213,055**	**91,385**

Phase 1 has been implemented with re-auditing in November 2022 showing no relative reduction in transport. However, we expect it will take more time for education and behaviour change to take

place and be reflected in our data. We are also yet to implement findings from phase 2 of our project.

Over the next 12 months, a 5-10% reduction in as hoc travel and associated emissions gives a potential annual saving of **1,950 - 3,901 kg CO2e per year** (4,677.7 - 9,355.5 miles driven).

Economic sustainability:

Calculating savings at this point has proved problematic due to several variables involved including insufficient information on the urgency of each ad hoc request and the cost of different tests. However, assuming a 5-10% reduction is achievable, potential savings of up to **~£5,183 - £10,367 per year** from reduced Taxi orders is possible.

Social sustainability:

We have known that there is potential waste in the system, but pathology management haven't formally reviewed it prior to this project. Colleagues have reported:

> *"This project has allowed us to really look at the process and see the potential savings"*
>
> *"Potential wasteful journeys that add nothing to the patient pathway can now start to be removed"*

Colleagues have also highlighted that reducing unnecessary processing for 'urgent' transport for tests that are not clinically urgent will save staff time:

> *"Reducing ad-hoc transport will also reduce pressure on staff, as the amount of urgent send away tests decrease this will allow them focus on more time sensitive tasks"*

Discussion:

Whilst we haven't been able to show any reduction in transport runs over the 10-week project period, this is almost certainly due to the short timescales to allow for the education and behavioural interventions to take effect. Other interventions are on-going and so will take longer to reflect impact.

Another factor is the urgency of some of these samples/ blood products. Sometimes they cannot wait for a routine transport or to be sent via the mail service. The transport of these will always be ad-hoc. Therefore, when measuring transportation, we must consider the clinical urgency.

No risk to patient outcomes will come from this project as all samples are reviewed based on clinical urgency. This project seeks to highlight when samples are sent via taxi when there may be more appropriate transport options available.

There is now a planned, yearly, ad-hoc transport audit to measure the levels. The ongoing interventions planned should show continued reductions in ad-hoc transport, until only clinically urgent samples require this mode of transport.

Conclusions:

The 'end' of this project is actually the start of a longer, larger project looking at pathology sample transport in Hywel Dda University HB and beyond. This project has allowed us to scope the current system and start to target the 'waste'.

References:

1. BEIS database: Greenhouse gas reporting: conversion factors 2022 - GOV.UK (www.gov.uk)

2. **REDUCING THE INHALER BLUES**, MEDICINES OPTIMISATION TEAM

TEAM MEMBERS:

- Pharmacists - Lowri Davies, Lowri Jones, Mair Davies and Rebekah Rogers
- Pharmacy Technician - Sian Jenkins
- Also recognising the co-operation from the Borth Surgery team

Background:

The NHS Wales Decarbonisation Strategic Delivery Plan, launched in March 2021, sets out NHS Wales' plan for addressing the climate emergency declared by Welsh Government in 2019. Part of this plan focuses on the decarbonisation of inhalers. Wales has an ambitious target to reduce the proportion of metered dose inhalers (MDIs) from 70% to less than 20% by 2025, which, if achieved will reduce the amount of CO_2 equivalent (CO2e) released into the atmosphere by 45,000 tonnes each year[1].

Hydrofluorocarbon/hydrofluoroalkane propellants from MDIs contribute 3.5% of the total carbon footprint of the NHS. This amounts to 65,000 tonnes of CO2e each year in Wales alone. Dry powder inhalers (DPIs) have a carbon footprint 18 times lower than MDIs and clinically, DPIs have been proven to be as effective as MDIs[2].

Currently, MDI use in Hywel Dda University Health Board (HDUHB) accounts for 63% of all inhalers prescribed, whereas DPIs account for only 37%[3]. There is clearly a scope to increase the proportion of lower global warming potential inhalers prescribed within HDUHB. The health board has set a target to reduce MDI use to 25% by December 2024 and increase DPI use to 75% or more.

Current data demonstrates that Ventolin® Evohaler or generic Salbutamol inhaler MDIs are by far the most prescribed inhalers, with more than 100,000 devices prescribed and dispensed in primary care in Wales every month. In combination, they contribute to about 66% of the total inhaler carbon footprint each year[2]. Equally effective alternatives exist which can reduce the carbon footprint by 50% (Salamol® MDI) or 98% (any short-acting beta-agonist (SABA) DPI). These inhalers are commonly known by patients as "blue inhalers" thus explaining the title of our project.

The Medicines Optimisation team support practices with their prescribing needs and ensure that they prescribe in line with local and national guidelines, and within the recommended formulary. We have local and national guidelines, patient apps and educational modules which address the green agenda and support inhaler switches to DPIs.

Specific Aims:

Within the ten-week competition period, our aim is to reduce the carbon footprint of MDI inhalers being prescribed within one practice in HDUHB by changing appropriate patients from high carbon footprint MDIs to lower carbon footprint MDIs or DPIs as appropriate.

Approach:

Studying the system:

Borth is a GP practice located in West Wales and has a patient population of 2666. Latest HDUHB data for DPI prescribing shows that Borth is the lowest prescriber of DPIs, (Only 25.79% of all inhalers prescribed are DPI) and they are also the highest prescriber of Salbutamol MDIs in Ceredigion[4]. The practice has a newly appointed practice pharmacist, a trainee pharmacist, a GP registrar, and medical students who were all eager to engage with the project and recognised the need to change their current prescribing practices.

The Medicines Optimisation team conducted a search of Vision; the practice's clinical record system, to find patients who were currently prescribed Salbutamol MDIs (branded or generic) as these have been identified as having a high carbon footprint. From these, we risk stratified the high-risk patients as detailed below, in order to assist the practice to prioritise patients for a face-to-face respiratory review. We met with the practice team and agreed how best to carry out the project. We decided that the project would have two work streams:

Work stream 1: Low carbon inhaler switch

- Medicines Optimisation team would carry out changing the Ventolin® and generic Salbutamol inhalers from high carbon MDIs to Salamol®, a lower carbon MDI. This would result in a decrease of 16kg CO2e per inhaler changed.
- Medicines Optimisation team would reduce the number of inhalers issued per repeat to 1 as per practice request. This should reduce the number of SABA's being prescribed for patients unnecessarily, which in turn will decrease the carbon footprint and reduce wastage.

Work stream 2: Reducing exacerbations

The Medicines Optimisation team would alert the surgery of high-risk patients, deemed to be at an increased risk of respiratory exacerbations due to either:

- being prescribed a high number of SABA MDIs in the last 12 months (≥12 in 12 months)
- being prescribed oral steroids in the last 6 months to treat a respiratory exacerbation
- being prescribed a SABA inhaler without an inhaled corticosteroid inhaler (ICS)

The patients identified would be contacted by the practice to attend a respiratory review where the intention was to agree a plan to better manage their condition. The aim of the review was to reduce the number of SABAs being prescribed, reduce GP & hospital visits due to poor respiratory disease management, provide better quality of life for the patient, and potentially reduce their carbon footprint by changing their inhalers to either lower carbon MDIs or to DPIs.

The medicines optimisation team assisted work stream 2 by:

- producing a green project respiratory review flowchart that was shared with healthcare professionals at the surgery and used during patient reviews *(see appendix 1)*

- producing a patient information leaflet that was provided to patients at their reviews, explaining the benefit of changing their inhalers from MDIs to lower carbon MDIs or DPIs *(see appendix 2)*

The Medicines Optimisation Team held an initial meeting with the practice at which the practice manager, pharmacist, trainee pharmacist, medical students, and GP registrar were in attendance. We discussed our proposal for the project and listened to their ideas and concerns. We outlined how the Medicines Optimisation team and the practice team could work together on the project. As a Medicines Optimisation team, we currently support practices with all aspects of prudent prescribing to ensure that they are prescribing the most clinically appropriate and cost-effective medication. We have remote access to all clinical systems and are trained to aid practices with all aspects of clinical work, thus making us ideally placed to assist the practice with this project work. All concerns were addressed, and some changes made to our proposal in line with the practice's request.

From this initial meeting we invited the respiratory interface nurse to the practice to offer support with the project work and upskill the clinicians. The clinicians felt that they needed some initial support from the Respiratory Interface Nurse on how to carry out a respiratory review. Some clinicians were new to respiratory reviews, and some felt they needed a refresher. The Respiratory Interface Nurse was able to offer support and guidance on how to carry out a successful respiratory review and was also able to offer shadowing of reviews and support to discuss complex cases. Educating staff about the various inhaler types should help them make informed decisions regarding changing inhalers and encourage lower carbon producing inhalers to be considered**.**

We continued weekly meetings throughout the project to address any concerns and keep the practice updated with the project development.

Measurement (Both work streams):

Environmental sustainability:

- We compared the CO2e of all MDIs at the start of the project with the CO2e once changed to lower carbon MDIs or DPIs. This included all the changes made from Ventolin®/generic Salbutamol to Salamol® (209 patients were identified as being on generic or branded Salbutamol MDI), as well as any changes made as a result of the face-to-face reviews carried out by the practice. The CO2e of all inhalers was taken from the MIMS online inhaler carbon emissions tool [5]

Economic Sustainability:

- We calculated the financial impact of any inhaler changes made. This included the changes to Salamol® MDIs as well as any changes made during the face-to-face respiratory reviews. We used the Drug Tariff prices per inhaler[6].

Patient Outcomes:

- We aim to improve the management of patients' respiratory conditions through education and change of treatment if required.
- We hope by assisting the practice to risk-stratify and identify appropriate patients for reviews the practice will be able to offer patient–centred care in a timely manner to the most high-risk patients. This is in line with the "Why Asthma Still Kills" National Review Asthma deaths (NRAD) 2014[7] report which recommends that all asthma patients who have been prescribed more than 12 SABA's in last 12 months be invited for an urgent review of their asthma control.

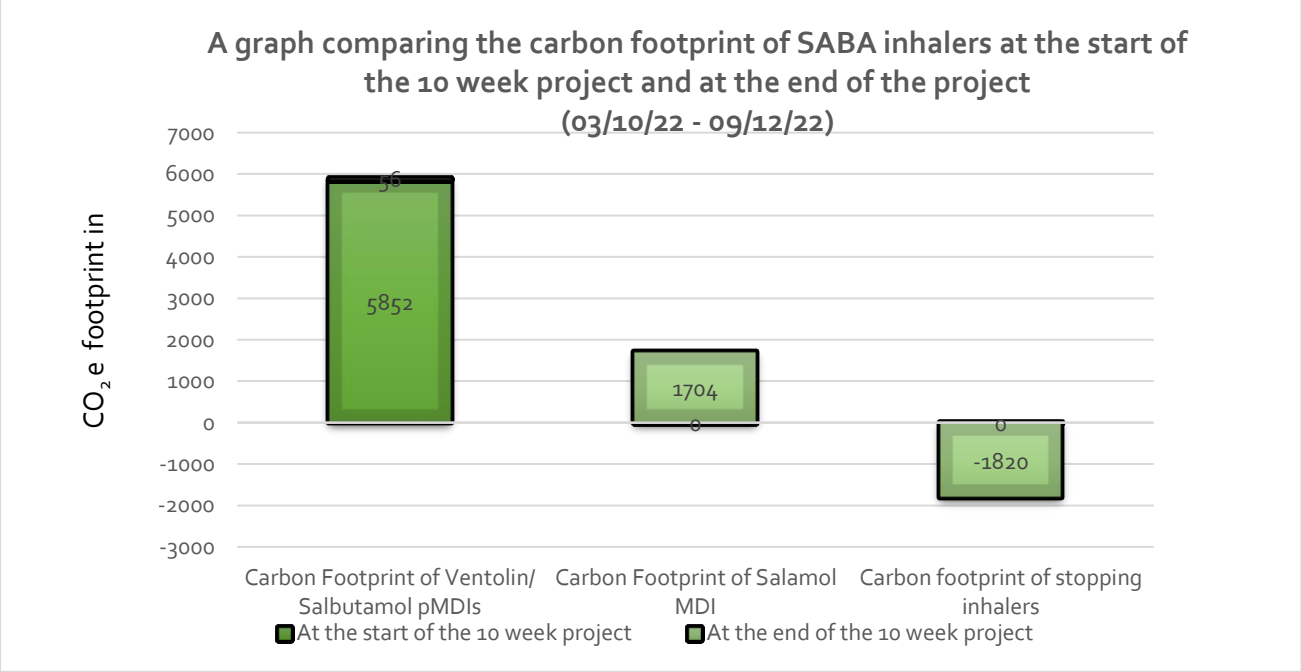
Social sustainability:

- We hope to increase patient awareness of the environmental issues of MDIs
- Having face-to-face respiratory reviews means that high risk individuals could potentially be better managed therefore freeing up GP/clinician time to see more patients.
- Reducing the quantity of medications on repeat, should reduce medicine wastage by patients. From a practice perspective, having less medication on repeats means that there are less for administration staff to process every month, less prescriptions for the GP to sign and less prescriptions for the local community pharmacy to dispense.

Results: Workstream 1: Low carbon inhaler switch

Prescribing at the start of project	Changes implemented over the 10 weeks	Environmental Impact - CO2e savings	Financial impact - £ saved
209 patients prescribed Ventolin® or generic Salbutamol	142 changed to Salamol®	Ventolin® Evohaler = 28kg CO2e, Salamol® inhaler = 12kg CO2e Reduction of CO2e is 28kg - 12kg = 16kg CO2e per inhaler 142 x 16kg = 2272kg of CO2e On average each patient would receive 6 inhalers per year 2272kg x 6 = 13,632kg CO2e	Cost saving of £0.04 per inhaler changed = 142 x 0.04 = £5.68 saved for the practice per month. On average patients would receive 6 inhalers per 12 months: £5.68 x 6 = £34.08 saving per year
	65 taken off repeat	If all patients were to have had only one inhaler in the last 12 months this would be a reduction of 65 x 28kg = 1,820kg of CO2e /12 months.	With each inhaler costing £1.50 this means that the practice would also save 65 x £1.50 = £97.50 per year.
	2 stayed on Ventolin®. *These patients were identified as requiring Ventolin by brand as respiratory symptoms worsened when a switch attempted in the past, therefore it was clinically appropriate for these to remain on branded Ventolin®.*	No saving	No financial impact
10 patients were given 2 Ventolin® inhalers per supply	10 patients were changed to receive 1 Salamol® inhaler per supply	The CO2e saving from 2 x 28kg CO2e inhalers to 1 x 12kg CO2e inhaler = 56kg – 12kg = 44kg CO2e reduction per inhaler per month Over 12 months (if they were supplied with 2 inhalers on 6 occasions throughout the year) this would equate to: 6 x 44kg = 264kg CO2e saved For 10 patients this would be a total of 2640kg CO2e saved	Reducing from 2 inhalers to 1 inhaler is a cost saving of £1.50 per supply. Over 12 months (if they were supplied with 2 inhalers on 6 occasions throughout the year) this would equate to: 6 x £1.50 = £9.00 For 10 patients this would be a total of £90.00 saved

1 patient was receiving 4 Ventolin® inhalers per supply	Patient changed to receive 1 Salamol® inhaler per supply	The CO2e saving from 4 x 28kg CO2e inhalers to 1 x 12kg CO2e inhaler = 112kg – 12kg = 100kg CO2e reduction per inhaler per month. Over 12 months (if they were supplied with 4 inhalers on 6 occasions throughout the year) this would equate to: 6 x 100kg = 600kg CO2e saved.	Reducing from 4 inhalers to 1 inhaler is a cost saving of £4.50 per supply. Over 12 months (if they were supplied with 4 inhalers on 6 occasions throughout the year) this would equate to: 6 x £4.50 = £27.00
Total savings from changes made in project period		**18,692 kgCO2e**	**£248.58**
Health Board wide potential if switch was replicated across HDUHB		147,964 SABA MDIs are prescribed in primary care in HDUHB per year. If 95% were changed to Salamol®: 140,565 x 16kg = **2,249,053 Kg CO2e saved per year. This is equivalent to 6.4 million miles driven in an average car.**	Current cost is £1.50 per inhaler, Salamol® cost is £1.46 = cost saving of £0.04 per inhaler changed. Changing to Salamol® would be an estimated cost saving of 140,565 x £0.04 = **£5,623 per year.** **95% switch = £5,623,** **80% switch= £4,735,** **50% switch = £2959**



Number of high-risk patients identified by Medicines Optimisation team and highlighted to GP practice:

- No of patients on ≥12 SABA in 12 months: 32
- No of patients on SABA with no ICS: 27

- No of patients on SABA who've had a course of oral steroid in last 6 months: 10
- A clinical pharmacist from the Medicines Optimisation team reviewed these 69 patients and highlighted the most high-risk patients for the practice to review.
- 6 face-to-face respiratory reviews have been conducted to date

  (Practice challenges with staff annual leave, need for staff upskilling and Respiratory Nurse not being available until week 9 of project)

Results: Workstream 2: Reducing exacerbations

Prescribing at the start of project	Changes implemented over the 10 weeks	Environmental Impact - CO_2 savings	Financial impact – money saved
Patient 1: Sirdupla® 25mcg/250mcg inhaler and Salamol® 100mcg inhaler	Salbutamol 200mcg Easyhaler® and Beclometasone 200mcg Easyhaler®	Sirdupla® 25mcg/250mcg to Beclometasone 200mcg Easyhaler® = 19.6kg – 0.6kg = 19kg CO2e saving Salamol® 100mcg to Salbutamol 200mcg Easyhaler® = 12kg – 0.6kg = 11.4kg CO2e saving If the patient were to receive their ICS inhaler 12 times a year and their SABA inhaler 6 times per year (19kg x 12) + (11.4kg x 6) = 296.4Kg CO2e saved per year	Sirdupla® 25/250mcg inhaler = £29.32 Beclometasone 200mcg Easyhaler® = 14.93 £29.32 - £14.93 = £14.39 saved Salamol® 100mcg inhaler = £1.46 Salbutamol 200mcg Easyhaler® = £6.63 £6.63 - £1.46 = £5.17 increase in price If the patient were to receive their ICS inhaler 12 times a year and their SABA inhaler 6 times per year £14.39 x 12 = 172.68 £5.17 x 6 = £31.02 £172.68 - £31.02 = £141.66 saved
Patient 2: Salamol® 100cmg inhaler and Clenil® 100mcg inhaler	Salbutamol 200mcg Easyhaler® and Beclometasone 200mcg Easyhaler®	Salamol® 100mcg to Salbutamol 200mcg Easyhaler® = 12kg – 0.6kg = 11.4kg CO2e saving Clenil® 100mcg to Beclometasone 200mcg Easyhaler® = 16.5kg – 0.6kg = 15.8kg CO2e saving If the patient were to receive their ICS inhaler 12 times a year and their SABA inhaler 6 times per year (11.4kg x 6) + (15.8kg x 12) = 258Kg CO2e saved per year	Salamol® 100mcg inhaler = £1.46 Salbutamol 200mcg Easyhaler® = £6.63 £6.63 - £1.46 = £5.17 increase in price Beclometasone 200mcg Easyhaler® = 14.93 Clenil® 100mcg inhaler = £7.42 £14.93 - £7.42 = £6.97 increase in price If the patient were to receive their ICS inhaler 12 times a year and their SABA inhaler 6 times per year (£5.17 x 12) + (£6.97 x 6) = £103.86 increase in price
Patient 3: Sirdupla® 25mcg/250mcg inhaler	DuoResp Spiromax® 160mcg/4.5mcg	Sirdupla® 25mcg/250mcg to DuoResp Spiromax® 160mcg/4.5mcg	Sirdupla® 25/250mcg inhaler = £29.32 Duoresp Spiromax® 160mcg/4.5mcg = £28.00

		= 19.6kg – 0.6kg = 19kg CO2e saving If the patient was to receive their ICS inhaler 12 times per year 19kg x 12 = 228kg CO2e saved per year	£29.32 - £28.00 = £1.32 saved If the patient were to receive their ICS inhaler 12 times per year £1.32 x 12 = £15.84 saved
Patient 4: Trelegy Ellipta® and Salamol® 100mcg inhaler	Fostair® 100/6 Inhaler and Salamol 100mcg inhaler (Patient changed from DPI to MDI due to poor inspiratory effort)	Trelegy Ellipta® = 0.77kg CO2e Fostair® 100/6 inhaler = 11.25kg CO2e 11.25kg – 0.77kg = 10.48kg Increase in CO2e Salamol® unchanged If the patient was to receive their ICS/LABA inhaler 12 times per year 10.48kg x 12 = 125.76kg CO2e increase per year	Trelegy Ellipta® = £44.50 Fostair® 100/6 inhaler = £29.32 £44.50 - £29.32 = £15.18 Salamol® unchanged If the patient was to receive their ICS/LABA inhaler 12 times per year £15.18 x 12 = £182.16 saved per year
Patient 5: Treatment not altered – Inhaler technique adjusted and referred for GP review			
Patient 6: Clenil® 100mcg inhaler and Salbutamol 100mcg inhaler	Fobumix Easyhaler® – MART regime	Clenil® 100mcg inhaler and Salbutamol 200mcg inhaler = 16.5kg + 28Kg = 44.5kg CO2e Fobumix Easyhaler® 160/4.5mcg = 0.48kg CO2e 44.5kg – 0.48kg = 44.02kg CO2e saving If the patient was to receive their ICS MART inhaler 12 times per year 44.02kg x 12 = 528.24kg CO2e saved per year	Clenil® 100mcg inhaler and Salbutamol 200mcg inhaler = £7.42 + £1.50 = £8.92 Fobumix Easyhaler® 160/4.5mcg = £28.00 £28.00 - £8.92 =£19.08 increase in price If the patient was to receive their ICS MART inhaler 12 times per year £19.08 x 12 = £228.96 increase in price
Total savings from changes made in project period		**1,436.34 kgCO2e**	**£6.84**

CO2e figures taken from MIMS[5], Drug Costs taken from the Drug Tariff[6]

Patient Outcomes for both workstreams:

No qualitative data from patients was collected during this project as very few respiratory reviews were undertaken by the practice due to numerous factors e.g., the relatively short period of the project made identifying and booking a patient for reviews a challenge. The practice also identified that they needed the support of the Respiratory interface Nurse to assist with reviews and therefore this decreased the number of reviews possible within the project time frame.

Feedback from clinicians undertaking the reviews was that the patients who attended the practice for a face-to-face respiratory review felt that they really benefitted from the review. Many had not been seen face-to-face for many years due to recent COVID rules and therefore were grateful for the opportunity to speak directly with a clinician. Patients felt that their respiratory needs were being met and that they were offered the most appropriate inhaler currently available. Patients were also given

a patient information leaflet during the review (Appendix 2) and felt that they had a better understanding of the carbon impact of inhalers after reading this.

Clinicians felt that face-to-face respiratory reviews were beneficial for patients as they could review inhaler technique and ensure that the patient was receiving the most appropriate inhaler for them, ensuring optimal disease management thus making the review extremely patient focused. Improved respiratory condition management should reduce the time lost from education or work, improve health and wellbeing, and improve patients' quality of life.

We hope that the practice continues to carry out respiratory reviews with the identified high-risk patients and we'll be in regular contact with them to obtain both patient and clinician feedback on the reviews and potential inhaler changes.

Going forward, as a Medicines Optimisation team we will be able to gather specific data for the practice using our CASPA database. We will have access to data detailing the number of SABA's prescribed monthly, as well as the number of DPIs prescribed. We will therefore be able to monitor if the project has had a long-lasting effect on prescribing within this practice. We predict that having assisted the practice to prioritise their high-risk patients who do not have well controlled respiratory conditions, and by forging close working relationships between the Respiratory Interface Nurse, the Medicines Optimisation team, and the practice, we will see reductions in unnecessary SABA prescribing and a positive shift towards DPI prescribing over the next 12 months.

Social sustainability; benefit to patients, health board staff and the community

The social impact from face-to-face respiratory reviews, optimising respiratory disease management and potentially changing patients' inhalers from MDIs to DPIs are vast.

The "Why Asthma Still Kills" (NRAD) report 2014[7] recommended actions for primary care to reduce asthma deaths and the work streams in this project align with these recommendations, giving clinical benefit whilst also aiming for decarbonisation. One of the recommendations noted was that all patients who had been prescribed more than 12 reliever inhalers in a 12-month period were invited for an urgent review of their asthma, with a view of improving their asthma through education and a change of treatment. We have adopted this recommendation as part of our project with the goal of ensuring that high-risk individuals have better control of their respiratory condition, require less GP/clinician appointments which in turn could free up GP/clinician time to see other patients. Improved control should also lead to less frequent exacerbations, reducing the risk of A+E attendances for uncontrolled asthma. Unfortunately, 10 weeks isn't long enough for us to measure these outcomes.

Improved respiratory control will also lessen the need for short courses of corticosteroids and antibiotics. This in turn will contribute towards lowering antibiotic resistance for both the patient themselves and the wider population.

Reducing the quantity of medications on repeat means there will be less wastage from patients who may be ordering medications when not required. From a practice perspective, having less medication on repeats means that there are less for administration staff to process every month, less prescriptions for GPs to sign and less prescriptions for the local community pharmacies to dispense.

The project improved working relationships between the Medicines Optimisation team, the GP practice, and the respiratory interface nurse. Educating the staff about the various inhaler types and

the carbon impact of inhalers allowed more informed decisions to be made and encouraged lower carbon producing inhalers to be considered. We also saw an improved awareness of decarbonisation and the green agenda by the multidisciplinary practice team. Staff have applied this new knowledge to their working day, for example administration staff at the practice now routinely query a request for a SABA inhaler from a patient and assign it to a clinician for review, rather than issue the prescription immediately. We have received positive feedback from all teams within the surgery, from reception and administration staff to the clinicians and practice manager. They were all keen to be involved with the work and enthusiastic to reduce the carbon footprint of the practice.

The project demonstrated how the Medicines Optimisation team can work collaboratively with a GP practice in order to prioritise high-risk patients for review. In this project, from the patients prescribed SABA's we risk stratified patients for respiratory reviews by clinicians, thus ensuring more efficient working. This is also in line with prudent prescribing principles as the correct patient was seen by the most appropriate clinician in the most appropriate time frame. The project has shown that by assisting the practice to risk- stratify and identify appropriate patients the practice is able to offer more patient-centred care in a timelier manner.

The Medicines Optimisation team are now more confident to approach further practices to discuss decarbonisation and potentially offer similar input. In addition to this, working on this project has sparked conversation within the team of ideas on how to improve sustainability within other aspects of patient care.

Discussion and Conclusion:

Barriers encountered:

The GP surgery encountered some barriers due to the challenges of staffing issues and work commitments. Due to the timing of the project the clinical staff at the surgery were delivering flu and COVID vaccination clinics alongside their usual workload and therefore time for project work was limited. Staff annual leave was also a barrier as we approached December. Unfortunately, the respiratory interface nurse for the health board was unable to help until week 9 of the project which was also a barrier as the practice felt they benefited enormously from her knowledge and expertise in reviewing respiratory patients. Due to all these factors, it was unfortunate that only six patients had attended the surgery for a face-to-face review during the 10-week project period. However, we are confident that with the structure for reviews now in place and high-risk patients identified the surgery team will continue with this work for the foreseeable future.

The practice pharmacist also highlighted a problem with the local community pharmacy where they were over–ordering SABA inhalers or ordering patients' inhalers when they were not needed. He discussed this with the pharmacy owner and training is now in place for new pharmacy staff, which should ensure that correct repeat medication ordering procedures are followed. The practice pharmacist will monitor the problem going forward.

Within the Medicines Optimisation team, project members worked part time at different ends of the week and therefore communication of work was a challenge, as was communicating with the practice due to the pressures mentioned above. We overcame such challenges by designing a project Excel worksheet which was stored on an accessible shared drive for all members of the project to access and update regularly as tasks were completed.

Steps taken to ensure lasting change

What the practice have done and will be doing going forward:

- They have ensured that all practice staff are aware of the SABA reduction drive. Reception staff are now highlighting any SABA inhaler requests to clinicians for review before issuing prescriptions.
- They have established a good working relationship with the health board's respiratory interface nurse who attends the surgery to review complex patients and offer training and support to clinicians.
- They have changed their policy to only have 1 SABA on repeat, and if reviewed by a clinician, SABAs are completely removed from the repeat and all acute requests will then need to be reviewed by a clinician first before issuing.

Medicine Optimisation team:

- Consideration given to rolling out the project to other high MDI prescribing practices within the health board.
- Continue to offer support to Borth GP practice with respiratory inhaler queries as needed.
- Continue to work closely and in collaboration with the respiratory interface nurses.

Consideration of other areas where the medicines optimisation team can impact on the environmental and financial cost of prescribing.

The project was successful in reducing the carbon footprint of MDI inhalers being prescribed within one practice in HDUHB by changing appropriate patients from high carbon footprint MDIs to lower carbon footprint MDIs or DPIs if appropriate. The project shows that intervention from the Medicines Optimisation team in changing inhalers from high carbon to lower carbon alternatives results in a reduction in carbon footprint.

From the health board's perspective, changing patients to the most carbon friendly inhaler where appropriate is in line with both the HDUHB and the national decarbonisation agenda.

It is accepted that, whilst making a carbon footprint reduction, and aligning with local and national decarbonisation targets, changing patients' inhalers from MDIs to DPIs won't always result in cost saving. In most cases changing a patient from 1 MDI to 1 DPI, thereby reducing the carbon footprint of inhalers could be more expensive, depending on which inhalers are appropriate for each patient. However, there will be cost savings if the total quantity of inhalers prescribed is reduced e.g., following better control, reducing the quantity on each prescription to avoid wastage, and when 3 MDI inhalers are changed to 1 DPI with triple therapy incorporated in one device. Cost savings from reduced exacerbations / reduced A+E visits and reduced asthma deaths are very difficult to cost but must be the ultimate goal of this work.

Positive feedback was received from the practice regarding our stratification of high-risk patients. This assisted them to prioritise patients for a respiratory review by the relevant clinician. The Green Project Respiratory review sheet was well received and deemed easy to use by the clinicians. We believe that we have empowered the practice staff and Medicines Optimisation team members to be more mindful of the environmental and financial impact of prescribing.

All aspects of the project could be replicated in different practices across the health board with potential CO_2 and financial savings. Financial savings will only be achieved if inhaler usage and quantities prescribed are reduced due to better patient management of respiratory conditions.

References and Resources

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Appendix 1

Green Project Respiratory review – High risk patient identified

This should not replace your standard respiratory review procedure

Oral Prednisolone in last 6 months ☐

>12 SABA's in last 6 months ☐

On SABA with no ICS ☐

1. Explain to patient why they have been asked to attend today:

- Explain one of risk factors identified above
- Poor control means that they are at an increased risk of further exacerbations/attacks

Done: Y/N

2. Check Vision/ EMIS clinical system for actual number of inhalers requested in last 12 months

- Although on repeat the patient may be requesting more often (SABA) or less often (ICS) than monthly
- No. of SABA in the last 12 months ……
- No. of ICS in the last 12 months ……
- Discuss high SABA use & encourage regular ICS use

Done: Y/N

3. Explain steps to improve control

- Ask patient "How often have you taken your ICS this week?" Encourage honest discussion
- Reduction in SABA use: take SABA off patient repeat to reduce ordering if appropriate
- Would change of inhaler be appropriate to improve control?

Done: Y/N

4. Discuss carbon footprint of inhalers and suitable DPI alternatives

- Use NICE Asthma patient decision aid: NG80 Asthma inhalers and the environment patient decision aid (nice.org.uk)
- Agree on DPI if appropriate and counsel on inhaler technique (*please see HDUHB inhaler change guide*)
- If DPI unsuitable change SABA to Salamol pMDI to be used with aerochamber

Done: Y/N

5. Promote All Wales Asthma Hub app: Asthmahub – Healthhub

- Mention Inhaler technique videos
- Encourage patient to keep a peak flow diary

Done: Y/N

6. Personal Asthma Plan: Final-asthma-care-plan-english.pdf (icst.org.uk) / Final-asthma-care-plan-welsh.pdf (icst.org.uk)

- Print off and fill in an All Wales Asthma Management plan with patient
- Discuss how to manage exacerbations
- Give patient information leaflet to patient with overview of consultation

Done: Y/N

7. Book follow up in 4 - 6 weeks and contact community pharmacy

- Update patient's community pharmacy on any changes made to inhalers and ensure the patient checks their bag on next collection to ensure they have been dispensed the correct inhalers
- Review new inhaler technique
- Review patient's 2 week peak flow diary
- Current management

Done: Y/N

Please turn over

Outcomes/comments: *(please provide information of any interventions made after patient review i.e., where inhalers changed from pMDI to DPI? Has SABA been taken off repeat?)* **A copy of this form needs to be sent to the HDUHB MM team for data collection**

Appendix 2. Inhalers and climate change posters – Welsh and English versions

Anadlyddion asthma a newid hinsawdd – beth allwn wneud?

Mae nwyon tŷ gwydr pwerus mewn rhai anadlyddion sydd yn helpu cario'r cyffur i'r ysgyfaint. Mae'r nwyon yma yn cyfrannu at newid hinsawdd. Mae yna anadlyddion eraill sydd ddim yn cynnwys nwyon tŷ gwydr.

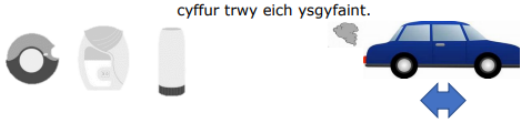
Sut mae'r anadlyddion yn cymharu:

Anadlydd Dôs Mesuredig

Mae un o'r anadlyddion yma yn creu 28kg o CO_2 ,sydd yn cyfateb i'r un faint o CO_2 â thaith **175 milltir** yn y car.

Anadlydd Powdwr sych

Mae un o'r anadlyddion yma yn creu llai na 1kg o CO_2 sydd yn cyfateb i'r un faint o CO_2 â thaith **3 milltir** yn y car. Does dim nwyon tŷ gwydr yn yr anadlyddion yma. Maent yn dibynnu ar eich anadl i wasgaru mân ronynnau'r cyffur trwy eich ysgyfaint.



Y peth pwysicaf am eich anadlyddion yw eu bod yn rheoli eich asthma! Yr anadlydd sydd â'r ôl troed carbon uchaf yw'r un sydd yn cael ei wastraffu!

Peidiwch â thaflu eich anadlyddion gwag i'r bin!

Unwaith yr ydych wedi sicrhau bod yr anadlydd yn wag, ewch ag ef nol i'r **fferyllfa** lle caiff ei waredu yn gywir. Mae hyn yn sicrhau na fydd eich anadlydd yn cyrraedd safle tirlenwi lle fydd y nwyon yn parhau i ollwng o'r ddyfais i'r amgylchedd.

Gwnewch yn siwr i wirio eich anadlyddion y tro nesaf yr ydych yn eu casglu o'r fferyllfa er mwyn sicrhau eich bod wedi derbyn yr anadlyddion cywir.

Asthma inhalers and climate change – what can be done?

Some types of inhalers contain a propellant (gas) to carry the medicine into the lungs. The propellant has a greenhouse gas effect, which contributes to climate change (global warming). Other types of inhalers do not contain propellants.

How inhaler types compare:

Metered dose inhalers (MDIs)

One of these inhalers produces 28kg CO_2 which is the same amount of CO_2 as a **175 mile** car journey.

Dry powder inhalers (DPIs)

One of these inhalers produces less than 1 kg CO_2 which is the same amount of CO_2 as a **3 mile** car journey. This is because they do not contain propellants (gases). They rely on your breath to break up and disperse tiny particles of the medicine through your airways.

The most important thing about your inhalers is that they're controlling your asthma! A wasted inhaler has the highest carbon footprint of all!

Please don't throw your used inhaler in the bin!

Once you are sure your inhaler is empty, please return it to the **pharmacy** for proper disposal. This ensures that it won't end up in landfill where the gases will continue to be released into the environment and will also help with recycling.

Make sure you check your inhalers the next time you collect them from your community pharmacy to ensure you have received the correct inhalers

3. HYWEL DDA FRONTLINE PROCUREMENT – **LOCAL SUPPLY CHAIN INITIATIVE**

TEAM MEMBERS:

- Gemma Deverill, Assistant Head of Procurement, Gemma.Deverill@wales.nhs.uk
- Lewis Wells, Procurement Business Manager, Lewis.Wells2@wales.nhs.uk
- Miles Thomas, Data Analyst

Background:

Welsh Ministers ambition is for the Welsh public sector to be net zero by 2030. As the largest public sector organisation in Wales the NHS has an important role to play. The very nature of the health service means it is unlikely it will be able to provide the services it does without causing any emissions, but more can be done to reduce them. This is particularly important with regard to its supply chain where decisions and influence needs to be used to take its suppliers on the low carbon journey.

The NWSSP Hywel Dda frontline procurement team provide a sourcing, supply chain and purchasing service to Hywel Dda UHB across West Wales. In addition to the operational activities of the team, Hywel Dda frontline procurement team also delivers significant cost savings for the health board, while continuing to review its own operating processes and procedures to ensure that the service provided to its customers is both efficient and cost effective.

Over the last 12 months Hywel Dda UHB has purchased goods and services from over 2000 different suppliers. These suppliers are based all around the UK. Some of these companies act as distributors for other international suppliers. Within the team our overarching goal is to develop a sustainable improvement process which will deliver maximum health gain with minimum financial cost and harmful environmental impacts, whilst adding social value.

The use of local suppliers has previously have not been considered when contracting with suppliers to provide goods and services, however aligns with the Well-being of Future Generations (Wales) Act 2015 to achieve a resilient, healthier and globally responsible Wales.

For the purpose of this project, Hywel Dda's Procurement team had identified a single contract as a pilot to measure the sustainable outcomes available through using a local supplier. Glangwili General Hospital Automatic Door Annual Contract was selected as it was due for renewal. Glangwili hospital has numerous automatic doors across its site. It has automatic doors at the ambulance entrance, A&E main entrance and numerous clinical areas such as the entrance to its operating theatres and childcare wards. These access control doors are in place for safety reasons as hospitals are public buildings. They ensure that the flow into certain areas is restricted for clinical, infection control and safety reasons. At present with the current supplier it can take a number of days before the doors can be repaired. This means the doors are often either jammed shut or jammed open. This will have a

serious effect as it'll either open up a restricted area which could cause both security and infection control problems. Alternatively, if a door is jammed shut the porters / patients will need to take an alternative route which causes delays and congestion within the hospital is other areas. A local supplier could therefore bring potential benefits to Hywel Dda across the triple bottom line.

This project was led by Lewis Wells and supported by Gemma Deverill and Miles Thomas within the Procurement team. Hywel Dda's Procurement team support the entire health board when contracting with its supply chain and act as a central team. This project has the ability to positively affect the supply chain Hywel Dda uses.

Specific Aims:

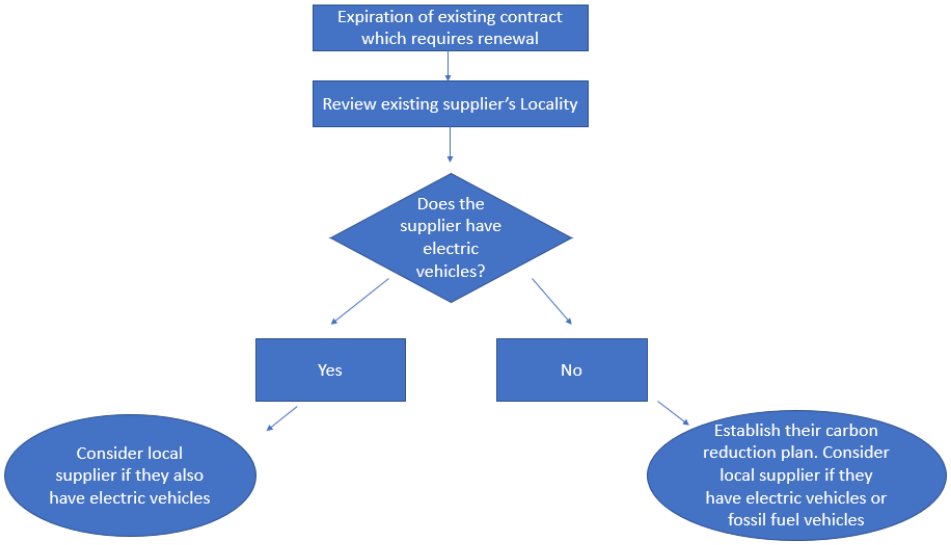
To measure the social, environmental and financial impact of transitioning to a local supplier of door maintenance inclusive of (normal hours) call outs, and who could guarantee an engineer being on site within 4 hours of a fault occurring.

Methods:

Studying the system:
Analysis was completed on Hywel Dda's current supply chain. Based on the data available on Hywel Dda's purchasing system, the procurement team were able to map geographically levels of spend across the UK. We identified the Health Board does not currently utilise a local supply chain network, with suppliers spread geographically across the UK. Roughly 75% of Hywel Dda's spend is with suppliers outside of Wales. Hywel Dda is also aware that a number of its suppliers will act as distributors for international companies, but that data is not currently available on its system.

Once the current landscape was established the principles of sustainable healthcare could be reviewed to assess where an opportunity for change was possible. A number of possible solutions were considered as highlighted in the driver diagram in Appendix 1, however for the purpose of this project have focused on low carbon alternatives such as using local suppliers or suppliers with already established electric fleets.

A new process was created to show the steps taken during the procurement planning stage.



Overview of the problem and current process

Across Hywel Dda there are circa 115 automatic doors (53 in Glangwili General Hospital (GGH) alone), that require bi-annual service visits for compliance as well as maintenance. To date, these have all been attached to a maintenance contract with all call outs, repairs and parts not included, and therefore chargeable. The total spend for all sites was measured as in excess of £80k for a 12 month period.

Through discussion with Estates colleagues in GGH Several issues were identified with our current contract with Geze UK (Bristol), and operational processes including turnaround time of service. For example, when an automatic door was out of service (particularly in a critical service area), the Estates team first must raise a requisition, then raise an ActionPoint call to procurement to expedite its processing. Depending on the time (or day) of the week, this process may take several days. Once a PO is then generated for a call out, the service provider would only then schedule an engineer to attend site. Geze UK has limited engineers. Often engineers would arrive after 5pm, generating additional out of hours tariffs on top of the baseline cost. Additionally, the company uses diesel Vans.

Change implemented

The automatic doors on site at Glangwili are standard automatic doors which means any access control automatic door specialist company could be utilised. The contract with Geze UK was due to expire soon and a local supplier, JManny (Caerphilly), was identified who could offer the same service. A quote process was undertaken, with geographical restrictions to give local supplier preference, which led to a local supplier being awarded a contract.

New process

Going forward, when an automatic door is logged with Estates as out of service, the Estates team will ring JManny without having to first generate a requisition and getting a purchase order number before an engineer can be dispatched. Due to the high number of engineers in the specific area, an engineer will now be on site within hours of a fault occurring, unlike the previous arrangement which often took days. Also, as there is no financial incentive for a company to perform a quick fix anymore (as call outs are inclusive), it is expected that repairs will be more robust. This improvement in service is an invaluable improvement for GGH Estates as there are automatic doors in critical areas (A&E, ITU, Maternity etc), and when automatic doors are either jammed shut or jammed open, waiting days for them to be operational again is untenable.

The service sheets that JManny provide are also very comprehensive and include photographs and anticipated life span of components, so that the Estates team have visibility of future issues and can plan works on the doors instead of being reactionary. They have also agreed to work with the Estates manager ahead of the contract commencement in January, so that critical spares can be identified and stock can be kept on site to avoid any instances where critical parts are unavailable and a door cannot be operational after one visit. Common stock and consumables are available and are carried by the engineers.

Aside from engineers now only travelling a short distance to local call outs (as opposed to an engineer travelling from Bristol), JManny will also make a positive impact on decarbonisation goals as 3 of their

vans are already electric as part of a phased plan to get most all vans replaced by 2030. Their focus (as a company) to reduce their carbon footprint centres around this replacement of business vehicles, recycling of all paper and cardboard, and of focusing on a specific geographical area (providing a service within a fixed region in Wales where engineers are based), as well as building an awareness of the supply chain process to enable 'first time fixes' - as is evident in their engagement regarding the holding on site of critical spares that aren't common stock. They also hold and offer a stock of reconditioned parts from doors or gates that have been removed or have become obsolete. These reconditioned parts that they hold are all fully refurbished and meet the relevant BS/EN quality standards, but they also are cost effective as well as extending the life span of older doors that would otherwise need to be replaced due to obsolete parts' availability. (This could be particularly advantageous within the HB where many doors are older).

Measurement:

Patient outcomes:

It is not expected that this project will have any negative impact on patient care and clinical outcomes. The automatic doors have a manual override to open them if they jam shut. However, by overriding the automatic element of the doors they can only be left either open or shut. This could lead to security issues, infection control concerns, fire safety concerns if a door is jammed shut and general time wasted if a door is jammed shut and not be able to use it as intended. Further time is required to review possible Datix reports to established whether delays in fixing the automatic doors results in any patient outcomes.

Population outcomes:

Emissions associated with procurement vans in Wales create poor air quality which contributes to significant health problems. The exhaust from the diesel van releases a combination of harmful gases into the atmosphere. Transport-related air pollution is among the leading concerns about transport. Research consistently points to the adverse effects of outdoor air pollution on human health, and there is evidence that points to air pollution stemming from transport as an important contributor to these effects. It is not possible to measure the specific contribution in reduction of air pollution, but Hywel Dda will be contributing to a reduction of the larger issues by reducing emissions associated with supply chain vehicles.

Environmental sustainability:

Hywel Dda's Procurement team established a baseline CO2e emissions level for the incumbent supplier transport emissions by establishing the miles travelled, across a contractual year, from the head office of Geze in Bristol to Glangwili Hospital in Carmarthen.

The same exercise and assumptions were used to estimate the CO2e of the new supplier. By reducing the distance travelled from a head office in England, compared with a head office in Wales. It resulted in a clear reduction in CO2e emissions.

The UK Gov Greenhouse gas reporting: conversion factors 2022 was used which provided data on transport emissions.

Economic sustainability:

We completed a spend analysis using our procurement team's internal database, Oracle. Additionally, we tried to measure the staff time and cost of this. We used the Agenda for change bandings multiplied by the time taken to complete the tasks and the varying levels.

Social sustainability:

Public sector anchor organisations can influence the social circumstances of patients, carers, dependants, staff, local and distant communities (e.g., people working in the supply chain). Using local suppliers can bring several benefits to the local community. The previous contract was not offering any additional social benefits.

The Welsh government has created several proxies based on the 7 values within the Wellbeing of Future Generations Act 2015. For example, if the supplier is employing someone from Wales it will attract a certain monetary value for the Welsh economy. Alternatively, if the supplier is providing training to its staff, it will attract a different value. These are effectively additional value which can be measured from the contract which is outside of the contracts original scope. Hywel Dda is keen to work with suppliers who can offer this additional value for the local communities of Wales[2].

Results:

Patient outcomes:

We anticipate the change may reduce security issues, infection control concerns and fire safety concerns.

Population outcomes:

By using a local supplier, the direct consequence is that less air pollution will be emitted over the course of the contract.

Environmental sustainability:

Geze were making a round-trip journey from Bristol to Carmarthen (230 miles) 49 times per year, added up to 3,405.4 kg CO2e. By switching to a more local supplier the annual CO2 emission dropped to 2,072.85 KG per year. This is a saving of **1,332.55kgCO2e per year.** This is equivalent to 3,838 miles driven in an average car.

Furthermore, the new supplier JManny has committed to relaces it entire commercial fleet to electric vehicles by 2030. This would result in the annual CO2 emission relating to transport dropping to 512.58 KG per year. Data tables for all calculations can be found in Appendix 2.

Based on the reduction of CO2 per year by utilising a local supplier for this contract, Hywel Dda is able to reduce emissions equivalent to offset 96 A&E trips, 25,625 pairs of gloves and 66,627 Type IIR surgical masks.

Economic sustainability:

Across the four acute sites, Hywel Dda was spending circa £80K per year with the incumbent supplier. Hywel Dda's Procurement team worked in partnership with Glangwili's estates team to identify that £40K (50% of the total spend) was being spend at Glangwili hospital per year in relation to call-out fees to repair fault automatic doors. The new supplier JManny has quoted to provide the same service for circa £10K per year. This has resulted in a circa **£30K per annum cash releasing saving** which can be reinvested into the health board.

Additionally, there is another efficiency saving through this new contract. The original contract required the estates team to raise a new purchase order through the purchasing system each time a call out was required. However, with the new contract a single call-off purchase order has been put

in place for all callouts. Hywel Dda procurement team have created an efficiency calculation, based on the Agenda for Change pay scales, an estimate of how much it costs to raise a purchase order on the system.

Activity Type	Average Time (Mins)	Rate	Labour per Minute	Total Cost
Requisition creation	10	3	£0.24	£2.41
Manager Approval	2	8	£0.00	£0.00
Allocation scrutiny	5	6	£0.45	£2.27
Purchasing Review Multiquote/Clarification	10	3	£0.24	£2.41
Manager Approval	0	8	£0.00	£0.00
Receipting of order	1	3	£0.24	£0.24
Invoice payment query	2	3	£0.24	£0.48
		Current	**Total**	**£7.81**

Based on the above, Glangwili raised 49 callout orders last year, this cost the health board £382.70 in lost time. Although this is not a financial savings as staff will still be paid. However, it is a good point to note as this time can be redirected to higher value work which is a great social impact and example of additional value being achieved from the contract.

Social sustainability:

The new contract will streamline processes and reduce the workload within procurement. Over the past 12 months, both the estates team and procurement buyers have had to manually process 49 separate requisitions to generate purchase orders. However, going forward, one purchase order will be processed to cover the entire 12 months contract period. Both buyers and the estates team have provided feedback confirming this will save them time, reduce stress, give time for higher value work.

Under the new contract JManny have 40 engineers who live in Wales, so we anticipate repairs to be completed in a much timelier manner, reducing inconvenience to staff and patients. From a community benefit perspective, JManny have supported local communities with flood aid – providing 10 wet vacs to their local area following recent floods. They also sponsor local sports teams in Caerphilly (Cwrt Rawlin Football Club and Aber Valley Football Club). Of the 40 staff members who live in Wales, three of them volunteer in their own time as football coaches within their local communities which JManny support - by offering them flexibility with finishing hours to accommodate these community activities. Furthermore, JManny also have an internal apprentice engineer programme where they recruit local young people to their business with full training in their own training facility that on completion they are a fully trained ADIA automatic door engineer.

Alongside the social value benefits of the provision of local jobs, adding to the local skills set and money being put back into the local economy, the new contract supports Hywel Dda's adherence to The Well-being of Future Generations (Wales) Act and supporting Fair Work Wales. Work is a key building block to health and well-being and in turn being in good health supports work and the economy. Organisations of all sizes have an important role to play in increasing participation in fair work for a more equal, prosperous, sustainable and greener Wales.

Socially responsible procurement, job creation schemes and attracting employers can create fair work. Social value and a fair work approach can support all seven well-being goals of The Well-being of Future Generations (Wales) Act. This will all be managed through quarterly contract management meetings to ensure the added value is realised.

Discussion:

The aim of this project was to help create a healthier Wales by reducing the Carbon footprint of Hywel Dda's supply chain. The primary benefit from utilising a local supplier was to reduce Hywel Dda's business transport emissions. A contract was identified by Hywel Dda's Procurement team which was due for renewal in relation to the repair of its automatic doors. By using a more local supplier the primary aim was achieved. The measurements of the carbon footprint of the current supply chain and comparing it to the carbon footprint of the new supplier showed a significant decrease in transport emissions. Additionally, this project has highlighted a number of other benefits including economic and social benefits too.

This project wanted to assess what additional benefits arise through using local suppliers. This project studied the additional sustainable considerations which benefit Hywel Dda patients, staff and the wider community. Historically, the health board has evaluated contract renewals based on commercial and technical specification weightings. However, this project has highlighted the benefit of taken onboard wider considerations. Moving forward this will form staff training within the procurement team to show them the added benefit of considering these additional factors. There will also need to be a culture change amongst health board staff, Hywel Dda staff understand their responsibility as budget holders of public funds. This means that most staff would feel more comfortable using the cheapest supplier, irrespective of the additional harm it could be doing to the wider environment. This approach can be shared amongst Procurement staff and used in future contract renewal opportunities.

Conclusions:

This project has been a success for the procurement team. The aim of getting involved with this green team competition was to use the tools and support available to review the benefits of using local suppliers. The keys elements that contributed to success in this project was primarily cross-department collaboration. The team pulled together all of the information to be able to accurately benchmark the current supplier's environmental impact. This was then reviewed and compared to the proposed new supplier which showed clear environmental and social benefits through switching.

It has been recommended that this agreement is rolled out to Bronglais, Withybush and Prince Philip after their current agreements with the incumbent company expires in January too. This means that the benefits obtained from this contract will be multiplied across the other acute sites.

JManny have also committed to quarterly contract reviews to monitor performance. Procurement should also use these review meetings as updates on their decarbonisation and wider WFGA targets. Further improvements to the HB service can be made, as well as financial gains, as well as measurable strides towards the foundational economy, decarbonisation and Wellbeing of Future Generations Act targets.

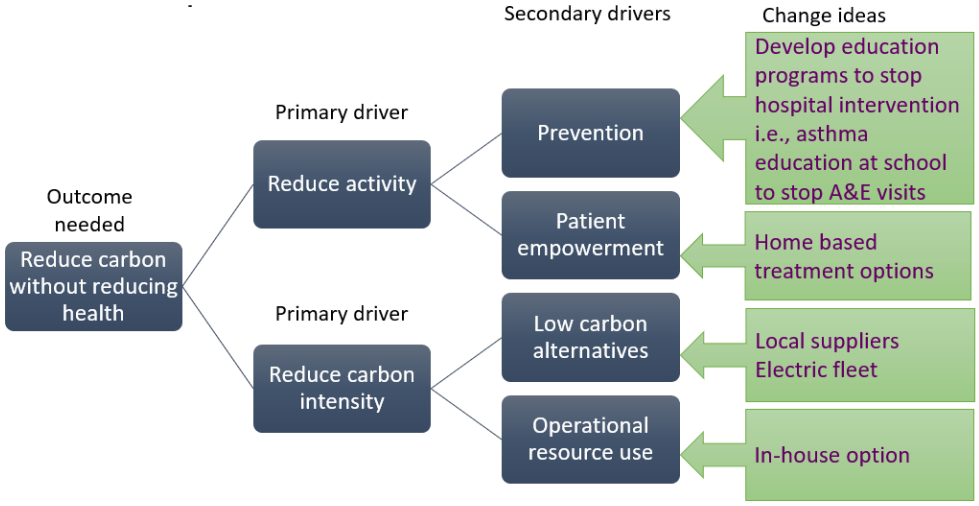
Now this project has had proven success for this specific contract it can be recommended to the other main sites. This approach that was taken can now be used on future contracts. When assessing contract renewals, sustainable elements should be considered. This approach will be adopted by the frontline procurement team to recommend at any appropriate opportunity the use of local suppliers and will be included within a number of Procurement updates across the Health Board to educate

and promote the positive outcomes that can be achieved if we consider more than the traditional cost v quality approach.

References

- *Community Benefits Helping Suppliers Deliver Maximum Value for the Welsh Pound Gov.wales*. Available at: https://www.gov.wales/sites/default/files/publications/2019-09/community-benefits-helping-suppliers-deliver-maximum-value-for-the-welsh-pound.pdf
- *Procurement services NHS Wales Shared Services Partnership*. Available at: https://nwssp.nhs.wales/ourservices/procurement-services/
- Welsh Government Statutory Guidance *Well-being of future generations (wales) act 2015*, *Futuregenerations.wales*. Available at: https://www.futuregenerations.wales/about-us/future-generations-act/

Appendix 1: Designing improvement driver diagram



Mortimer-F. The Sustainable Physician
Clinical Medicine 2010, Vol 10, No 2: 110–11

Appendix 2: Environmental outcomes – CO2e calculations

	Existing Deliveries								
	From	To	Mileage	Return Mileage	Vehicle Class	Unit	Total kg CO_2e per unit	No of Journey per annum	Total CO2 (kg)
Delivery Vehicle	BS39 7SU	SA31 2AF	115	230	Class I (up to 1.305 tonnes)	Miles	0.22836	49	2573.6172
WTT - Fuels	BS39 7SU	SA31 2AF	115	230	Class I (up to 1.305 tonnes)	Miles	0.073805	49	831.78235
								Total CO2 emissions existing	3405.39955

	New Deliveries								
	From	To	Mileage	Return Mileage	Vehicle Class	Unit	Total kg CO_2e per unit	No of Journey per annum	Total CO2 (kg)
Delivery Vehicle	CF38 1BQ	SA31 2AF	70	140	Class I (up to 1.305 tonnes)	Miles	0.22836	49	1566.5496
WTT - Fuels	CF38 1BQ	SA31 2AF	70	140	Class I (up to 1.305 tonnes)	Miles	0.073805	49	506.3023
								Total CO2 emissions existing	2072.8519

	New Deliveries Electric								
	From	To	Mileage	Return Mileage	Vehicle Class	Unit	Total kg CO_2e per unit	No of Journey per annum	Total CO2 (kg)
Delivery Vehicle	CF38 1BQ	SA31 2AF	70	140	Class I (up to 1.305 tonnes)	Miles	0.05814	49	398.8404
WTT - Fuels	CF38 1BQ	SA31 2AF	70	140	Class I (up to 1.305 tonnes)	Miles	0.01658	49	113.7388
								Total CO2 emissions existing	512.5792

4. DIVERTING NAPPY/INCONTINENCE WASTE FROM DEEP LANDFILL TO THE RECYCLING WASTE STREAM, ENVIRONMENT OFFICER TEAM

TEAM MEMBERS:

Terri Shaw - Senior Environmental Officer
Rachel Davies – Environment Officer
Sandra Pegram, Louise Hughes, Diane Lewis and all SCBU staff
Glangwili Hospital Hotel Services/Waste Porters - Nolan Hunt, Emrys James, Dafydd James

Supported by:
Other Environment Team members
Catherine Williams - Infection Prevention and Control Nurse
Claire Rawlinson – Quality Improvement Practitioner
Llyr Lloyd – Senior Public Health Practitioner

Background:

Hywel Dda University Health Board are committed to improving recycling rates in line with the regulatory requirements facing all NHS Wales Health Boards, as well as to meet its commitments to Welsh Governments 'Toward Zero Waste plan'[1] and 'The Waste Circular Economy Strategy'[2] for development of a more circular economy. This includes the following ambitions to be achieved by 2030:

- 70% of all waste to be recycled
- A maximum level of 5% landfill
- A maximum level of 30% waste to energy

In response to these challenges the Health Board has produced its own Waste Strategy in which it has committed to meeting annual targets aligned to the Welsh government targets above. The Health Board currently has a recycling rate of 47%, recovery rate 33%, landfill rate 20%.

In addition, the Health Board has a duty to report its progress to Welsh Government against the carbon reduction targets within the 'All Wales NHS Decarbonisation Strategy'[3.] Waste contributes to the Health Board's carbon footprint so any measures implemented to reduce carbon and promote the circular economy is a positive contribution to Welsh Government's ambition for a net zero public sector in Wales by 2030.

Within the Health Board, the Environment Team has a remit for waste management, and leads on implementing processes to improve recycling and reduce overall waste. Across the Health Board, several waste streams are utilised including clinical (Incineration, Orange bag, Hygiene/Offensive waste), general and recycling. The hygiene (or tiger stripe) waste stream (Image 1) is used for the disposal of non-infectious, non-hazardous items including disposable nappies and incontinence waste.

I**mage** 1 – container of hygiene/tiger stripe waste

The problem:

Disposable nappies/incontinence waste has the capability of being recycled and is already recycled in the community. However, The Health Board (HB) currently sends hygiene/tiger stripe waste to deep landfill. This has a greater carbon emissions impact than if it were to be diverted to the recycling waste stream.

There is little data available, however it has been estimated that circa 58% of hygiene/tiger stripe waste is made up of incontinence waste including nappies[4]. Recycling of this waste could therefore be increased significantly, leading to environmental benefits to the HB. As a key producer of nappy waste, the Environment Team engaged the Special Care Baby Unit (SCBU) team in Glangwili General Hospital (GGH) to pilot this recycling initiative and ascertain if the process could be successfully implemented, with a longer-term plan to replicate across other departments and hospitals within the HB. We believe that Hywel Dda University Health Board will be the first Health Board in Wales to address this issue.

Specific Aims:

- Trial nappy and incontinence waste recycling at departmental level in the Special Care Baby Unit (SCBU)
- Demonstrate that introducing nappy and incontinence waste recycling across the whole Health Board could;
  - Increase overall Health Board recycling rate and reduce clinical waste
  - Reduce carbon emissions from waste disposal
  - Improve staff/patient awareness of greener disposal options

Methods:

We started by reviewing and understanding our current waste stream volumes using historical Health Board wide waste figures. Table 1 shows the annual tonnage of different clinical wastes produced in 21/22 by the HB.

Table 1 – Clinical waste figures 21/22

Waste Stream	Tonnage 21/22
Incineration (Sharps/medicines)	130
AT (orange bag)	593
Hygiene (Tiger stripe)	333
Total	**1056**

Based on an assumption that 58% of hygiene/tiger stripe waste is incontinence waste including nappies, and recyclable, there is a potential for 193 tonnes of HB waste to be diverted from landfill to recycling per annum.

We had engaged with the SCBU team previously on other recycling initiatives and they were very keen to find other ways to increase recycling, therefore we felt that this department would be proactive in helping us trial this process for wider roll out within the Health Board and increase sustainability in SCBU.

The purpose of the trial was to;

- understand logistics and test processes
- identify any potential barriers and solutions to these barriers
- evaluate success of the initiative before considering suitability to scale

Logistics

Prior to the project, all nappy and continence waste in SCBU was being sent to landfill. We ensured our proposed changes would meet legislative requirements as per Natural Resource Wales and worked with worked with our HB Infection Prevention Control team to ensure that the change to process would not compromise clinical standards to ensure continued compliance. We identified a local company, NappiCycle5 , to provide a trial of recycling free of charge. For information on NappiCycle see Appendices 1-3. We engaged with departments involved in the disposal process to ensure all were aware of the process and that their work would not be negatively impacted.

Internal Process:

Purple bags were supplied to the SCBU team to trial the nappy recycling process and they were briefed as to which items could be disposed of in this stream (Appendix 1). The HB chose to utilise the same colour bags as Local Authorities (LAs) in Pembrokeshire, Carmarthenshire and Ceredigion for their nappy/incontinence waste collections, which provides consistency for new parents. These were placed in designated bins labelled as nappy waste only (Image 2).

Image 2 – Bin set up in SCBU sluice

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A 660L yellow clinical bin was provided by Natural UK Ltd, a local partner of NappiCycle, in the main waste compound at GGH.

The Portering staff were briefed on the trial and asked that when returning to the main waste compound after collecting from the ward, the purple bags were to be deposited in the designated bin (Image 3).

Image 3: purple bags and waste compound

Trial implementation:

We have planned a trial with supplier NappiCycle. The trial process has been delayed due to a number of factors including;

- Delivery of purple bags being delayed
- Infection control signing off the change to the process
- Absence of key staff members to set up the process in the department

The SCBU trial is scheduled to commence on 12/12/2022 and continue until end of January 2023. The bin will be collected from the compound on a weekly basis for the trial period to identify any issues in the process. A report will be provided by the contractor to the Environment Team to show the breakdown of material recycled or recovered from the collections. An example report can be seen in Appendix 3. A flow diagram of the disposal process can be found in Appendix 4.

Following the implementation of the process HB wide, we will audit and evaluate if 58% of hygiene waste has been successfully diverted from landfill.

Measurement:

Patient outcomes:

There will be no change or impact on patient care and no patient outcomes were measured.

Environmental sustainability:

As the department starts to collate nappy/incontinence waste data from this trial and wider roll out in the HB, this will be recorded along with all other waste data from waste reports received from the chosen waste contractor.

We could not use data gathered from the trial in SCBU as at the time of writing the report due to delays in starting the trial as highlight above. The HB do not collect data to department level for waste reporting purposes. We have made assumptions on the number of nappies used per baby per day to estimate potential savings in SCBU. We used HB wide historical data as an indicator of potential benefits that could be achieved from introducing this process across the HB. Going forward the reduction in overall tiger stripe waste and recording of recycled nappy waste will be used as indicators of the overall success of this project.

The Health Board's historical data has been used to ascertain the potential for this project to have a positive impact by increasing recycling rates and lowering carbon emissions. Emissions factors for landfill and recycling were taken from the UK government database.

Economic sustainability:

The HB's historical financial waste data based on invoiced costs will be used to compare the financial cost of the current method of disposing of this waste stream compared our current waste disposal with recycling.

Social sustainability:

A parent questionnaire (Appendix 5) was developed to capture qualitative data on parents' knowledge of local nappy recycling as well as to look at current disposal behaviours and whether recycling rates may increase because of the project.

A Staff questionnaire (Appendix 6) was developed to capture data on staff understanding and awareness of recycling in the Health Board and to ascertain whether improvements to process could be identified.

Results:

Environmental sustainability:

SCBU potential impact:
SCBU have on average 13 babies in the unit at any one time and each baby uses on average 7 nappies a day. This equates to approximately 33,124 disposable nappies, or 5.5 tonnes of hygiene waste being generated from this ward alone per annum. If recycled there is a potential to reduce carbon emissions from this nappy/incontinence waste stream in the department by 74%. This is a reduction of 1,810.19 kgCO2e per year.

This calculated as follows:

When sent to landfill 5.5t x 446.242 = 2,454.331 Kg CO_2e
When recycled 5.5t x 21.294 = 644.1435 Kg CO_2e
2,454.331 Kg co_2e – 644.1435Kg CO_2e = 1,810.1875 kg CO_2e
1,810.1875 Kg co_2e ÷ 2,454.331 Kg CO_2e x 100 = 74%

Health board wide potential impact:
The total weight of tiger stripe waste disposed of from the HB in 2021/22 was 333 tonnes. If as suggested above that 58% of hygiene/tiger stripe waste is incontinence waste including nappies, there is a potential for 193 tonnes of HB waste to be diverted from landfill to recycling per annum. This would reduce the HB's total clinical waste by circa 18%.

This was calculated as follows:

Tonnage to be diverted to recycling = 193t
Total clinical waste tonnage 21/22 = 1056t
Therefore 193t ÷ 1056t x 100 = 18% reduction of clinical waste

Deep landfill has an emissions factor of 446.242 (based on 21/22 GHG emissions factors[6]) and the GHG factor for recycling is 21.294 based on the BEIS database. There is therefore a potential to reduce carbon emissions from the nappy/incontinence waste stream across the whole Health Board by 96%.

This calculated as follows:

When sent to landfill 193t x 446.242 = 86,124.706 Kg CO_2e
When recycled 193t x 21.294 = 4,302.742 Kg CO_2e
86,124,706 Kg CO_2e – 4,302.742 Kg C_2e = 82,821.964 Kg CO_2e
82,821.964 Kg CO_2e ÷ 86,124.706 Kg CO_2e x 100 = 96%

Successful implementation of nappy/incontinence waste recycling will therefore lead to savings of up to **82,821.964 Kg CO2e** for the HB. This is based on assumptions that the full 58% of hygiene waste is placed into the new bins, and that 100% of nappy waste sent to NappiCycle is recycled, so the savings may be overestimated.

Economic sustainability:

The cost to dispose of tiger stripe waste is currently £298 per tonne. Therefore, the cost to send 193t of tiger stripe waste to landfill per annum equates to £57,514.

The cost to dispose of nappy/incontinence waste by recycling with the company used during the trial period will be free. If continuing beyond a trial, there will be a cost of £416 per tonne.

Therefore, using these costs to send 193 tonnes of tiger stripe waste to be recycled per annum equates to £80,288. To ensure best value, should the trial prove successful the HB would tender this work, which could potentially reduce this cost.

It is approximately **an additional £22,000 more** to recycle this waste stream via NappiCycle rather than send it to deep landfill. The cost discrepancy may reduce slightly year on year as landfill taxes increase on an annual basis. The other benefits of this project such as reduced carbon, clinical waste reduction and improved recycling need to be considered along with financial costs.

Social sustainability:

The outcome of the staff feedback form showed that some staff felt they were more knowledgeable to advise parents on sustainable nappy recycling following this project. Others felt that until they had managed to fully implement the process they were not. All staff felt that the use of the same colour coded bags as the local authorities was beneficial and that it was important on a personal level and for the environment to recycle nappies.

While not a part of our current project, we asked staff about reusable nappies. Staff views was positive. Comments included this would be 'better for the Environment', 'reduced waste within the hospital' and 'would save the hospital money'. Staff also noted some barriers including being 'unsure if reusable nappies are available for babies as small as those in special care' and that currently there are 'no washing machines on site for this purpose and if sent off site could take a long time to return'.

Based on our parent awareness questionnaires, 71% of parents were aware that the local authorities had the purple bag scheme for recycling nappy waste with the rest stating they were unaware. Those unaware said now they would sign up for this process on their return home. 100% of parents asked thought that using the same colour coded bags in the hospital as used in the community setting was beneficial as would prevent confusion. Only 29% of parents asked said they would be interested in the use of reusable over disposable nappies. Reasons included; **'**too much hassle with a new baby', **'**whether the efficiency of washing them and the use of detergents was any better for the environment than disposable nappies being recycled' and the 'time it would take to wash reusable nappies'.

Discussion:

The process to date has shown that nappy/incontinence recycling could be relatively easily implemented HB wide and an analysis of historic data has shown that by diverting this waste from deep landfill to the recycling waste stream, the following potential positive impacts for the Health Board could be recognised;

- 6% increase on recycling rate
- 18% reduction in clinical waste
- 96% reduction in carbon emissions from disposal of this waste stream
- Improved staff and patient awareness/empowerment

The parent questionnaires indicated that their preference was the use of disposable nappies and recycling these over the use of reusable nappies. However, as awareness improves and more information is available on the carbon impact of disposable versus reusable nappies this opinion could change, particularly if departments within the Health Sector could work collaboratively with other public sector organisations to disseminate this information and raise awareness. Further

projects could be explored to promote reusable nappies and to determine what incentives are available.

Challenges / Barriers:

- Waste Contractor: Finding a local contractor that could provide this service and accommodate the quantities generated. The Environment Team contacted current clinical waste providers to ascertain whether this service was available locally.
- Legislative compliance for waste disposal: National Resources Wales (NRW) have the legal responsibility for ensuring that waste is assigned correctly for disposal and that waste is processed by properly licenced facilities. Hygiene waste in a healthcare setting is categorised as EWC 180104. Liaising with the regulator was a crucial step to ensure that by changing the route of disposal this did not change its categorisation.
- Hotel Services/Portering staff - Staff from this department are key to ensuring that new waste processes can be implemented. Ensuring they were aware of the purpose and responsibilities of keeping this waste separate to ensure it entered up in the recycling waste stream was an essential part of the project process.
- Sourcing purple bags – As previously mentioned the HB decided to use the same colour bags as LAs for this waste stream to ensure standardisation and consistency and to prevent confusion and mixed messages. It was important that we engaged with the local authorities to see where we could obtain a supply of these bags and then with our own Procurement. Due to the timescales available for the trial it was challenging getting the information we needed and raising the orders at the early stages of the project.
- Delay in purple bag delivery and availability of staff - This has prevented the process starting as early as planned

Risks:

- There is a potential risk for infectious hygiene waste to end up in the recycling waste stream however this is no more of a risk than this ending up in landfill currently. With reiteration through training from IPC and re-emphasis by the Environment Team through clinical waste training of the purpose of the various colour coded waste streams the risk of this occurring is minimal. Staff also have access to the HB's waste policy and HTM-07-01 (Management and Disposal of Healthcare waste) 7 guidance document on Sharepoint.
- Potentially there is an affordability risk due to the cost to recycle this waste stream currently being more expensive than sending it to deep landfill.

Next steps

Following the trial, we aim to begin engagement and roll out the process across the wider HB site by site, starting with other departments on the GGH site. The following factors must be taken into consideration if this is rolled out further across the Health Board:

- Engaging with all relevant parties at the start of the process to avoid problems as the roll out progresses.
- Consideration of what additional resources would be required and the financial implications of that.
- Providing training to ensure all staff are aware of what waste materials are able to go into the nappy recycling waste stream and in what circumstances they should go into the clinical waste orange bag waste stream. IPC will be key in assisting with the ongoing monitoring of this.

In addition, we aim to

- Roll out a poster to raise awareness of sustainable nappy options (Appendix 7). Alongside the poster we will consider other opportunities with SCBU and Maternity to

- encourage new parents to use the nappy recycling scheme offered by local authorities within Hywel Dda's catchment area.
- Encourage new parents to consider the use of reusable rather than disposable nappies.

- Engage with Local Authorities to see how reusable nappies could be explored as a collaborative venture. Given that SCBU produce circa 33,000 disposable nappies per annum the social and environmental impact of encouraging the use of reusable nappies instead could be significant. Additional resources and the financial implications of introducing reusable nappies would need to be considered.
- Share case study findings with colleagues in other HB's across Wales to identify the potential benefits this could bring to their organisations and share lessons learnt throughout the process.

Conclusions:

It can be concluded that there are multifaceted benefits to the HB diverting incontinence/nappy waste from the clinical waste stream to the recycling waste stream and from the bottom of the waste hierarchy (landfill) to the recycling waste stream. The HB also has a moral and legislative duty to reduce its impact on the environment and the roll out of this project can contribute to a number of the Wellbeing goals including a globally responsible Wales and resilient Wales, as well as compliance with the mandatory standard ISO14001 that the HB has to comply with.

References:

1. Towards zero waste: our waste strategy | GOV.WALES
2. Circular economy strategy | GOV.WALES
3. NHS Wales Decarbonisation Strategic Delivery Plan (gov.wales)
4. Measuring and reducing plastics in the healthcare sector | Health Care Without Harm (noharm-europe.org)
5. Who We Are – NappiCycle
6. www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021
7. NHS England » (HTM 07-01) Management and disposal of healthcare waste
8. https://www.lse.ac.uk/GranthamInstitute/publication/the-economics-of-climate-change-the-stern-review/
9. https://www.healthaffairs.org/doi/10.1377/hlthaff.2020.01109
10. Home | Sustainable Quality Improvement (susqi.org)
11. Environmentally Sustainable Healthcare - elearning for healthcare (e-lfh.org.uk)
12. Sustainability in Quality Improvement (SusQI) explained - YouTube
13. Green Ward Competition | Centre for Sustainable Healthcare

Appendix 1 - List of items that can go into purple bag stream

- papier mâché bed pans and other such products
- babies and adult nappies
- sanitary towels
- wipes
- paper towels
- gowns
- aprons
- plastic nappy sacks

Appendix 2 - What is NappiCycle

NappiCycle – Nappy Recycling & Collection Services

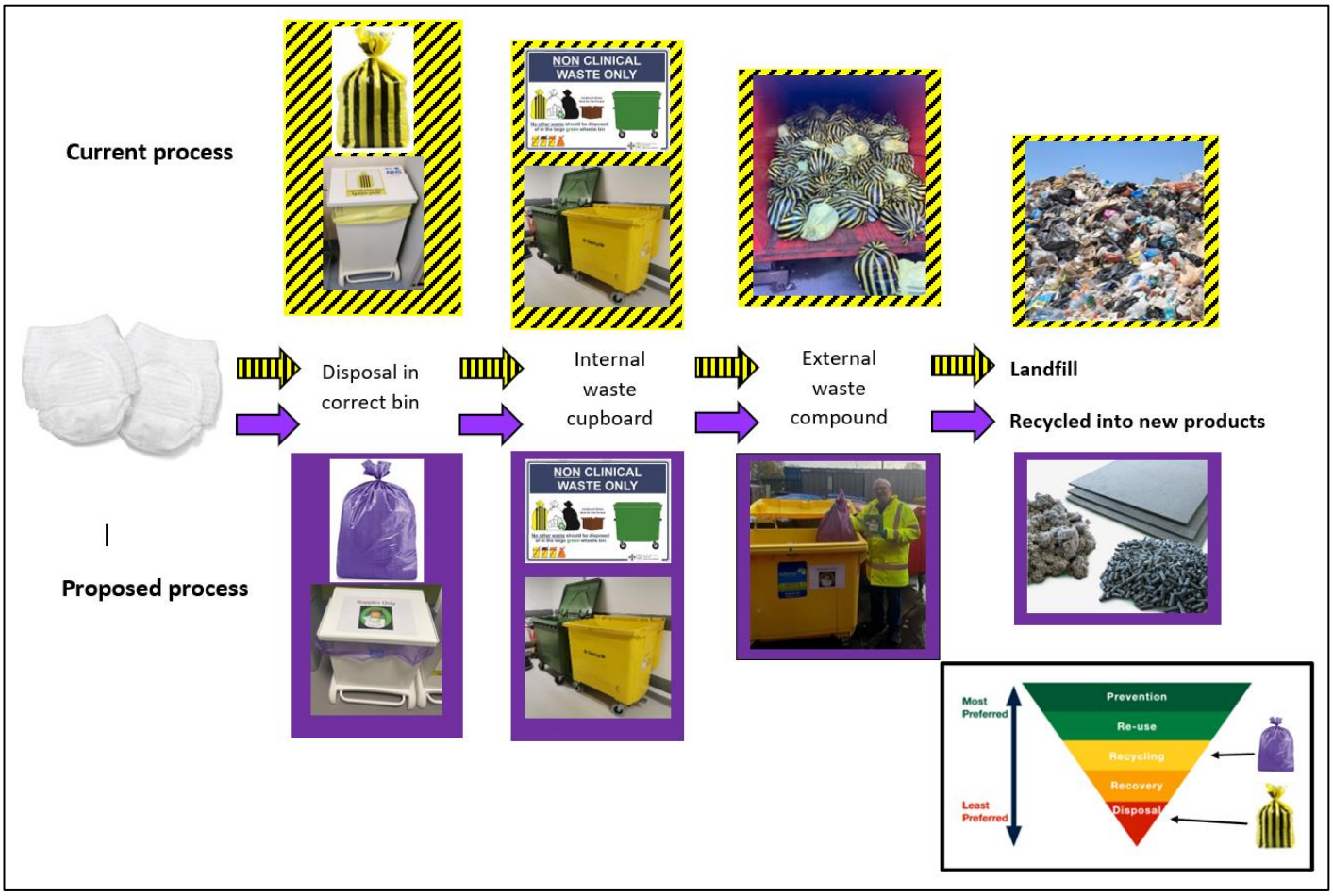
The concept for NappiCycle started back in 2009, to provide a low impact, cost-efficient nappy and absorbent hygiene products recycling facility in Wales. The purpose was to provide a facility that had the capability of serving the business community at large on a scale that would assist the public sector to achieve challenging recycling targets set by Welsh Government, in the drive 'Towards Zero Waste'. Natural UK Ltd are an exclusive partner of NappiCycle. NappiCycle has undertaken comprehensive research and development of a unique and innovative treatment system for the recovery of cellulose and plastics from nappy and incontinence wastes, this results in 100% diversion of this waste stream from the traditional landfill disposal method as well as providing the added element of recovery and recycling. The products of the recycling process have become a resource, with the cellulose fibre being used for a wide variety of commercial purposes, including the production of fibre boards and acoustic panelling, and the plastics sent to secondary re-processors for recycling. The plastic fibres can also be added to other materials and used for road surfacing. NappiCycle/Natural UK are a local company and based within the Hywel Dda catchment area.

'With nearly 200 million nappies thrown away in Wales every year, or over half a million nappies each day, NappiCycle offers an innovative and environmentally-friendly solution to this problem'.[5]

Appendix 3 – Example Waste Report from Waste Contractor

Overall Plant Performance	HDUHB	Total
Waste Input: KGS, based on 4.333 weeks x 55kgs per 660L wheelie bin	238.32	238.32
Material Sent for Disposal	0.00	0.00
Waste Treated at Nappicycle	238.32	238.32
Volumes of Plastic and Cellulose Generated (a)	100.57	100.57
Liquid byproduct Recovered and reused in process	137.75	137.75
(a) Plastics and cellulose are recovered via permitted MRF		
and production of composite panel boards	1.91	1.91
Materials sent for secondary fuels	98.66	98.66
SRF delivers a further total recovery of 23% via Ash aggregate recovery	23.13	23.13
Total recycled by Weight	25.04	25.04
Total bi-product allowable	137.75	137.75
Current average plant Recycling percentage	68.31%	68.31%
Current Landfill Diversion percentage	100%	100%

Appendix 4 – Flow diagram of disposal process



Appendix 5 – Parent Awareness Questionnaire

GIG CYMRU NHS WALES
Bwrdd Iechyd Prifysgol Hywel Dda University Health Board

Parent Awareness Questionnaire – Nappy recycling project

1. How do you currently/intend to dispose of your baby's nappies?
   _____
   _____

2. Your Local Authority provide a free AHP (Absorbent Hygiene Product) collection service, where they provide purple bags and the nappies you dispose of are diverted from landfill and the majority is recycled. Were you aware of this? Y/N (please circle)

3. Will you be setting-up and using this service when you return home? Y/N (please circle)

4. Is it useful using the same colour (purple) bags in the hospital and when you return home? Y/N (please circle)

5. Are you using or would you be interested in using reusable nappies?
   _____
   _____

For more information on AHP collections and reusable nappy incentives please contact your Local Authority

Appendix 6 – Staff Project Feedback

Staff Nappy Recycling/Purple Bag Project Feedback

1. Why do you think it is important to recycle nappies?
   a) To improve Health Board recycling figures ☐
   b) To reduce carbon ☐
   c) It's better for the environment ☐
   d) It's important to me personally ☐
   e) All of the above ☐
   f) Other:

2. Do you think it is beneficial to have the same colour-coded bags in the department as parents would use at home? Y/N (please circle)

2. Has implementing this process improved your knowledge of the benefits of recycling?

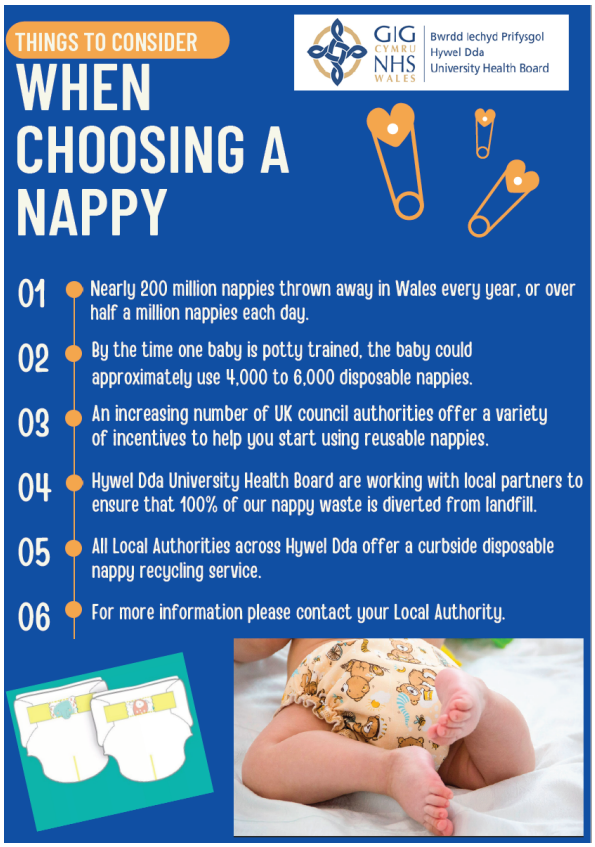
3. Do you feel more informed on advising parents on sustainable nappy disposal? Y/N (please circle)

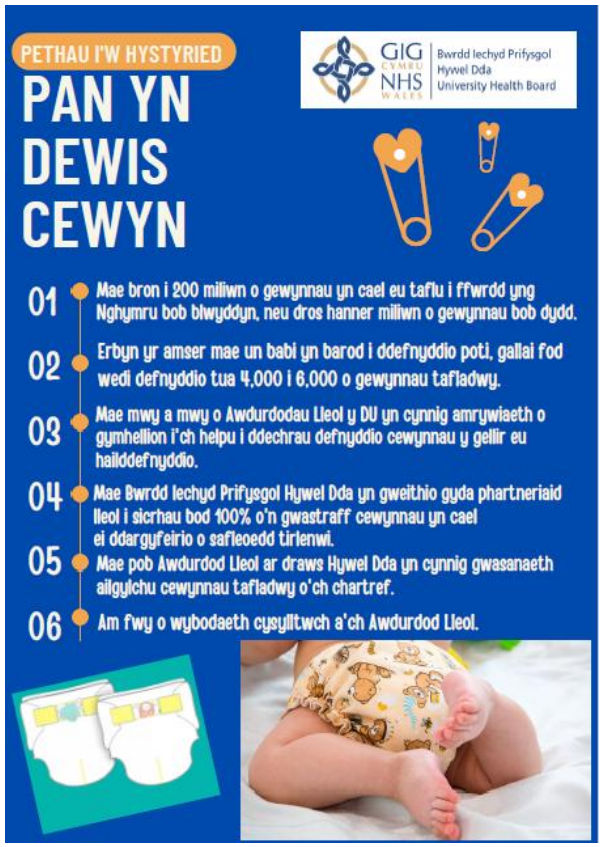
4. If the purple bag project was to be rolled out to other departments and sites across the HB, do you have any suggestions on how the process could be improved?

5. Any other feedback on this project:

6. Do you think the use of reusable nappies should be encouraged in the hospital? Y/N (please circle). What are you reasons:

Appendix 7 – 'Things to consider when picking a nappy' poster





5. REDUCING PLASTIC BAG USAGE IN BRONGLAIS HOSPITAL PHARMACY DEPARTMENT

TEAM MEMBERS:

- Zoe Kennerley, Pharmacist
- Farah Reaney, Pharmacy Technician

Background:

One of the targets in the 'NHS Wales Decarbonisation Strategic Delivery Plan 2021-2030' is to develop a 'plastics in healthcare' initiative to address waste in the delivery of health care – this will aim to tackle PPE, single use plastics, and packaging waste.'[1]

Within our pharmacy department, the standard operating procedure (SOP) for delivering medication from the pharmacy to patients on the wards in Bronglais hospital involves packaging every patient's medication into plastic bags. Bronglais pharmacy department orders approximately 7,000 plastic bags per year for this purpose, costing the department around £377 each year. Only a small proportion of these plastic bags are returned to the department for re-use.

This project to reduce plastic bag use was started as the first stepping-stone within the department to achieve the NHS carbon footprint goal of being net-zero by 2045[2].

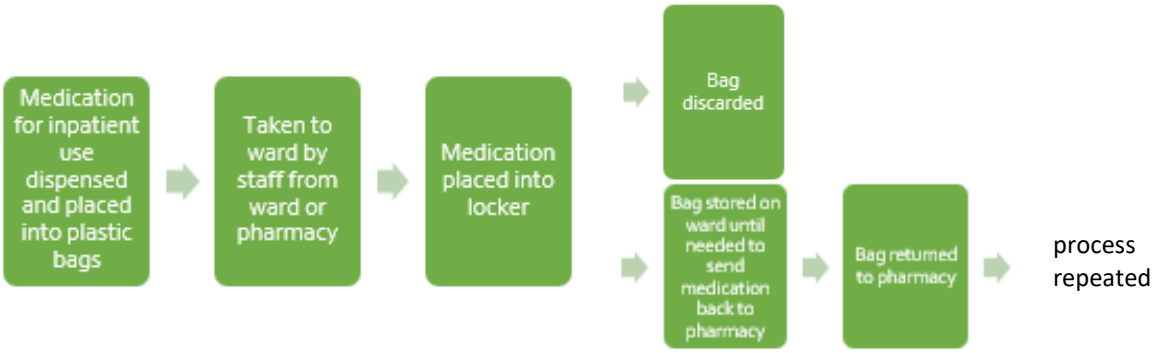
Specific Aims:

Review the method for transporting medications to patients on the wards from the pharmacy department to reduce the number of plastic bags used.

Methods:

Studying the system

A process map was created of how plastic bags were used.



We discovered this practice of plastic bag use for individual patient medications started in response to an incident in which a patient was given incorrect medication, resulting in an adverse outcome for the patient. Informal discussions were held with nurses on the wards and pharmacy staff, revealing varied attitudes toward plastic bag use and disposal. Some attributed the habit of throwing the bags away in the general waste to lack of time or lack of recycling facilities, while others had not considered reusing an option.

We spoke to colleagues from other sites within the health board to understand their policies and procedures around the transportation of medication and found similar systems were being used in the other sites.

Change implemented

As medications are already individually labelled with patient details, we agreed the plastic bags were unnecessary, instead opting to place all medications taken to the ward in a reusable zip bag with a 'return to pharmacy' label. The pharmacy has had these reusable bags available for several years that have been used infrequently for other purposes.

Once on the ward, each medication would be distributed to patient specific lockers as usual, and then the bags left in pharmacy boxes for ward stock deliveries to be returned to the pharmacy.

Stakeholders including senior pharmacists and nursing teams were approached about reasons for the change and to explain implementation of the change. Senior nurses briefed the sisters from all wards during morning bed meetings to disseminate information on the change to their ward teams. Multiple staff meetings were conducted to keep teams informed and to present findings with them.

Measurement:

Patient outcomes:

Using the data from the All Wales Medicines Safety Audit collected on a monthly basis by ward pharmacists, we were able to determine whether the change in procedure affected the availability of medicines on the ward for patients. This audit collects data on medications prescribed and administered on the wards, including incidents of missed medication due to it being 'unavailable'. We also monitored the Trust Datix system for any reports on missed medication.

Environmental sustainability:

Data collection was carried out by pharmacy staff in the dispensary to ascertain the numbers of plastic bags leaving the department each week before and after the change. Pharmacists kept a tally chart on the checking bench each day to record the number sent out of the dispensary.

We calculated the carbon emission for each size of plastic bag used in the pharmacy department.

Due to time constraints, we couldn't carbon footprint a reusable bag within the 10-week time frame, and instead we have taken the carbon footprint of a similar reusable bag from another Green Team project (1.3452 kgCO2e).

Economic sustainability:

The cost of each bag was obtained via our procurement system. We extrapolated a cost per individual bad to extrapolate financial savings following implementation of the project.

As we repurposed reusable bags that have existed in the department for several years, we have not included a financial cost given the cost per use would be negligible. If additional bags were needed in the future, the cost would need to be considered.

Social sustainability: Data was gathered through informal discussions with nursing staff on the wards and during the pharmacy team meetings around impact of plastic bags.

Results:

Patient outcomes:

Based on our audits and monitoring of Datix incidents, there has been no change to frequency incident reports following our change, implying eliminating the use of plastic bags has not impacted on patients receiving their correct medications. As each box of medication is labelled with patient details, we are confident eliminating the plastic bag should not increase incidents in the future.

Environmental sustainability:

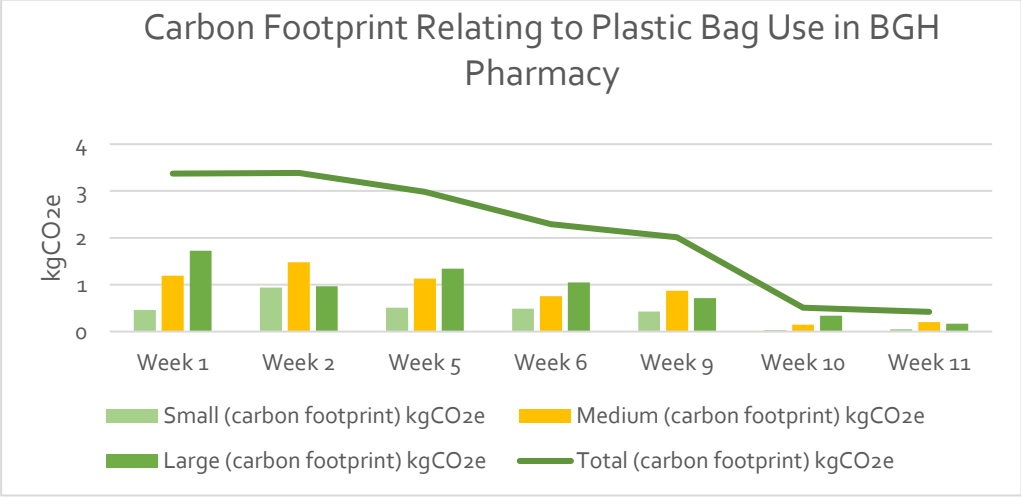
Average carbon reductions per week are demonstrated in the table below:

Bag	CO2e per bag	Average number of bags used	Average weekly CO2e before change	Average weekly CO2e after change	Reduction per week
Small	0.010 kgCO2e	56.6	0.57 kgCO2e	0.04 kgCO2e	-0.53 kgCO2e
Medium	0.029 kgCO2e	37.4	1.08 kgCO2e	0.18 kgCO2e	-0.90 kgCO2e
Large	0.042 kgCO2e	27.6	1.16 kgCO2e	0.26 kgCO2e	-0.90 kgCO2e

The graph below shows a reduction in plastic bag use, particularly in weeks 9-11 of the project. Assuming an absolute reduction is achievable soon, our CO2e reduction per week is 2.33kgCO2e which extrapolated over a year is 121.16 kgCO2e.

It was assumed that 15 reusable bags will be used and that they will last 5 years, providing a carbon footprint of 4.0356 kgCO2e per year.

Considering the CO2e of the reusable bags, our overall savings are **117 kgCO2e per year**. This is equivalent to driving 337 miles driven in an average car.



Economic sustainability:

Before our intervention an average of £5.70/week was spent on plastic bags (£0.02 / small bag and £0.07 / medium or large bag). This reduced to £0.92/week following the change, a saving of £4.78/week. Extrapolated across a year this is a potential saving of **£248.56**. This is equivalent to 9 months of a starting dose of blood pressure medication (ramipril) for one patient.

Social sustainability:

Discussions within the pharmacy department about the plastic bag reuse and disposal made people more aware of their actions in the department. The team have discussed the best options for changing practice and how we could group items together in a more sustainable way. More staff have become interested in the use of paper bags instead of plastic.

Nurses have not expressed any concerns following the change of practice and the senior nurses have welcomed the change in a step to make the wards and hospital more sustainable.

Discussion:

Discussions with the pharmacy team around the use of the bags is likely to have impacted on the number used throughout the project as a gradual decline is seen as the staff become more conscious of the use and impact. Some plastic bags are still used to dispense medication in bottles for the same patient and the label is attached to the bag, this may need to be reviewed as part of the dispensing policy.

A limitation was the data was only collected from the dispensary, there are still plastic bags being used in the storeroom.

One of the main challenges of this project was enabling change and managing the risk which was identified from a previous incident, leading to use of plastic bags in the first instance. There were other steps put in place to reduce risk of a similar incident including a two nurse check on discharge medication and them being delivered/collected separately to ward stock. Another challenge has been finding the time to complete the project in a busy patient facing department.

Conclusions:

This project has kickstarted our department to look at the impact they can have, and we are proud we have reduced our plastic bag usage within the dispensary. Some insightful discussions have been had and a collaborative approach was attained to find a new way of working. Some ideas for future projects involve paper bags for take home medication, inhaler recycling and reducing paper use.

References:

1. NHS Wales Decarbonisation Strategic Delivery Plan 2021-2030. Published March 2021. NHS Wales Decarbonisation Strategic Delivery Plan (gov.wales)
2. UK health services make landmark pledge to achieve net zero - GOV.UK (www.gov.uk)

TEAM MEMBERS:
Sr Emilia Wronska Endoscopy Pre-assessment and JAG Lead

Background:

Hywel Dda University Health Board (HB) provides all healthcare services for the 375,000 people living in West Wales. The Health Board operate four acute hospitals, several community hospitals and resource centres, eleven health centres as well as GPs, Dentists and Pharmacists providing Acute, Primary, Community, Mental health and Learning disabilities for the people of Carmarthenshire, Ceredigion and Pembrokeshire.

Each of the four acute hospital sites has its own endoscopy unit. Work is ongoing to align clinical and technical standards and processes across the four units. This includes matters concerning sustainability. A Green Endoscopy group was developed to look closely at pathways, usage of equipment, waste, perform waste walks and many others. As an example, we have established effective segregation of clinical, recycling and domestic waste across 4 units. We are also cooperating with environmental team in performing Pre-acceptance audits.

By reviewing work and pathways on all 4 units we have identified an area of improvement within one unit is the usage of slide sheets for each patient. 3 of 4 remaining units were using laundry department in order to wash sheets, so they can be re-used. One unit continued to use single use patient transfer sheets for all patients attending the unit regardless of how mobile the individual was. This was an opportunity for improvement.

Specific Aims:

To reduce environmental waste (CO2e) by

a) reducing unnecessary use of single use slide sheets
b) replace remaining necessary slide sheets with a reusable alternative

Methods

It has not been possible to implement our change in the 10 week project timeframe. We plan to reduce the use of single-use patient transfer sheets by encouraging staff to use the results of the individual manual handling assessment completed with each patient, to determine if any aids are required.

We are continuing to gather data on reusable alternatives to slide sheets for continued required use.

Measurement:

Patient outcomes: These were not affected by the project objectives

Environmental sustainability:

We have been liaising with Procurement, Laundry Department, and Manual Handling. The carbon footprint of the single use patient transfer sheet was calculated using a bottom-up carbon footprinting methodology, however due to data unavailability the carbon footprint of a single use patient transfer sheet is likely to be an underestimation. To estimate the greenhouse gas (GHG) emissions associated with the raw materials of the sheet and the first layer of packaging, the raw material weight was obtained from the manufacturer and converted into emissions using the BEIS 2022 database. Data was unavailable to estimate emissions for the second layer of packaging. It was assumed the sheet gets disposed of into clinical waste and the first layer of packaging into domestic waste. Disposal conversion factors were taken from Rizan et al. (2021) the carbon footprint of waste streams in a UK hospital. Transport GHG emissions from manufacturer (China) to UK harbour were estimated using the Pier2Pier tool, data for transport from UK harbour to supplier was unavailable and so was excluded and assumed the sheets get transported directly to the health board.

Economic sustainability:

Reducing costs associated with the purchase and transport of the single use patient transfer sheet

Social sustainability: This has not been measured within the competition timeframe.

Results:

Patient outcomes: Health & safety of patient unaffected.

Environmental sustainability:
The CO_2e of a disposable single use patient transfer sheet is 1.38 $kgCO_2e$ per sheet
We perform on average 250 endoscopic procedures a month, equating to 3000 a year.
At baseline, assuming one slide sheet is used per patient, this equates to CO_2e of 4,140 $kgCO_2e$

We estimate that 90% of slide sheet use (2,700 sheets) is not needed clinically for the patient. This will lead to potential savings of **3,726 $kgCO_2e$ per year**. This is equivalent to 10,731miles driven in an average car.

We are continuing to collect data on the carbon footprint of reusable slide sheets and laundering and aim to share additional impacts of switching disposable to reusable for remaining slide sheets this in the future.

Economic sustainability:
A single transfer slide sheet costs £0.80p. A reduction of 90% (2,700 sheets) will save **£2,160 per year.**

We are continuing to collect data on the cost of reusable slide sheets and associated costs from laundering and aim to share additional impacts of this in the future.

Social sustainability:
Patients maintaining independence throughout the Endoscopy journey, including Procedure and recovery.

Ensuring individuals maintain maximum independence when having procedures in our endoscopy units.

Discussion:

Although the project felt very straight forward to undertake, it was difficult to gather essential information. However, in undertaking the project we learned a lot and made valuable connections across our organisation that will support our ongoing Green Health agenda. We now appreciate the detailed information we need to gather for a full carbon footprint to be undertaken and allow the timeneeded for this to be collected in future work.

Currently, the endoscopy unit mentioned above is still in the process of implementing standard sheets.

One of the highlights of this work, is that it has begun changing the mindsets of staff working within the endoscopy units. To question why we are doing or using things the way we do. To take into consideration not just the financial cost of what we use within the department. But to consider the environmental impact of our decision making per se and of the disposal of our consumables.

We are also still focusing on our Green initiative and will be looking at the endoscopy areas like:

- use of endoscopy accessories
- reduce of histology pots numbers
- reduce Entonox use (currently we are monitoring exposure)
- reducing pre-assessment paper leaflets and patient information (both prior and post procedure) in favour of digital information.
- Telephone Pre-assessment, electronic reporting and digitally collected patient feedback

Conclusion:

This project highlights the need for staff as well as the public to think in a more sustainable way and the Endoscopy Green Team will be undertaking other pathway reviews to ensure we are providing sustainable healthcare in our endoscopy units.

AWARDS

WINNERS: The Procurement Team

HIGHLY COMMENDED: Two teams were selected: The Medicines Optimisation Team and The Environment Team

Congratulations to the WINNING team, the Procurement team. Their project, piloting a local procurement initiative for door maintenance, is a great example of how NHS procurement teams can reduce their environmental impact whist achieving wider social value priorities. We at CSH are looking forward to hearing updates from the team in regards to their ambitious longer term aims to scale this project to further procurement contracts in the Health Board.

ACKNOWLEDGEMENTS

CSH would like to thank the teams for all their enthusiasm, dedicated work & creativity in devising and completing their projects.

Thank you to Sarah Thorne, One Health Practitioner, Hywel Dda University Health Board for partnering with us for one of the first Green Team Competitions in Wales.

Thank you to our judges for your time and keen interest in the projects.

- Lisa Wise, Head of Health and Social Care Climate Emergency National Programme, Welsh Government
- Steve Moore, Chief Executive, Hywel Dda University Health Board
- Dr Hayley Pinto, Education and Training Lead, Centre for Sustainable Healthcare

Thank you to Rosie Hillson, Carbon Modelling Assistant, The Centre for Sustainable Healthcare, for her 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 2022 green team competition. Savings in black text are based on actual changes made during the 10 week competition. Savings in red text are based on planned or potential changes that require more time to implement.

Project	Financial Outcomes	Environmental (CO2e) Outcomes	Social Outcomes	Clinical Outcomes
Reducing pathology sample transport	£10,367	3,900 kgCO2e	• Increased awareness of sustainability issues in the team • Time saving from reducing 'urgent' transport requests (that are not clinically urgent).	No impact on clinical care
Reducing the Inhaler Blues	£2959-£5,623 (50-95% applicability)	20,182 kgCO2e (GP practice) 2,249,053 kgCO2e HB wide	• Increased awareness of impact of inhalers • Improved asthma control will reduce burden on healthcare services and may reduce waiting times for other patients • Reduced medication prescriptions save staff time • Improved working relationships between Medicines Optimisation team, the GP practice, and the respiratory interface nurse	Improved patient inhaler technique which may in turn reduce symptoms, exacerbations and overall respiratory health
Procurement – Local Supply Chain initiative	£30,000	1,332.55 kgCO2e	• reduce the workload within procurement. • Timelier door repairs for staff and patients • community benefits as supplier supports local community initiatives and employs local people • Contract supports adherence to Well-being of Future Generations (Wales) Act and supporting Fair Work Wales.	The change may reduce security issues, infection control concerns and fire safety concerns.
Diverting nappy/incontinence waste from landfill to recycling waste	- £22,000	82,821.96 kgCO2e	• Increased staff knowledge on sustainable nappy recycling. • Increased parent report that they would recycle at home • 100% of parents agreed same colour coded bags in the hospital as used in the community setting was beneficial • Positive staff views on reusable nappies / alternatives. 29% of parents would be interested in the use of reusable over disposable nappies.	No impact on clinical acre
Reducing plastic bag usage in Bronglais Hospital	£248.56	117 kgCO2e	• Project made staff more aware of sustainability actions	No impact on clinical care
Transfer Sheets in Endoscopy	£2,160	3,726 kgCO2e	Not measured in project period	No impact on clinical care
Total Savings	**£26,398.56**	**2,340,950 kgCO2e**		