Medicine Waste in Care Homes: Reducing Social and Environmental Impact

SusQI Sustainability in Quality Improvement

CENTRE for SUSTAINABLE HEALTHCARE
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Supported by Q network (The Health Foundation)

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Section 1: Executive Summary and Policy Recommendations

Executive Summary

The Medicine Waste in Care Homes Project, led by the Centre for Sustainable Healthcare (CSH) with four multi-professional "hub" teams, set out to explore the environmental and social costs of unused medicine in English care homes. The study followed the Sustainability in Quality Improvement (SusQI) framework, combining system-wide process-mapping, 12 months of medicine-waste log analysis, and two action-learning workshops with staff from care homes, general practices and community pharmacies. All four hubs were rural or semi-rural, and together covered 211 beds and three different dispensing models.

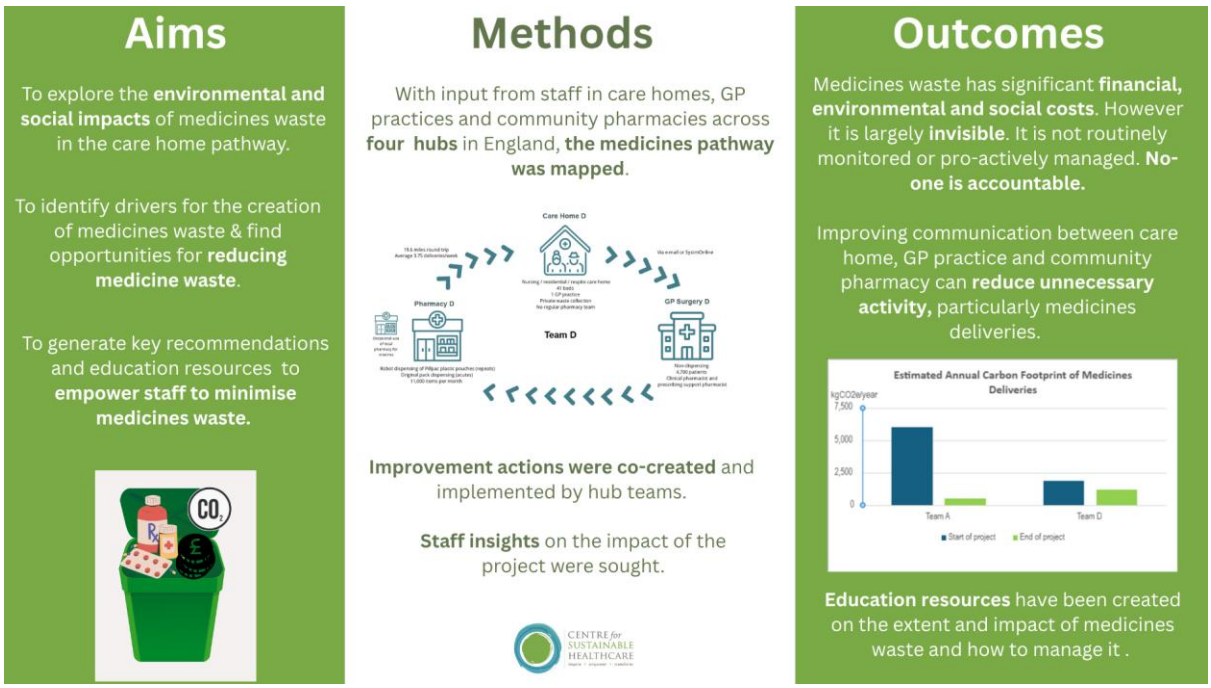
Scale of the problem

Financial: Annual medicine waste per care home ranged from £2,125 to £9,404 (mean £6,619), equivalent to £125 per bed every year.

Environmental: This wastage carried an average carbon footprint of 3.2 tCO_2e per home, comparable to driving 9,425 petrol-car miles or the equivalent of 335 GP appointments. In one hub, transport emissions from daily medicine deliveries (5.99 tCO_2e/yr) actually exceeded the carbon footprint of the medicine themselves.

Workforce: Around 46 oral doses were discarded, and 2.5 waste-log entries written every day per care home. Based on conservative estimates of staff timings, staff spent an estimated 155 hours per home each year on disposal of unused medicine alone.

Figure 1: Project Summary



Why it happens

Process maps showed a highly fragmented pathway involving up to eight staff groups across three organisations, where time pressure is high and communication is challenging. Common waste drivers included:

- duplicate or emergency interim prescriptions triggered by poor inter-site communication
- stock over-ordering and pack sizes in excess of need, particularly liquids and high-cost "specials"
- poor stock management.

Variable medicine disposal and packaging-segregation practices were observed and a lack of guidance on the disposal of non-drug items such as sip-feeds was noted. Critically, responsibility is diffuse; care homes must record waste, but data are seldom shared with prescribers or commissioners, leaving the problem invisible to those who control budgets.

Interventions tested

After workshop-based co-design, hubs trialled low-cost improvements such as the use of secure nhs.net email to communicate between sites, explicit "urgency" flags on prescription requests, synchronised monthly cycles, medicine delivery route rationalisation and staff training on waste segregation. By the end of the project, the two pharmacies that tracked data cut direct deliveries by 33–91%, saving an estimated 6.1 tCO_2e per year. Staff surveys (n = 19) showed 63% believed the project would improve patient care and 42% intended to run further quality-improvement (QI) work.

Strategic significance

The findings align with the Greener NHS commitment to reach net-zero direct emissions by 2040 and indirect emissions by 2045[1], and complement current adult-social-care reform goals of "People at the Heart of Care", which emphasise personalised, high-quality and efficient services[2]. Reducing medicine waste offers a rapid route to free up frontline capacity, curb avoidable costs, and contribute to statutory carbon-reduction targets - all priorities for Integrated Care Systems (ICSs) and local authorities facing severe financial pressure following the July 2024 cancellation of the planned care-costs cap[3].

A quick guide to implementing our findings into your service

- Medicine waste hides multiple costs – around £50 million of stock is binned in English care homes every year, with avoidable carbon, financial and staff-time impacts[4].

[1] https://www.england.nhs.uk/greenernhs/a-net-zero-nhs/

[2] https://www.gov.uk/government/publications/people-at-the-heart-of-care-adult-social-care-reform-white-paper

[3] https://www.communitycare.co.uk/2024/07/29/government-scraps-cap-on-care-costs-to-help-tackle-22bn-public-spending-black-hole/

[4]https://discovery.ucl.ac.uk/id/eprint/1350234/1/Evaluation_of_NHS_Medicines_Waste__web_publication_version.pdf

- Delivery miles add to the carbon footprint; frequent direct medicine delivery trips between pharmacy and care home are a potential carbon hotspot and increase costs for pharmacy in staff time and fuel costs.
- Over-ordering, inefficient stock management and poor medicine cycle synchronisation drive most waste; frequent interim prescriptions and duplicate requests arise when communication breaks down between the care home, GP practice and community pharmacy.
- Waste segregation matters – recyclable cardboard and paper inserts from medicines packaging should be diverted from the medicine bin to recycling or general disposal, following the removal of any patient-identifiable information.
- Staff time is precious – every discarded item has already been ordered, issued, checked, dispensed, delivered and booked in. Eliminating waste frees up time for resident care in the home and for staff in both the GP and pharmacy settings.
- Quick wins are low-cost; simple process tweaks and improved communication channels improved staff experience and reduced prescription volume and deliveries in this project.

Step 1 – Build your improvement team

- Bring together one medicine champion from the care home, its linked GP practice and the dispensing pharmacy.
- Agree on a clear aim (e.g. “halve returned items in six months”) and establish regular brief online meetings.
- Ensure all staff have appropriate training on medicine waste, its impacts and how to minimise it.

Step 2 – Map, measure, share

- Process map the medicine pathway end-to-end, including routine monthly orders, interim and urgent requests. You can find guidance on this on the SusQI website. Ensure that all staff involved are aware of the overall medicine pathway processes across all three sites.
- Map out timelines – monthly order cycle, daily cut-off time for orders/deliveries, typical turnaround times for prescription requests and deliveries, etc.
- Identify communication gaps and challenges across the pathway.
- Monitor the medicine waste log on a monthly basis.
    - If your log is electronic, get training on how best to use the capacity of the system to interrogate and analyse the data – aim to monitor the content and cost of medicine waste. Calculate the £ and $kgCO_2e$ of that waste (current emission factor for pharmaceuticals is 0.240kgCO2e/£)
    - If your medicine log is paper-based, review entries to spot themes. Use broad measurements, for example, number of entries, total amount of liquid discarded etc.
- Take pictures of the monthly medicine waste (ensuring no patient identifiable information is visible) to illustrate to all staff at all sites the extent of medicine waste.

Step 3 – Optimise communication

- Create direct, secure communication links (e.g. nhs.net e-mail) between key staff at care home, GP practice and community pharmacy.
- For large homes with multiple units, ensure internal collation of information before making requests to avoid duplication. For example, utilise daily staff meeting / huddle to co-ordinate actions in relation to prescription ordering / chasing. Ensure communication between day/night and weekday/weekend staff.
- Develop working relationships with routine catchups to proactively address challenges and ensure continuity, despite staff turnover and other challenges.
- Plan regular communication to proactively address queries e.g. weekly phone call between the GP practice-based pharmacy team and the care home.
- Ensure changes to prescriptions are communicated clearly to all parties following significant events e.g. regular ward rounds, new admissions, and transfer to palliative care. Communication to include a summary of all medication changes to be made, how urgently each medication change needs to be made e.g. same day / next few days / next cycle etc.

Step 4 – Optimise prescription processes

- Ensure key staff at care homes, GP practices and community pharmacies understand medicine pathway processes at each site, how they interconnect and how teams at each site can work together.
- Care homes and GP practices should collaborate to outline the most effective route for ordering prescriptions, depending on local practice e.g. proxy ordering, AskMyGP etc.
- Ensure that all sites are aware of the monthly ordering cycle, cut-off dates for prescription requests and turnaround time from prescription request to delivery.
- Optimise stock management:
    - optimise monthly ordering system to minimise interim requests (include PRNs, topicals, test strips etc)
    - align interim requests to the monthly cycle
    - be explicit about the urgency of interim prescription requests so that the pharmacy can plan deliveries
    - avoid overordering quantities, particularly for interim requests, PRN items, liquids and expensive “specials” items
    - utilise appropriate policies to optimise stock management such as bulk prescriptions and homely remedies. Information about these can be found in the PrescQIPP care home webkit
    - avoid routinely returning all leftover medicine at the end of each month. Carry forward surplus medicine at the end of each cycle from medicine still prescribed for individual patients.
- Pharmacies should aim to streamline medicine deliveries, both route and frequency of delivery.

Step 5 – Optimise medicine waste disposal

- Use published guidance (see Appendix 1) to review medicine waste disposal policies to ensure that waste is appropriately segregated and streamlined to the correct waste stream.
- Separate waste before disposal - remove outer packaging and paper inserts. Recycle packaging where possible, after removing patient identifiable information.
- Streamline disposal to correct waste stream – general waste / recycling / clinical medicine waste.

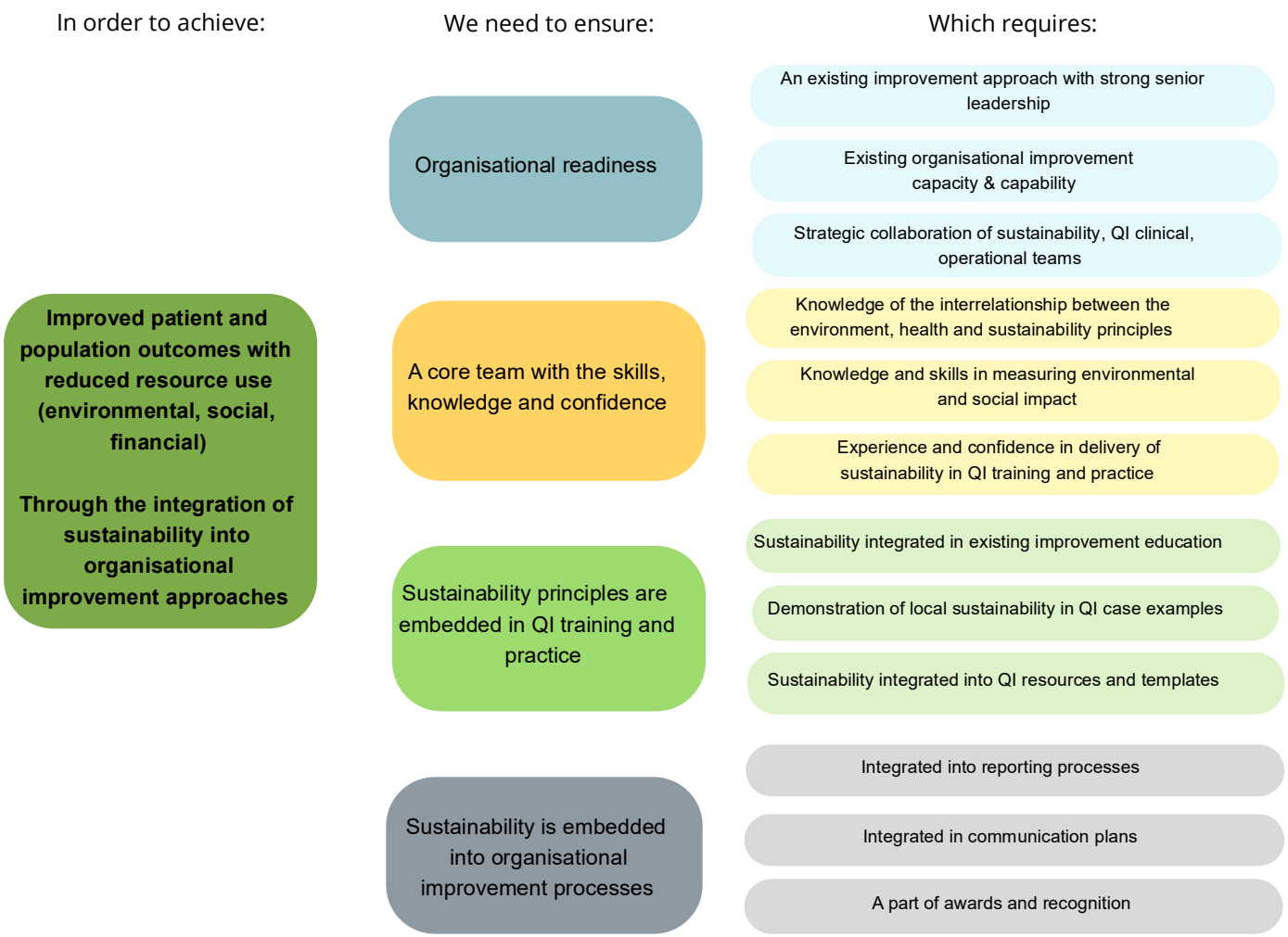
Step 6 – Monitor and celebrate

- Track progress and share with wider teams.
- Celebrate improvements.
- Engage staff to find solutions to challenges.

Table 1: Key Findings and Improvement Ideas

Aim In order to achieve:	Primary Drivers We need to ensure:	Secondary Drivers Which requires:	Change Ideas Ideas to make this happen:
Reduce Medicines Waste in Care Homes	Improved Communication across Stakeholders	•Shared understanding of medicines processes across care homes, GPs, and pharmacies •Direct and secure communication channels •Regular communications	**Improvement ideas** **Local Actions** •Assign local leads to coordinate •Appoint a medicines waste champion in each care home, linked GP practice and dispensing pharmacy. •Share medicines waste data with all stakeholders •Share educational resources on impact and drivers of medicines waste and how to improve **Communication and Prescription Processes** •Weekly phone call between GP practice pharmacist / pharmacy technician and care home medicines lead to pro -actively address queries and troubleshoot problems. •Care home and GP to collaborate and agree best system for ordering prescriptions e.g. proxy ordering, AskMyGP etc. •Flag truly "urgent" prescriptions so pharmacy can plan deliveries •Streamline medicines deliveries to maximise deliveries per trip **Optimise stock management** •Align interim requests to monthly cycle. •Avoid overordering items, particularly PRN, liquids and "specials" items. •Avoid routinely returning all leftover medicines at the end of each cycle. •Utilise initiatives such as proxy ordering, bulk prescriptions and homely remedy policies.
	Staff Awareness and Engagement	•Training on extent, drivers and impact of medicines waste •Role clarity: key staff with responsibility for medicines •Promote staff efficiency benefits	
	Optimised Prescription and Supply Processes	•Optimise medicines stock management •Minimise overordering to reduce waste •Streamline medicines deliveries	
	Efficient Medicines Disposal Practices	•Appropriate segregation of packaging before disposal •Appropriate disposal of unused or expired medications	
	System -wide Collaboration and Leadership	•Share medicines waste data with all stakeholders •Local hub leads to drive quality improvement •Improved data collection and use	

Table 1 (continued): Key Findings and Improvement Ideas



Policy recommendations

Recommendations for commissioners, Integrated Care System (ICS) leads, Community pharmacy leads and other senior executives

- **Create accountability for medicine waste**
    - Create clear lines of accountability for regular and transparent monitoring, reporting and management of care home medicine waste data to identify trends and reduce avoidable waste.
    - Link medicine waste data with NHSBSA reporting on care home prescribing data[5] to enable calculation of the costs of medicine waste as a proportion of the prescribing costs. Share medicine waste data locally with prescribers. Share insights nationally to inform medicine policy in care homes.
    - Write avoidable-carbon and medicine-waste indicators into provider contracts.
    - Report progress together with other Greener NHS milestones.
    - *Why?* Aligns financial, quality and sustainability goals under a single performance narrative.
- **Issue clear disposal & segregation guidance**
    - Publish a standard operating procedure aligned to HTM 07-01[6] and the NHS Clinical Waste Strategy[7], including safe disposal of oral nutritional supplements and topical products, and blister-pack, insulin pen and inhaler recycling routes.
    - *Why?* Consistent rules reduce confusion, unlock recycling, and improve auditability.
- **Optimise logistics and last-mile delivery**
    - Encourage consolidated, scheduled "round-trip" deliveries for medicine deliveries; transition supplier fleets to electric vehicles.
    - *Why?* Lowers transport emissions, driver time and site traffic.
- **Strengthen cross-sector communication & governance**
    - Appoint a medicine-waste champion in each care home, linked GP practice and dispensing pharmacy.
    - Hold a regular "waste huddle" and maintain a shared secure email channel for urgent queries.
    - *Why?* Rapid issue-resolution prevents duplicate orders and builds shared accountability.
- **Invest in workforce capability and culture**

[5] https://nhsbsa-data-analytics.shinyapps.io/estimated-prescribing-patterns-for-care-home-patients/
[6] https://www.england.nhs.uk/publication/management-and-disposal-of-healthcare-waste-htm-07-01/
[7] https://www.england.nhs.uk/estates/nhs-clinical-waste-strategy/

- Embed medicine-waste prevention and environmental stewardship in induction and mandatory medicine-management training for all relevant staff groups.
- *Why?* Equips staff to sustain improvements and supports long-term culture change.

Recommendations for UK Government & national bodies (DHSC, NHS England, NHSBSA, CQC, Treasury)

- **Put data in plain sight**
  - Create monthly digital medicine waste dashboards for care homes showing returned-item value, volumes and kg CO_2e alongside prescribing spend.
  - *Why?* Making waste visible drives improvement, embeds stewardship in Net-Zero plans and gives executives clear, comparable data.
- **National guidance on disposal & packaging segregation**
  - Update HTM 07-01[8] and the NHS Clinical Waste Strategy[9] to give formulation-specific instructions on packaging segregation and disposal of prescribed non-medicinal items such as oral nutritional supplements and thickening powders. Where disposal in the medicine waste bin is not required, specific guidance for appropriate, safe and minimally environmentally impactful recycling or disposal is required. Address the increasing range of recycling options available within the medicine waste stream e.g. medicine blister packs, inhalers, insulin pens, eye drop bottles, and how these should be managed.
- **Digital infrastructure investment**
  - Provide capital grants or tariff uplifts for care home electronic waste-logging systems interoperable with GP and pharmacy records, supporting the "joined-up services" vision of the adult-social-care reform plan[10].
- **Safe medicine-reuse legislation**
  - Reinstate (with strengthened safeguards) the COVID-19 emergency reuse protocol for care homes and hospices, enabling redistribution of unopened, clinically appropriate end-of-life medicine.
- **Research & evaluation fund**
  - Commission NIHR and UK Research & Innovation to quantify the carbon footprint of the care home medicine pathway to identify carbon hot-spots, test behavioural interventions and evaluate life-cycle emissions of different dispensing and delivery models.

[8] https://www.england.nhs.uk/publication/management-and-disposal-of-healthcare-waste-htm-07-01/
[9] https://www.england.nhs.uk/long-read/nhs-clinical-waste-strategy/
[10] https://www.gov.uk/government/publications/adult-social-care-system-reform-next-steps-to-put-people-at-the-heart-of-care

By acting on these recommendations, leaders can unlock financial savings, cut tens of thousands of tonnes of CO_2e, and demonstrably improve staff capacity—delivering on both fiscal prudence and the UK's statutory climate and social-care ambitions.

Section 2: Project Report

Background:

The provision of medicine to care homes is a complex, multifaceted process requiring excellent communication across the interface between the busy settings of care homes, general practice and community pharmacy, repeated monthly. Approximately £50 million worth of medicine are disposed of, unused, annually by care homes[11]. This is a long-standing problem. The financial cost is documented; social and environmental impacts are less well understood. Much of this waste is preventable[12]. Exploration of the infrastructure, organisational and cultural factors driving this wastage has the potential to deepen understanding of the challenges and identify solutions for the future. Our focus on the environmental and social impact of medicine wastage re-frames the problem to encourage a more holistic approach to understanding how to optimise sustainable value in the medicine pathway within the care home setting.

Aims:

This project primarily aimed to explore the infrastructure, organisational and cultural factors in care homes, general practice and community pharmacy that contribute to medicine wastage so as to better understand the current system. The focus was on the processes within the medicine pathway (ordering monthly and interim prescriptions, stock control, medicine disposal) rather than the clinical aspects of prescribing, deprescribing and medication review.

Where possible, we aimed to measure the environmental and social impact of wasted medicine in the care home pathway.

We then planned to utilise the knowledge and insights gained to:

- Generate innovative and implementable solutions that inspire people to act at all levels of the system.
- Generate key criteria for the sustainable management of medicine in care homes.
- Disseminate the learning in the form of education and recommendations.
- Use the learning to influence change at policy level.

Methodology:

The project was carried out in line with the Centre for Sustainable Healthcare's (CSH) Sustainability in Quality Improvement (SusQI) framework[13], with a focus on studying the system. The four steps of SusQI are illustrated in Figure 2. Further details can be found at https://www.susqi.org/. The project timeline is illustrated in Figure 3.

[11] https://discovery.ucl.ac.uk/id/eprint/1350234/1/Evaluation_of_NHS_Medicines_Waste__web_publication_version.pdf

[12] https://www.england.nhs.uk/publication/pharmaceutical-waste-reduction-in-the-nhs/

[13] https://www.susqi.org/step-by-step-guide

Figure 2: The four steps of SusQI

Selection of Sites

Four hubs were recruited by CSH to engage in the project. Participation was voluntary; a payment of £2,500 was paid to each hub's hosting organisation in recognition of staff time invested in the project.

Each hub consisted of a hub lead plus at least one representative from the participating care home, the GP practice that prescribed for that care home and the community pharmacy that dispensed the monthly medicine for that care home. Representatives were expected to be key staff involved in the care home medicine pathway at each site. Representatives included:

- Care home manager, registered nurses, staff trained in medicine administration.
- GP, practice manager, prescription clerk, GP practice-based pharmacist and pharmacy technician.
- Community pharmacist, dispensing technician, dispensing assistant.

The hubs recruited represented a range of different sizes of organisations and models of working at each site to maximize the diversity of the sites participating, as detailed in Table 2.

Table 2: Hub Characteristics

Hub	Setting	Care home type	Number of residents	GP practice	Community pharmacy
A	Market town	Residential / Nursing / Dementia (armed forces)	101 (across 3 units)	Non-dispensing, population 11,073	Online pharmacy, original pack dispensing, 27,500 items/month, 20 miles from care home
B	Rural village	Nursing	46	Non-dispensing, population 6,933	Local pharmacy (multiple), original pack dispensing, 11 miles from care home
C	Rural	Residential	23	Dispensing, population 6,100	Local pharmacy (independent), original pack dispensing, 6,500 items/month, 6 miles from care home
D	Rural	Residential / Nursing / Respite	41	Non-dispensing, population 4,700	Local pharmacy (independent), robot plastic pouch dispensing, 11,000 items/month, 10 miles from care home

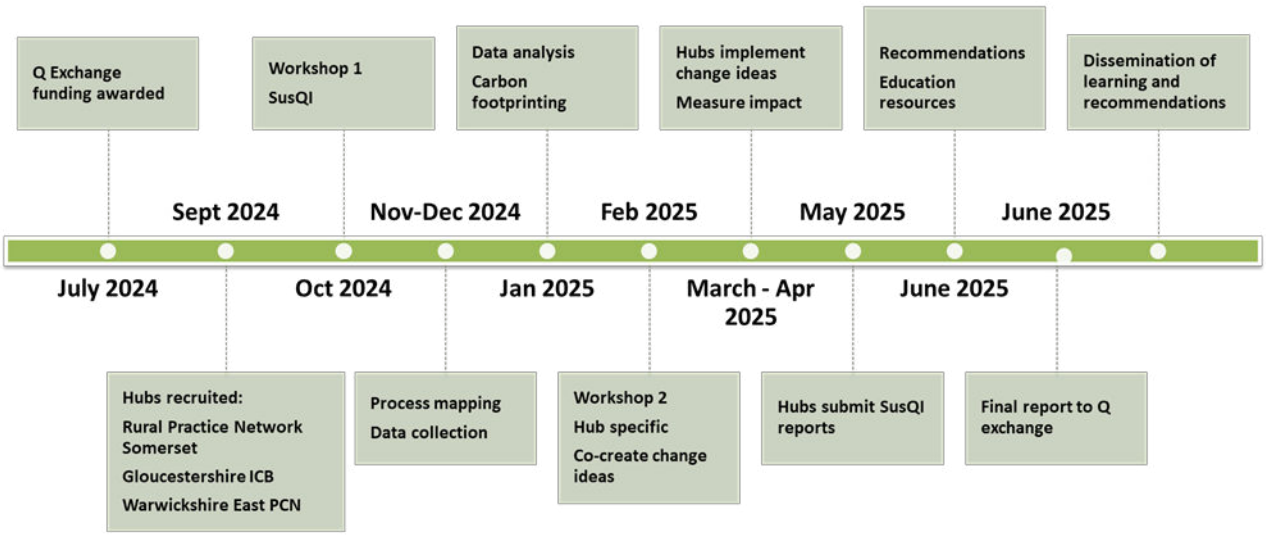
Workshop 1

The project began with an initial introductory and educational workshop which also aimed to develop working relationships between key team members within each hub and between hubs.

Workshop 1: A 2-hour online workshop attended by multiple hub teams aimed to:

- Develop collaborative working relationships with other sites within each hub and between hubs and with the CSH team (motivation to maintain engagement).
- Outline the purpose of the project.
- Provide foundational education on medicine waste, a brief introduction to the health impacts of climate change and how healthcare generally contributes to the problem of climate change.
- Introduce the principles of sustainable healthcare and the SusQI framework, focussing on process mapping to study the system.
- Explore what data sites have already collected in relation to medicine waste.
- Outline the planned project timeline, expectations of each site throughout the project and support available from CSH.

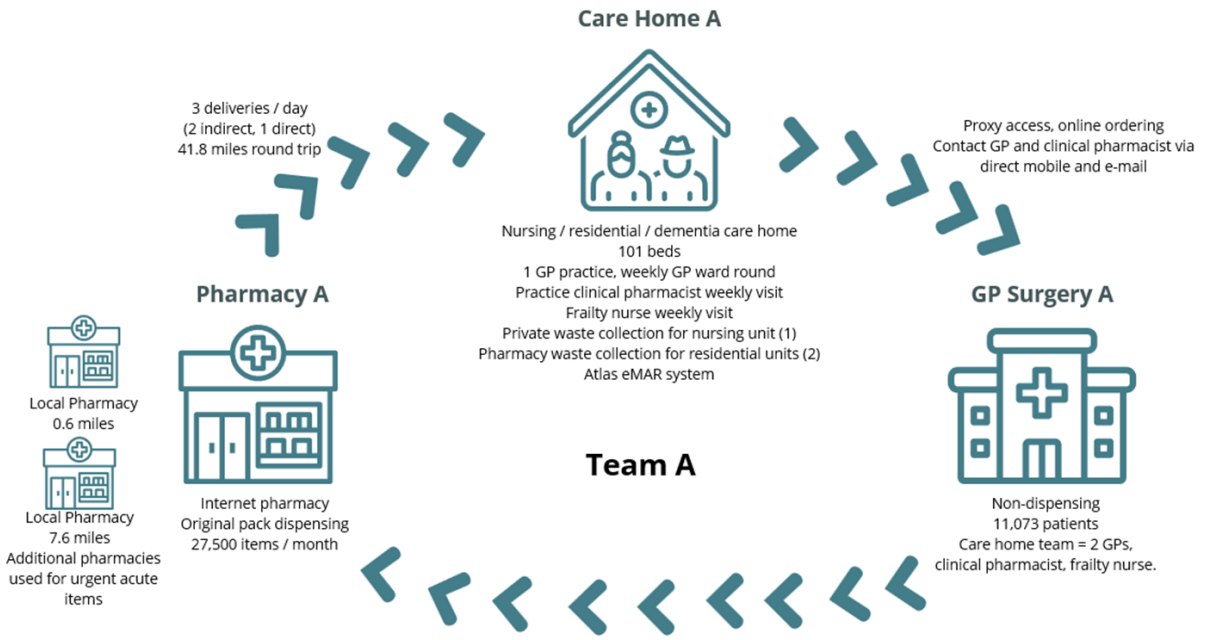
Figure 3: Project Timeline



Pathway Mapping

Teams then engaged in process mapping to study their systems as per step 2 of the SusQI framework. The care home medicine pathway included the monthly and interim ordering of medicines by care homes, associated activities at the home, including stock checking and stock management, and the associated activities at the GP practice to prescribe the medicine and at the community pharmacy to dispense and deliver the medicine. See figure 4 for a simplified overview. Each site created a detailed process map which included both the regular monthly ordering of medicine and the more frequent (often daily) interim ordering of medicine.

Figure 4: Example Care Home Medicine Pathway



Process maps for each hub were collated and shared so all team members could understand the whole medicine pathway across the interface of care home, general practice and community pharmacy for their hub.

Data Collection

Site teams collected data on medicine waste (12 months' worth of data from existing medicine waste logs), staff time spent on medicine processes and the number of deliveries of medicine. CSH collated and analysed the data and, where possible, calculated carbon footprints for medicine waste and medicine deliveries.

Workshop 2

A second workshop was undertaken with each individual hub to present and discuss their data and to co-create and agree on improvement actions within each hub team.

Workshop 2: A 2-hour online workshop individualised for each hub team aimed to:

- Continue to develop collaborative working relationships within each hub.
- Present and review the data collected from each hub.
- Provide further guidance on the sustainable value equation and the SusQI process.
- Co-create and prioritise improvement ideas for each site within the hub.
- Agree on an action plan for implementing, measuring and reporting on improvement ideas.

Improvement Ideas

Teams then had an eight-week period to implement improvement ideas and report back on impacts, if any.

Staff Survey

During the implementation period, an online staff survey was distributed to evaluate the social impacts of the project.

CSH then collated the information for each hub to produce individual detailed hub reports and the overall project report.

Patient Involvement

Patients were not directly involved in this project as the focus was on the medicine ordering, dispensing and delivering pathway. However, a summary of the project and the individual hub reports were provided to patient representative groups where these existed at sites. The project lead communicated directly with patient representative groups and offered to respond to any questions or provide a presentation, but these were not requested.

Data Analysis:

Medicine Waste Logs

Medicine waste data for 12 months prior to the start of the project was collected for analysis using the care home medicine waste logs. The financial cost of medicine waste was calculated using the November 2024 edition of the Drug Tariff online[14]. Each hub was presented with a detailed analysis of their medicine waste. Key findings are listed in Table 3.

Table 4 outlines the financial, environmental and social impacts directly related to medicine waste – the cost of the medicine wasted, the cost of medicine disposal and an approximation of the staff time spent logging and disposing of medicine waste.

Carbon footprint analysis – medicine waste log

The greenhouse gas (GHG) emissions associated with medicine were estimated using an Environmentally Extended Input-Output Analysis (EEIOA). Financial costs of medicine were deflated to reflect their 2021 values and converted into carbon emissions using the pharmaceutical emission factor from the UK Government's 2021 Standard Industrial Classification (SIC) database[15]. Note that since the completion of this project, the pharmaceutical emission factor has reduced from 0.581 kgCO2e/£ to 0.240 kgCO2e/£.

Medicine Pathway

Table 5 outlines the environmental impacts related to medicine deliveries. Medicine deliveries were identified as a potential carbon hotspot during the process mapping stage, but only two hubs consistently recorded medicine delivery information.

Carbon footprint analysis – medicine deliveries

[14] https://www.nhsbsa.nhs.uk/pharmacies-gp-practices-and-appliance-contractors/drug-tariff

[15] https://www.gov.uk/government/statistics/uks-carbon-footprint

The GHG emissions associated with pharmaceutical deliveries were estimated using a bottom-up, process-based approach. The round-trip distance between the pharmacy and the care home was estimated using postcode information. Where vehicle type was not specified, it was assumed that deliveries were made using an average-sized van. The emission factors for vehicles were sourced from the 2024 BEIS database[16]. Where pharmacies included the care home delivery within a wider round of deliveries (indirect trips), it was estimated that each indirect trip included 20 deliveries, based on information from the pharmacy.

Table 6 outlines the social impact, in terms of staff time, of the overall medicine pathway. Staff were requested to log the time taken for activities relating to the medicine pathway in an attempt to measure the social impact of medicine waste. Activities were logged sporadically and staff at all sites noted that it was difficult to find the time to log their activities because they were too busy. Hence the data is provided to give an insight into the extent of the issue and the likely time spent by care home staff on dealing with medicine disposal and other aspects of the medicine pathway.

Results:

Medicine Waste Logs

Extensive data was collected from the care home medicine waste logs, as these were an easily accessible form of data that the homes were already required to collect. Hence, 12 months' worth of data prior to the project start were collected and analysed, as summarised in Table 3. A detailed analysis was provided for each hub so that they can use this data to better understand the volume, content and cost of their medicine waste.

Commonly Wasted Medicine

Liquid medicines were the most commonly wasted formulation in 3 out of the 4 homes. Across the four homes, over 50 litres of liquid medicine were disposed of over the course of 12 months.

Analgesics were in the top 5 most costly classes of wasted medicine at all four homes. End of life medicine were in the top 5 most costly classes of wasted medicine at 3 of the 4 homes (end of life medicine was the 6th most costly class at the 4th home). The "end of life" medicine included injectable formulations of Hyoscine, Levomepromazine, Midazolam and Morphine.

In some cases, medicine waste data was skewed by wastage of a particularly high-cost item. For example, at home D, disposal of 10 x Dupilumab injections, a hospital-only item costing £6,324 accounted for around two-thirds of the cost of the home's annual medicine waste. At home B, disposal of 13 capsules of Lenalidomide, a hospital-only item costing £2,210, accounted for around one third of the cost of the home's annual medicine waste. The cost of "specials" items also contributed to costs e.g. levothyroxine liquid (£242) and quetiapine liquid (£348).

In other cases, wastage of multiple doses of lower-cost medicine resulted in relatively high costs of medicine wasted e.g. 70 x Fentanyl 25mcg patches (£251.86), 120 bottles Fortisip (£105) and 89 bottles of Fortijuice (£160) (for the same patient).

Reasons for Disposal

The most common reasons for disposal of medicine in each home were:

[16] https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2024

- Old stock
- Patient died (in two homes)
- Medicine refused.

The costliest reasons for disposal of medicine in each home were:

- Old stock
- Patient died (in two homes) – the high cost of drugs in this category was due to disposal of injectable end-of-life drugs.
- Discontinued.

Direct Impacts of Medicine Waste

Table 4 outlines the financial, environmental and social impacts directly related to medicine waste – the cost of the medicine wasted, the cost of medicine disposal and an approximation of the staff time spent logging and disposing of medicine waste.

The annual average cost of medicine waste per home ranged from £2,125 - £9,404. The homes included in this project varied significantly in size and services provided so direct comparison is of limited value. Hence costs per bed per year were calculated for a more appropriate comparison. The average cost of medicine waste per bed per year was £125, with a range of £86.90 - £229.40. The carbon footprint of the medicine waste was calculated using emission factors and so aligns directly with the cost.

An attempt was made to quantify the volume of waste by calculating the number of doses discarded. This applied to solid oral dosage forms only, i.e. tablets or capsules, as the quantities and strengths of tablets disposed were recorded, making it possible to estimate the number of doses discarded. In comparison, it is more difficult to predict the doses of liquids, and often precise quantities of liquids discarded were not recorded. Hence the number of doses discarded is an estimate and is likely to be a significant underestimate as it does not include liquids, which were the most frequently discarded formulation, nor does it include topical preparations and eye and ear drops. On average, 45.9 doses were discarded daily at each home.

The number of entries in the medicine waste log gave an indication of both the volume of waste and the potential time spent by staff in logging medicine waste, a regulatory requirement. On average, 2.5 entries were made in the medicine waste log daily at each home. Using an estimation of 30 seconds to discard a dose of medicine and 1 minute to log an entry in the medicine waste log, this equates to an average of 25.5 minutes daily of staff time in every home disposing of tablets and capsules, which is equivalent to 155 hours of staff time over the year at each home.

Table 3: Medicine waste data (12 months)

Care Home	Most frequently wasted formulation	Quantity disposed	Mostly costly class of wasted medicine	Most common reasons for disposal	Most costly reasons for disposal
A	Liquids	30,269mls	**Analgesics** Antineoplastics (hydroxycarbamide) Laxatives Anticoagulants **End of life medicine**	Old stock Patient died Refusal	Old stock Patient died Discontinued
B	Liquids	7,050mls	Thalidomides (lenalidomide) Antimuscarinics (glycopyrronium, oral hyoscine and solifenacin) Laxatives **Analgesics** Monoclonal antibodies (denosumab).	Patient died Discontinued Excess stock	Patient died Discontinued Expired
C	Liquids	7,900mls	**Analgesics** (paracetamol liquid, fentanyl / buprenorphine patches) Antipsychotics (quetiapine liquid) **End of Life medicine**, Monoclonal antibodies (denosumab) Anticoagulants	Patient died Prescription changed In blister packaging	Patient died Prescription changed Patient unavailable
D	Tablets	6,883 tablets	Interleukin inhibitor (Dupilumab) **Analgesics** Antihypertensives Anticoagulants **End of Life medicine**	Refused Discontinued Medication on hold	Discontinued Patient died Old stock

Table 4: Financial, environmental and social impacts of medicine waste

Medicine Waste Totals: 12 months data	
£	Cost of medicine waste per home: **£2,125 – 9,404 (**average **£6,619**) per home Cost of medicine waste per bed per year: **£86.90 – £229.40** (average **£125**) per bed per year) Cost of disposal (data from one home): Medicine disposal contract: **£170/year** (nursing unit) Sharps disposal contract: **£286/year**
CO_2	Carbon footprint of medicine waste per home: **1,029 - 4,254 kgCO2e** (average **3,205.5 kgCO2e**) per home Carbon footprint of medicine waste per bed per year: **42.1 - 111.1 kgCO2e (**average **65.7kgCO2e**) per bed per year The total carbon footprint of the medicine waste across the four homes was equivalent to: ▪ driving 37,700 miles in a petrol car OR ▪ 1,341 GP appointments
	**Volume of Waste** Across the four homes, over a period of a year, between **7,043** - **36,305 doses** of medication were discarded, excluding liquids, topical preparations and eye/ear drops. Based on this, at each home on average **45.9 doses** were discarded daily.
	**Care Home Staff Time** Across the four homes, over a period of a year, between **227 - 2,629 entries** were made in the medicine waste log. At the time of data collection, all four homes were using handwritten medicine waste logs. Based on this, at each home on average **2.54 entries** were made in the medicine waste log daily. Estimating 30 seconds to discard a dose of medicine and 1 minute to log an entry in the medicine waste log, this equates to an average of **25.5 minutes daily** of staff time in every home disposing of tablets and capsules, which is equivalent to **155 hours of staff time over the year**. This is likely to be a significant underestimate as it does not include discarding of liquids, topical preparations and eye/ear drops. Note from Table 2 that liquids were the most frequently wasted formulation and will therefore contribute significantly to the time spent managing and logging medicine waste, in addition to adding significant bulk to the waste as the entire bottle must be disposed of.

Medicine Pathway

Medicine Deliveries

Table 5 outlines the environmental impacts related to medicine deliveries. Medicine deliveries were identified as a potential carbon hotspot during the process mapping stage, but only two hubs consistently recorded medicine delivery information at the start and end of the project. Calculations are based on two data collection periods, each of 8 weeks.

Pharmacy A:

For Team A, prior to the start of the project, the care home typically received one direct delivery and two indirect deliveries per day from the pharmacy. Post-project, the care home successfully managed to reduce 1 direct delivery per day, saving approximately 5,448.78 kgCO2e per year, a 91% reduction in their travel-related carbon emissions.

The carbon calculation for the round trip is an estimation, based on data on the number of deliveries provided by the pharmacy. Round-trip delivery is more efficient as more deliveries are made in a single trip, making the carbon footprint per delivery much lower.

Pharmacy D:

For Team D, data on the number of direct deliveries was collected over an eight-week period before the project began, along with information on the average round-trip distance (19.6 miles) between the pharmacy and the care home, and the type of delivery vehicle used. Comparable data was also gathered during the project's implementation phase. Before the project, the care home received an average of 3.75 direct deliveries per week; this was reduced to 2.42 deliveries per week, resulting in an estimated annual saving of approximately 679.97 kgCO2e, one third of their travel-related emissions.

The comparative carbon savings are illustrated in Figure 5.

Figure 5: Travel-related carbon emissions

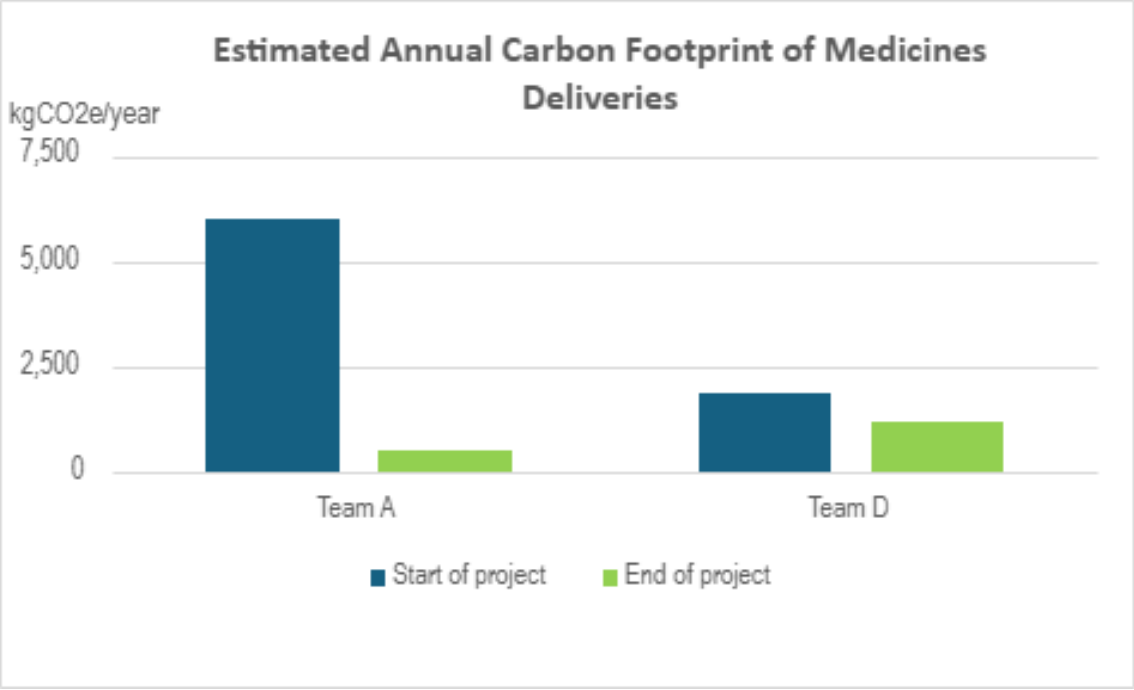


Table 5: Environmental impacts of medicine deliveries

Medicine Deliveries (8 week data collection period x 2)	
	**Prescription delivery** Only two hubs recorded prescription deliveries. Calculations are based on two data collection periods, each of 8 weeks. **Pharmacy A:** Direct delivery - **41.8 miles, 20.96 kgCO2e/trip** Indirect trip – estimate **1.05 kgCO2e/trip** (round trip of 20 deliveries) <u>Number of trips:</u> Start of project: 1 direct and 2 round trips daily, 5 days/week = **5,994kgCO2e/year** *Note that at the start of the project in this hub, the carbon footprint for delivery of medicine (**5,994kgCO2e/year)** was greater than the carbon footprint of the medicine (**4,254kgCO2e/year)**, due to long distances travelled and frequency of deliveries.* End of project: 2 round trips daily, 5 days/week = **545kgCO2e/year** **Saving 5,449 kgCO2e per year.** **Pharmacy D:** Direct delivery - **19.6 miles, 9.80 kgCO2e/trip** No indirect trips <u>Number of trips:</u> Start of project: average 3.75 direct deliveries / week = **1,911 kgCO2e/year** End of project: average 2.42 direct deliveries / week = **1,230.72 kgCO2e/year** **Saving 680 kgCO2e per year.**

Staff Time

Table 6 lists the staff time taken to complete various activities. These figures relate to the whole medicine pathway, not just dealing with medicine waste. Activities logged by staff were diverse and involved a range of different grades of staff. The challenge of comprehensively logging staff time means that these figures are an estimation and are provided to give an insight into the complex nature of the care home medicine pathway.

Table 6: Social impacts of medicine pathway

Medicine Pathway Staff Time (4 week data collection period)	
	**Care Home Staff Time** Home A: Staff time spent on monthly medicine process was between **17.2 - 22.1 mins/resident** Additional staff time was spent collecting urgent prescriptions from a local pharmacy when the prescription cut-off time had been missed at their regular remote pharmacy. This ranged from **10 – 75 mins per collection** episode, depending on the distance travelled and wait time at the pharmacy. Home C: Average staff (healthcare assistant) time spent on medicine processes was **1.5 hours/week** (excluding weekly audit) Home D: Staff (team leader, nurse, healthcare assistant) spent on average **2 hours 6 mins per week** dealing with medicine pathway issues (monthly orders, prescription queries, chasing prescriptions etc.) via phone or e-mail.
	**GP Practice Staff Time** Team A: Approximate GP time to process **interim prescription request: 5mins** Team B: Approximate average staff time (receptionist, prescription clerk, admin staff) spent on prescription processing **New medicine request: 4.67 mins** **Interim medicine request: 4 mins** **Monthly medication request: 3.4 mins** **Prescription query: 1.83 mins** **Medication query: 1 mins** **Overall average: 3 mins** Team C: Average admin time to deal with prescription query: **1.6 mins/query**

	Approximate GP time to undertake a paper-based review: **6.6mins/review** Team D: Clinical pharmacist / Prescribing support pharmacist recorded dealing with on average 2.2 prescription queries/requests per week, including monthly orders. Time spent on queries ranged from **2 – 60 mins, average 12.55 mins per query.**
	**Pharmacy Staff Time** Pharmacy A: Average time to dispense and check prescriptions (pharmacist and dispenser): **Standard prescription 5-7mins** **End of Life prescription 7-10mins.** Pharmacy C: Interim Prescriptions: average time to dispense and check: **Dispenser 1 min, Pharmacist 2 min, Driver 20mins.** Monthly prescriptions: average time to dispense: **Dispenser 5.2 mins/resident, Pharmacist 7.8 mins/resident, Driver 20mins** Pharmacy D: Interim Prescriptions: Pharmacist / dispenser / technician / checker in total are dealing with interim prescriptions on **average 3.6 days/week**. On those days, the total staff time spent **dealing with interim prescriptions** is on **average 1 hour**. Interim deliveries take place on average 3.6 times/week. Driver time 1 hour per delivery. Interim deliveries were for prescriptions for between 1-12 patients Monthly Prescriptions: Dispenser / technician / pharmacist total average time on monthly orders = 23 hours 47 mins. Monthly deliveries once a month. Driver time 1 hour per delivery.

Staff Survey

Following workshop 2, an anonymous staff survey was distributed electronically for any staff involved in the project to complete.

19 members of staff completed the survey:

- 9 care home staff
- 7 general practice staff
- 3 community pharmacy staff.

Results can be seen in Figures 6-10 and Table 7.

The majority of respondents agreed that involvement in the project improved their awareness of medicine waste, the environmental impact of medicine waste and the appropriate disposal of medicine waste. See figure 6.

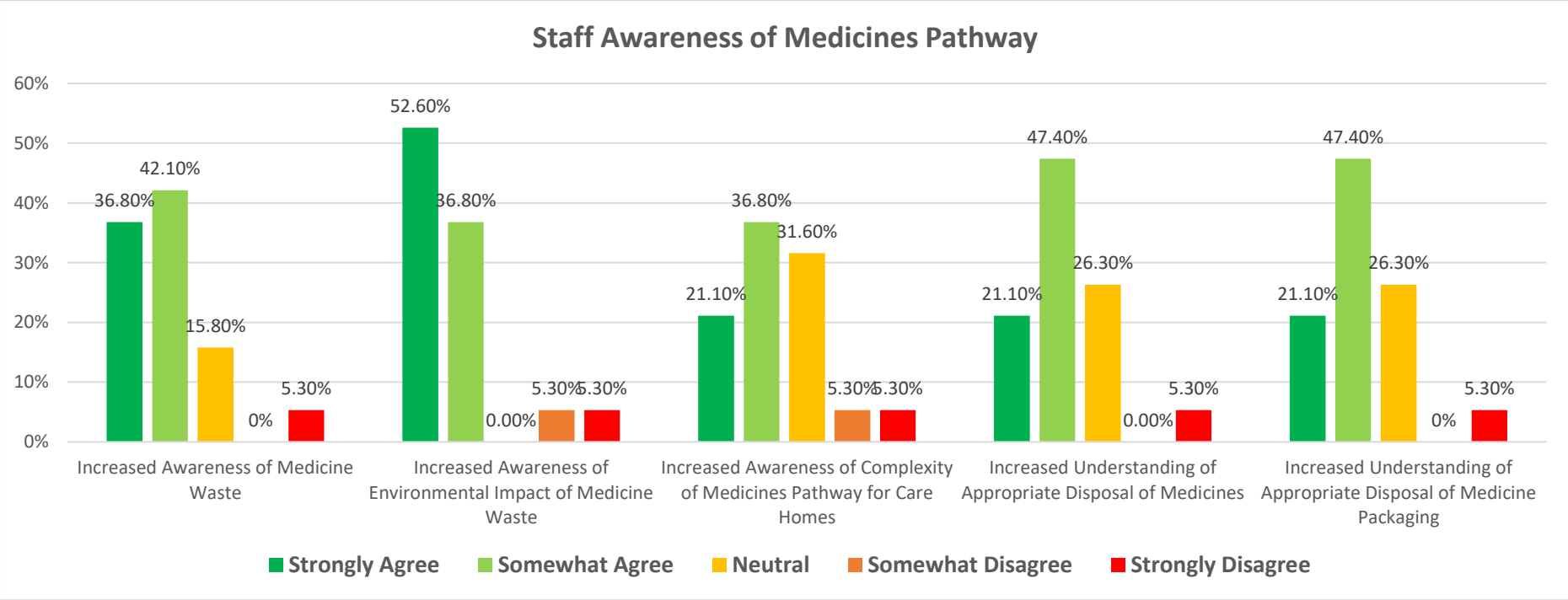
Over 60% of respondents agreed that the project had enabled them to identify improvements in the medicine pathway (figure 7). A range of improvement actions in relation to medicine waste and other quality improvement topics were outlined (table 7). 42% of respondents state that they plan to do further quality improvement work as a result of involvement in this project (figure 8).

Over 50% of respondents agreed that communication has improved as a result of involvement in this project (figure 9). However, there is a clear narrative that the work done in this project needs to be built upon, and that good communication requires ongoing work. 1 respondent stated that they did not feel that the teams sufficiently appreciated the importance of communication, and that there was still much work to do.

53% of respondents reported improved job satisfaction as a result of involvement in the project. 47% thought that involvement in the project helped them to save time on medicine-related tasks. 63% of respondents reported that they thought the project would enable them to improve patient care (figure 10).

Staff Survey Results

Figure 6: Impact of project: Staff awareness of medicine pathway and medicine waste



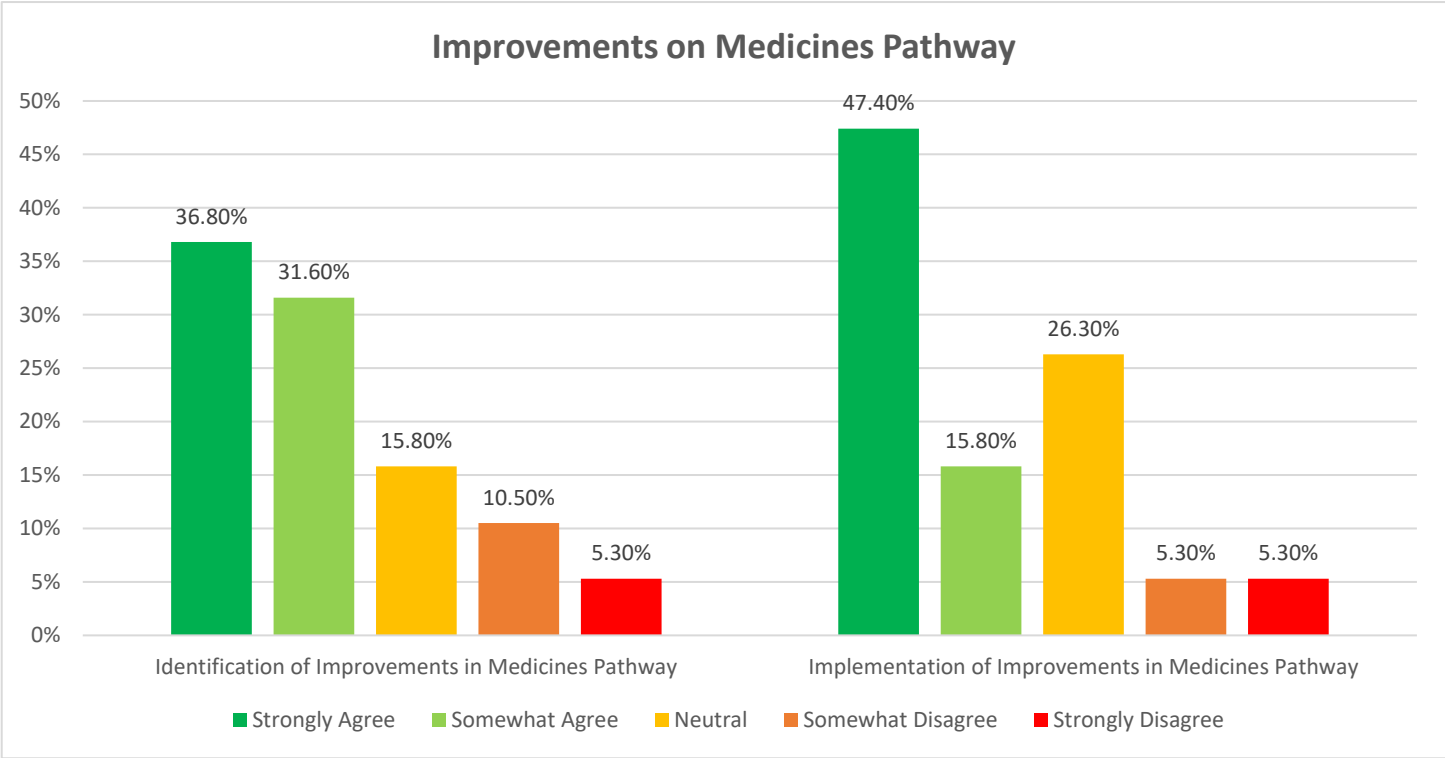
Please state if there is any additional learning which you have achieved as a result of your involvement in this project.

Learned more about carbon emissions. I have been able to share the knowledge gained with other colleagues

I am fully aware of duplication of prescriptions and how important it is for the pharmacy to prevent these from being dispensed. As any items sent to the care home, not required - are then wasted.

The project has greatly highlighted the social and environmental impact medicine waste in care homes can have. It was interesting to see the findings related to the carbon emissions.

Figure 7: Impact of project: Improvements in medicine pathway



Additional comments:

It's been great to meet members of the other teams and I think this may be a great way to continue with our focus on sustainability with medicine waste and other matters going forward.

Struggling to understand the pros of this project doesn't appear to consider appropriate time management and also has potential for removal of drugs to one's person instead of the waste bin

In regards to identifying improvements to the medicine pathway, I still feel there is a lot of work to be done within the care homes and surgeries communication to prevent duplicate ordering.

Table 7: Impact of project: Actions taken and actions planned

Actions taken in your workplace as a result of your involvement in this project	Actions planned: what will you do differently as a result of your involvement in this project	Has this project motivated you to undertake further quality improvement work? If yes, please state what this might be.
Shared the information I have learned with colleagues and educated them on the SusQI approach which has got to be the way forward if we are to achieve a greener practice.	*Continue to maintain the standards established as part of the project.*	*Yes - at present we will look at a greener approach to inhalers.*
Adjusted prescription request processing protocol.	*Be more aware of the medicine that contribute to the higher proportion of wastage medicine and double check with patient if they are actually required at present.*	*Yes. Improvement in the workplace, disposal of medication.*
Ensuring that correct amounts of medications are issued when required rather than simply issuing everything that is on the patient's medication list.	*I will continue to monitor the ordering of medication and the disposal of medication.*	*Yes, always keen to make improvements as it's always useful to measure the impact. I want to see if we can really improve the pathway for care home to obtain stock medicine for some medicine/items.*
Checking and ordering of stocks is now done by allocated staff only. Other nurses will just leave a note for us if there is a concern in the stock. This will mean the stock is controlled to prevent overstocking of supply.	*Continue keeping waste low*	*Yes.*
Better communication	*We will be very aware that the GP surgery release duplicate prescriptions due to multiple staff getting involved with no communication when request has been completed.*	*Yes. We already have an active green team within the home so we are always looking at new initiatives.*
New form (for communication) and list of medication returned	*I would try to facilitate a face-to-face workshop with more staff present. As it would be a valuable way to capture the insights of the staff on the*	*Yes. I have joined several networks.*

	ground and disseminate some of the key messages and findings.	
As a pharmacy, we have stopped delivering non urgent prescriptions daily. Routine deliveries are routed 2 times a week. Urgent acutes will go daily, if communicated.	*Check before ordering*	
Signing out returns as we go rather than just before returning.	*Ensure that all staff are aware as part of their medication management training*	
We have tightened up on our disposal of medication re packaging, we are also closely monitoring ordering smaller amounts of stock especially PRN medication.	*Continue to monitor waste and look at ways to reduce waste within my practice.*	
We have become more aware of areas for improvement and now review this regularly	*Make more of my involvement with medication issuing and supply more efficient*	
Reminded GPs to only prescribe what is required. Dispensary staff will flag any large quantities or unusual items being requested.		

Figure 8: Impact of project: Inspiration for further Quality Improvement

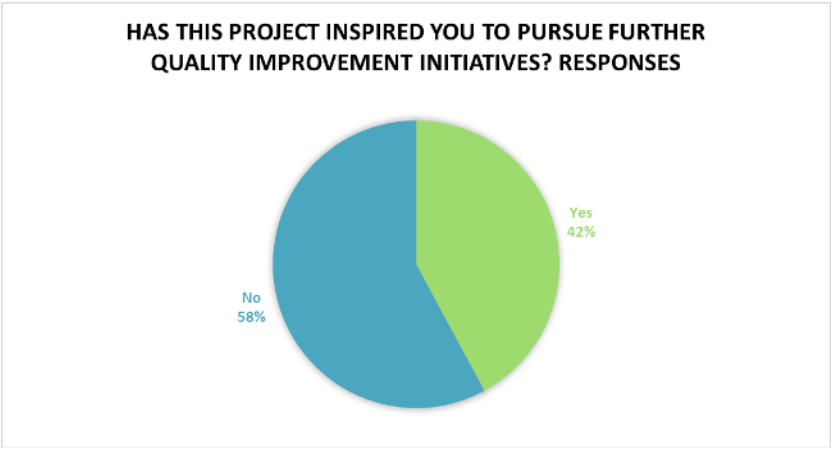
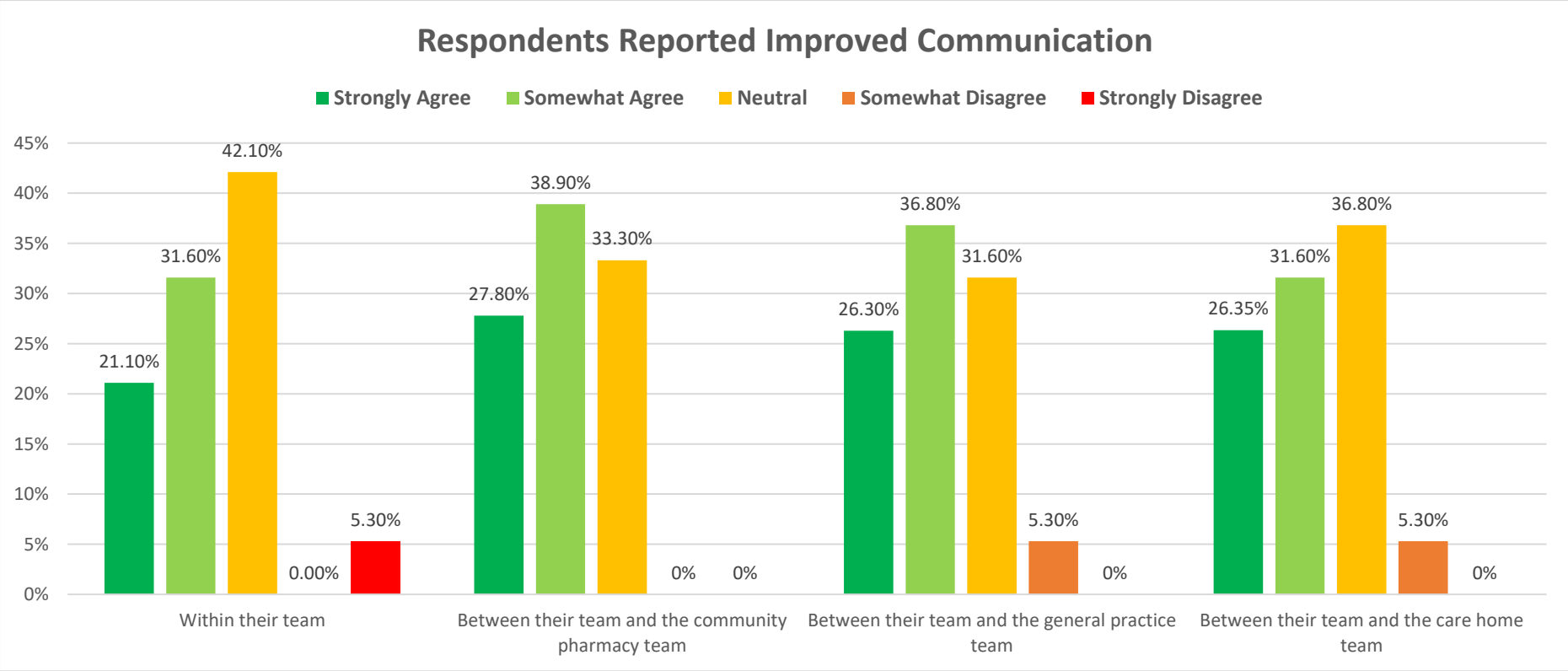


Figure 9: Impact of project: Communication



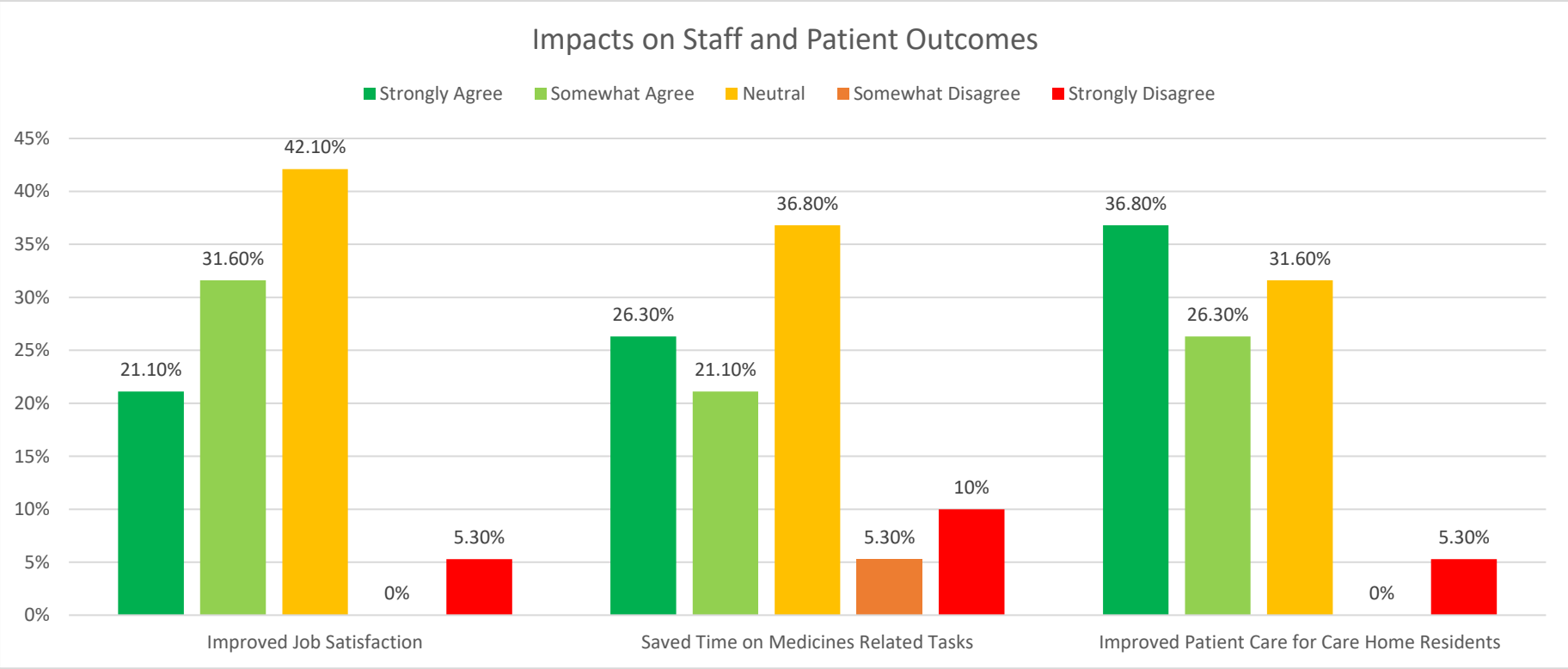
Additional comments:

No more communication forms to be completed. Sending email direct to pharmacy is less time consuming.

Personally, I feel with regards to communication - we are not at a better point that prior to this project. I think the teams do not understand how important communication is. They also do not take into account that it takes time to have requests processed.

Our communication within the home has always been good but we can always improve, a definite improvement between the practice and the pharmacy.

Figure 10: Impact of project: Staff and Patient Outcomes



Additional comments:

It doesn't appear to save time if anything increase time spent disposing of medication in comparison to previous policies. More time taken from patient care.

Discussion:

Medicine Waste Logs

The medicine waste log data was used primarily to outline the costs and carbon footprint of medicine waste for this project. The rich data (most commonly wasted, most costly items, formulation etc) could be used to make clinical interventions to reduce medicine waste within each home. Clinical interventions were outside of the scope of this project, which focuses on processes within the medicine pathway, so the detailed data analysis was provided to each hub to enable them to utilise this information as appropriate to inform clinical interventions or review. Key observations included the fact that small quantities of high cost / hospital-only drugs contributed significantly to the cost of medicine waste at some homes. The disposal of end-of-life medicine was noted by staff to be particularly wasteful and frustrating as homes were often disposing of end-of-life medicine for one patient whilst at the same time urgently ordering the same medicine for another patient.

Regulatory requirements state that care homes must log all medicine waste, which provides a rich data set on the volume, content and variety of medicine waste. This is data which is not readily available in other settings. However, we found that this data source was not routinely reviewed, monitored or communicated to prescribers. The problem of medicine waste is therefore largely invisible to prescribers and to the ICBs who allocate the prescribing budgets. In addition, care home-specific prescribing data and costs are difficult to obtain so we were unable to calculate what proportion of the care homes' prescribing costs the medicine waste represented. It seems that medicine waste is everyone's responsibility, but no one is accountable.

At the time of data collection, all four homes were using handwritten medicine waste logs, time consuming to complete and difficult to interrogate. During the course of the project, one home moved to an electronic system (Atlas) which created potential for more efficient logging and monitoring of medicine waste, subject to staff training on the new system.

A wide range of terminology was used to log reasons for disposal. In one home, more than 40 different reasons for disposal were logged, many of them similar, some of them unclear. For example, there was a need to define the difference (if any) between old stock, end of cycle stock, expired stock and excess stock.

Medicine waste is a significant and costly problem. NHS data estimates that during 2023/24 there was a monthly average of 323,000 care home patients aged 65 years and over receiving prescriptions in England[17]. Applying the medicine waste costs identified in this project to the elderly care home population in England suggests an annual wastage of medicine of between £28 - £74 million annually (average £40.3 million). Hence, our findings are in line with published data which estimate the annual cost of medicine waste in the care home pathway in England at £50 million[18].

Although it is difficult to quantify, the amount of staff time spent dealing with medicine waste and logging the medicine waste is likely to be significant, given the known significant volume of medicine waste. Using conservative estimates of staff time and records of the number of doses

[17] https://nhsbsa-data-analytics.shinyapps.io/estimated-prescribing-patterns-for-care-home-patients/

[18] https://discovery.ucl.ac.uk/id/eprint/1350234/1/Evaluation_of_NHS_Medicines_Waste__web_publication_version.pdf

disposed and the number of entries in the medicine waste log, we estimated that approximately 155 hours of staff time are spent at each home annually, discarding doses and logging medicine waste.

The cost of medicine waste disposal receives little attention. Only one of the homes in the project recorded the cost of medicine waste disposal. Registered nursing homes pay for their medicine waste disposal whereas residential homes return their medicine waste to the community pharmacy for disposal, where their medicine waste is disposed of along with medicine waste from members of the public returning unwanted medicine to the pharmacy. Medicine waste is classed as clinical waste and requires incineration which has both a financial and environmental impact. The cost of medicine waste disposal, although largely borne by the NHS, is not often reported and is a cost that most prescribers are unaware of.

Policy recommendation: create clear lines of accountability for regular and transparent monitoring, reporting and management of care home medicine waste data to identify trends and reduce avoidable waste. Link this data with NHSBSA reporting on care home prescribing data[19] to enable calculation of the costs of medicine waste as a proportion of the prescribing costs. Share medicine waste data locally with prescribers. Share insights nationally to inform medicine policy in care homes.

Policy recommendation: explore the creation of a medicine re-use policy for end-of-life medicine (as implemented successfully during the COVID pandemic)[20], to reduce the waste of these items.

Practice recommendation: encourage care homes to proactively monitor their medicine waste logs to identify trends, spot high cost and hospital drugs, identify waste hotspots e.g. end of life medicine, sip feeds, liquids and continually monitor the cost of medicine waste.

Practice recommendation: create a standardised list of reasons for disposal to optimise efficiency of the medicine waste logging process and enable accurate interpretation of the medicine waste data. Published guidance is available to support this approach[21].

Methods of Medicine Waste Disposal

The process of segregating medicine waste for disposal varied across the four homes. Figure 11 provides an illustration of the contents of medicine waste bins. In some cases, medicine and their entire outer packaging were disposed of. At the other extreme, tablets and capsules were popped out of blisters directly into medicine waste bins.

During the course of the project, nursing homes that were disposing of entire outer packaging recognised that they could reduce their medicine disposal costs by removing packaging before disposing of medicine waste. However, there is a risk of undertaking inappropriate disposal in an attempt to be more environmentally friendly. For example, rinsing out medicine bottles and adding the bottles to plastic or glass recycling might seem to be a good approach because the bottles are being recycled. However, rinsing out medicine bottles adds to the already significant

[19] https://nhsbsa-data-analytics.shinyapps.io/estimated-prescribing-patterns-for-care-home-patients/

[20] https://www.gov.uk/government/publications/coronavirus-covid-19-reuse-of-medicines-in-a-care-home-or-hospice (policy withdrawn April 2022)

[21] https://www.prescqipp.info/our-resources/bulletins/bulletin-259-care-homesdomiciliary-care-pharmacy-technician-medication-review-and-process-reviews/

problem of pharmaceutical pollution of waterways and, in the case of antimicrobials, contributes to antimicrobial resistance[22].

Observations from the project identified that reducing the amount of unnecessary packaging that was disposed of could result in a reduction in the number of medicine waste collections (and therefore costs) that nursing homes had to pay for. This needed to be balanced against the staff time which was required to segregate waste and ensure the removal of patient-identifiable information. The majority of care homes did not have access to recycling facilities.

Figure11: Examples of medicine waste in care homes

Due to the range of approaches observed, and the risk of staff spending excessive time removing individual dosage forms from packaging, some brief guidance was collated for the care homes to use when reviewing their policies (see appendix 1). Published guidance does not provide information specific to formulations and is open to interpretation. The availability of recycling schemes for items such as medicine blister packaging, eye drop bottles, inhalers and insulin pens adds complexity to the process.

Practice recommendation: use published guidance to review medicine waste disposal policies to ensure that waste is appropriately segregated and streamlined to the correct waste stream – general waste / recycling / clinical medicine waste (see appendix 1).

[22] https://read.oecd-ilibrary.org/environment/pharmaceutical-residues-in-freshwater_6a617955-en#page5

Policy recommendation: there is a need for clear, specific national guidance on the appropriate packaging segregation and disposal of all formulations of medicine and prescribed non-medicine items such as topical preparations, dressings, and bulk items such as oral nutritional supplements and thickening powders. Where disposal in the medicine waste bin is not required, specific guidance for appropriate, safe and minimally environmentally impactful recycling or disposal is required.

Research recommendation: explore appropriate disposal methods for non-medicinal prescribed items, particularly oral nutritional supplements and thickening powders.

Medicine Pathway

Medicine Deliveries

Medicine deliveries were identified as a potential carbon hotspot during the process mapping phase of the project. This was due to long distances travelled and the frequency of deliveries. For teams A and D, the process of logging their deliveries to care homes identified potential for streamlining deliveries. In both cases, the wider work of the project to improve communication between care homes and community pharmacies and to streamline ordering of medicine to avoid duplication of requests and unnecessary urgent requests all contributed to enabling the pharmacies to reduce the number of deliveries they were routinely making to the care home.

The carbon footprint of medicine deliveries was particularly high for Pharmacy A. It was noted that at the start of the project, the carbon footprint for delivery of medicine (5,994kgCO2e/year) was greater than the carbon footprint of the medicine (4,254kgCO2e/year), due to long distances travelled and a direct delivery to the care home on a daily basis in addition to two other round-trip deliveries. The streamlined approach to communication and prescription ordering implemented during the project enabled Pharmacy A to avoid this third daily direct trip to the care home. This reduced their travel-related carbon footprint by an impressive 91%.

Team D started with a much lower carbon footprint for their medicine deliveries but were able to reduce their average number of round-trip deliveries per week enabling them to reduce their travel-related carbon footprint by a third. This was mainly in response to a change in process ensuring clarification of the urgency of prescription orders from the care home. Prior to the project, all interim prescription requests were assumed to be urgent, requiring frequent delivery trips. In addition, involvement in the project empowered pharmacy staff to challenge duplicate prescriptions so as to avoid duplicate dispensing.

For both of the pharmacy businesses above there will be corresponding savings on fuel costs (none of the delivery vehicles were electric) and driver time, although these were not measured.

Practice recommendation: aim to streamline medicine deliveries, both route and frequency of delivery. Note that round-trip deliveries (where multiple deliveries are made in one trip) are likely to be more efficient and have lower carbon emissions than multiple direct trips.

Practice recommendation: consider investing in electric vehicles to reduce transport-related carbon emissions.

Research recommendation: undertake a comprehensive calculation of the carbon footprint of the care home pathway to identify carbon hotspots so that further improvements to reduce the carbon footprint of the care home pathway can be prioritised.

Research recommendation: undertake a comprehensive calculation of the carbon footprint of different models of dispensing to include factors such as travel emissions relating to medicine deliveries and plastic waste from robot dispensing into a plastic pouch system.

Staff Time

Attempts were made throughout the project to quantify staff time spent on various activities so that time spent in relation to medicine waste could be quantified. However, across all three sites in each hub, staff reported that they were too busy to consistently log their activities. The data in Table 6 gives an insight into the range of activities undertaken, the range of staff grades involved, and the time spent on the medicine pathway across the three sites, reflecting the complexity of the medicine pathway.

During workshop 1 and the process mapping stages of the project, it became apparent that the challenges to communication and the lack of awareness of processes at different sites contributed to unnecessary activity and wasted staff time at all three sites. In some cases, Workshop 1 was the first time that key members of staff at each of the three sites had spoken to each other. A range of inefficiencies and examples of duplicate work were described by staff, including duplicate ordering of prescriptions, care home staff chasing up prescriptions which had not yet been dispensed, pharmacy staff inquiring about the clinical accuracy of prescriptions because recommendations made by the prescriber at the ward round had not been communicated, lack of awareness of the timings of the monthly ordering cycle, lack of awareness of prescription ordering and delivery cut-off times, lack of clarity on the urgency of interim prescription requests. It was clear that these inefficiencies and challenges added to the workload and stress levels at all three sites and could contribute to the creation of medicine waste. In addition, staff were spending a lot of time on the phone and blocking busy phone lines at all three sites.

Sharing the process maps for the three sites within the hub helped teams to understand processes at the other sites and how their actions could impact either positively or negatively on these processes. Workshop 2 for each hub was designed to first address communication issues between sites. Attendees were encouraged to discuss what was currently working well and what could be better. This enabled teams to identify a whole range of improvement activities relating to communication and increasing efficiency of processes, in light of their new understanding of the wider medicine pathway and the interconnectedness of processes at each site.

Table 7 outlines some of the improvement ideas which were generated as a result of these activities.

Practice recommendation: key staff at care homes, GP practices and community pharmacies should be encouraged to understand medicine pathway processes at each site, how they interconnect and how teams at each site can work and communicate with each other to set up efficient processes, set realistic expectations, troubleshoot problems and minimise waste in the overall pathway.

Practice recommendation: key staff at care homes, GP practices and community pharmacies should be encouraged to create direct, secure communication links (e.g. ensure care home has an nhs.net e-mail) and develop working relationships with routine catch-ups to proactively address challenges and ensure continuity despite staff turnover. Implement routine communication in relation to medicine, for example weekly phone call between the GP practice (pharmacy team) and the care home to proactively address queries, interim requests, ward round requests, requests relating to admissions/transfer of care, move to palliative care etc.

Practice recommendation: care homes should utilise existing policies and processes to efficiently manage medicine and minimise waste e.g. proxy ordering, bulk prescribing, homely remedy policies and food fortification.

Staff Survey

The staff survey was undertaken in an attempt to capture some of the social impacts of the project on staff at all sites. A total of 19 staff from care homes, GP practices and community pharmacies completed the survey. The survey was anonymous and more than one member of staff from each site may have completed the survey, so it is not clear if all of the sites at the four hubs were represented. There are only three responses from community pharmacies, indicating that one community pharmacy did not respond to the survey.

Responses to the survey were largely positive, suggesting that engagement with the project was beneficial. The majority of respondents agreed that involvement in the project improved their awareness of medicine waste, the environmental impact of medicine waste and the appropriate disposal of medicine waste. A majority also agreed that the project had enabled them to identify and implement improvements in the medicine pathway, as outlined in Table 7.

The responses in relation to communication issues are less clear-cut and give an insight into the challenges of communication across the sites. Although the majority of respondents reported improved communication within their own team and across sites, the comments give an insight into the ongoing challenges that communication presents and the need for staff at all sites to understand processes at each site and prioritise good communication in relation to the care home pathway.

A majority of respondents reported improved job satisfaction and improved patient care as a result of involvement with the project. Views on whether involvement in the project saved time on medicine-related task was less clear-cut with 47% agreeing, 37% neutral and 15% disagreeing. Further insight into this can be gained from the two negative comments in relation to time management (additional comments on figure 7 and figure 10), both relating to medicine waste disposal policies and the increased time required to segregate waste before disposal. The medicine waste guidance (Appendix 1) is aimed at addressing concerns raised in these comments. Homes were encouraged to ensure their policies aligned with published guidance and ensure appropriate staff training on medicine disposal.

Throughout the survey there is at least one member of staff who disagreed strongly with most of the statements, suggesting that at least one member of staff did not benefit from engagement in the project and that there is much more work to do in addressing medicine waste, improving communication and reducing inefficiencies in the care home pathway.

Practice recommendation: ensure that all care home staff have appropriate training on the medicine waste policy, which aligns with published guidance.

Practice recommendation: care homes should engage with staff routinely to seek feedback on policies and processes and invite ideas for improvements.

Limitations:

Site characteristics: All of the hubs involved in the project were based in rural or semi-rural areas. No city centre or urban sites were studied. The carbon footprint of travel emissions is likely to be different in an urban setting.

Evaluation of improvement ideas: the teams generated a significant list of improvement ideas, both short and long-term suggestions. The focus of the project was to study the system, so there was insufficient time to robustly evaluate the implementation of the improvement ideas. A summary of interventions completed during the project is illustrated in Appendix 2.

Staff capacity: all of the sites in the study are patient-facing, busy healthcare sites working under constant pressure. As such, staff had limited capacity to log data in a comprehensive manner. As a result, we were unable to gather comprehensive data on staff time and on medicine deliveries.

Medicine waste logs: at the time of data collection, all of the sites used handwritten medicine waste logs. Some were difficult to transcribe because some entries were indecipherable, and others were incomplete. Indecipherable entries were omitted. Where the strength or quantity of medicine disposed of was unclear, the cheapest strength was assumed, and one unit dose was assumed. This is likely to result in an underestimation of the costs and carbon footprint of medicine waste calculated.

Conclusions:

There is no overall accountability for medicine waste. Data on medicine waste is not routinely shared. The extent of medicine waste is largely invisible to prescribers.

The care home medicine pathway is highly complex and communication between sites is challenging due to:

- physical separation of the sites involved (care home, GP practice, community pharmacy)
- the nature of the usually busy, pressured working environment at each site
- lack of a formal, secure communication loop between key stakeholders at each site, adding to time spent on queries, waiting on the phone etc, further adding to workload pressure and stress
- a lack of understanding and appreciation of the complex medicine pathway within each site (care home, GP practice and community pharmacy) and how they interconnect.

Factors at each stage of the pathway can contribute to unnecessary activity in the form of urgent prescription requests, duplicate prescription requests, queries relating to prescriptions, chasing up prescriptions and deliveries. This can contribute to wasted medicine, wasted staff time and unnecessary deliveries.

Medicine delivery is a potential carbon hotspot within the care home medicine pathway. This aspect requires further investigation to establish the impact of setting – rural, semi-rural, suburban, urban – on travel emissions.

There is a need for clear, specific national guidance on the appropriate packaging segregation and disposal of all formulations of medicine and prescribed non-medicine items such as topical preparations, dressings, and bulk items such as sip feeds and thickening powders. Where disposal in the medicine waste bin is not required, specific guidance for appropriate, safe and minimally environmentally impactful recycling or disposal is required.

There is a need for education on medicine waste and its negative impacts for all staff involved in the care home medicine pathway. This should include:

- the financial impacts of medicine waste (resource – medicine, staff time, deliveries, disposal)
- the environmental Impacts of medicine waste (carbon and environmental footprint of medicine which have served no benefit, impacts of inappropriate or unnecessary disposal, emissions relating to delivery of medicine and removal of waste)
- how to reduce medicine waste
- the appropriate management and disposal of medicine waste.

Insights from the project will be utilised to developing short online educational resources which will be made freely available via the CSH website[23].

[23] https://sustainablehealthcare.org.uk/activity/medicine-waste-in-care-homes/

APPENDIX 1: Guidance for disposal of medicine waste

To support care homes going forward in developing a clear, safe and appropriate policy for segregation of medicine waste for disposal, the following points should be considered:

- Seek guidance from your medicine waste contractor (nursing homes) or community pharmacy (residential homes) as to what should and should not be included in the medicine waste bin.
- Medicine waste is classed as "*waste which contains or is contaminated with a medicine that contains a biologically active pharmaceutical agent*". **NHS clinical waste strategy Jan 2023**
- Waste medicine should, as far as possible, be disposed of in their original packaging (such as the blister pack or bottle). This will help to minimise the risk of a dangerous reaction. External packaging (typically cardboard or paper) must be removed and disposed of separately. **Health Technical Memorandum 07-01: Safe and sustainable management of healthcare waste**
- Recyclable waste (e.g. carboard packaging, and other packaging such as blister packs and metered-dose inhalers depending on local arrangements) should be disposed of correctly in line with NHS England Clinical Waste Strategy, instead of being sent for incineration as clinical waste, which is associated with an increased cost and environmental impact. (Remember to remove any patient identifiable information, such as dispensing labels). **PrescQIPP Medicine Adherence and Waste March 2025**
- Guidance specific to topical products from the British Association of Dermatologists:
    - Containers which have held non-medicated products (e.g. emollients) can be cleaned and recycled (if container is recyclable and recycling facility is available) or disposed of in general waste. Use a paper towel to clean the inside of the tub before rinsing. There is specific guidance for Epaderm containers - Is Epaderm Cream packaging recyclable?
    - Medicated creams (which tend to be in smaller tubes) should go in the medicine disposal bin.

Additional Resources

NICE SC1 Managing medicine in care homes 2014

https://www.nice.org.uk/guidance/sc1/resources/managing-medicine-in-care-homes-pdf-61677133765

CQC information for providers: Disposing of medicine

https://www.cqc.org.uk/guidance-providers/adult-social-care/disposing-medicine

NHS Frimley Disposal of medicine in care homes guidance

https://www.frimley.icb.nhs.uk/policies-and-documents/medicine-optimisation/care-homes/medicine-management

Medicine waste management guidance from Kent and Medway CCG (note is overdue for review)
https://www.eastkentformulary.nhs.uk/media/1687/4-medication-waste-management-kmccg-best-practice-guidance-v11.pdf

APPENDIX 2: Example interventions

Segregation of medicines waste in care homes

Supported by Q network (The Health Foundation)

Aim: To reduce the amount of packaging being unnecessarily disposed of in medicines waste bins. Review current policy in line with guidelines.

Outcome: Updated medicines disposal process to ensure removal of packaging where appropriate. Clarification of process for bulky emollient tubs.

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Environmental	Reduced volume of medicines waste going to incineration.
Financial	Reduced medicines disposal costs
Social	Staff feel more confident in how to dispose of medicines waste appropriately. Negative impact of increased staff time to remove medicines from packaging.

Improving communication to reduce medicines queries and multiple medicines deliveries

Supported by Q network (The Health Foundation)

Aim: Achieve more efficient and effective communication within the care home and between care home, community pharmacy and GP practice.

Outcome: Reduced frequency of prescription requests. Reduced number of medicine deliveries.

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Clinical	More efficient delivery of medicines
Environmental	Number of medicines deliveries reduced from 3 to 2 daily, saving **5,448.78kgCO2e per year**.
Financial	Reduced delivery travel: approximately **10,868 miles per year**. Reduced fuel and staff time on deliveries.
Social	• Prescription queries are clarified and collated at daily care home staff huddle. All requests in one daily e-mail to GP and community pharmacy. Urgency of requests are clearly specified. • Staff at all sites are better informed about prescription requests and their urgency, enabling more efficient processing and delivery of prescriptions.

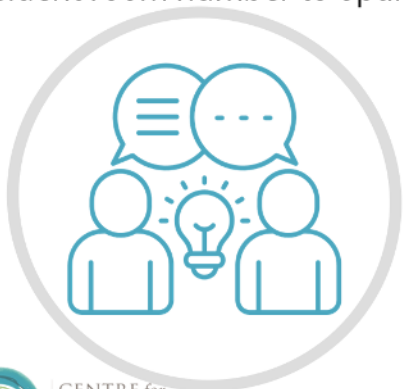
Optimising Communication

Supported by Q network (The Health Foundation)

Background: Communication between care home, GP practice and community pharmacy was found to be inefficient, with duplication of work occurring frequently.

Aim: Optimise communication between care home, community pharmacy and GP practice to save staff time at all sites, reduce duplication of information and optimise efficiency of medicines pathway.

Outcome: More efficient methods of communication established between sites. Order cycle dates shared with all sites so that prescription requests can be aligned. Medicine deliveries ordered by resident room number to optimise efficiency.



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Social

Staff report that the changes have been helpful.
"The most important change that we have since the workshop, was the collaborative discussion that took place between us and the pharmacy and the GP practice whereby we managed to find a solution with our concerns in communication which are time consuming. All in all, we are now happy with how things are running".

Optimising Communication

Supported by Q network (The Health Foundation)

Background: Poor communication between pharmacy and care home teams caused medication discrepancies and delayed treatments.

Aim: To optimise communication between care home and pharmacy and utilise the expertise of the pharmacy team in supporting medicines optimisation.

Outcome: Established regular meetings and joint medicines optimisation reviews with the pharmacy.

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Social

- Stronger communication between the pharmacy and the care team, has led to fewer medication discrepancies.
- Improved efficiency: The enhanced medication review process and better collaboration with the pharmacy have streamlined operations, allowing staff to focus more on patient care rather than administrative tasks.

Optimising Medicines Processes

Supported by Q network (The Health Foundation)

Background: Medication stock management and ordering processes were inconsistent, leading to stock-outs, urgent re-orders, and staff time wasted on resolving shortages. Staff competency in medication management varied.

Aim: To address medicines processes within the care home to streamline medication management and enhance patient safety.

Outcome: Implemented a clear, structured, and consistent medication ordering and re-ordering process. Implemented regular stock monitoring and synchronized ordering systems with pharmacy.

Introduced regular competency checks and updated training sessions for all staff involved in medication handling.

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£ **Financial**	• Potential to reduce wasted staff time at all sites, dealing with unnecessary interim orders. • Reduced medicine stockpiling.
Social	• Reduced time spent managing medications and dealing with issues such as stock-outs and emergency reorders. • Fewer errors and discrepancies, contributing to smoother workflows and less time spent rectifying mistakes.

Optimising Prescription Processes

Supported by Q network (The Health Foundation)

Aim: Optimise prescription processing across care home, GP practice and community pharmacy to reduce unnecessary activity.

Process implemented to ensure timely addition of patient details to online system for efficient processing of prescriptions. Care home medicines stock management improved to avoid overordering. Medicines requests and deliveries streamlined.

Outcome: Reduced medicines deliveries. More efficient prescription processing across sites, using electronic prescriptions only.

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Environmental

- Number of medicines deliveries reduced from a weekly average of 3.75 to 2.62, saving **679.97kgCO2e per year**.

Financial

- Reduced delivery travel: approximately **1,355 miles per year**.
- Reduced fuel and staff time on deliveries.

Social

- Potential to reduce delay to getting patients on prescription system and subsequent processing of prescriptions.
- Potential to reduce time wasted looking for paper prescriptions.
- Reduced staff time dealing with deliveries.

Optimising Communication

Supported by Q network (The Health Foundation)

Aim: Optimise communication across care home, GP practice and community pharmacy to reduce unnecessary activity.

Secure e-mail group created between three sites. Weekly phone call to proactively manage medicines queries. Internal care home communication optimised to streamline queries.

Outcome: Improved communication between sites. Proactive management of prescription queries.

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Environmental	• Number of medicines deliveries reduced from a weekly average of 3.75 to 2.62, saving **679.97kgCO2e per year**.
Financial	• Potential to reduce wasted staff time at all sites, dealing with prescription queries. • Potential to reduce duplicate prescription requests.
Social	• All sites are included in the communication loop and are aware of queries relating to prescriptions. • Potential to reduced time spent on phone chasing prescriptions.