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Testing a sustainable packaging system to reduce pharmaceutical waste and support a net-zero NHS

Submission date
11/03/2026

Recruitment status
Recruiting

Registration date
01/04/2026

Overall study status
Ongoing

Last Edited
07/05/2026

Condition category
Other

[X] Prospectively registered
[_] Protocol
[_] Statistical analysis plan
[_] Results
[_] Individual participant data
[X] Record updated in last year

Plain English summary of protocol

Background and study aims
Every year, a lot of NHS medicine goes to waste. This can happen for many reasons. Sometimes treatment plans might change. Sometimes patients get side-effects. Sadly, some patients die before they finish their medicine. Even if medicines are still in date and unopened, UK rules say they must be thrown away. This is because we can't tell if they've been stored safely and are still okay to use.

Wasting medicines is harmful in many ways. Making and moving medicines creates more pollution than all the cars on the road. When unused medicines are thrown away, they can leak into soil and water, damaging the environment. It's also expensive. This waste costs the NHS over £300 million every year. Also, when we throw away medicines that could have been reused, it can cause medicine shortages, making it harder for others to get the treatments they need.

This project will test a new medicine bag called the PharmaBag which can tell if a medicine has been opened or kept too hot or too cold. If an unopened medicine is returned in a PharmaBag, and it has been stored safely, it might be possible to safely reuse it. This could be especially important for expensive cancer medicines, which are often left unused due to side effects or treatment changes.

Who can participate?
Adult patients aged ≥18 years diagnosed with cancer and prescribed oral anti-cancer medicines (OACMs) by clinicians at The Clatterbridge Cancer Centre, UK.

What does the study involve?
Patients in the study who are prescribed oral anti-cancer medicines will be given their normal prescription inside the PharmaBags. This will help us see how well the bags work in real NHS settings. The study will measure how many medicines are returned, what condition they're in, and whether they could have been safely reused. This information will be usedto calculate how this system could reduce waste, save NHS money, and help the environment.

What are the possible benefits and risks of participating?
In future, this new system could help stop medicine waste across the NHS. If it works well and is safe, it could even help change national rules, so that safe, unused medicines don't have to be thrown away. This could save money, help the environment, and help patients get the care they need.

Participation in this study is considered low risk. All medications will continue to be prescribed and dispensed according to the participant's usual treatment plan, and no changes to clinical care will be made. The PharmaBag is an additional packaging system designed to support the safe return of unused medication.

Any potential burden is minimal, as unused medications will be returned either during routine clinic visits or via the existing home delivery and collection service. Participants will be provided with clear instructions, and support will be available from the study team if needed.

Where is the study run from?
Clatterbridge Cancer Centre NHS Foundation Trust, UK.

When is the study starting and how long is it expected to run for?
August 2026 to July 2027

Who is funding the study?
National Institute for Health and Care Research (NIHR), UK.

Who is the main contact?
Dr Seamus Coyle, seamus.coyle@nhs.net

Contact information

Type(s)
Principal investigator, Scientific, Public

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Additional identifiers

Integrated Research Application System (IRAS)
368405

Central Portfolio Management System (CPMS)
72531

Study information

Scientific Title
PharmaBag: a sustainable packaging system to reduce pharmaceutical waste and support a net-zero NHS

Acronym
PharmaBag

Study objectives
The overarching aim of this study is to evaluate the potential environmental benefits of the PharmaBag system as a safe return and redispensing pathway for unused oral anti-cancer medicines (OACMs).

To achieve this aim, the study has the following objectives:
• To determine the quantity and proportion of returned OACMs suitable for potential redispensing using the PharmaBag system.
• To estimate the potential environmental impact of the PharmaBag system through life cycle assessment modelling.
• To estimate the potential NHS cost savings associated with medicines suitable for redispensing.
• To explore the usability and acceptability of the PharmaBag system among patients receiving oral anti-cancer medicines.

Ethics approval required
Ethics approval required

Ethics approval(s)
Not yet submitted

Primary study design
Interventional

Allocation
N/A: single arm study

Masking
Open (masking not used)

Control
Uncontrolled

Assignment
Single

Purpose
Device feasibility

Study type(s)

Health condition(s) or problem(s) studied
Patients receiving oral anti-cancer medicines

Interventions
Consenting participants will receive their prescribed OACM in its standard manufacturer packaging, but contained within the PharmaBag over-packing system. They will receive written instructions outlining how to store and handle the medication, how to preserve the integrity of the PharmaBag, and how to return any unused medication. This information will also be discussed during the recruitment and consent process, either in person or via telephone.

Participants will be advised to return any unused OACMs by bringing the PharmaBag to their next scheduled clinical visit, or via the Clatterbridge Cancer Centre's pre-existing, risk-assessed home medication collection and delivery service. No additional hospital visits will be required so as not to inconvenience the participant. Three weeks after receiving their first PharmaBag packaged medication, participants will complete a digital questionnaire via email, a paper questionnaire supplied with their medications if requested, or a telephonic questionnaire administered by the pharmacy technician or research delivery team. The questionnaire has been developed with input from patients and clinicians and includes structured items addressing ease of use, confidence in returning medications, satisfaction with packaging, and any perceived barriers, as well as questions designed to assess whether the intervention has improved knowledge or awareness about safe medication storage at home.

The PharmaBag intervention does not alter clinical care or prescribing; all medications will continue to be dispensed according to the participant’s usual treatment plan. The additional packaging will enable quality assurance checks to support information on the reusability of returned medications. Following these checks and data recording, the medicines will be disposed of using normal pharmacy disposal procedures.

Intervention Type
Device

Phase
Not Applicable

Drug/device/biological/vaccine name(s)
PharmaBag

Primary outcome(s)
1. Quantity and proportion of returned oral anti-cancer medicines (OACMs) suitable for redispensing measured using the number and proportion of returned OACMs returned via the PharmaBag system that meet predefined quality criteria for potential redispensing following pharmacist assessment at the point of medicine return and evaluation

Key secondary outcome(s)
1. Estimated environmental impact associated with medicines suitable for redispensing measured using a cradle-to-grave Life Cycle Assessment (LCA) comparing conventional linear

pharmaceutical distribution with the circular PharmaBag model and reporting indicators including global warming potential (kg CO_2e) relative to the functional unit of oncology treatment for one patient over one year at the completion of data collection

2. Estimated NHS cost savings associated with medicines suitable for redispensing measured using economic impact assessment through a cost-benefit analysis comparing the costs of developing and implementing the PharmaBag system with potential NHS and Personal Social Services savings (£) from reduced pharmaceutical waste and medication reuse, incorporating monetised environmental benefits using UK Government carbon values at completion of data collection

3. Participant-reported usability and acceptability of the PharmaBag system measured using a questionnaire, including measures of ease of use, clarity of instructions, and overall acceptability assessed at 3 weeks following collection or delivery of the first prescription packaged using the PharmaBag

4. Global warming potential (kg CO_2e): Net change in global warming potential (kg CO_2e), measured using data on the number, type, and dose of oral anti-cancer medicines prescribed, returned, and suitable for redispensing, collected from prescribing and pharmacy records at the completion of data collection

5. Resource use: Net change in resource use, measured using data on the number and type of oral anti-cancer medicines returned and suitable for redispensing, collected from pharmacy records at the completion of data collection

6. Fossil resource depletion: Net change in fossil resource depletion, measured using data on the number and type of oral anti-cancer medicines returned and suitable for redispensing, collected from pharmacy records at the completion of data collection

7. Pharmaceutical waste avoided: Reduction in pharmaceutical waste, measured using data on the number and proportion of oral anti-cancer medicines suitable for redispensing, collected from pharmacy records at the completion of data collection

8. Economic Outcome Measure: Estimated cost savings (£), measured using measured using data on the number, type, and unit cost of oral anti-cancer medicines suitable for redispensing, collected from prescribing and pharmacy records, at the completion of data collection

9. Economic Outcome Measure: Net cost benefit (£) measured using data comparison of the costs of implementing the PharmaBag system with the estimated cost savings from medicines suitable for redispensing, using data collected from project financial records, prescribing records, and pharmacy records, at the completion of data collection

10. Economic Outcome Measure: Cost savings per patient (£), measured using measured by dividing total estimated cost savings by the number of participants enrolled in the study, using data collected from prescribing and pharmacy records, at the completion of data collection

11. Economic Outcome Measure: Monetised environmental benefit (£), measured using measured using data on the quantity of oral anti-cancer medicines suitable for redispensing and associated reduction in carbon emissions, applying UK Government carbon values, at the completion of data collection

Completion date

31/07/2027

Eligibility

Key inclusion criteria
1. Adults aged ≥18 years
2. Diagnosis of cancer
3. Prescribed oral anti-cancer medicines (OACMs) by clinicians at The Clatterbridge Cancer Centre
4. Able to provide informed consent

Healthy volunteers allowed
No

Age group
Mixed

Lower age limit
18 Years

Upper age limit
100 Years

Sex
All

Total final enrolment
0

Key exclusion criteria
Severe co-morbidities considered by the study team to interfere with the individual's ability to complete requirements of the study, or to provide informed consent.

Date of first enrolment
01/08/2026

Date of final enrolment
29/01/2027

Locations

Countries of recruitment
United Kingdom

England

Study participating centre
The Clatterbridge Cancer Centre NHS Foundation Trust
Clatterbridge Hospital

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Bebington
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England
CH63 4JY

Sponsor information

Organisation
Clatterbridge Cancer Centre NHS Foundation Trust

ROR
https://ror.org/05gcq4j10

Funder(s)

Funder type

Funder Name
National Institute for Health and Care Research

Alternative Name(s)
National Institute for Health Research, NIHR Research, NIHRresearch, NIHR - National Institute for Health Research, NIHR (The National Institute for Health and Care Research), NIHR

Funding Body Type
Government organisation

Funding Body Subtype
National government

Location
United Kingdom

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary
Not expected to be made available