

# Postgraduate Diploma in General Pharmacy Practice

## Quality Improvement Written Task Coversheet

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<b>Topic</b>	Increasing the number of inhalers collected from inpatient hospital wards for recycling at Charing Cross Hospital.
<b>Name</b>	Carol-Estelle Beecham
<b>Date</b>	1 <sup>st</sup> June 2023

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Educational Programme Director	Eva Bayerkoehler	June 2023
Trust ( <i>relevant Trust group</i> )	Imperial College Healthcare NHS Trust	June 2023
Ethics Committee (where appropriate)	N/A	N/A

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## Postgraduate Diploma in General Pharmacy Practice

### Quality Improvement

#### Title

Increasing the number of inhalers collected from inpatient hospital wards for recycling at Charing Cross Hospital.

#### Abstract

It is estimated that within the UK, over 12 million patients are affected by respiratory disease, with treatment leading to over 60 million inhalers being prescribed. Inhalers are significant in treating respiratory conditions and have been found to contribute to 3% of the NHS carbon footprint. Waste management company, Grondon, have initiated an inhaler recycling pilot scheme at Imperial College Healthcare Trust (ICHT) which currently aims to increase the number of inhalers within inpatient healthcare to be collected and returned from the wards and sent to Grondon for appropriate recycling disposal. Specifically, metered dose inhalers (MDI) have the highest contribution (13%) due to the need of an aerosol propellant to deliver a required dose.

Baseline data from a service evaluation confirmed, on average, only 3-5 inhalers were found to have been placed in the inhaler recycling bin weekly, emphasising the opportunity for this Quality Improvement Project (QIP) as a report of progress; to increase the number of inhalers collected from inpatient wards. The IHI Model for Improvement approach was best suited as it guided evaluation of current practice and implementation of PDSA cycles. The number of inhalers were manually counted weekly for both baseline and post-implementation change data.

The first PDSA cycle (cycle 1) consisted of allocating a member of the QIP team to manually remove inhalers from the ward return bags. This required only a minimum of one hour per week, to prioritise inhalers being placed inside the inhaler recycling bin. Data was then collected for a further three weeks to compare any improvements seen. Post-implementation an average number of 22 inhalers were collected weekly, showing just under 5 times more weekly counted inhalers. Additionally, as predicted, there was a higher proportion (approximately double each week) of MDIs in comparison to DPIs.

A key strength of the QIP was the ability to implement the PDSA cycle to highlight that the improvement of the collected number of inhalers was not by chance. Although favourable initial results, this project also highlighted limitations that may affect the sustainability. Time constraints prevented strong statistical evidence for random variation due to external factors. Additionally, the frequency of inpatient medication returns were inconsistent, therefore an inability to fill the inhaler recycling bins.

By implementing inhaler recycling schemes in multiple patient areas where high inhaler turnover is seen, it will encourage and contribute to recycling practices in an overall aim to reduce the NHS carbon footprint.

#### Understanding the problem

It is estimated that within the UK, over 12 million patients are affected by respiratory disease, with treatment leading to over 60 million inhalers being prescribed<sup>1</sup>. Evidence has shown asthmatic patients in the UK to have poorer prognostic outcomes in comparison to other European countries. Several factors have contributed to this, including the optimal use of inhalers through regular reviews, inhaler technique, adherence, and appropriate therapy<sup>2</sup>. Inhalers are significant in treating respiratory conditions and have been found to contribute to 3% of the NHS carbon footprint<sup>3</sup>. Specifically, metered dose inhalers (MDI) have the highest contribution (13%) due to the need of an aerosol propellant to deliver a required dose<sup>4</sup>. In 2019, an NHS funded national working group was initiated with an aim to reduce the health service's contribution to climate change, through the impact of inhalers. Projections of reducing this carbon footprint by 51% by 2025 were considered via multiple strategies, of which include recycling inhalers<sup>5</sup>. Currently, NHS England & NHS Improvement (NHS&I) have no official planned schemes but have encouraged "local and manufacturer-led inhaler disposal schemes"<sup>5</sup>.

Prior to NHS&I discussions, GSK had successfully implemented "The Complete the Cycle" scheme, only found in the UK between 2011 to 2020 to recycle over two million inhalers. This reduced carbon dioxide emissions that were equivalent to emissions produced from 8665 cars per year<sup>6</sup>, highlighting how relevant and important such practices can have on global outcomes.

Waste management company, Grondon, have initiated an inhaler recycling pilot scheme at Imperial College Healthcare NHS Trust (ICHNT) which currently aims to increase the number of inhalers within inpatient healthcare to be collected and returned from the wards, and sent to Grondon for appropriate

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recycling disposal. Baseline data collected from a Service Evaluation “Inhaler Recycling at Charing Cross Hospital” highlighted if there was success from the implemented scheme over a total of six weeks.

Data confirmed, on average, only 3-5 inhalers were found to have been placed in these inhaler recycling bins weekly, emphasising the opportunity for this Quality Improvement Project (QIP) as a report of progress. The aim to increase the number of inhalers collected from inpatient wards, to then be placed in the inhaler recycling bin at Charing Cross Hospital located in inpatient pharmacy, resulting in a favourable number of inhalers sent to Grundon for appropriate recycling. Reasons for the current reduced number of inhalers collected from the service evaluation were discussed with the QIP team, with a target of at least 5 times more inhalers to be manually counted weekly, after appropriate implementation. The Institute for Healthcare Improvement (IHI) Model for improvement approach was best suited as it guided evaluation of current practice and implementation of Plan-Do-Study-Act (PDSA) cycles<sup>7</sup>.

Stake Holder analysis: Power-interest matrix

Figure 1: Stakeholder Analysis

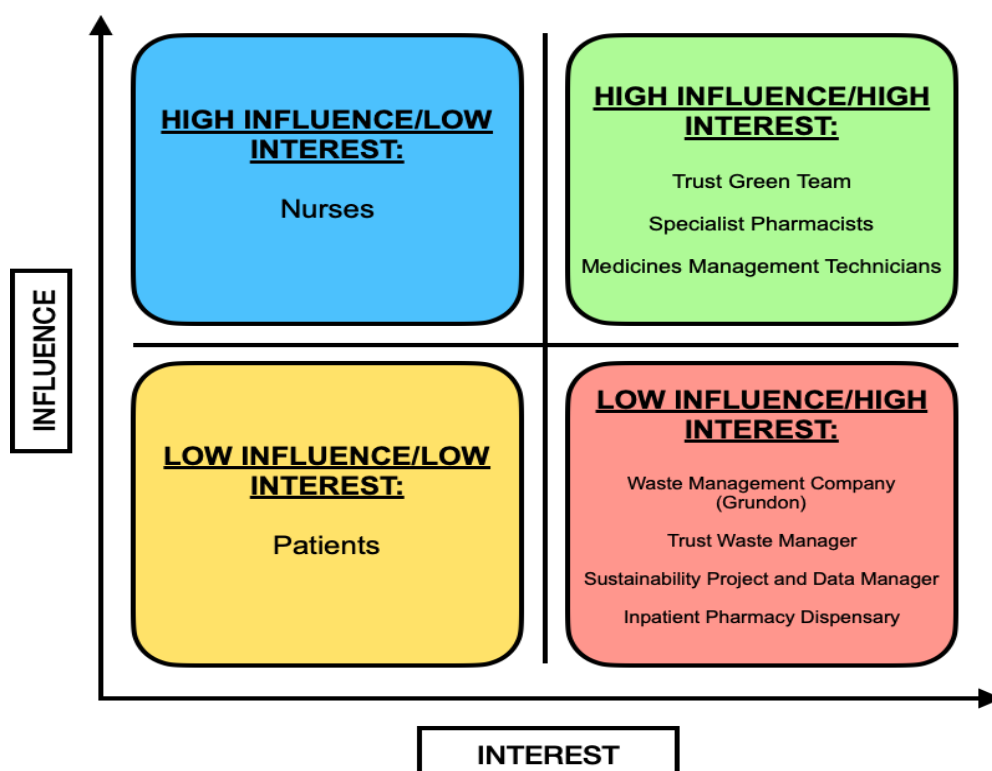


Figure 1 depicts positions of the key stakeholders within this QIP. The QIP team included the Trust Green Team (including the Senior Lead Pharmacist – Specialist Medicines, and the Lead Pharmacist Education and Training), Trust Sustainability Project and Data Manager, the Medicines Management Technician and myself, Specialist Rotational Pharmacist with the Specialist Medicines rotation. Additionally, I conducted focus groups with ward Nurses and pharmacy technicians to brainstorm potential ideas to reach the overall aim. This led to ideas for further PDSA cycles to be discussed with the QIP team, as depicted in Figure 3.

To establish points where improvements can be implemented, the current process (as shown in Figure 2) was discussed with the Sustainability Project and Data Manager. Baseline data from the previous service evaluation confirmed that despite a known increased number of inhalers that can be recycled, the action of taking inhalers out of ward return bags, and to be placed in the inhaler recycling bins were the likely result of the reduced number of counted inhalers.

Figure 2: Flowchart showing the current process of recycling of inhalers.

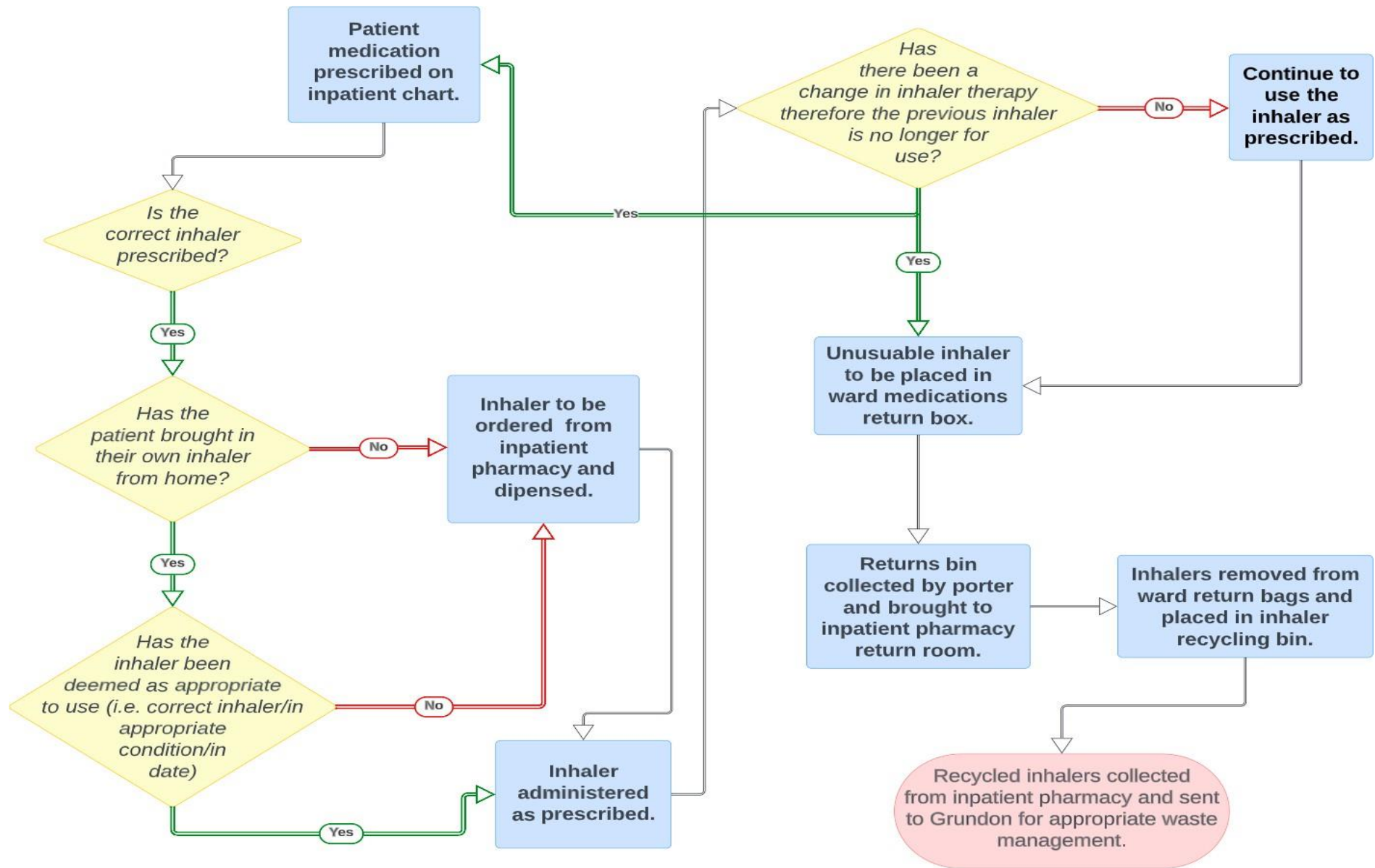
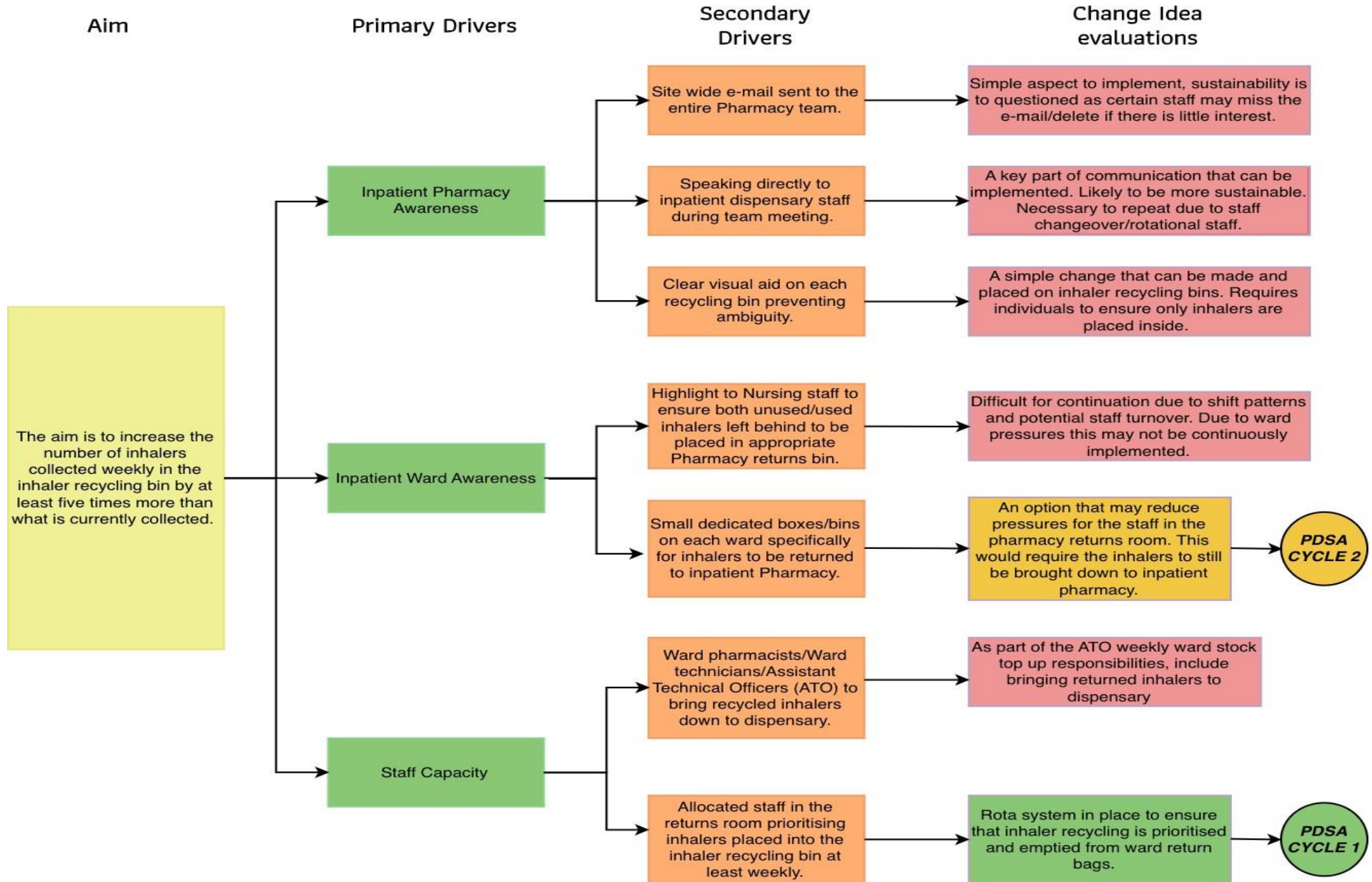


Figure 3: Driver diagram to generate change ideas



### Choice of measures

As shown in Figure 3, the outcome measure of how many inhalers were collected in each time-period was chosen. This would enable trends to be identified, interpreted, and evaluated with quantifiable data from baseline to implemented improvements. Process measurements were also considered, but due to inconsistent balancing measures, it would prove difficult to see a consistent trend of improvement.

The baseline data (completed as part of the service evaluation) was collected each Monday for 3 weeks to confirm the number of inhalers returned over the previous week. The bin was emptied, counted manually and the total number of inhalers, including the numbers of MDIs and DPIs were recorded. The data collection table use can be seen in Appendix 1. Any items that were not inhalers found in the recycling bin were removed and appropriately disposed of. It was an additional advantage to document the number of different types of inhalers for confirmed context. In 2011, Lavorini et. al, established that there was clear variability in the number of inhaler type sales between 2002 to 2008, the UK had the highest proportion of MDIs in comparison to 16 other European countries<sup>8</sup>. Once collected, the first PSDA cycle was actioned and a further 3 weeks of inhalers were counted using the same approach.

The results were analysed by documenting the number of inhalers counted at each data collection point, in addition to accounting for any confounding factors such as staff availability to enable inhaler collection from ward return bags, time of day of data collection, and patients admitted with inhalers.

### Design and application of PSDA method (Improvement approach)

As per the QIP driver diagram (Figure 3), it was discussed the number of avenues that contribute to inhaler collection into inpatient pharmacy. Many of which would require further education and training which was found to require further planning and progressive implementation. The choice of physical inhaler bins on the ward was explored, but similarly, would require further input from ward managers/nurse-in-charges, infectious disease control and confirmed staffing responsibility. Although not fully explored, this was highlighted as a potential future PSDA cycle (cycle 2).

From these options, it was chosen to implement PSDA cycle 1 – to amend the physical location and visual aid on the recycling bin to prevent non-inhaler products placed in them. Furthermore, one hour per week was allocated to removing the inhalers from the ward return bags and placing them into the inhaler recycling bins in addition to the usual process/timing of inhaler removal from ward returns. This required a member of the QIP team to do so.

Figure 4: Run graph depicting the number of inhalers counted at baseline and post PSDA Cycle 1 implementation

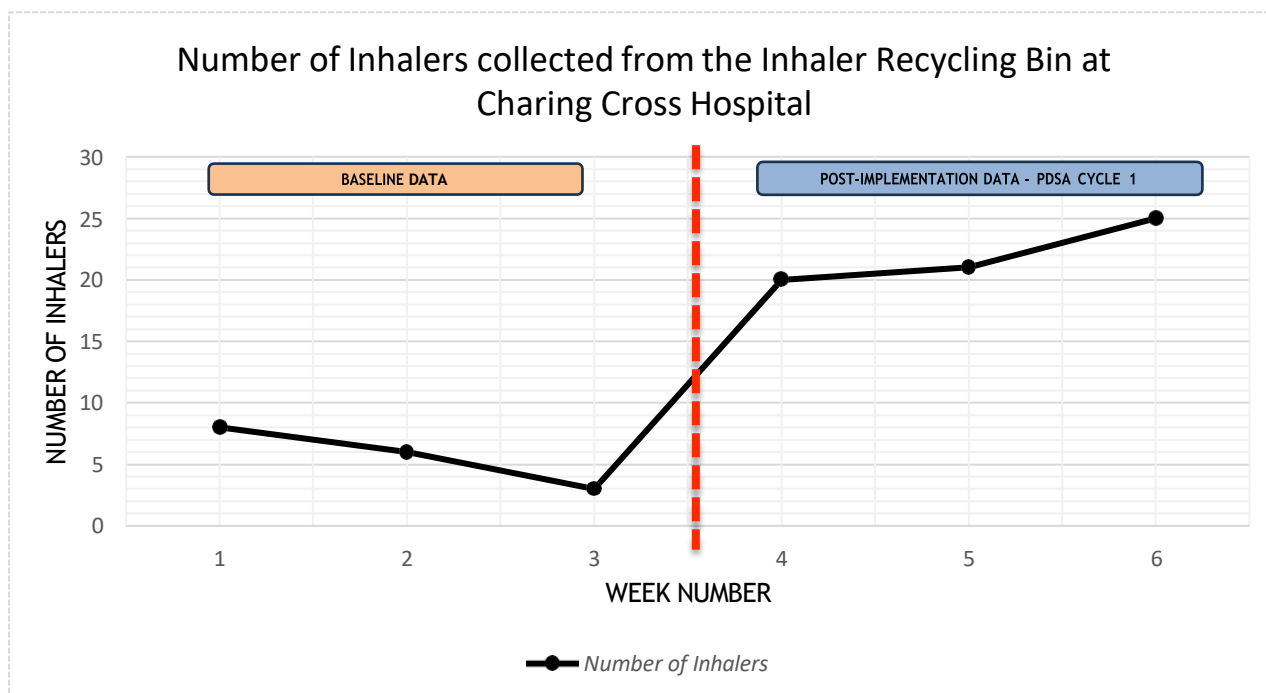
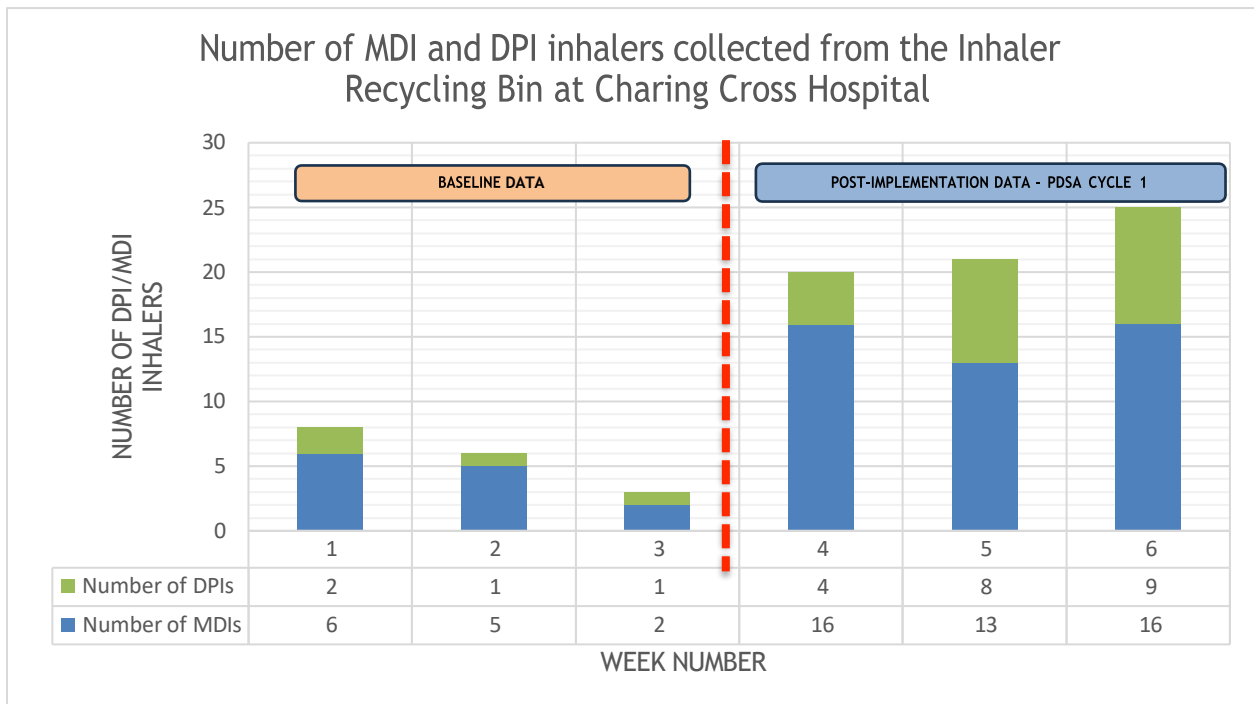


Figure 5: Bar chart comparing the collection of DPIs and MDIs at baseline and post PDSA Cycle 1 implementation



During PDSA cycle 1, it was clear that staffing levels/availability and prioritisation of returns had a key effect on the number of inhalers collected. The usual process of medication returns, require each returned bag to be separated into reusable stock (and returned on CMM system) and un-usable stock to be appropriately disposed of. It was found that due to the lack of awareness of this pilot/implementation, inhaler removal from ward bags was not prioritised.

An initial PDSA cycle 2 was evaluated and initially implemented to divide returned inhaler stock directly into a box that would enable these to be placed directly into the inhaler returns bin in inpatient pharmacy. It was piloted on two inpatient wards where both ward matrons were made aware. Due to time-constraints, this ward pilot could not be fully evaluated, and results seen but highlights the potential for an effective aid of increased inhaler collection.

### Critical evaluation of findings

As seen depicted in Figure 4, at baseline, only an average of 5 inhalers was collected weekly. Post PDSA implementation, the average number increased to 22 inhalers, showing an average of just under 5 times more inhalers were counted weekly. The use of a run-graph has shown a vast difference in the observed data presented due one implemented change. Due to the location of the inhaler recycling bin, it would be a requirement for the allocated staff member to empty inpatient return bags, but with the knowledge of the pilot scheme, it enables any member of the Pharmacy team to remove unusable inhalers from these bags. An allocated amount of time spent prioritising removing inhalers out of each inpatient returns bag, were able to be recycled in an overall timely manner.

Additionally, as predicted, there was a higher proportion (approximately double each week) of MDIs in comparison to DPIs (as shown in Figure 5). This supports the evidence showing the highest proportion of inhalers still used are MDIs.

Currently, as this is the first piloted scheme in London through Grondon, it is difficult to compare and evaluate outcomes. A 12-month 'Take Action for Inhaler Recycling' Scheme piloted by Chiesi pharmaceutical company, recycled more than 20,000 inhalers in 2021/2022<sup>9</sup>. Both hospitals and community pharmacies in Leicestershire participated in the scheme which enabled patients to send their unused inhalers via pre-paid envelopes to a chosen waste management company<sup>9</sup>. Due to the scalability of the scheme, it is difficult to compare results especially due to the sizeable involvement across both primary

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and secondary care, and the method used to return inhalers. Despite this, it enables future planning of potential options for reaching more patients to encourage inhaler recycling.

A key strength of the QIP was the ability to implement the PDSA cycle, highlighting that the improvement seen was not due to chance. Although favourable initial results, this project also highlighted limitations that may affect the sustainability. Time constraints during the data collection processes prevented strong statistical evidence for random variation due to external factors (depicted in Figure 3). The PDSA cycle required a member of the QIP team to allocate a specific amount of time to prioritise inhaler recycling - this may not always be a viable option in day-to-day practice if a member of the dispensary team is required to do so. Additionally, the frequency of inpatient medication returns is not consistent, therefore an inability to fill the inhaler recycling bins. This further contributes to the amount of time it will for the inhalers to reach Grondon and then be recycling. Currently the recycling bin is only emptied from inpatient pharmacy once full.

This QIP has highlighted the multiple processes that contribute to an increase/decrease of inhaler recycling, which overall requires more awareness and prioritisation to ensure a success of this pilot and future longevity. Potential sustainability of this project was piloted for PDSA cycle 2, small inhaler recycling boxes were placed on two inpatient wards to reduce the need for the inhalers to be taken out of medication return bags, but instead to allow these boxes to be filled at ward level and taken directly into the inhaler recycling bins. Due to time constraints, data collection could not be included in this QIP, but it is currently still being trialled. Furthermore, increased awareness, through cross-site updates of current findings, to the wider pharmacy team may increase participation at multiple levels. This includes both on the inpatient wards and in the inpatient dispensary.

This QIP has had a further impact in further projects to increase inhaler recycling within the differing hospital settings. There are current planned pilots to be implemented in both paediatric and outpatient care settings as it has been recognised that these are healthcare areas where a high number of inhalers can be collected. By implementing inhaler recycling schemes in multiple patient areas where high inhaler turnover is seen, it will encourage and contribute to recycling practices in an overall aim to reduce the NHS carbon footprint.



## References

1. Allen M. Delivery high quality, low carbon respiratory care [Internet]. 2023 [cited 1<sup>st</sup> May 2023]. Available from: <https://www.england.nhs.uk/blog/delivering-high-quality-low-carbon-respiratory-care/>
2. National Review of Asthma Deaths. Why asthma still kills [Internet]. 2015. Available from: <https://www.rcplondon.ac.uk/projects/outputs/why-asthma-still-kills>
3. NHS. Improving health outcomes for respiratory patients while reducing carbon emissions [Internet]. 2023. Available from: <https://www.england.nhs.uk/greenernhs/whats-already-happening/improving-health-outcomes-for-respiratory-patients-while-reducing-carbon-emissions/>
4. Wilkinson A, Woodcock A. The environmental impact of inhalers for asthma: a green challenge and a golden opportunity. *Br J Clin Pharmacol* 2022 Jul;88(7):3016-3022. Available from: <https://pubmed.ncbi.nlm.nih.gov/34719810/>
5. Robinson J. Working group set to cut climate change impact of asthma inhalers. [Internet]. 2019. Available from: <https://pharmaceutical-journal.com/article/news/working-group-set-up-to-cut-climate-change-impact-of-asthma-inhalers>
6. Clews G. Inhaler recycling scheme that cut carbon emission equivalent to more than 8,500 cars in scrapped. [Internet]. 2020. Available from: <https://pharmaceutical-journal.com/article/news/inhaler-recycling-scheme-that-cut-carbon-emissions-equivalent-to-more-than-8500-cars-is-scrapped>
7. Institute for Healthcare Improvement. How to Improve. [Internet]. 2023. Available from: <https://www.ihl.org/resources/Pages/HowtoImprove/default.aspx>
8. Lavorini F, Corrigan CJ, Barnes PJ, Dekhuijzen PRN, Levy ML, et al. Retail sales of inhalation devices in European countries: So much for a global policy. 2011 July;105(7):1099-1103. Available from: <https://www.sciencedirect.com/science/article/pii/S09546111111001004>.
9. Robinson J. More than 20,000 inhalers returned through postal inhaler recycling scheme. [Internet]. 2023. Available from: <https://pharmaceutical-journal.com/article/news/more-than-20000-inhalers-returned-through-postal-inhaler-recycling-scheme>

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## Appendix 1

*Table used to record collected data.*

Date	Number of inhalers
DD/MM/YY	DPI:
	MDI:
	Total number: