



SusQI Project Report

<p>Project Title: Reduction of Inhalers in the Paediatric Service</p>	<p>Date of Report:</p>
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Background:

Metered dose ('puffer') inhalers or MDIs prescribed for symptomatic relief of respiratory symptoms have been identified as a carbon hotspot in the NHS. MDIs contain a propellant gas that has high greenhouse warming potential. The table below compares the carbon footprint of 2 puffs of an MDI with other day to day items and a powdered dose inhaler (PDI) that delivers the same drug, without the need for a propellant.

Estimated carbon footprint comparison (g CO₂eq)

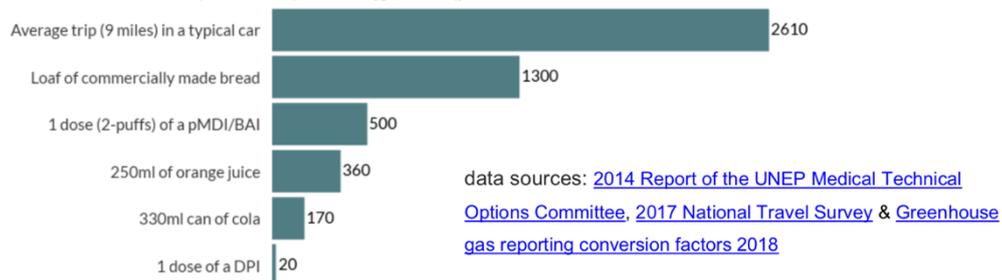


Figure 1: Extract from the NICE inhaler decision guide showing the carbon footprint of MDI's versus other common carbon footprint comparisons.

MDIs are commonly prescribed to children in the paediatric assessment unit, as 80% of admissions for children under 2 years of age are due to respiratory symptoms. Moreover, paediatric doctors frequently choose to prescribe MDIs for young children as a 'spacer' (a device to aid delivery of the drug to the lungs) can help children who have difficulty co-ordinating breathing to adequately receive the medication dose. Spacers cannot be used with PDIs.

Given both the high carbon footprint of MDIs and high incidence of respiratory disease in young children, inhaler use is likely to be a carbon hotspot in inpatient paediatric services.

Specific Aims:

To reduce the carbon footprint of treatment of respiratory conditions requiring an inhaler in the paediatric population.

Methods:

Studying the system:

The team created a process map (Appendix 1) of inhaler use in the acute paediatric department with the help of a member of their QI team.

Further information was gathered to help to direct the improvement effort;

- A staff survey to benchmark current practice around inhaler prescribing and advice in hospital respiratory teams was carried out. Findings were;
 - 30% of doctors and nurses do not ask if a patient already has an in-date inhaler before issuing a duplicate.
 - 44% of clinical staff were unaware that inhalers contain HFC gases that have a high global warming impact.
 - 88% of clinical staff were unaware that inhalers should be disposed of at a pharmacy or at an inhaler recycling point
- Patients were surveyed to find out the number of inhalers used at home and how they routinely dispose of them.
 - 80% of patients had an inhaler with them when visiting the hospital respiratory department (potential for continued use rather than prescribing a new inhaler)
 - 0% of parents or patients knew how to correctly assess if the inhaler was empty (counting the number of doses is the only reliable method and that there are 200 doses per inhaler).
 - 80% of patients disposed of their inhalers in the domestic waste, 20% took their old inhalers to the GP. None took used inhalers to the pharmacy for disposal.
- Types of inhalers used in the hospital and community were investigated.
 - The hospital uses Salamol, an inhaler that uses a lower volume of HFC propellant to deliver a dose of the drug salbutamol.
- A CCG pharmacist carried out an analysis of community salbutamol prescribing as a comparison; the analysis showed that 14,348 (51%) of salbutamol inhalers prescribed in the community in one year are Ventolin, that have the highest carbon footprint of all salbutamol MDIs on the market.
- The local CCG prescribes a much higher proportion MDIs (total number including the adult and paediatric population) compared to other CCGs in the country.

Changes Implemented:

Change ideas were devised from the data collected and the principles of sustainable healthcare.

- **Prevention**
 - Checking inhaler technique (including use of spacers) to prevent exacerbations of disease and make sure that the drug is reaching the lungs where it will have effect.
 - A staff education campaign was implemented to increase awareness of the environmental impact of inhalers and what action could be taken to minimise this impact including reduced duplication of inhalers. This information was disseminated via departmental meetings and posters.
- **Patient empowerment and self-care.** Patient education was provided to 15 families on
 - correct method to assess when an inhaler still contains doses and when to replace it
 - inhaler disposal including identifying most convenient pharmacy to dispose at

- duplicate prescribing
- **Low carbon alternatives:**
 - The team spoke to the lead pharmacist at the local CCG to recommend prescribing low volume MDIs like Salamol (contains less GHG) over Ventolin to match community practice to the Hospital. The pharmacist disseminated this information via the CCG newsletter, and by an automatic alert on the prescribing system as well as in the new ICS COPD guideline (and in the asthma guideline when that is due to be updated)
- **Operational:**
 - Inhaler recycling points in the hospital were increased.
 - The CCG pharmacist confirmed which local pharmacies are part of the inhaler recycling scheme and publicised these.

Measurements:

- A staff questionnaire was used to assess existing practice in the department, staff understanding of the environmental impact of inhalers
- A patient questionnaire was used to assess current use and knowledge of inhalers and disposal methods.
- Figures were obtained from the CCG on patterns of inhaler prescribing in the community, benchmarked against current trends.
- Carbon emission factors were used from Wilkinson, Braggins & Steinbach (2019)¹
- The carbon footprint calculation for waste saving was based on assumptions made in line with findings of a study carried out in primary care in Brighton². The study found that 40% of inhalers returned to pharmacies for disposal are completely empty, 18% completely full and the remaining 42% contain an average residual 35% of drug.

Results:

Clinical outcomes:

8977 paediatric patients attended Wexham Park Hospital paediatrics acute assessment unit over November 2018 to November 2019. An assumption was made that an estimated 80%, 7,182 patients, will have presented with respiratory problems.

There is potential clinical benefit for to prevent exacerbations of disease and reattendances at ED due to improved inhaler technique and awareness of how to tell when inhaler is empty.

Environmental sustainability:

To calculate environmental savings the assumption was made that all respiratory patients use inhalers.

Inhaler disposal:

According to the patient questionnaire results, 80% of patients dispose of inhalers in general domestic waste at home, leading to the inhaler going to landfill and releasing propellant gases. 100% of those surveyed expressed a willingness to dispose of inhalers to reduce negative environmental impacts.

If 30% of patients and/or carers changed their behaviour to dispose of inhalers at their local pharmacy, the release of the propellant gases in landfill could be avoided. This change could save

11 tonnes CO₂e per year. However, few patients use just 1 inhaler per year, so the potential saving is likely to be higher. If we assume that each patient uses 4 inhalers per year, then the savings would increase to 44 tonnes CO₂e per year.

Inhaler prescribing:

If 30% GPs changed their prescribing patterns for Salbutamol inhalers by prescribing Salamol over Ventolin, this would save 363 tonnes CO₂e per year. This saving is equivalent to the average annual carbon footprint of 24 people.

Social sustainability

Quotes below are from patients and families:

'My GP just gives me a new inhaler each time I see him...I'm collecting them at home'

'I had no idea inhalers damage the environment if just thrown away, of course I don't want that for the next generation. Now I know I'll take them back to a pharmacy'

'We all have a responsibility for the environment, and I'd like to do my bit'

'200 puffs is a lot – I thought the inhaler only last 3 months'

'I have so many inhalers lying around at home, now I'll take them to my pharmacy'

Economic sustainability

Interventions on inhaler prescribing and disposal above would be cost neutral for NHS healthcare providers and pharmacies. It was not assessed, however there is the potential for fewer inhalers to be prescribed through increased appropriate use, which would reduce financial costs.

Conclusions:

This project has demonstrated there are many ways to improve patient care and reduce the harmful impacts of inhalers, even when a switch to a PDI is not appropriate.

Several steps were taken to ensure changes made were embedded into everyday practice. These included increasing inhaler recycling points at the hospital, continuing to meet with colleagues to build awareness and address misconceptions, and forming connections with CCH pharmacists to support in spreading the project across the community. The team plan to teach local GP trainees about the environmental impacts of inhalers in children. The team have also had respiratory professionals from other tertiary centres contact them to spread their project to other sites in both paediatric and adult populations.

References

1. Wilkinson AJK, Braggins R, Steinbach I, *et al.* Costs of switching to low global warming potential inhalers. An economic and carbon footprint analysis of NHS prescription data in England. *BMJ Open* 2019;**9**:e028763. doi: 10.1136/bmjopen-2018-028763
2. Breathe better Waste less [https://cpb-eu-w2.wpmucdn.com/blogs.brighton.ac.uk/dist/8/2186/files/2016/07/Breathe Better-Waste-Less-Poster-2gfocmh.pdf](https://cpb-eu-w2.wpmucdn.com/blogs.brighton.ac.uk/dist/8/2186/files/2016/07/Breathe_Better-Waste-Less-Poster-2gfocmh.pdf)

Appendix 1: Process map

