Reducing the environmental impact of asthma and its treatment: findings from the SENTINEL pilot site

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The Sentinel Project
Partnering to improve asthma outcomes in Hull

Introduction

- Climate change represents a global health emergency. The National Health Service (NHS) in the UK has committed to reducing the environmental impact of inhalers.[1]
- Uncontrolled asthma has a carbon footprint 3.1 times greater than controlled asthma, with 63% of the carbon footprint directly attributed to short-acting beta-agonist (SABA) prescribing.[2]
- SABA overuse in asthma is therefore associated with both patient and environmental harm.
- The SENTINEL Programme[3] targets SABA overuse in asthma through supported implementation of a maintenance and reliever therapy (MART)-based guideline across six English primary care networks (PCNs). Pilot data show reduced SABA use and fewer exacerbations post-implementation.[4]

Aim: Investigate the impact of the SENTINEL Programme on the carbon footprint of asthma prescribing in its pilot PCN.[4]

Background: What is SENTINEL and what is already known?

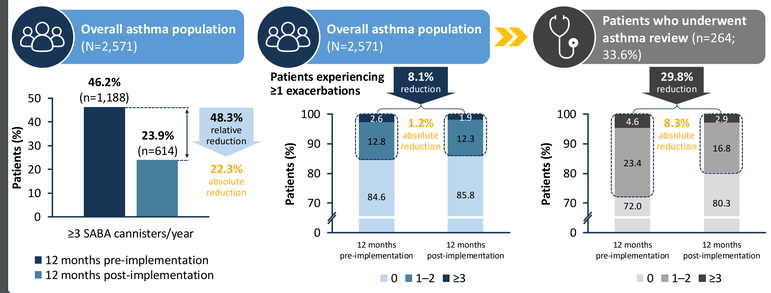
The SENTINEL project aimed to improve outcomes for adult asthma patients and reduce the environmental impact of asthma care by identifying and addressing SABA overuse through supported implementation of a MART asthma guideline. Guideline recommended care was supported by implementation of the SENTINEL intervention[3] has five components:

- Healthcare Professional Education
- Implementation of Prescribing 'Gold Standards'
- Targeted Asthma Reviews
- Patient Support and Education
- Data Monitoring and Feedback

Pilot site analysis

- The proportion of adult asthma patients overusing SABA (prescribed 3 or more SABA canisters per year) decreased from 46.2% during the 12 months pre-SENTINEL to 23.9% during the 12 months post-SENTINEL.
- In the overall adult asthma population (N=2,571), there was a relative reduction of 8.1% in the proportion of adult asthma patients treated for an asthma exacerbation during the 12 months after SENTINEL compared with the 12 months before.
- In patients reviewed, there was a 29.8% relative reduction in the proportion of patients with ≥1 exacerbations.

Figure 1. Evaluation of the impact of implementation of the SENTINEL intervention on SABA overuse and asthma exacerbations in the SENTINEL Project pilot PCN[2]



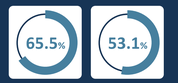
Methods

- Prescribing data were analysed for adult asthma patients (N=2,571) in the SENTINEL Programme pilot PCN. The carbon footprint of asthma prescribing was assessed during three periods: 24–12 months pre-, 12 months pre- and 12 months post-SENTINEL implementation.

Results

The carbon footprint (CO_2e) of asthma prescribing fell by 38% in the 12 months post-SENTINEL implementation in the SENTINEL Project pilot PCN.

SABA reduction accounted for 85% of carbon savings with an increase in the proportion of inhalers prescribed as DPI responsible for the remaining 15%.



SABA accounted for 65.5% of asthma prescribing carbon footprint during the 12 months before SENTINEL and **53.1% in the 12 months after SENTINEL.**

Figure 2. Calculated carbon footprint (kg CO_2e) of asthma medications prescribed 24–12 months pre-, 12 months pre- and 12 months post-SENTINEL implementation in the SENTINEL Project pilot PCN (N=2,571 adult asthma patients)

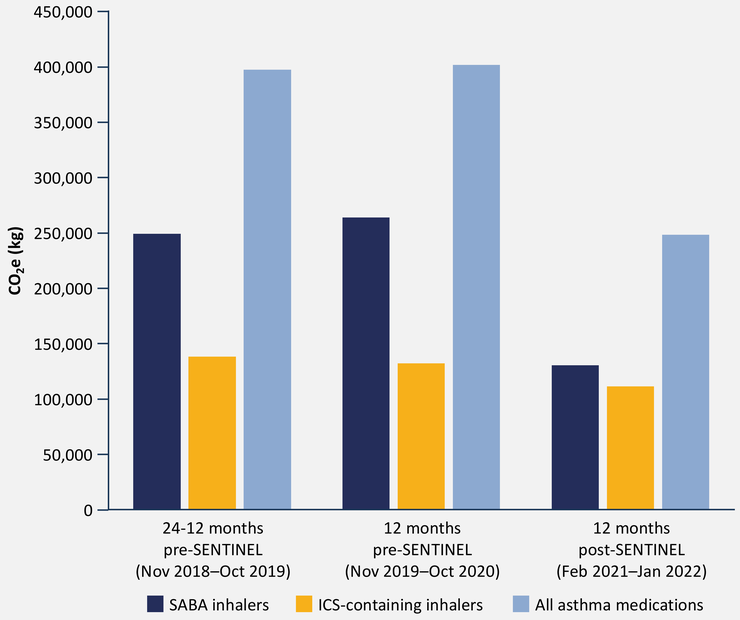


Table 1. The number of prescriptions (n) and the carbon footprint (CO_2e) of asthma medications prescribed in the SENTINEL Programme pilot PCN during 24–12 months pre-, 12 months pre- and 12 months post-SENTINEL implementation

Asthma medication	24–12 months pre-SENTINEL implementation (Nov 2018–Oct 2019)	12-months pre-SENTINEL implementation (Nov 2019–Oct 2020)	12-months post-SENTINEL implementation (Feb 2021–Jan 2022)
SABA inhalers			
• **Prescriptions (n)**	10,041	10,542	5,145
• **CO_2e**	249,371.3 kg	263,090 kg	131,282.8 kg
ICS containing inhalers			
• **Prescriptions (n)**	12,166	11,998	12,460
• **CO_2e**	138,809.5 kg	132,045.4 kg	110,727.4 kg
All asthma medications			
• **Prescriptions (n)**	26,786	27,333	23,160
• **CO_2e**	396,708.5 kg	401,948.8 kg	247,431.2 kg
Carbon footprint of asthma prescribing by inhaler class			
SABA			
• **pMDI**	n: 9,289 CO_2e: 248,910.5 kg	n: 9,791 CO_2e: 262,632.1 kg	n: 4,871 CO_2e: 131,119.7 kg
• **DPI**	n: 752 CO_2e: 460.8 kg	n: 751 CO_2e: 457.9 kg	n: 274 CO_2e: 163.2 kg
ICS			
• **pMDI**	n: 3,299 CO_2e: 49,356.9 kg	n: 2,390 CO_2e: 33,811.7 kg	n: 1,382 CO_2e: 19,260.9 kg
• **DPI**	n: 328 CO_2e: 329.9 kg	n: 334 CO_2e: 332.9 kg	n: 418 CO_2e: 500.3 kg
ICS-LABA			
• **pMDI**	n: 5,419 CO_2e: 86,291.8 kg	n: 6,099 CO2e: 94,530.9 kg	n: 6,007 CO_2e: 86,291.8 kg
• **DPI**	n: 3,094 CO_2e: 2,456.5 kg	n: 3,110 CO_2e: 2,433.9 kg	n: 4,535 CO_2e: 3,494 kg
ICS-LABA-LAMA			
• **pMDI**	n: 26 CO_2e: 374.4 kg	n: 65 CO_2e: 936 kg	n: 74 CO_2e: 1,064.2 kg
• **DPI**	n: 0 CO_2e: 0 kg	n: 0 CO_2e: 0 kg	n: 44 CO_2e: 16.1 kg

Conclusions

- **Supported implementation of a MART-based asthma guideline in the SENTINEL Project pilot PCN led to a substantial reduction in SABA use with associated patient and environmental benefits.**
- **In keeping with previously published studies, SABA was responsible for the majority of the carbon footprint of prescribed asthma treatment.**
- **Identifying and addressing SABA overuse and implementing guideline recommended therapy in asthma are critical to achieve health and environmental co-benefits.**

The SENTINEL project was a joint working between Hull York Medical school, Hull University Teaching Hospitals NHS Trust and AstraZeneca. This poster is part of the Sentinel Plus quality improvement framework, providing non-promotional educational resources funded by AstraZeneca and co-developed with Hull University Teaching Hospitals NHS Trust, and is intended for UK Healthcare Professionals'

GB-77544 | June 2026

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