# Identifying and Correcting pMDI Dosing Errors in the Community

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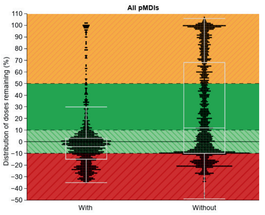
## Context

Pressurised metered-dose inhalers (pMDIs) are widely used in asthma and COPD management, yet dosing errors remain under-recognised. Two prevalent issues are: (1) disposal of inhalers with substantial doses remaining, and (2) continued use after depletion [1] — both negatively impacting disease control and contributing to waste.

## Problem

Despite national guidelines and awareness campaigns, there is limited real-world evidence, quantifying the scale of these errors in community settings or evaluating the role of pharmacists in addressing them. This pilot aimed to identify pMDI dosing errors and assess the feasibility of pharmacist-led interventions using digital tools.

Murphy et al have analysed pMDIs returned through the Chiesi Take AIR scheme, and we aimed to verify the occurrence of dosing errors in a less committed group of patients, everyday community pharmacy customers.




| Dose counter | With (n=1015) | Without (n=1480) |
|---|---|---|
| >50% doses remaining | 53 (5.2%) | 492 (33.2%) |
| >10% to ≤50% doses remaining | 96 (9.5%) | 272 (18.4%) |
| Within 10% of zero | 521 (51.3%) | 372 (25.1%) |
| >10% lower than zero | 345 (34.0%) | 344 (23.2%) |

## Methods

Three branches of Pearl Chemist Group in south-west London were equipped with calibrated digital scales, enabling pharmacy staff to assess residual doses in returned pMDIs.

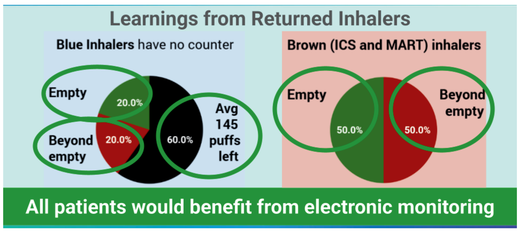

Patients were offered Smart MDI Sensors—electronic tracking devices—to support real-time inhaler dose monitoring.

The intervention also included brief patient education on correct inhaler use and safe disposal practices.

## Measurement of Improvement

Key data points included:

- Frequency and extent of residual doses in returned inhalers
- Uptake and usage rates of Smart MDI Sensors
- Patient satisfaction and behavioural changes regarding inhaler use




## Results

- High incidence of dosing errors was confirmed, aligning with prior national findings [2]
- Most patients accepted the electronic monitors when offered at no cost
- A significant proportion indicated willingness to purchase the devices themselves
- Regular use of the devices was reported, with improved patient confidence in dose tracking
- Pharmacists observed increased engagement and higher rates of inhaler returns for disposal

## Lessons Learned

1. Shift from hospital to community Community pharmacies are well-placed to deliver low-cost, high-impact interventions, as part of the new neighbourhood teams. We equipped pharmacists and pharmacy staff with tools to optimise inhaler use, moving essential health services to a more accessible, local setting. Staff engagement and patient communication were key enablers.
2. Shift from analogue to digital. The use of digital scales for accurate inhaler weighing and the introduction of the Smart MDI Sensor, integrate digital tools to provide real-time data on dosing errors and inhaler usage, which is a significant move away from traditional, analogue methods like dose counters or ‘shaking’ the inhaler. Digital solutions were not only accepted but valued by patients, indicating scalability.
3. Shift from sickness to prevention. Preventing inhaler overuse ensures patients receive the full, effective dose, which can lead to better disease control and a reduction in emergency hospital admissions. This proactive approach helped patients manage their conditions more effectively, reducing the likelihood of a crisis and the need for reactive, expensive care.

## Message for Others

This pilot demonstrates a replicable, pharmacist-led model to address pMDI dosing errors using digital adherence tools. Plans are underway to pilot a broader pMDI Optimisation Service with national applicability. Interested pharmacists are invited to participate.

## References

1. Beckett R et al. Estimating remaining doses in a salbutamol pMDI via canister weight.
2. Murphy A et al. How do patients determine when their inhaler is empty?

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