Submission Type: Research

Poster Title: **Reducing the Carbon Footprint in Healthcare: Quantifying the Carbon Emission Reduction by Eliminating Metered-Dose Inhalers in a Hospital**

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Purpose & Objective

Metered-dose inhalers (MDIs) and dry powder inhalers (DPIs) significantly contribute to greenhouse gas emissions and hospital-generated plastic waste. Designed for single-patient use, MDIs utilize hydrofluoroalkane (HFA) propellants, a class of hydrofluorocarbons (HFCs), which are potent greenhouse gases with high global warming potential measured in CO_2-equivalents. Our hospital transitioned from single-use MDIs and DPIs to nebulized therapy where clinically appropriate. This study aims to quantify the positive environmental impact of this transition by determining the reduction in CO_2-equivalent emissions.

Methods

Drug utilization reports were generated using Cerner Discern Analytics to identify all MDIs and PDIs dispensed over 2023 and 2024, prior to our transition to nebulized therapy. Each inhaler was categorized by type and manufacturer. Data on inhaler propellant emissions and device weights were collected from manufacturer datasheets and verified with publicly available environmental impact assessments. Emissions were calculated and converted to CO2 equivalents to estimate the carbon footprint. Inhaler weights were summed to quantify the amount of plastic waste potentially avoided from landfill. Medication-level spending was extracted from pharmacy records and grouped under inhaler therapies. Inhalers were classified by device type based on formulation (MDIs - ProAir, Ventolin, Atrovent, Flovent) and DPIs - Ellipta and Diskus - based therapies, including Breo, Anoro, Incruse, Arnuity, and Serevent). Descriptive statistics, including totals and averages, were used to summarize inhaler usage and environmental impact. This study was approved by our Institutional Review Board.

Results

Approximately 1,121 inhalers were utilized in 2023 and 840 in 2024. Inhaler-related CO_2 emissions decreased from 14,302 kg in 2023 to 7,868 kg in 2024, and to 0 kg in 2025 following the complete transition to nebulized therapy. The creation of 14,302 metric tonnes Co2e was avoided, equivalent to the annual electricity use for 2 US homes or

driving around the Earth 1.4 times. These emissions would have required about 1,700 trees to absorb the emissions in 1 year. Although the purpose of our initiative was not to demonstrate financial savings, $281,235 was saved on inhaler spending. This money was redirected towards nebulized therapies and preliminary evaluation suggests modest cost savings.

Conclusion

A systems-based initiative to eliminate most inhalers can align patient care with environmental sustainability goals without compromising treatment quality. We demonstrated that routine inpatient prescribing practices can carry a meaningful environmental footprint. This project highlights how practical changes in clinical workflows can translate into substantial sustainability gains, while maintaining a high level of quality patient care.