

## The Last Puff: Editorial

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The NHS has set a goal of becoming the world's first health system to commit to net zero by 2040. In order to achieve this, we all have a part to play and can start by picking low hanging fruits-for example decreasing and stopping the use of desflurane and nitrous oxide in anaesthesia and rethinking asthma inhalers.

GSK estimate that the total carbon footprint of the 73m inhalers used annually in the UK is equivalent to a VW Golf going round the earth 89000 times!

The asthma puffer (pMDI-propellant multidose inhaler) was introduced in the 1950's and arguably has saved millions of lives, but in the context of its impact on climate change it is a mixed blessing and we need to refocus. An average 70% of inhaler use in the UK are pMDIs and Ventolin use is top of the list.



*Figure: A mixed blessing.*

Two puffs of Ventolin are equivalent to 9 miles in an average car or just one device when prescribed is equivalent to a carbon footprint of a family car being driven for 200 miles.

NHS is responsible for 5.6% of total greenhouse gas emissions and inhalers contribute up to 4% of these. This issue is so important that NICE has produced guidelines on the use of inhalers with climate change in mind. As there is a deluge of types of inhalers, I will concentrate on sharing knowledge with a view to changing behaviour.

Doctors need to understand the impact of inhalers on the environment for them engage and act. In the process they also need to continually educate the public about not wasting any medication, and safely disposing the devices. Seven out of ten inhalers are disposed through household waste, often not completely empty, and reach landfills where HFC (Hydrofluorocarbon) a potent greenhouse gas (GHG), is released into the atmosphere.

HFC is the primary propellant in pMDIs. Two types of HFC are used as propellants - HFA 227ea (hydrofluoroalkane) and HFA 134a (lower volume of propellant) - the latter should be a preference. This gas is X1300 more potent than CO<sub>2</sub> - Methane on the other hand is a mere x80 more powerful, relatively speaking.

All inhalers including nebulisers have a carbon foot print but not all have the propellant HFC which contributes hugely to the carbon footprint of a single inhaler. Inhalers have 3 components - the plastic outside (usually made of polypropylene, not easy to recycle but can be), the cannister made out of stainless steel/aluminium (can be recycled) and the gas that it contains.

There is evidence to suggest that there is an excessive and unnecessary use of relievers, such as Ventolin. This often implies poor control and a need for improved education. As long as patient care is not compromised, with better education, salbutamol (Ventolin) use can be decreased with more emphasis on preventors.

DPIs (Dry Powder Inhalers) have a twenty- five times lower carbon footprint compared to pMDIs (20 gms CO<sub>2</sub> equivalent per 2 puff doses compared to a similar dose of MDIs which is 500g CO<sub>2</sub> equivalent). So, a change to powdered inhalers e.g. Ventolin accuhaler or a type of Respimat (soft mist inhaler) should be considered more and more, appreciating the fact that in less than 5-year-olds, powders may not be appropriate as children may not breathe quickly and deeply over 2 - 3 seconds through their mouths). Respimat type of inhalers (not commonly used in the UK) can be used with up to six refills cartridges that are replaced each time the medication runs out. This would save money and also be environmentally friendly.

In addition, where possible, giving a larger dose of e.g. salbutamol 200 micrograms per puff compared to 100 micrograms would decrease release of the propellant gas. Indeed, a complete change to Salmol which has a small volume propellant compared to Ventolin would decrease carbon footprint three times. Salmol is a brand name for Salbutamol. Ventolin and Salmol both contain 200 doses and have the same amount of salbutamol, the active drug, in each puff and is equally effective.

The short message is to increase the use of powdered devices and decrease the use of pMDIs with a view to eventually stopping them, until a much safer propellant is discovered. Where possible, a combination inhaler may be a better option.

In addition, pressure should be put to bear on manufacturers on incorporating counters into all inhalers to decrease wastage, although some devices do already have them. The force needed to activate the valve must result in delivery, otherwise there could possibly be a situation where the cannister is empty and wrong information is recorded.

To have an impact on the contribution of HFC to global GHG emissions, manufacturers, in addition, urgently need to produce inhalers with an end- of- life type of plastic in mind i.e. that which can be recycled or even a plant based plastic. Furthermore, health care professionals, including pharmacists, should educate the public on safe disposal and signpost them to a government supported 'Recycle Now' website. In the meantime, universally, a strategy should be worked out by various trusts and other health care organisations for collection of inhalers and their safe disposal through thermal incineration which degrades HFC.

Asthma is a very common condition that globally is dealt with largely by the use of inhalers. The UK National Institute for Health and Care Excellence (NICE) published a Patient Decision Aid on asthma inhalers in 2019 that emphasizes carbon footprint as a criterion in the choice of inhaler, thereby favouring a switch to DPIs or re-usable SMIs. Furthermore the UK Government's Environmental Audit

Committee has set the UK National Health Service (NHS) the challenge of reducing the GWP impact from inhaler use by 50% before 2028. <https://www.sduhealth.org.uk/nhs%20long%20term%20plan/carbon-reduction/anaesthetics-and-inhalers.aspx>.

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