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EDITORIALS

Inhaled drugs and global warming: time to shift to dry powder inhalers

Propellants in metered dose inhalers are powerful greenhouse gases

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It is five years since the Climate Change Act (2008) was introduced to ensure that by 2050 the United Kingdom cuts its carbon emissions by 80%. Despite this, atmospheric carbon dioxide levels have recently increased, passing the 400 parts per million mark. Although the potential impact of climate change on respiratory health is widely appreciated,[1] it is less well known that respiratory drugs may be making a sizeable contribution to global warming because of the propellant gases used in metered dose inhalers.

The NHS has an annual global warming potential of about 20 million tonnes of carbon dioxide equivalent (1 million tonnes of carbon dioxide is equivalent to 1000 kg or 55.6 billion L of carbon dioxide),[2] which is about the same as that of Estonia. This constitutes about 3% of total UK emissions, which were 590 million tonnes of carbon dioxide equivalent in 2010. Of this, only 35% is accounted for by heating, lighting, and transport, with 65% being due to procurement—the delivery of healthcare, including drugs.[2] Respiratory inhalers are some of the most commonly prescribed and expensive items in the UK, with annual primary care prescribing costs for chronic obstructive pulmonary disease estimated to be £268.5m (€315m; $407m).[3] For financial reasons alone, it is important to ensure that inhaled drugs are prescribed appropriately and that inhalers are being used correctly to avoid waste. However, it is also important to consider the environmental cost of inhalers.

The Montreal Protocol, introduced to protect the ozone layer, ensured a planned phasing out of chlorofluorocarbon propellants from inhalers. A major effort was made to find different propellants on the basis of technical and economic feasibility. The hydrofluorocarbon group of chemicals was identified as an alternative propellant for aerosols, and these chemicals are now used in metered dose inhalers. Although hydrofluorocarbons do not deplete the ozone layer, they are powerful greenhouse gases. They have a global warming effect of up to 3800 times that of carbon dioxide,[4] and the greenhouse effect of current UK emissions of hydrofluorocarbons from inhalers is equivalent to 8% of the NHS's entire carbon footprint.

Fortunately, alternatives—including dry powder inhalers—are available for the delivery of respiratory drugs, which raises the possibility of reducing an important source of greenhouse gas emissions. Three arguments can be used to reassure clinicians that a shift to dry powder inhalers would be unlikely to affect their patients adversely. Firstly, current evidence suggests that dry powder inhalers, which have a carbon footprint 18 times lower than metered dose inhalers, are equally effective for the treatment of asthma and chronic obstructive pulmonary disease.[5-7]

Secondly, the proportion of metered dose inhalers prescribed compared with dry powder devices varies considerably across Europe. They make up 70% of inhalers prescribed in the UK but only 10% in Sweden, so there is unlikely to be an important clinical difference.[8]

Thirdly, evidence suggests that dry powder inhalers used for maintenance treatment are not less cost effective than metered dose inhalers.[9] Some pricing structures already support a switch to dry powder inhalers. Where dry powder inhalers are cheaper than the equivalent metered dose inhalers this allows the creation of a virtuous circle: money is saved and carbon emissions reduced. However, short acting bronchodilators are generally much cheaper when they come in a form that can be used in metered dose inhalers rather than dry powder inhalers. But because dry powder inhalers are more likely to be used correctly,[10] especially when used for both maintenance and short acting therapy, a direct cost per dose analysis may overestimate the cost effectiveness of metered dose inhalers. Nevertheless, dry powder inhalers will need to be cheaper if they are to be used widely, particularly in emerging economies and systems where patients pay for their own drugs.

Complete elimination of metered dose, hydrofluorocarbon driven inhalers is not yet feasible. As well as individual patient

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preference, some patients, particularly children, may not be able to generate sufficient inspiratory flow to operate dry powder inhalers. The UK Department for Environment, Food and Rural Affairs has proposed that UK reliance on metered dose inhalers should fall from current levels (70%) to 25% of users, which would reduce emissions by 1.3 million tonnes carbon dioxide equivalent a year.[4] This will require a culture change, with dry powder inhalers becoming the initial choice for most situations and doctors switching existing patients to dry powder inhalers when possible. Doctors will need to make time to ensure that patients learn correct inhaler technique and revise as necessary. Patients will need to be reassured that, although the new inhalers will probably be equally effective, they can return to their previous device if this is not the case.

In an Ipsos MORI poll, 92% of the public surveyed said it was important for the NHS to work in a more sustainable way.[11] This suggests that, if properly informed of a way to minimise environmental harm, patients are likely to consider switching to a more sustainable treatment option. An approach based on the environmental benefit of a move away from hydrofluorocarbon inhalers is clinically acceptable, ecologically sound, and accords with patient preferences to protect the environment. We therefore urge policy makers to develop a framework that makes it viable for healthcare systems to phase out hydrofluorocarbon inhalers as soon as possible.

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