Reducing indoor and outdoor air pollution in healthcare settings

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Air pollution causes up to 36,000 deaths in the UK every year and both cause and worsen lung disease. While outdoor air pollution may be a topic for governmental policy, we, as healthcare professionals, can take a range of steps to minimise our own contribution to local levels of air pollution, improve the air quality in our places of work and support patients in managing their risk from air pollution in their daily lives. In this paper we consider the importance of indoor and outdoor air quality in our places of work and the practical steps we can take to improve air quality for ourselves and our patients.

Introduction

Air pollution is recognised as one of the top environmental global threats to human health causing 4.2 million deaths globally every year.[1] In the UK, air pollution is estimated to account for between 28,000 and 36,000 deaths every year.[2]

Air pollution arises from industry and manufacturing, power generation, the way we heat and light our homes, the way we run our transport systems and even farming.[2,3] Pollution can also come from natural sources such as pollen, sandstorms and volcanic eruptions. Pollution consists of noxious gases, such as ammonia and nitrogen dioxide, and particulate matter which together can damage the lungs and trigger respiratory symptoms when inhaled.[2] In 2010, the three leading risk factors for global disease burden were high blood pressure (7.0% [95% uncertainty interval 6.2–7.7] of global disability-adjusted life years [DALYs]), tobacco smoking including second-hand smoke (6.3% [5.5–7.0]) and household air pollution from solid fuels (4.3% [3.4–5.3]).[4]

Air pollution affects everyone, healthy or well, affecting the growth and development of children and causing chronic lung disease with long-term exposure. Poor air quality is an increasing cause of concern for the prevention and management of lung disease, and measures led by international agreements and UK-based initiatives are working to improve the air that we breathe. Environmental pollutants such as traffic fumes and industrial waste are targeted by national policies designed to improve air quality for all, which will particularly benefit people with lung conditions. Workplace exposure to substances harmful to the lungs is also now increasingly recognised. Indeed, removal of the patient from exposure can actually cause a condition such as asthma to disappear, if caused by a workplace trigger. Healthcare settings are places of work for healthcare professionals. In addition to ensuring air quality is optimal for patients visiting for care, it is equally important to ensure healthcare settings are safe for the people who work there.

In this paper we consider the importance of indoor and outdoor air quality in our places of work and the practical steps we can take to improve air quality for ourselves and our patients.

Steps to improve indoor air quality in healthcare settings

Good building management is fundamental to maintaining indoor air quality in healthcare settings. At the most basic level, buildings should be well ventilated and have efficient, well maintained heating systems. Questions to ask about your place of work might include: Is there a facility-level policy on ventilation of rooms? Can windows be opened for ventilation? If windows face a road, is there a time of day when road traffic is low? This is particularly important to avoid allowing polluted outdoor air to enter the building. One way to minimise the amount of vehicle-related pollution near to healthcare facilities is to operate (and enforce) a 'no-idling' rule in the car park, especially for parking spaces close to the building.

Buildings in a state of disrepair may be associated with increased levels of small particulate matter and mould spores, both of which are known to be damaging to the lungs of healthy individuals and triggers for symptom worsening among people with lung disease. It is particularly important that air conditioning systems are regularly maintained and used appropriately to avoid clogging of filters or the build-up of areas where bacteria might proliferate. The choice of materials for the buildings themselves, as well as the furnishings used, can influence air quality as many give off harmful organic compounds.[2] Surfaces and furnishings should be easy to clean and designed to minimise the accumulation of dust particles.

The cleaning materials used can have a detrimental impact on indoor air quality as well as their wider environmental impact, and cleaning materials that are environmentally safe and contain minimal fumes and volatile organic compounds should be used where possible.

Indoor air purifiers may be helpful in clinical areas where asthma reviews are conducted. There is evidence that the use of air purifiers can reduce the medication burden in children with asthma by reducing small particulate mass levels.[5] These should be cleaned and maintained regularly. However, air fresheners should be avoided in healthcare settings, even in the toilets.

Steps to improve outdoor air quality around healthcare settings

In 2018, the British Lung Foundation report highlighted that 2,220 GP practices were in areas that exceed the WHO's safe air pollution limits.[6] Data from DEFRA demonstrated a considerable reduction in levels of air pollution during the period of national lockdown in 2020 due to the COVID-19 pandemic (https://geographical.co.uk/nature/climate/item/3680-coronavirus-measures-taken-now-could-ensure-a-greener-life-after-lockdown). A reduction in travel is likely to have played a major part in this reduction, emphasising the need to reduce healthcare-related travel in order to improve air quality for patients with respiratory disease and the wider community. You might like to consider engaging with and supporting local action groups focused on improving local public transport links and local air quality – for example, by replacing public transport fleets with low emissions vehicles.

While outdoor air quality is an area of national policy, there are many things we can do to minimise our own contribution to air pollution. Travel to and from work for both staff and patients is a major contributor to air pollution, and using and encouraging others to use public transport or consider car sharing where possible is one way to reduce work-related travel (Figure 1).

Remote consultations for routine reviews for engaged, informed patients with stable conditions may be helpful to reduce patient travel and also to minimise the need for vulnerable patients to go outside during periods of poor air quality. Much has been learnt about the benefits and limitations of remote consultations during the recent COVID-19 pandemic, and while they are unlikely to replace face-to-face consultations, especially for patients with worsening symptoms, they can be useful for some routine consults.[7]

The ban on smoking in public places has had a significant impact on the experience of people with lung disease. While smoking is banned inside all healthcare buildings, the ban on smoking outside is less well enforced and environmental tobacco smoke continues to be an issue around many secondary healthcare settings.

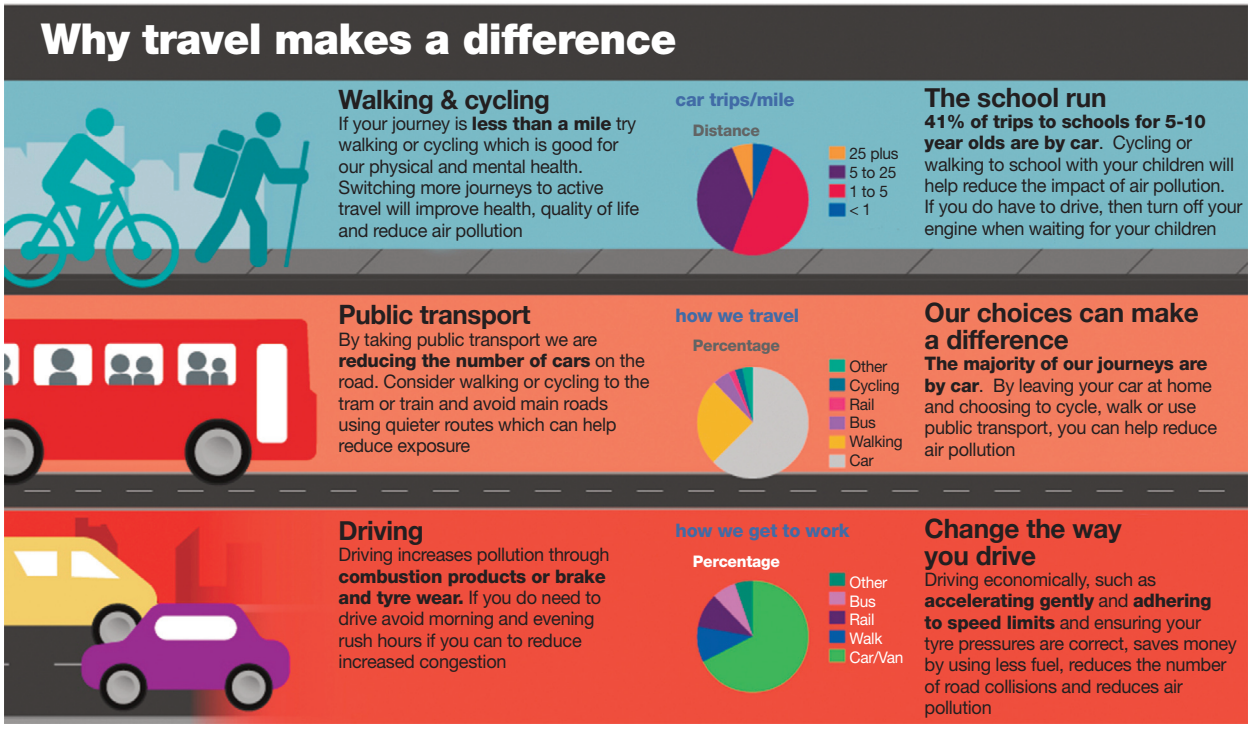
Supporting patients in understanding the dangers of air pollution and minimising their exposure

In February 2019, NICE issued their Quality Standard on outdoor air quality and health for England and Wales (QS181).[8] The statement recommends that clinicians provide patients with chronic respiratory conditions with advice on what to do when outdoor air quality is poor. This advice should be offered at routine appointments and enable patients and their families or carers to protect themselves and prevent their respiratory condition worsening.

The advice that patients should be offered includes:

- Avoiding or reducing strenuous activity outside, especially in highly polluted locations such as busy streets, and particularly if experiencing symptoms such as sore eyes, a cough or sore throat
- Using an asthma reliever inhaler more often, as needed
- Closing external doors and windows facing a busy street at times when traffic is heavy or congested to minimise the amount of polluted air coming into the home
- Being aware of expected outdoor air quality in the days ahead so that time outside the home can be planned or minimised as appropriate. See Box 1 for examples of sources on information on national and local air pollution levels.

Figure 1. Why the way we travel makes a difference *(Permission granted under the Open Government License v3.0)*.[2]



Box 1: Sources of information on national and local air pollution levels

- Government monitoring services:
  - UK-wide: Department for Environment, Food and Rural Affairs Daily Air Quality Index (https://uk-air.defra.gov.uk/)
  - Scotland: http://www.scottishairquality.scot/
  - Wales: https://airquality.gov.wales/
  - Northern Ireland: https://www.airqualityni.co.uk/
- Text messaging services:
  - London: https://www.airtext.info/
  - Sussex: https://airalert.info/Splash.aspx
  - Scotland: http://www.scottishairquality.scot/know-and-respond/

Summary and looking to the future

Seeking out ways to reduce air pollution should be an integral part of all our lives, both personal and professional. Achieving real change will require cooperation between healthcare and social policy makers to ensure reducing air pollution is at the heart of decisions made with regard to urban planning. In the meantime, there are a multitude of small changes we can all make at a personal level and within the governance of the healthcare facilities in which we work to improve air quality for ourselves and our patients.

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Date of Preparation: May 2021

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