Air pollution linked to increased hospital admissions for mental/physical illness

Stricter environmental restrictions needed to curb impact in Scotland, conclude researchers

Cumulative exposure to air pollution over several years is linked to a heightened risk of admission to hospital for mental/behavioural and physical illness, finds Scottish research published in the open access journal ***BMJ Open.***

Stricter environmental restrictions are needed to curb the impact on secondary care, conclude the researchers.

Previously published research on the health effects of long term exposure to ambient air pollution has tended to emphasise deaths rather than hospital admissions, and physical, rather than mental, ill health, suggest the researchers.

In a bid to plug this knowledge gap, the researchers drew on individual level data from the Scottish Longitudinal Study, which represents 5% of the Scottish population and includes demographic information from linked censuses.

In all, 202,237 people aged 17 and above were included in the analysis. Their health and hospital admissions for all causes; cardiovascular, respiratory, or infectious diseases; and mental illness/behaviour disorders were tracked from Public Health Scotland data and linked to levels of 4 key pollutants for each of the years between 2002 and 2017 inclusive.

The 4 pollutants from road traffic and industry comprised: nitrogen dioxide (NO2); sulphur dioxide (SO2); particulate matter diameter of at least 10 µm (PM10); and small particulate matter of 2.5 µm or less (PM2.5) per 1 km2 in each person's residential postcode.

Fluctuations in pollutant levels were observed across the study period, with higher levels recorded in 2002–04. Over the entire period 2002–17 average levels of NO2, SO2, PM10 and PM2.5 were 12, 2, just over 11, and just over 7 µg/m3, respectively.

The average annual levels for NO2, PM10 and PM2.5 were lower than the 2005 World Health Organization (WHO) guidelines, but the levels of NO2 and PM2.5 were higher than the most recent 2021 WHO guidelines.

Average cumulative exposure to air pollution was strongly associated with higher rates of hospital admissions.

Higher cumulative exposure to NO2, PM10, and PM2.5 was associated with a higher incidence of hospital admissions for all causes, and for cardiovascular, respiratory, and infectious diseases before accounting for residential area.

When fully adjusted for cumulative exposure across time, the incidence rate for respiratory disease hospital admissions rose by just over 4% and just over 1%, respectively, for every 1 µg/m3 increase in PM2.5 and NO2 pollutants.

SO2 was mainly associated with hospital admissions for respiratory disease while NO2 was associated with a higher number of hospital admissions for mental illness/behavioural disorders.

This is an observational study, and as such, no firm conclusions about cause and effect can be drawn.

And the researchers acknowledge that although they accounted for demographics, such as age, sex, ethnicity and education level, they weren't able to account for other potentially influential factors, such as lifestyle, weight (BMI), noise pollution or the absence of green spaces.

Exposure to ambient air pollution was assessed yearly rather than monthly or daily, so masking seasonal variations, while residential postcode had to serve as a proxy for personal exposure to air pollution.

Nevertheless, the findings echo those of previously published research, say the researchers, who suggest: "Policies and interventions on air pollution through stricter environmental regulations, long term planning, and the shifting towards renewable energy could eventually help ease the hospital care burden in Scotland in the long term."

The continue: "Specifically, policies aimed at making the zero emission zones (ie small areas where only zero emission vehicles, pedestrians and bikes are permitted) more abundant in Scotland, especially in the central belt of Scotland where busy and more polluted cities such as Glasgow and Edinburgh are located, would improve the air quality and in turn lower the hospital care burden in those cities."