

# FOCUS ON RESEARCH

## AIR POLLUTION AND RISK OF PRE-HOSPITAL CARDIOPULMONARY ARREST

### Researchers

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### Aim

To determine whether transient increases in common urban air pollutants (particulate matter, black smoke, ozone, carbon monoxide, sulphur dioxide, and nitrogen dioxide) are associated with an increased risk of cardiopulmonary arrest.

### Project Outline/Methodology

We collated data over 1995-2005 on:

**Cardiopulmonary arrests:** The Scottish Ambulance Service is the sole provider of emergency pre-hospital ambulance care for the 5.1 million population of Scotland and, since 1991, has collected data prospectively on all pre-hospital cardiopulmonary arrests in Scotland. These data are collated to form the HeartStart Register.

**Air pollution:** DEFRA (Department for the Environment, Food and Rural Affairs) measures pollutants at urban and rural sites across Scotland.

**Climate (Met Office):** Hourly measurements of temperature, humidity and rainfall are available from over 100 sites throughout Scotland. We undertook a case-crossover study to determine whether acute changes in air pollution were associated with increased risk of cardiopulmonary arrest. We modelled the main effects of individual pollutants at different time lags and different measurement distances. We then tested whether the effect of pollutants could be explained by other factors such as weather. Finally, we explored whether pollutants interact with other factors. We included monitoring sites with at least 75% data completeness and excluded kerbside and urban industrial sites. Distances were calculated between an individual's residence and all sites. Each individual was then assigned to the nearest monitoring site. However, if there were insufficient data or control periods then the individual was assigned to the next nearest monitoring site up to the distance cut-off. Estimates of each subject's longterm background exposure were obtained from mean exposures over the previous year.

### Key Results

There was relatively weak evidence for acute changes in pollutants predisposing to cardiopulmonary arrest. The associations which did exist were independent of weather. The acute effects of pollutants were greater among those with pre-existing heart disease and among those who arrested outside of their home. People exposed to lower background levels of pollution were more sensitive to the effect of acute changes. The associations with acute changes in weather, especially temperature and relative humidity, were much more consistent than those with pollutants.

### Conclusions

Our results suggest that chronic levels of pollution and acute changes in weather may be more important factors in predisposing to cardiopulmonary arrest than acute changes in pollutants.

### What does this study add to the field?

Previous studies have focused on myocardial infarction. Our study results add to the sparse literature on cardiopulmonary arrest and provide a useful insight into how acute changes in pollutants interact with other factors, such as weather and chronic levels of pollution.

### Implications for Practice or Policy

Our results suggest that chronic pollution levels may contribute to cardiovascular events and, therefore, provide additional evidence for the need to protect the public from high levels of environmental pollutants.

### Where to next?

The roles of chronic pollution and weather merit further investigation.

### Further details from:

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