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The relationship between acute asthma exacerbations and air pollution levels in an urban population.

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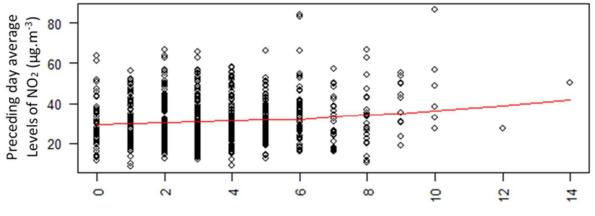[2]Institute for Transport Studies, University of Leeds, Leeds, UK

Introduction: Triggers for asthma symptoms include air pollutants. There is growing evidence that high pollution levels are linked with increased asthma exacerbations and hospital admission particularly in urban areas[1,2] in both the adult[3] and paediatric population[4]. A lag effect has also been noted, where poor air quality during air pollution episodes is followed by a rise in hospital admissions for asthma in the following days[1,2].

Leeds is a heavily trafficked city, with diesel passenger cars out-numbering those on the road with less polluting petrol, petrol-hybrid or battery electric powertrains. NO_2 levels in Leeds exceed the UK, EU and WHO annual average air quality standards. We hypothesised that air pollution levels in Leeds are associated with attendances to hospital with asthma exacerbations asthma.

Methods:
Anonymous hospital attendances/admissions for acute asthma were recorded. Air pollution measurements (hourly) of NO_2, O_3 and particulate matter are routinely collected from several sites across the Leeds district using networks of precision, real-time instruments[5]. Correlations were established to determine underlying relationships between air pollution levels and asthma hospital attendance. Boosted Regression Tree[6] statistical methods will be used to examine and rank the importance of relationships between air pollution level metrics (e.g. average, hourly maximum), other environmental indicators (e.g. temperature, wind speed and direction) and asthma exacerbations.

Results:

There was a positive correlation between rising NO_2 levels and increased asthma admission numbers. This relationship was stronger for the NO_2 levels on the day preceding admission compared to the day of attendance.

Conclusion:

NO_2 levels on the day preceding were associated with increased numbers of asthma admissions to the emergency department. These data support the hypothesis that air pollution has an effect on lung health, and the need for action on air pollution. These data will act as a baseline as we continue to monitor the impact of the clean air zone within Leeds on emergency department attendances for asthma.

References:

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