THE RELATIONSHIP BETWEEN POLLUTANT PROPERTIES AND HOSPITAL ADMISSIONS IN ATLANTA, GA

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Background and Aims: Methods that are based on the chemical properties or structures of pollutants offer an alternative approach to assessing health impacts from multiple pollutants. We performed a study to examine whether the odds of daily hospital admission differs by pollutant chemical properties. .

Methods: We categorized pollutants by chemical properties and examined their impacts on the odds of daily hospital admissions in two-stages. In the first stage we applied a case-crossover analysis of 65 pollutants using hospital admissions data from Atlanta counties (1998-2006), controlling for temperature and ozone. We regressed pollutant specific slopes from stage one on pollutant properties in stage two. We calculated uncertainty estimates using a bootstrap procedure. For comparison, we analyzed the association between hospital admissions and $PM_{2.5}$, ozone, elemental carbon, and organic carbon in case-crossover models. We also repeated the two-stage analyses, but running the first stage separately by pollutant while controlling for the same covariates including ozone. We based primary analyses on day of admission exposures.

Results: Ambient $PM_{2.5}$, ozone, EC, and OC were not associated with hospital admissions. 24-h transition metals and alkanes were associated with increased odds (0.26% and 0.37% per IQR, respectively) of hospital admissions for cardiovascular disease (CVD). Transition pollutants were positively associated with hospital admissions for ischemic heart disease, congestive heart failure, and atrial fibrillation. Respiratory-related hospital admissions were positively associated with alkanes. Aromatics and microcrystalline oxides were negatively associated with CVD- and respiratory-related hospital admissions.   Results were comparable for alternative pollutant groupings and first stage models.

Conclusions: Transition metals were associated with increased odds of CVD-related hospital admissions.   Alkanes were associated with increased odds of hospital admissions for CVD and respiratory disease, whereas aromatics were associated with decreased odds of these outcomes.