

Associations of PM 2.5 exposure with emergency department visits and readmissions among preterm infants with bronchopulmonary dysplasia

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Abstract

Objectives: To quantify the association of ambient air pollution (particulate matter, PM_{2.5}) exposure with medically attended acute respiratory illness among infants with bronchopulmonary dysplasia (BPD). **Study Design:** Single center, retrospective cohort study of preterm infants with BPD in Metropolitan Philadelphia. Multivariable logistic regression quantified associations of annual mean PM_{2.5} exposure (per $\mu\text{g}/\text{m}^3$) at the census block group level with medically attended acute respiratory illness, defined as emergency department (ED) visits or hospital readmissions within a year after first hospital discharge adjusting for age at neonatal intensive care unit (NICU) discharge, year, sex, race, insurance, BPD severity, and census tract deprivation. As a secondary analysis, we examined whether BPD severity modified the associations. **Results:** Of the 378 infants included in the analysis, 189 were non-Hispanic Black and 235 were publicly insured. Census block PM_{2.5} level was not significantly associated with medically attended acute respiratory illnesses, ED visits, or hospital readmissions in the full study cohort. We observed significant effect modification by BPD grade; each 1 $\mu\text{g}/\text{m}^3$ higher annual PM_{2.5} exposure was medically attended acute respiratory illness (aOR 1.65, 95% CI: 1.06-2.63) among infants with grade 1 BPD but not among infants with grade 3 BPD (aOR 0.83, 95% CI: 0.47-1.48) (interaction $p=0.024$). **Conclusions:** Cumulative PM_{2.5} exposure in the year after NICU discharge was not significantly associated with medically attended acute respiratory illness among infants with BPD. However, infants with grade 1 BPD had significantly higher odds with higher exposures. If replicated, these findings could inform anticipatory guidance for families of these infants to avoid outdoor activities during high pollution days after NICU discharge.

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