Examing the Association Between Asthma and Extreme Temperature Events Across Maryland: A Four County Study

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Abstract

Several studies have found associations between ambient temperature and overall precipitation with risk of respiratory health outcomes such as asthma. Limited understanding exists regarding exposure to extreme weather events and risk of hospitalization for asthma. Hospitalization records for all asthma cases (ICD-9 code 493) were obtained for the state of Maryland from 2002 to 2012 along with clinical and demographic information. Extreme temperature events were defined as days when the daily maximum temperature exceeded the 95th percentile of county and calendar day specific maximum daily temperature over a 30-year baseline period (1960-1989). We used a time-stratified case-crossover design to examine the association between exposure to extreme temperature events and risk of hospitalization for asthma. From 2002 to 2012, 116,470 asthma hospitalizations occurred in Maryland. For all of Maryland, we observed a 3% increase in risk of hospitalization for asthma associated with a 1 unit increase in extreme temperature events (Odds Ratios (OR) 1.03; 95% Confidence Interval (CI): 1.00-1.07), with a considerably higher risk associated with summertime extreme temperature events (OR 1.22, CI: 1.14-1.31). Furthermore, the increase in risk was more pronounced among African Americans compared to Whites. Our results indicate that extreme temperature events increase the risk of hospitalization for asthma. Further efforts are currently underway to assess how this risk varies across geographic areas and demographic characteristics.

Introduction

• ~25.5 million people affected by asthma in the U.S. annually (CDC 2012)
• Extreme temperature events may impact the frequency and severity of asthma attacks
• United Nations International Panel on Climate Change projects extreme temperature events to increase in intensity, frequency, and duration
• Limited understanding of the impact that extreme temperature events have upon the risk of hospitalization due to asthma

Case Information and Analysis Approach

• Case data was combined with location and calendar day specific extreme temperature and precipitation events calculated using a 30-year baseline (1960-1989)
• Extreme temperature events based upon 95th percentile threshold

Results

All of Maryland: Odds Ratio (95%CI) for Asthma Hospitalization across Race and Age due to Extreme Temperature Events

4 Counties vs. Maryland Analysis: Odds Ratios (95%CI) for Asthma Hospitalization due to Extreme Temperature Events for Year Round & Summer Only Time Periods

Study

• All of Maryland was assessed with particular focus on 4 jurisdictions (Wicomico, Washington, Prince George's, & Baltimore City)

Data

• 116,470 Hospitalization cases (ICD-9 code 493) for Maryland from 2002 to 2012

Approach

• Case data was combined with location and calendar day specific extreme temperature and precipitation events calculated using a 30-year baseline (1960-1989)
• Extreme temperature events based upon 95th percentile threshold

Statistical Analysis

• Time-stratified bidirectional semi-symmetric case-crossover design used to assess the association between extreme weather events and risk of hospitalization for asthma

Summary & Implications

• Maryland year round vs. summer only data found to have increased risk of 3% and 23% with extreme temperature events, respectively
• Odds ratios for summer time period only were higher relative to year round data for all of Maryland and counties studied
• Adaptation strategies need to be communicated based upon location

Acknowledgements

Research Collaborators and Funding

Special thanks to Jared Fisher for his assistance on the analysis portion. Grant suppot was from the U.S. Centers for Disease Control and Prevention (CDC) (1UE1EH001049-01 and SUD1C10003010)