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Supplemental Material

Warm Season and Emergency Department Visits to U.S. Children's Hospitals

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Figure S1. Children's Estimated exposure-response functions and 95% confidence intervals of the association between daily maximum temperature and relative risk of emergency department visits for all causes and specific causes, summed over all lags (0-7 days), and fitted using a quadratic B-spline with 3 degrees of freedom. The temperature-ED visit association was modeled with a quasi-Poisson regression with distributed lag nonlinear model for each hospital, controlling for temporal trends, seasonality, relative humidity, federal holidays, and day of the week. Relative risks were then pooled across the 47 participating hospitals using multivariate random-effect meta-analyses with hospital-specific mean and range of temperatures as the predictors. The mean minimum morbidity daily maximum temperature across the 47 children's hospitals was the reference temperature.

Figure S2. Estimated exposure-response functions and 95% confidence intervals as in Figure S1 but fitted with a natural cubic spline with 3 degrees of freedom for ambient temperature.

Figure S3. Estimated lag-response functions and 95% confidence intervals depicting the time course of the association between daily maximum temperature at the 95th percentile and relative risk of emergency department visits for all causes and specific causes, May through September of 2016-2018. The temperature-ED visit association was modeled with a quasi-Poisson regression with a distributed lag nonlinear model for each hospital, controlling for temporal trends, seasonality, relative humidity, federal holidays, and day of the week. The relationship between ambient temperature and emergency department visits was fitted using a quadratic B- spline with 3 degrees of freedom and the time-response function was fitted using a natural cubic B-spline with 2 knots placed at equal intervals on the log scale of lags up to 7 days. Relative risks are then pooled across the 47 participating hospitals using multivariate random-effect meta-analyses with hospital-specific mean and range of temperatures as the predictors. The mean minimum morbidity daily maximum temperature across the 47 children's hospitals was the reference temperature.

Figure S4. Sensitivity analyses controlling for air pollutants and seasonality on the association of specific causes of emergency department visits with daily maximum warm season (May to September) temperature among 47 participating children's hospitals, 2016-2018. Relative risks contrast the 95th percentile of the hospital-specific warm season (May to September) daily maximum temperature distribution to the hospital-specific minimum morbidity temperature (MMT) over lag 0-7 days among 47 participating children's hospitals from May to September, 2016-2018. The temperature-ED visit association was modeled with a quasi-Poisson regression with distributed lag nonlinear model for each hospital, controlling for temporal trends, seasonality, relative humidity, federal holidays, and day of the week. Relative risks are then pooled across the 47 participating hospitals using multivariate random-effect meta-analyses with hospital-specific mean and range of daily maximum temperatures as the predictors.

Figure S5. Pearson correlation between temperature metrics. Size and shading of the square is proportional to the correlation coefficients.

Table S1. Personal characteristics of the subjects for all causes and heat-related illness, 2016-2018.

Table S2. The attributable number and fraction for specific causes of emergency department visits attributable to moderate and extreme heat exposure over lag 0-7 days during May to September from 2016 to 2018 in 47 participating US children's hospitals.

Table S3. Stratified pooled relative risk and 95% confidence interval of the association of cause-specific emergency department visits associated with days of extreme heat by age and sex.

Table S4. Stratified pooled relative risk and 95% confidence interval of the association of cause-specific emergency department visits associated with days of extreme heat by race and insurance status.

Table S5. Sample sizes for stratified analyses shown in tables S3 and S4.

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References