Ondate di calore, picchi di inquinamento e salute respiratoria dei bambini

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Ondate di calore & salute respiratoria dei bambini

Number of papers/year in MEDLINE using search terms for heat wave and respiratory and children 1966-2016

Stefania La Grutta 23.06.2017
Three consecutive hot days increased total daily mortality by 19%.
6% of all deaths were attributable to heat.

Association (RR) estimate and 95% CI between total mortality and extremely hot days (those that exceeded the weather station-specific 95th percentile of maximum temperature) stratified by age and sex.

Percent increase in the daily number of deaths in days with a heat wave (HW) and a “low” or “high” level of PM$_{10}$

- Not consistent modification pattern of the HW effects on respiratory mortality during low and high pollution days.
- HW effect on respiratory mortality is larger than on other causes of death.

Percent increase in the daily number of deaths in days with a heat wave (HW) and a “low” or “high” level of ozone

- Not consistent modification pattern of the HW effects on respiratory mortality during low and high pollution days.
- HW effect on respiratory mortality is larger than on other causes of death.

The impact of temperature on mortality in a subtropical city: Effects of cold, heat, and heat waves in São Paulo, Brazil

Relationship between temperature and risk of mortality, comparing various temperature levels with a reference temperature of 20.5°C for RESPIRATORY MORTALITY

lag 0-1 days for heat effect, May 1996- Dec 2010

The impact of temperature on mortality in a subtropical city:
Effects of cold, heat, and heat waves in São Paulo, Brazil

Percentage change in mortality risk on HW days compared with non-HW days by cause of death

HW effects were estimated based on the HW definition of temperatures ≥96th (25.6°C) for ≥2 days, 27 HW occurred in the study period (average 1.8 heat waves/year) percentile for ≥ 2 days.

The impact of temperature on mortality in a subtropical city: Effects of cold, heat, and heat waves in São Paulo, Brazil

Percentage change in total mortality risk for heat effect by age

The 2006 California Heat Wave: Impacts on Hospitalizations and Emergency Department Visits

RRs (95% CIs) for HEAT-RELATED ILLNESSES in California during the 2006 HW (15 July to 1 August 2006) vs the reference period (8–14 July and 12–22 August 2006)

The impact of heat, cold, and heat waves on hospital admissions in eight cities in Korea

Overall absolute heat effects, percent change in risk (95% interval)

Lag 0 for heat effect. The values represent percent change in risk comparing the 25°C (90th) and 15°C (50th)

The impact of heat waves on children’s health: a systematic review

Literature published up to August 2012

Potentially relevant studies in the initial searching (n= 628)

Studies included in final review (n=12)

Future research:
- define a heat wave from a children’s health perspective
- identify the best measure of exposure to heat waves
- explore sensitive outcome measures
- quantify the impact on children’s birth outcomes
- understand age differences in vulnerability to heat waves

Global Climate Change and Children’s Health

COUNCIL ON ENVIRONMENTAL HEALTH

PEDIATRICS Volume 136, number 5, November 2015
RECOMMENDATIONS TO PEDIATRICIANS

1. Promote medical educational opportunities.

2. Discuss climate change with families.

3. Educate children, families, and communities on emergency.

4. Advocate for local, national, policies for adaptation strategies.

5. Build a broader coalition across disciplines to address climate change at the local and national levels.

PEDIATRICS Volume 136, number 5, November 2015
Picchi di inquinamento & salute respiratoria dei bambini

Number of papers/year in MEDLINE using search terms for outdoor pollution and respiratory and children 1977 -2017

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Acute respiratory health effects of air pollution on children with asthma in US inner cities

- 861 children (7.7 yrs), persistent asthma in urban communities.
- 2-week periods of twice-daily PFTs every 6 mos for 2 yrs.

5-day average pollutant concentration is related to the risk of experiencing:
- FEV₁ %pred more than 10% below personal best
- PEFR %pred more than 10% below personal best

Effects of particulate air pollution and ozone on lung function in non-asthmatic children

Comparison of the effects of short-term and sub-chronic ambient air pollutant exposure on children's lung function

<table>
<thead>
<tr>
<th></th>
<th>FVC (ml)</th>
<th>FEV1 (ml)</th>
<th>FEV1/FVC (%)</th>
<th>MMEF/FVC</th>
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<tbody>
<tr>
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<td>c</td>
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<tr>
<td><strong>Total</strong> (Level 1 n = 1494, Level 2 n = 44, Level 3 n = 24)</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>PM2.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1ST-lag-day</td>
<td>−16.3</td>
<td>30.8</td>
<td>0.598</td>
<td>−17.6</td>
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<tr>
<td>2 m average</td>
<td>−94.3</td>
<td>41.2</td>
<td>0.027</td>
<td>−77.1</td>
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<tr>
<td>PM10</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1ST-lag-day</td>
<td>−3.3</td>
<td>21.4</td>
<td>0.879</td>
<td>−4</td>
</tr>
<tr>
<td>2 m average</td>
<td>−158.5</td>
<td>60.7</td>
<td>0.013</td>
<td>−132.3</td>
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<tr>
<td>PM2.5–10</td>
<td></td>
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<tr>
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<td>6</td>
<td>27.4</td>
<td>0.827</td>
<td>6</td>
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<tr>
<td>2 m average</td>
<td>−121</td>
<td>54</td>
<td>0.03</td>
<td>−102.6</td>
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<td>O3</td>
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<tr>
<td>1ST-lag-day</td>
<td>−11.9</td>
<td>40.9</td>
<td>0.773</td>
<td>−20</td>
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<tr>
<td>2 m average</td>
<td>−137.4</td>
<td>44.8</td>
<td>0.004</td>
<td>−123.7</td>
</tr>
</tbody>
</table>


Stefania La Grutta    23.06.2017
Associazione tra inquinanti e ricoveri per asma nei bambini: i risultati dello studio EpiAir a vari lag

<table>
<thead>
<tr>
<th>Inquinanti</th>
<th>Ricoveri per asma (0-14 anni)</th>
<th>lag</th>
<th>%</th>
<th>CI 95%</th>
<th>p-het</th>
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<tbody>
<tr>
<td>PM10</td>
<td></td>
<td>0</td>
<td>0.51</td>
<td>-1.10; 2.15</td>
<td>0.132</td>
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<tr>
<td></td>
<td></td>
<td>0-1</td>
<td>1.35</td>
<td>-0.52; 3.25</td>
<td>0.304</td>
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<td></td>
<td></td>
<td>2-5</td>
<td>2.93</td>
<td>-0.82; 6.82</td>
<td>0.000</td>
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<td></td>
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<td>0-5</td>
<td>2.36</td>
<td>-0.26; 5.06</td>
<td>0.005</td>
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<tr>
<td>NO₂</td>
<td></td>
<td>0</td>
<td>1.31</td>
<td>-1.15; 3.83</td>
<td>0.972</td>
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<td></td>
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<td>0-1</td>
<td>3.04</td>
<td>0.28; 5.87</td>
<td>0.816</td>
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<td></td>
<td></td>
<td>2-5</td>
<td>9.14</td>
<td>5.27; 13.16</td>
<td>0.006</td>
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<td></td>
<td></td>
<td>0-5</td>
<td>8.77</td>
<td>4.79; 12.90</td>
<td>0.132</td>
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<tr>
<td>O₃</td>
<td></td>
<td>0</td>
<td>-2.16</td>
<td>-4.79; 0.54</td>
<td>0.387</td>
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<td></td>
<td></td>
<td>0-1</td>
<td>-1.03</td>
<td>-4.52; 2.58</td>
<td>0.199</td>
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<td></td>
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<td>2-5</td>
<td>-2.92</td>
<td>-7.45; 1.84</td>
<td>0.114</td>
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<td></td>
<td></td>
<td>0-5</td>
<td>-5.07</td>
<td>-12.27; 2.72</td>
<td>0.021</td>
</tr>
</tbody>
</table>

Effetti ritardati che si mantengono fino a lag5 per il PM_{10} e l’NO₂

Age-related association of fine particles and ozone with severe acute asthma in New York City

Picchi di inquinamento & salute respiratoria dei bambini

Modeling of Regional Climate Change Effects on Ground-Level Ozone and Childhood Asthma


Variazione percentuale delle visite in PS correla con $O_3$ (2020 vs 1990) per i bambini da 0-17 anni.

Nel 2020 $\uparrow$ 7.3% di visite per asma in PS attribuibili alla media regionale di $O_3$.
The impact of PM2.5 on asthma emergency department visits: a systematic review and meta-analysis

Short-term effects

*asthma ED visits increased* at higher PM$_{2.5}$ concentrations

$(RR \ 1.5\% \ per \ 10 \ \mu g/m^3; \ 95\% \ CI \ 1.2-1.7\%)$

ED visits increased during the warm season by $3.7\%$ ($95\% \ CI \ 0.5, \ 6.9\%$) per $10 \ \mu g/m^3$ increase in PM$_{2.5}$, higher than the corresponding increase during the cold season ($2.6\%, \ 95\% \ CI \ 0.7-4.6\%)$.

Children’s hospital admissions and emergency department visits for asthma are positively associated with a short-term 10 μg/m³ increase in PM$_{2.5}$ (RR, 1.048; 95% CI, 1.028-1.067)

Punti chiave

- **Vulnerabilità** all’effetto della esposizione.
- Fattore di **rischio** per declino della funzione e riacutizzazioni.
- Necessita di molteplicità di **azioni** per la riduzione della esposizione in età pediatrica.
Ondate di calore, picchi di inquinamento e salute respiratoria dei bambini

Grazie per l’attenzione

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