Asthma: Yesterday, Today and Tomorrow
Addressing the Asthma and Allergy Epidemics

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Disclosures

Previous: Advisory board, Merck Childhood Asthma Network

Technical Advisory Board: CarboNix LLC

No discussion of off label drug use

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Other: Chair, Allergy, Pulmonary and Rheumatology Products Advisory Committee, US FDA
Current controversies in allergy and asthma epidemiology:
  General trends or specific circumstances
  New allergens
  Recognition of new diseases or pathophysiologies
  How can asthma prevalence be decreased

J Allergy Clin Immunol 2015; 136:3-13
Sequential rises in three different allergic diseases

- Seasonal Allergic Rhinitis
- Pediatric Asthma
- Latex Allergy
- Peanut Allergy
- Alpha-gal

Key Events:

- 1974: US Safe Drinking Water Act
- 1986: US Safe Drinking Water Amended
- 1960: 19,000 Municipal Water Systems in US

Additional Information:

1870: Blackley (UK) and Wyman (USA) define hay fever
1911: Noon starts immunotherapy for hay fever
1946: New York initiates ragweed eradication
1974: Peak of asthma prevalence and severity

[http://www2.epa.gov/laws-regulations/summary-safe-drinking-water-act]
Asthma Yesterday
between large and small bronchi, both sibilus and rhonchus. Its site is on the
as the disease advances, it is replaced by large crepitations.
MM. Riliet and Barthez state that acute bronchitis rarely occurs
children without pneumonia being also present. Hence they say the value
of subcrepitant rhonchus as a diagnostic sign of bronchitis differs with the age of the child. If in a child under five this sound is heard on one or both sides of the chest there is danger that the bronchitis is complicated with lobular pneumonia. In older children there is less probability of such being the case. When there is crepitant rhonchus pneumonia is almost certainly present. Bronchitis in children not unfrequently assumes a chronic form with copious perspirations and flushes of fever especially towards night; the disease then bears a strong resemblance to phthisis.

Prognosis.—Bronchitis is dangerous in children at the breast, and under five years of age. Capillary bronchitis, broncho-pneumonia, and collapse of the lung are all very fatal.

Broncho-pneumonia.—Rare during the first year of life; is common after that period up to the fifth or sixth year, when its frequency diminishes. It is a sequel of capillary bronchitis, and also of pertussis, measles, and collapse of the lung. It is more acute in character when supervening on capillary bronchitis; less, when occurring as a sequel of pertussis. The onset—say in the child—say in the child—say in the characteristic of pulse, and respiration elevated temperature and orthopnoea; the face becomes livid, and restlessness and struggle for breath, are soon succeeded by ing into coma and death. The disease is which is extremely painful, the dullness, increasing in the vocal fremitus and finally spreading over the chest.
3. **ALLERGY** (atopy) is sensitivity to bacteria, foods, plants, animals, dust, sera, etc. (allergens). It is common, and results in the various types of reactions described below, which may occur alone or combined. Allergy is a dominant hereditary trait with variable expressivity. The laboratory tests, treatment and prevention, which apply to all allergic manifestations, are discussed in the last 5 paragraphs.

**Asthma:** The average age at the onset of the first attack usually is 4-5 yr., but it may occur at 8 months. Generally, though not always, it follows a “cold.” The initial symptoms are “wheezing,” dyspnea and orthopnea, and frequently cannot be distinguished from those of an upper respiratory infection. Pallor, cyanosis, increased sweating, bradycardia and cough also may be present. Rales may be heard throughout both lungs. These symptoms usually disappear after several days but are followed by a recurrence a few weeks or months later. The attacks are more common in the winter but in some children occur only in the summer.
Childhood Asthma 1950’s-1960’s

Review 18 studies of asthma in children from various countries

- Rates per 1,000 population
- Highest rate Broder (1962) Tecumseh, MI, 6-19 years: probable = 117/1,000; definite only 39/1,000
- Second highest Milne (1969) Lower Hutt, New Zealand, 11-13 years = 71.4/1,000
- Distribution of rates in 18 studies, 1950 - 1968:

<table>
<thead>
<tr>
<th>Rate per 1,000 children</th>
<th>Number of studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 10</td>
<td>6</td>
</tr>
<tr>
<td>10 - 30</td>
<td>6</td>
</tr>
<tr>
<td>30-100</td>
<td>5</td>
</tr>
<tr>
<td>&gt;100</td>
<td>1</td>
</tr>
</tbody>
</table>

Asthma Hospital Admissions in English Speaking Countries: 1952-1982

Mitchell EA. Arch Dis Children 1985;60:376-8
MUSC Asthma Discharges, 0-18 yr, Annual Rate per 100,000 population 0-18

Asthma Today
Current Asthma Prevalence Percents by Age, Sex, Race/Ethnicity, USA, 2013

Current Asthma, 2013, United States

<table>
<thead>
<tr>
<th>Age</th>
<th>Number with Asthma</th>
<th>Percent with Asthma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child (&lt;18 yr)</td>
<td>6,109,000</td>
<td>8.3</td>
</tr>
<tr>
<td>Adult (18+ yr)</td>
<td>16,540,000</td>
<td>7.0</td>
</tr>
</tbody>
</table>

Source: National Health Interview Survey, National Center for Health Statistics, Centers for Disease Control and Prevention

http://www.cdc.gov/asthma/most_recent_data.htm
## Current Asthma Prevalence, 2013, United States

<table>
<thead>
<tr>
<th>Strata</th>
<th>Number, thousands</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>White, non Hispanic</td>
<td>14,383</td>
<td>7.4</td>
</tr>
<tr>
<td>Child</td>
<td>2,920</td>
<td>7.5</td>
</tr>
<tr>
<td>Adult</td>
<td>11,463</td>
<td>7.3</td>
</tr>
<tr>
<td>Black, non Hispanic</td>
<td>3,712</td>
<td>9.9</td>
</tr>
<tr>
<td>Child</td>
<td>1,344</td>
<td>13.4</td>
</tr>
<tr>
<td>Adult</td>
<td>2,368</td>
<td>8.6</td>
</tr>
<tr>
<td>Hispanic</td>
<td>3,157</td>
<td>5.9</td>
</tr>
<tr>
<td>Child</td>
<td>1,307</td>
<td>7.4</td>
</tr>
<tr>
<td>Adult</td>
<td>1,850</td>
<td>5.2</td>
</tr>
</tbody>
</table>

[http://www.cdc.gov/asthma/most_recent_data.htm]
## Current Asthma Prevalence, 2013, United States

<table>
<thead>
<tr>
<th>Federal Poverty Threshold</th>
<th>Number, thousands</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 100% of poverty level</td>
<td>5,321</td>
<td>10.9%</td>
</tr>
<tr>
<td>100-250% of poverty level</td>
<td>6,260</td>
<td>7.0%</td>
</tr>
<tr>
<td>250-450% of poverty level</td>
<td>5,280</td>
<td>6.2%</td>
</tr>
<tr>
<td>&gt;450% of poverty level</td>
<td>5,859</td>
<td>6.6%</td>
</tr>
</tbody>
</table>

[http://www.cdc.gov/asthma/most_recent_data.htm](http://www.cdc.gov/asthma/most_recent_data.htm)
## Child Current Asthma, 2013 BRFSS, Compared to Symptom Surveys

<table>
<thead>
<tr>
<th>State</th>
<th>Sample #</th>
<th>Prevalence %</th>
<th>95% CI</th>
<th>Prevalence #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Georgia</td>
<td>1864</td>
<td>10.8%</td>
<td>9.1 - 12.7</td>
<td>259,917</td>
</tr>
<tr>
<td>Michigan</td>
<td>2715</td>
<td>10.9%</td>
<td>9.5 – 12.5</td>
<td>238,422</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>State</th>
<th>Sample #</th>
<th>Current Diagnosed Asthma Prevalence %</th>
<th>Current UnDiagnosed, %</th>
<th>Prevalence %, Diagnosed and Undiagnosed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Georgia, rural</td>
<td>2523</td>
<td>13.7%</td>
<td>7.3%</td>
<td>13.7 + 7.3 = 21.0</td>
</tr>
<tr>
<td>Michigan, Detroit</td>
<td>7297</td>
<td>15.0%</td>
<td>7.8%</td>
<td>15.0 + 7.8 = 22.8</td>
</tr>
</tbody>
</table>

Obesity and Asthma in the USA

http://www.cdc.gov/asthma/asthma_stats/asthma_obesity.htm
Asthma Tomorrow
Important Public Health Questions

• National prevalence estimates suggest that the rapid increase seen from 1970 to 2000 has stopped

• Poverty is not likely to be eliminated within the next 20 years
  ◦ Poor housing (indoor & outdoor air quality); family, social, neighborhood stress; access to medical care; health literacy

• Obesity continues to increase and will likely continue to increase
  ◦ Clinically difficult to separate obesity related shortness of breath (breathing impairment) from asthma
  ◦ Causal relationship between obesity and asthma or common root cause

• Common causes of obesity and asthma
  ◦ Relationship between diet and asthma: balance of calories versus quality of foods, salt intake
  ◦ Less food with viable bacteria: root vegetable, fermented foods (yoghurt, sauerkraut, home cider)
Conclusions

Asthma is a major chronic disease affecting nearly 10% of the US population.
Asthma is probably the largest contributor to the cost of health care in the US that can potentially be reduced in prevalence within one generation.
Improving air quality, especially in cities, will reduce exacerbations of asthma.
Improving the quality of food consumed by children and reducing the prevalence of obesity will likely reduce the prevalence of asthma.
M.A.A.P. Team of Investigators

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