Lead in Spices

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Lead in Spices

• Health effects of lead exposure
• TCHD Lead Surveillance Program
• Environmental assessments for lead
• Case 1
• Case 2
• Case follow-up
Health Effects of Lead Exposure

• Lead may cause serious damage
• Most dangerous effects
  – Central and peripheral nervous systems
  – Cardiovascular system
  – Kidneys
Health Effects of Lead Exposure

- Exposure to high concentrations may cause:
  - Retardation
  - Convulsions
  - Coma
  - Death (sometimes)
Health Effects of Lead Exposure

• Children are especially vulnerable to lead poisoning
  – Continual low levels can
    • Slow normal development
    • Cause learning and behavioral problems
    • Create long lasting effects on intelligence, motor control, hearing and emotional development

  – Many effects are irreversible
Health Effects of Lead Exposure

• Lead is stored in the body
  – 5-10% in blood; half-life ≈ 1 month
  – 5-10% in kidneys; half-life ≈ 1 month
  – 80-90% in bones; half-life ≈ 25 years
Health Effects of Lead Exposure

• Once a high BLL established in child
  – May take months to years to decline to <10 μg/dL
  – Depends on duration and dose of exposure
CDC Blood Levels of Concern

• Since 1970, CDC has responded to emerging knowledge about effects of low level lead exposure by lowering Blood Lead Level (BLL) warranting medical intervention

• In 1970, level of concern was 60 µg/dL

• Today, level of concern is 10 µg/dL
CDC Blood Levels of Concern

• CDC recognizes that 10 µg/dL does not define threshold for harmful effects of lead

• Research since 1991 has strengthened evidence children’s physical and mental development affected at BLLs <10 µg/dL
Lead Exposure

- Routes of exposure
  - Ingestion
  - Inhalation
# Interpretation of Lead Levels in Children and Recommended Actions

<table>
<thead>
<tr>
<th>Venous Confirmed BLL (µg/dL)</th>
<th>Interpretation for Children Under Age 6</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 10</td>
<td>Not lead poisoned</td>
<td>No action</td>
</tr>
<tr>
<td>10-14</td>
<td>Some exposure to lead</td>
<td>Community intervention activities</td>
</tr>
<tr>
<td>15-19</td>
<td>Elevated blood lead level</td>
<td>Confirm with 2(^{nd}) BLL test. Case management, including nutritional and educational intervention; more frequent screenings. If level persists, environmental inspection and remediation.</td>
</tr>
<tr>
<td>20-44</td>
<td>Lead poisoned</td>
<td>Environmental investigation and remediation. Medical check-up</td>
</tr>
<tr>
<td>Above 45</td>
<td>Seriously lead poisoned</td>
<td>Medical check-up and treatment</td>
</tr>
</tbody>
</table>
TCHD Lead Surveillance Program

- CDPHE Regulation 6 CCR 1009-7
- State Board of Health Regulations Pertaining to the Detection, Monitoring and Investigation of Environmental and Chronic Diseases
- Medical testing labs must report to CDPHE
  - If aged > 18 yrs., BLL > 25 µg/dL
  - If aged ≤ 18 yrs., all BLLs
TCHD Lead Surveillance Program

- CDPHE reports to TCHD all children aged under 6 with BLL $\geq 10 \, \mu g/dL$

- TCHD requests permission to conduct environmental assessments of homes
Environmental Assessment

Testing Tools
Environmental Assessment of Home of Child with EBLL

• Check all potential sources
- Interior and exterior paint
- Galvanized fences
- Brass keys and plumbing fixtures
Environmental Assessment of Home of Child with EBLL

- Plastic and painted wooden toys
- Plastic mini blinds
- Dishware
Environmental Assessment of Home of Child with EBLL

– Ceramic tiles
– Children’s jewelry
– Children’s clothing
Case 1

- January 2010, received notice of 20-month old
  - BLL = 15.3 µg/dL on 10/13/09
  - BLL = 25.2 µg/dL on 11/20/09
- Family lived in Aurora apartment for previous 7 months
- Prior to living in Aurora, family lived in Nepal refugee camp
- Mother speaks Nepali; father speaks some English
- 1/4/10 conducted environmental assessment of apartment
Case 1 Sources Found

- White pitcher
- Ceramic tile
Case 1 Recommendations

• Discard pitcher

• Source is probably not ceramic tile in bathroom

• Standard recommendations
Case 1 Recommendations

- Standard recommendations
  - Wash hands
  - Eat foods rich in iron, vitamin C, and calcium
  - Discourage child from putting fingers in mouth
  - Continue with blood lead testing
Case 1 Follow-up

- 6/11/10 — Received call from case’s doctor at Lowry Refugee Clinic

- Case’s BLL rose from 21 µg/dL to 31 µg/dL

- Doctor requested TCHD re-visit home to look for additional sources
2nd Environmental Assessment of Home

- Child spends time at uncle’s house also
- Sampled uncle’s and re-sampled case’s apartment
- Used XRF, collected wipe samples, soil samples, bulk samples
2nd Environmental Assessment of Home

- Sources found at uncle’s home
  - Gold colored vases
  - Beige ceramic floor tile in kitchen
  - Curry spice
2nd Environmental Assessment of Home

• Additional sources found at case's apartment
  – Beige ceramic floor tile in kitchen
Case 1 Follow-up

• Recommendations
  – Discard vase
  – Wash ceramic floor weekly with Tri-Sodium Phosphate and water
  – Standard recommendations

• Sent letter to landlord

• Contacted Consumer Product Safety at CDPHE regarding curry
Additional Questions for Parents

• Additional questions
  – What plants were used to make curry?
  – Were lead tools used to grind spice?
  – Where did they purchase dried plants?

• We were not able to re-connect with family
Curry Spice

- Case’s mother ground various dried plants purchased from nearby ethnic grocery store to make curry powder.
- Curry measured 29.2 ppm lead.
- Lead standard for curry?
  - FDA maximum recommended standard of 0.1 ppm lead in candy.
Case 2

- August 2010, received notice of 15-month old
  - BLL = 10.1 µg/dL on 8/4/10
  - BLL = 24 µg/dL on 11/3/10
- Child born in U.S.
- Educated parents; father worked in IT, both spoke English well
- Family had recently been in India for 2.5 months
- 11/15/10 conducted environmental assessment of apartment
- Parents had elevated lead levels
Case 2 Sources Found

- Various spices
  - Chile powder—368.8 ppm
  - Turmeric—211.2 ppm
  - Coriander powder—2.4 ppm
  - Garam masala —1.4 ppm
- Red vase
Case 2 Spices

• Dried plants purchased in two cities in India by case’s grandfather

• Plants were ground in India

• Ground spices were brought back into U.S. by family
Case 2 Recommendations

• Recommendations to parents
  – Discard vases
  – Don’t use spices from India
Outbreak???

• Definition of Disease Outbreak = 2 cases

• Requested assistance from TCHD’s Epidemic Intelligence Service Officer, Nancy Williams, M.D.
  – Conducted literature search

• Found recent articles linking Indian spices and religious powders to lead poisoning
Grocery Store Sampling

- TCHD decided to test spices in ethnic groceries for lead
  - Developed sampling protocol
  - TCHD staff brought in spices from home to test sampling protocol
Grocery Store Sampling

- Using XRF, screened TCHD staff spices for lead
- Screening levels ranged from 44 to 50 +/- 8 ppm lead in San Francisco Herb & Natural Food Co. turmeric
- Elevated lead levels confirmed by lab
Regulatory Action

- TCHD requests voluntary withdrawal of product from sale
- Notice to local health departments (with retail facilities of this chain) and CDPHE
- Involvement of suppliers
- Coordination with CDPHE and US FDA Denver Regional office
Regulatory Action

- Detailed label/package information gathered
- Larger scale sampling of suspect spices by FDA lab
- Waiting for results
Regulatory Action

- Questions about regulatory standards
- Risk Assessment – culturally scenario specific
- Lab results
- Action! - national withdrawal from market, recall
Many Thanks!!

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