Is Lead Poisoning Still a Problem?

Lisa Menillo MD
St. Francis Hospital and Medical Center
Co-Director Hartford Regional Lead Treatment Center
Assistant Professor Pediatrics University of Connecticut Medical School
CDC’s Ten Great Public Health Achievements 2001-2010:

• Vaccine Preventable Diseases
• Prevention and Control of Infectious Diseases
• Tobacco Control
• Maternal and Infant health
• Motor vehicle safety
• Cardiovascular Disease Prevention
• Occupational Safety
• Cancer Prevention
• Public Health Preparedness and Response
• **Childhood Lead Poisoning**
Is Lead Still a Problem?

• Objectives:
  – Understand the health effects of lead
  – Understand AAP screening guidelines
  – Review CT State Lead Law and the role of the clinician
  – Understand services provided
Figure 1. MSCA Scale Scores at the age of four years, According to blood lead concentration at three years of age.

- Port Pirie, Australia
- 537 children
- BLL’s done at birth, 6, 15, 24 months then yearly.

NEJM 1988; 319; 469-75
Cincinnati: Cognitive deficits and lead levels below 10 ug/dl

- 4,853 children

- Inverse relationship with lead level and performance on arithmetic and reading.

- 1 point decrease in reading score for every 1ug/dl increase in blood lead level.

Public Health Reports Nov/Dec 2000 Vol 115
Adjusted mean scores on cognitive/academic subtests for 4,852 children ages 6-16 years, NHANES III (1988-1994) by blood lead concentration quartile.

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Adjusted Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reading</strong></td>
<td></td>
</tr>
<tr>
<td>≤ 1 ug/dL</td>
<td>94.5</td>
</tr>
<tr>
<td>1.1 ug/dL-1.9 ug/dL</td>
<td>93.8</td>
</tr>
<tr>
<td>2.0 ug/dL-3.0 ug/dL</td>
<td>93.0</td>
</tr>
<tr>
<td>&gt;3 ug/dL</td>
<td>88.2</td>
</tr>
<tr>
<td><strong>Arithmetic</strong></td>
<td></td>
</tr>
<tr>
<td>≤ 1 ug/dL</td>
<td>95.8</td>
</tr>
<tr>
<td>1.1 ug/dL-1.9 ug/dL</td>
<td>94.0</td>
</tr>
<tr>
<td>2.0 ug/dL-3.0 ug/dL</td>
<td>94.7</td>
</tr>
<tr>
<td>&gt;3.0 ug/dL</td>
<td>91.4</td>
</tr>
</tbody>
</table>
Cognitive Deficits and lead levels below 10 ug/dl

- Measured BLL at 6, 12, 18, 24, 36, 48, 60 months and 3 and 5 years. Cognitive testing performed.
- Decline of 7.4 IQ points for a lifetime average blood lead concentration up to 10 ug/dl
- Previous studies have shown a 2.5 point IQ decrease as lead increases from 10-30 ug/dl
- Therefore greater neurotoxic effect at the lower levels

NEJM April 17, 2003
Figure 2. IQ as a Function of Lifetime Average Blood Lead Concentration.

IQ was assessed with use of the Stanford–Binet Intelligence Scale, fourth edition. The line represents the relation between IQ and lifetime average blood lead concentration estimated by the covariate-adjusted penalized-spline mixed model. Individual points are the unadjusted lifetime average blood lead and IQ values. To convert values for lead to micromoles per liter, multiply by 0.0483.
CDC Guidelines

• 1991
  – CDC Defined 10 ug/dL as toxic
  – Recommends universal screening 6 months to 6 years

• 1997
  – Meant to increase screening in high risk areas
  – Calls for a statewide plan
  – Targeted screening vs. universal screening
  – Use of the screening questionnaire
Risk Assessment Tool

- Does your child live in or regularly visit a house built before 1978?
- Does your child live in or regularly visit a house built before 1978 that is being or has recently been renovated or remodeled?
- Does your child have a sibling or playmate who has or had lead poisoning?
- Does your child live with an adult whose job or hobby involves exposure to lead?
- Does your child live near heavy traffic areas, a hazardous waste site or incinerator, industry or an active lead smelter or other industry likely to release lead into the environment?
- Does your child have pica or other frequent hand to mouth activity?
Screening Questionaire in Connecticut

- Schonfeld from CT
- 1085 children in 4 private practice settings
- Most with private insurance
- 9 children identified with elevated BLL’s by lab testing
- 2 children identified by questionnaire
Screening Recommendations
AAP 2005

• Screen all Medicaid and Medicaid eligible children at 1 and 2 years of age. Screen up to 72 months if never screened before.
• For non Medicaid eligible children look to state or municipality policy. If none exists: universal screening.
• Screen all refugees, immigrants, and international adoptees.
Refugees, Immigrants, and International Adoptee

• April 2000 Manchester NH, Sudanese girl died with BLL 392

• New Hampshire looked at 92 refugee children:
  – 14% had elevated BLL at both initial and 6 month follow up testing
  – 10.9% had elevated BLL at initial screening only
  – 29.3% were not elevated at screening but were elevated at follow up.
Refugees, Immigrants, International Adoptees

- At risk because:
  - Presence of lead hazards
  - Old housing
  - Behaviors that increase exposure
  - Leaded gasoline from country of origin,
  - lack of knowledge about lead,
  - malnutrition

- 30% of refugees have elevated lead levels after resettlement
- Federal regulations call for medical evaluation within 90 days of arrival
- Follow up venous test 3-6 months after initial screen to assess exposure after resettlement.
Cultural Sources of Lead Recent Cases

- 17 month old with BLL 22ug/dl, home negative, sindoor and bindi noted on mom and baby.
- 10 month old, family from Pakistan with VPb of 54ug/dl, due to Surma use on eye
- 3 year old from Pakistan with VPb 104ug/dl from imported spices
History of Screening in CT

Both the AAP and CT DPH strongly recommended universal Pb screening; despite these recommendations:

<table>
<thead>
<tr>
<th>Year</th>
<th>% 1-6 year olds screened</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>25%</td>
</tr>
<tr>
<td>2004</td>
<td>25.4%</td>
</tr>
<tr>
<td>2005</td>
<td>25.6%</td>
</tr>
<tr>
<td>2006</td>
<td>25.7%</td>
</tr>
</tbody>
</table>
Childhood Lead Poisoning Prevention
Public Act 07-2

• Law passed in June 2007
• Became effective in January 2009
Childhood Lead Poisoning Prevention
Public Act 07-2
Effective January 1, 2009

• Pediatric providers shall conduct lead screening at least annually for each child 9 to 35 months of age.
9 to 35 months
A critical time

- Children become more mobile
- Children naturally have hand to mouth activity.
- Increased absorption
- A time of rapid brain growth
- Peak Pb levels 18-24 months of age.
Lead Screening by providers

Public Act 07-2

Effective January 1, 2009

• Any child age 36 months to 72 months of age should be screened if not screened before or if clinically indicated.
Clinical Indications to test for Lead Poisoning

- Clinical indications to test:
  - Neurologic symptoms such as unexplained seizures
  - Developmental delays including behavior problems, hyperactivity
  - GI symptoms such as abdominal pain, chronic diarrhea, or constipation.
  - Pica
  - Growth failure
  - History of anemia
  - History of parasites
  - Hearing loss
Medical risk assessment should be conducted at least annually but also as indicated on any child 36 to 71 months of age.
Medical Risk Assessment
A yearly discussion about lead

- Includes anticipatory guidance
- Ask about recent change address
- Ask about places child visits
- Ask about renovations of homes
- Ask about pica
- Assess risk for iron/calcium deficiency
- Ask about exposure to recalled toys
- Sources: Occupations, hobbies
Sources of Lead
The local health department shall provide information to the parent or guardian of a poisoned child with a lead level greater than 10 about:

- lead,
- measures to reduce exposure,
- laws of lead abatement and
- information about potential eligibility for service for children from birth to three years of age.
Regional Lead Treatment Centers

• 1994 Two Regional Lead Treatment Centers were established: Hartford and Yale-New Haven.
• Provide multi-disciplinary culturally sensitive care including
  – medical evaluation and treatment,
  – developmental evaluations,
  – social service support,
  – outreach teaching and
  – assistance with relocation.
• Lead Clinic medical staff are available for consultation to medical providers by phone or by visit. We will accept children with levels over 5ug/dL.
Telephone #’s treatment centers

• Hartford Regional Lead Treatment Center
  – 860-714-5184

• Yale New Haven Regional Lead Treatment Center
  – 203-764-9106
The Lead Safe House

- Social Service, Outreach, and LSH manager on site. LAMPP staff also on site.
- Close to Treatment Centers at SFH and CCMC in Hartford.
- We arrange school transportation
- We provide assistance with relocation
- Parent meetings are held around issues important to parents.
Childhood Lead Poisoning in Connecticut
2010 Surveillance Report
Overview

Is Lead Poisoning Still A Problem?

May 9, 2012

Jimmy Davila
Percentage of children 1-2 years of age who had a lead screening, by calendar year – Connecticut 1996-2010
Percentage of children under 6 years of age who had a lead screening, by calendar year – Connecticut 1996-2010
Connecticut Towns and Screening Rates, Children under 6 – 2010
Percentage of children who have had at least one/two screenings by 18/36 months of age, by year of birth
Number of children under 6 years of age with elevated blood lead, CY 2010
Percentage and number of children under 6 years of age with blood lead \( \geq 5 \) \( \mu \text{g/dL} \)

Number of children reported in parentheses

- 5-9 \( \mu \text{g/dL} \): 6.6% (5401)
- 10-14 \( \mu \text{g/dL} \): 0.5% (428)
- 15-19 \( \mu \text{g/dL} \): 0.2% (159)
- 20-44 \( \mu \text{g/dL} \): 0.2% (149)
- 45+ \( \mu \text{g/dL} \): 0.0% (7)
Percentage of children under 6 years of age with elevated blood lead, by race – Connecticut CY 2010
Percentage of children under 6 years of age with elevated blood lead, by ethnicity – Connecticut CY 2010

p-value < 0.001 (statistically significant)
Properties Associated with Elevated Blood Levels ≥10 mcg/dL and Housing Units Built pre-1960, Connecticut 2010

Total: 713 properties accounting for 743 children under 6 years of age

Housing Data Source: 2005-2009 American Community Survey 5-Year Estimates, U.S. Census Bureau

Number of Pre-1960 Housing Units
- 81 - 999
- 1000 - 1999
- 2000 - 3999
- 4000 - 8999
- 9000 - 19999
- 20000 - 33104

Property with Elevated Child(ren) (1 dot = 1 unit)
Age of housing as a percentage of overall housing stock – CT and U.S.
Percentage of dwelling units (157) identified with environmental lead hazards, by source
Thank you!

Lead and Healthy Homes Program
(860)509-7299
www.ct.gov/dph

The 2010 surveillance report can be accessed @
The 3 R’s of Lead Screening:

Reimbursement, Reporting, Recommendations for Treatment

Hilda Slivka, MD
Co-Director, Hartford Regional Lead Treatment Center
Connecticut Children’s Medical Center
Objectives

- Understand in-office lead testing
- Review reimbursement for lead testing
- Understand various treatments for elevated lead levels
Childhood Lead Poisoning Prevention
Public Act 07-2
Effective January 1, 2009

- Pediatric providers shall conduct lead screening at least annually for each child 9 to 35 months of age.
- Screening is either a capillary or venous blood draw.
Sec. 38a-535. Mandatory coverage for preventive pediatric care and blood lead screening and risk assessment.

(b) Each group health insurance policy providing coverage of the type specified in subdivisions (1), (2), (4), (6), (11) and (12) of section 38a-469 delivered, issued for delivery or renewed on or after October 1, 1989, or continued as defined in section 38a-531, on or after October 1, 1990, shall provide benefits for preventive pediatric care for any child covered by the policy or contract at approximately the following age intervals: Every two months from birth to six months of age, every three months from nine to eighteen months of age and annually from two through six years of age. Any such policy may provide that services rendered during a periodic review shall be covered to the extent that such services are provided by or under

On and after January 1, 2009, each such policy shall also provide coverage for blood lead screening and risk assessments ordered by a primary care provider pursuant to section 19a-111g. Such benefits shall be subject to any policy provisions which apply to other services covered by such policy.
Benefits of Lead Screening

- CT children are exposed to lead due to old housing
- Identify children exposed to lead
- Prevent further elevation of blood lead level
- Evidence of societal and cost benefits if lead levels were lower
- Compliance with the law

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New Roadblock to Lead Screening

Effective 12/1/2011: the CT Dept. of Public Health (DPH) Laboratory requests that blood lead specimens (for patients covered by private insurance or Medicaid) NOT be sent to the DPH Laboratory for analysis.

CT State Laboratory is no longer providing this service for all children*

*Note: CT State Lab will provide testing for children without insurance
Barriers of Sending Children to Outside Laboratories for Lead Screening

- Inconvenient for family, who must take child to another site/laboratory to have blood drawn
- Compliance issue
- Amount of blood required is 0.5 ml
- Outside laboratories may require venous draw
Barriers In-Office Lead Testing

- Requires office personnel
- Some MCOs do not reimburse in-office testing
- All Results must be reported to the state lab
Advantages of In-Office Lead Testing

- Convenience for patient
- Smaller amount of blood required, 50 µL
- Immediate results for family
- Allows education for at-risk families at visit
- Perfect complement to hemoglobin testing. It allows for another reimbursable CPT code
- Helps comply with state mandate
Analyzer for In-Office Blood Lead Testing
Reimbursement Rates for Lead Screening

<table>
<thead>
<tr>
<th>Insurance Company</th>
<th>Reimbursement</th>
<th>Date</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>AETNA</td>
<td>$19.79</td>
<td>10-Jan-12</td>
<td></td>
</tr>
<tr>
<td>BCBS</td>
<td>$14.07</td>
<td>10-Jan-12</td>
<td></td>
</tr>
<tr>
<td>CHP (CIGNA)</td>
<td>$10.42</td>
<td>10-Jan-12</td>
<td></td>
</tr>
<tr>
<td>CONNECTICARE (CTCARE)</td>
<td>$0.00</td>
<td>10-Jan-12</td>
<td></td>
</tr>
<tr>
<td>CHN Medicaid</td>
<td>$16.06</td>
<td>10-Jan-12</td>
<td>State taking over reimbursement</td>
</tr>
<tr>
<td>OXFORD HEALTH PLANS</td>
<td>$7.50 - $9.00</td>
<td>10-Jan-12</td>
<td></td>
</tr>
</tbody>
</table>

The above rates were obtained from a LeadCare II user in CT. We suggest you verify the information with your insurance providers.

Most insurance companies reimburse for the capillary blood collection. The CPT code is 36416 and reimbursement is $3-$5
Codes for Reimbursement

- **The Correct Blood Lead Testing Code:**
  - CPT Code 83655
    - Average Reimbursement:
      - Private Plans: $13
      - Medicaid: $16

- **Collection of Capillary Blood Specimen Code:**
  - CPT Code 36416
    - Average Reimbursement: ~$3
Reporting to the State Health Department

- All lead results must be reported to:
  - Connecticut Department of Health
  - Fax: 860-509-7259

- For Assistance:
  Jimmy Davila
  Epidemiologist 2
  860-509-7277
  Jimmy.Davila@ct.gov
Guidelines for Follow-Up Blood Lead Testing

Screening Recommendations: CDC and AAP

<table>
<thead>
<tr>
<th>If screening blood lead level is:</th>
<th>CDC: Repeat venous blood test by:</th>
<th>AAP: Repeat venous blood test by:</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 - 19 mcg/dL</td>
<td>3 months</td>
<td>1 month</td>
</tr>
<tr>
<td>20 - 44 mcg/dL</td>
<td>1 month to 1 week, sooner if concentration is high</td>
<td>1 week</td>
</tr>
<tr>
<td>45 - 59 mcg/dL</td>
<td>48 hours</td>
<td>48 hours</td>
</tr>
<tr>
<td>60 - 69 mcg/dL</td>
<td>24 hours</td>
<td>48 hours</td>
</tr>
<tr>
<td>&gt; 70 mcg/dL</td>
<td>immediately</td>
<td>immediately</td>
</tr>
</tbody>
</table>

While testing can identify children with lead toxicity, follow-up of elevated levels is critical.
Testing Schedule-After Lead Declines

Follow-Up after BLL Begins to Decline:

<table>
<thead>
<tr>
<th>Venous blood lead level (µg/dL)</th>
<th>Late follow-up (after BLL begins to decline)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-14</td>
<td>6-9 months</td>
</tr>
<tr>
<td>15-19</td>
<td>3-6 months</td>
</tr>
<tr>
<td>20-24</td>
<td>1-3 months</td>
</tr>
<tr>
<td>25-44</td>
<td>1 month</td>
</tr>
<tr>
<td>&gt; 45</td>
<td>Chelation with subsequent follow-up</td>
</tr>
</tbody>
</table>
CDC Recommendations

The most recent CDC recommendations have added:

“For a child whose blood lead level is approaching 10µg/dL, more frequent lead screening might be appropriate, particularly if the child is < 2 years of age and was tested at the start of warm weather (when blood lead levels tend to increase, or is at high risk for lead exposure.” (CDC 2007)

More research needs to be done in this area of screening children with lead levels < 10 µg/dL in order to offer more specific recommendations.
What if Lead Levels are 5-9 µg/dL?

- No lead level is considered safe
- Identifies children exposed to lead
- Continued lead screening is appropriate.
- Allows removal of lead source before further elevation
- Early follow up of lead level at 1-3 months initially
- Later follow up every 3-6 months until lead level is < 5 µg/dL.
Treatment /Management

- Environmental investigation of home
- Test paint, water, dust, soil
- Lead Education for family
- Identify and remove source of lead
- Temporizing measures to decrease lead exposure
- Test for iron deficiency and treat, if appropriate
- Neurodevelopmental monitoring
- Repeat lead testing
- Home abatement/remediation
- Chelation therapy for a lead level ≥ 45µg/dL
CHELATING AGENTS

- CaNa₂ EDTA: Calcium disodium ethylenediamine tetraacetate
- BAL: 2,3 dimercapto-1-propanol
- D-penicillamine: Cuprimine 3-mercapto-D-valine
- Succimer (Chemet): 2,3 dimercaptosuccinic acid
SUCCIMER or CHEMET

- Oral administration makes it easier to give
- TID for 5 days, then BID for 14 days
- **Must** be in lead safe environment
- Need to be certain child is tolerating medication
- Side effects: Neutropenia, elevated LFT’s, rash, nausea

Lead treatment centers are available for consultation of drug administration
We’ve Made Progress…

These walls don’t just look good. They’re Yummy Too!

New Flavored Lead-Based Paint and Varnish

Great Flavors!
Pistacio (Shown)
Cotton Candy
Lemon
Marshmellow

But there’s still more to be done