MDAAP/AAP Lead Testing ECHO

April 5, 2023

Session 7: Cases From The Field
ACKNOWLEDGMENTS

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Acknowledgement: The U.S. Environmental Protection Agency (EPA) supports the PEHSU by providing partial funding to ATSDR under Inter-Agency Agreement number DW-75-9587770. The content in this material represents the views of the various contributors. It does not represent the views of the Centers for Disease Control and Prevention (CDC)/ATSDR nor EPA and does not represent endorsement by CDC/ATSDR nor EPA of the purchase of any commercial products or services that are mentioned.
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- For educational and quality improvement purposes, this teleECHO session will be recorded
  - By participating in this session, you are consenting to be recorded – we appreciate and value your participation
- To protect patient privacy, please do not provide any protected health information (PHI)
- Please mute your microphone when not speaking
- Please enable your video if possible
- Chat with Loretta I. Hoepfner in Chatbox if you need technical assistance
AGENDA

• Welcome – Loretta I. Hoepfner
• Case Presentations and Discussions
  – Mike Ichniowski, MD, FAAP
  – Paul Rogers, MD, FAAP
  – Guest Speaker: Clifford Mitchell, MS, MD, MPH (Maryland Department of Health)
• QI Data Review – Troy Jacobs, MD, FAAP
• Follow Up and Next Steps – Loretta I. Hoepfner
CASE PRESENTATIONS AND DISCUSSIONS

Michael Ichniowski, MD, FAAP
Paul T. Rogers, MD, MBA, FAAP
Clifford Mitchell, MS, MD, MPH

April 5, 2023
**DISCLOSURES**

- In the past 12 months, we have had no financial relationships with the manufacturer(s) of any commercial product(s) and/or provider(s) of commercial service(s).

- The views presented in this session do not necessarily represent the views and opinions of the AAP.
CASE PRESENTATION #1
(THANKS TO TAMARA KIM, CPNP-PC)

Michael Ichniowski, MD, FAAP
Clifford Mitchell, MS, MD, MPH
Paul T. Rogers, MD, MBA, FAAP
CASE PRESENTATION #1

CC: “A” is an eighteen-month male who had an elevated BLL of 4 ug/dL after his 18 month well child visit on 9/3/21. Lead risk screening negative at this visit. PEDS and MCHAT assessments normal. No behavioral concerns.

Property: Built in 1925

PMHx: Birth Hx: Pt. was born full term by vaginal delivery with no complications
Past Medical History: Eczema at two months; pneumonia at age 18 months
Medications: Loratadine 5 mg qd for allergic rhinitis; Albuterol inhaler 2 puffs prn wheezing

Development: Screening normal; Referred to Head Start Program 9/23/21

FHx: Two sisters; no further information available

SHx: Family moved into a newly built home 8/30/22
# Blood Lead Levels

<table>
<thead>
<tr>
<th>Date</th>
<th>Result µg/dL</th>
<th>Age</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/13/21</td>
<td>4</td>
<td>18 mon.</td>
<td>Venous; Hgb=11.4</td>
</tr>
<tr>
<td>6/17/22</td>
<td>6.3</td>
<td>27 mon.</td>
<td>Venous; Hgb=12.3</td>
</tr>
<tr>
<td>9/19/22</td>
<td>4.6</td>
<td>30 mon.</td>
<td>Venous; Hgb=11.9</td>
</tr>
<tr>
<td>Average</td>
<td>4.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Case Presentation #1 - Chronology

History:

4/9/21: 12 month well child visit: Lead risk assessment screening negative; PEDS & MCHAT assessments normal; Developmental screening normal; no behavior concerns. Venous blood lead and Hgb/Hct ordered.

9/3/21: 18 month well child visit: Child noted to be delayed for well visits and immunizations. Blood lead and Hgb/Hct had not been obtained. Lead risk screening negative; PEDS & MCHAT assessments normal; no behavior concerns. Labs reordered.

9/13/21: Lab results: Venous Blood Lead Level = 4 ug/dL; Hgb = 11.4 g/dL; Hct = 34.8%

9/23/21: Referral for Head Start enrollment initiated for elevated blood lead level.


6/17/22: Lab results: VBLL = 6.3ug/dL; Hgb = 12.3g/dL; Hct = 36.9%

7/19/22: Acute care visit for elevated blood lead: Family indicated they were in process of moving into newly constructed house. Family indicated that no obvious source of lead had been found in current home (unclear if health department had been involved in evaluation). Normal physical exam; no behavioral concerns; good appetite, not taking any vitamins. Follow-up Lead, Hgb/Hct ordered.

9/19/22: Lab results: VBLL = 4.6 ug/dL; Hgb = 11.9 g/dL; Hct = 36.4%

9/29/22: 30 month well child visit: Family reported moving into new home 8/30/22. Ht = 87cm (7%ile); Wt = 11.9kg (9.6%ile). Lead level to be repeated at 3 year well child visit.
QUESTIONS FOR DISCUSSION

1. What were some barriers to optimal lead testing in this case?

2. What counseling can you, as primary care providers, provide to your patients in a similar situation?

3. What would be the recommended timing for follow-up lead testing?

4. What information or support from other agencies would be helpful to you for ongoing follow-up of this patient?
BARRIERS TO TESTING

• Parental compliance with blood testing
• Availability/affordability of in-office testing
• COVID lockdown and disruption of regular care
LEAD HAZARD REDUCTION COUNSELING

1. Reduce continued lead exposure in the home: inspection to identify sources of lead

2. Nutritional interventions to minimize further absorption of lead: Iron/Vitamin C; Calcium/Vitamin D

3. Minimize exposure to lead in house dust: wet mopping, damp dusting, HEPA filtered vacuum; wash toys, pacifiers, etc.

4. Minimize exposure to lead in soil: take off shoes at door, wash hands after outdoor play

5. Eliminate any other sources of lead exposure: work, hobbies, imported spices, glazed cookware

Images from Clip Art with exception of early intervention image; sourced from content created by Marissa Hauptman
# Blood Lead Level (BLL) Monitoring

<table>
<thead>
<tr>
<th>Venous blood lead</th>
<th>Early F/U testing</th>
<th>Later F/U testing**</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5-9 ug/dL</td>
<td>3 months*</td>
<td>6-9 months</td>
</tr>
<tr>
<td>10-19 ug/dL</td>
<td>1-3 months*</td>
<td>3-6 months</td>
</tr>
<tr>
<td>20-44 ug/dL</td>
<td>2-4 weeks</td>
<td>1-3 months</td>
</tr>
<tr>
<td>&gt;45 ug/dL</td>
<td>repeat ASAP (consider admission for chelation)</td>
<td></td>
</tr>
</tbody>
</table>

*initial F/U test can be done within one month to check for rising BLL

**after 2-4 tests show steady decline

[https://www.cdc.gov/nceh/lead/advisory/acclpp/actions-blls.htm](https://www.cdc.gov/nceh/lead/advisory/acclpp/actions-blls.htm)
CASE PRESENTATION #2

(THANKS TO CHEL MENCHAVEZ, MD, FAAP)

Paul T. Rogers, MD, MBA, FAAP
Michael Ichniowski, MD, FAAP
Clifford Mitchell, MS, MD, MPH
CASE PRESENTATION #2

CC: “W”, a three-and-a-half-year-old male and his siblings have been followed in this practice since December 28, 2021, for elevated BLL. He is back in the office for a follow-up for his lead poisoning.

Property: This house was built in 1853 and previously served as a doctor’s office and a hospital during the Civil War. Pt.’s mother reported paint was in good condition until they started to do home renovations. An Environmental Investigation by the MDE on April 7, 2021, found, on visual inspection, chipping, flaking and peeling paint in ten interior locations. All nine dust wipes were positive for lead-contaminated house dust. Two outdoor soil samples exceeded the threshold. An XRF Analyzer detected eight positive samples from interior surfaces, five in child play areas. Water samples were below the threshold. No other lead hazards were detected at this property.

Visiting property: “W” and his siblings were exposed to lead based paint hazards at the maternal grandmother’s home, which was built in 1910.
CASE PRESENTATION #2 - CONTINUED

PMHx: Birth Hx: Pt. was born full term by vaginal delivery with no complications. He was
Developmental Hx: Current developmental screening passed. Followed by Infants & Toddlers
Hospitalizations: 2019 for croup.
Medications: None
ROS: dental caries

FHx: Two sisters and one of two brothers have had elevated blood lead levels.

SHx: Due to size of house the family has not been able to fix or sell. Other agencies involved: MWPH Lead
Clinic, Local Health Dept. & MDE
## Laboratory Results

<table>
<thead>
<tr>
<th>Date</th>
<th>Result µg/dL</th>
<th>Age</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/20/2020</td>
<td>24</td>
<td>14 mon.</td>
<td>Capillary; Hgb=11.3</td>
</tr>
<tr>
<td>7/21/2020</td>
<td>19</td>
<td>14 mon.</td>
<td>Venous</td>
</tr>
<tr>
<td>8/21/2020</td>
<td>16</td>
<td>15 mon.</td>
<td>Venous</td>
</tr>
<tr>
<td>10/12/2010</td>
<td>14</td>
<td>17 mon.</td>
<td>Venous</td>
</tr>
<tr>
<td>11/16/2020</td>
<td>14</td>
<td>18 mon.</td>
<td>Venous</td>
</tr>
<tr>
<td>12/15/2020</td>
<td>17</td>
<td>19 mon.</td>
<td>Venous</td>
</tr>
<tr>
<td>2/26/2021</td>
<td>16</td>
<td>21 mon.</td>
<td>Venous; Hgb=11.7</td>
</tr>
<tr>
<td>3/26/2021</td>
<td>12</td>
<td>22 mon.</td>
<td>Venous</td>
</tr>
<tr>
<td>10/5/2021</td>
<td>12</td>
<td>29 mon.</td>
<td>Venous; Hgb=12.3</td>
</tr>
<tr>
<td>12/28/2021</td>
<td>9</td>
<td>31 mon.</td>
<td>Venous</td>
</tr>
<tr>
<td>4/8/2022</td>
<td>9</td>
<td>35 mon.</td>
<td>Venous</td>
</tr>
<tr>
<td>5/18/2022</td>
<td>8.2</td>
<td>36 mon.</td>
<td>Venous</td>
</tr>
<tr>
<td>1/10/2023</td>
<td>7.5</td>
<td>44 mon.</td>
<td>Venous</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>13.6</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DISCUSSION

Dr. Michael Ichniowski: Primary care aspects: counseling, follow-up testing, referral for services

Dr. Clifford Mitchell: Home visiting and lead abatement services for families available in Maryland

Dr. Paul Rogers: Lead poisoning effects on neurodevelopment
# Blood Lead Level (BLL) Monitoring

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CASE PRESENTATION #3

Paul T. Rogers, MD, MBA, FAAP
Clifford Mitchell, MS, MD, MPH
Michael Ichniowski, MD, FAAP
CASE PRESENTATION #3

CC: “Lily” is a seven-year-old female with previous history of an elevated BLL who returns to your office because of poor academic achievement.

Property: This house was built in 1905 where Lily lived from her birth till July 15, 2016, when she was 21 months old. Pt.’s mother reported deteriorated paint and lead-contaminated house dust throughout the house when they moved in. Lily had significant pica and was noted to chew on paint chips. An Environmental Investigation by the MDE detected the presence of lead-based paint by XRF testing and dust wipes. Tap water tested below the threshold for lead but two soil samples were above the lead threshold. No other lead hazards were detected. Lily’s older sister did not have an elevated BLL.

Visiting property: No visits to daycare or relative’s homes.
**CASE PRESENTATION #3 - CONTINUED**

**PMHx:** Birth Hx: Pt. was born full term by vaginal delivery with no complications.

**Developmental Hx:** Mother was concerned that Lily had speech delay noted at two years of age. Currently she is very active, often defiant and has temper tantrums when she does not get her way.

**Hospitalized:** At age of three for gastrointestinal symptoms diagnosed as chronic diarrhea and esophagitis.

**Medications:** None now; previously iron for iron deficient anemia and medications for her GI problems.

**ROS:** Severe dental caries requiring repair under general anesthesia at seven years old: fillings in two teeth; extractions of two teeth; stainless steel crowns for five teeth.

**FHx:** No FHx of ADHD, LD, or ID. Mother has history of GAD and her father works in a plastics factory. Lily’s older sister did not have an elevated BLL.

**SHx:** Recently, CPS involvement with family due to marital problems between Lily’s father and mother.
## Lily’s Lead Testing History

<table>
<thead>
<tr>
<th>EBL (μg/dL)</th>
<th>EBL (ppb)</th>
<th>Age</th>
<th>Date</th>
<th>Address</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>80</td>
<td>12 mon.</td>
<td>7/23/15</td>
<td>Home</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>200</td>
<td>15 mon.</td>
<td>10/28/15</td>
<td>Home</td>
<td>Venous</td>
</tr>
<tr>
<td>11</td>
<td>110</td>
<td>17 mon.</td>
<td>12/7/15</td>
<td>Home</td>
<td>Venous</td>
</tr>
<tr>
<td>9</td>
<td>90</td>
<td>20 mon.</td>
<td>3/2/16</td>
<td>Home</td>
<td>Venous; Ferritin 10</td>
</tr>
<tr>
<td>8</td>
<td>80</td>
<td>22 mon.</td>
<td>5/3/16</td>
<td>Red Roof Inn</td>
<td>Venous</td>
</tr>
<tr>
<td>7</td>
<td>70</td>
<td>23 mon.</td>
<td>6/9/16</td>
<td>Home</td>
<td>Venous</td>
</tr>
<tr>
<td>6</td>
<td>60</td>
<td>25 mon.</td>
<td>9/6/16</td>
<td>Home</td>
<td>Venous</td>
</tr>
<tr>
<td>6</td>
<td>60</td>
<td>30 mon.</td>
<td>12/7/16</td>
<td>Home</td>
<td>Venous</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
<td>33 mon.</td>
<td>4/17/17</td>
<td>Home</td>
<td>Venous</td>
</tr>
<tr>
<td>2</td>
<td>29</td>
<td>44 months</td>
<td>3/29/2018</td>
<td>Home</td>
<td>Venous; Fe=17 (25-101; ZPP 95μg/dL (&lt;100)</td>
</tr>
<tr>
<td>8.7</td>
<td>AVG.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
“Lily”, now eight years old, was retained in first grade at a private school with the following concerns of the teachers:

- Short attention span
- Easily distracted
- Doing well in math
- Behind in reading fluency
- Defiant in difficult situations
- Anxious
- Difficult to understand her speech
- Immature pencil grip, poor penmanship
# Pediatrician’s Plan for Lily

<table>
<thead>
<tr>
<th>Problem</th>
<th>Action Planned</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assess current house for lead exposure</td>
<td>Lead questionnaire negative</td>
</tr>
<tr>
<td>2. Inattention, distractibility</td>
<td>Parent &amp; teacher rating scale; ND Pediatrician</td>
</tr>
<tr>
<td>3. Anxiety</td>
<td>Rating scale; neuropsychological testing</td>
</tr>
<tr>
<td>4. Handwriting, pencil grip</td>
<td>OT found visual motor delays and Sensory Processing Disorder</td>
</tr>
<tr>
<td>5. Speech</td>
<td>S&amp;L found speech fluency disorder</td>
</tr>
<tr>
<td>6. Behavior problems</td>
<td>Individual counseling with Art Therapy, Individual, Supportive, Family Therapy, and CBT</td>
</tr>
<tr>
<td>6. Academic underachievement</td>
<td>Vision, Hearing screen; neuropsychological testing; IEP, 504</td>
</tr>
<tr>
<td>7. Parent marital discord</td>
<td>Marital counseling</td>
</tr>
<tr>
<td>8. Possible future pediatric medical problems</td>
<td>Anemia; Delayed Puberty; Hypertension; Slow Growth; Sleep Problems</td>
</tr>
<tr>
<td>9. Possible future adult medical problems</td>
<td>Reproductive Problems, Cancer, Coronary Artery Disease, and osteoporosis. She also is at risk for further cognitive decline and psychopathology</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Neuropsychological Test</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. WISC-V</td>
<td>FSIQ 96; VSI 75</td>
</tr>
<tr>
<td>2. Visual Motor Integration Test</td>
<td>SS 85</td>
</tr>
<tr>
<td>3. Executive Function with the BRIEF-P</td>
<td>Significant problems</td>
</tr>
<tr>
<td>4. Social Emotional functioning with BASC-3</td>
<td>Significant behavior problems with attention and self-regulation of Lily’s adaptive function characteristic of a much younger child</td>
</tr>
<tr>
<td>5. Adaptive behavior</td>
<td>Delayed with SS 75</td>
</tr>
</tbody>
</table>
**DISCUSSION**

Dr. Clifford Mitchell: Ending the historic, persistent impacts of lead poisoning

Dr. Paul Rogers: Lead poisoning effects on neurodevelopment

Dr. Michael Ichniowski: Primary Care aspects: long-term educational and behavioral follow-up

Agency for Toxic Substances and Disease Registry 2017: Case study lead toxicity. ASTDR case WB2832 @ [https://www.atsdr.cdc.gov/csem/csem.html].


Bellinger D. Childhood lead exposure and adult outcome. JAMA March 29, 2017; 317, (2); 1219-1220.

Center for Disease Control and Prevention publication 2002: Managing elevated blood lead levels among young children. March 2002. ( [https://www.cdc.gov/nceh/lead/casemanagement/casemanage_main.htm]).


Krantz BD. The behavior and routes of lead exposure in pregrasping infants. Journal of Exposure Analysis and Environmental Epidemiology 2004; 4 (4); 300-11.
Krantz BD. The behavior and routes of lead exposure in pregrasping infants. Journal of Exposure Analysis and Environmental Epidemiology 2004; 4 (4); 300-11.
Lanphear B. The contribution of lead contaminated house dust and residential soil to children’s blood lead level: a pooled analysis of 12 epidemiological studies. Environmental Research 1998; 79; 51-68.
Lanphear B. Low-level environmental lead exposure and children's intellectual function: an international pooled analysis. Environmental Health Perspective 2005; 113, (7); 894-899.
Lidsky T. Adverse effects of childhood lead poisoning: The clinical neuropsychological perspective. 2006: Environmental Research 100; 284-293.


Reuben A. Association of childhood lead exposure with adult traits and lifelong mental health. JAMA Psychiatry. 2019; 75(4); 418-425.
QUESTIONS?
QI DATA REVIEW

Troy A. Jacobs, MD, MPH, FAAP
Referral to Academic programming

- **Sanchez Pediatrics**
  - Cycle 1 (N = 0)
  - Cycle 2 (N = 0)
  - Cycle 3 (N = 1)
  - Cycle 4 (N = 2)
  - Cycle 5 (N = 0)
  - Cycle 6 (N = 0)
  - Cycle 7 (N = 0)

- **University of Maryland Shore Medical Group-Pediatrics**
  - Cycle 1 (N = 0)
  - Cycle 2 (N = 0)
  - Cycle 3 (N = 1)
  - Cycle 4 (N = 2)
  - Cycle 5 (N = 0)
  - Cycle 6 (N = 0)
  - Cycle 7 (N = 0)

- **Greenspring Pediatric Associates**
  - Cycle 1 (N = 1)
  - Cycle 2 (N = 1)
  - Cycle 3 (N = 0)
  - Cycle 4 (N = 2)
  - Cycle 5 (N = 0)
  - Cycle 6 (N = 0)
  - Cycle 7 (N = 1)

- **MENCHAVEZ Pediatrics**
  - Cycle 1 (N = 2)
  - Cycle 2 (N = 2)
  - Cycle 3 (N = 1)
  - Cycle 4 (N = 4)
  - Cycle 5 (N = 0)
  - Cycle 6 (N = 0)
  - Cycle 7 (N = 0)
**Reflections on PDSAs**

- Focus on practice changes/improvements
- Determine feasibility, acceptability, sustainability, “costs” etc of implementation
- PDSAs can be used: process, project, or study

QUESTIONS?
**FOLLOW-UP AND NEXT STEPS**

- You will receive a follow-up email from MDAAP with:
  - PPT slides from today and a recording of the session
  - Link to the post-session SurveyMonkey

- You will also be contacted by National AAP and MDAAP regarding:
  - Claiming CME and MOC credits
  - Retrospective survey on the Lead Testing ECHO program
THANKS FOR BEING A PART OF THIS ECHO!
THANKS

FOR TAKING CARE OF

OUR MARYLAND KIDS!