A Wisconsin Physician's Guide to

Blood Lead Screening
& Treatment of
Lead Poisoning
in Children

Wisconsin Childhood Lead Poisoning Prevention Program
Bureau of Environmental Health, Division of Public Health,
Department of Health and Family Services
Glossary

Screening for lead poisoning
A screen for lead poisoning is a blood lead test drawn to identify children who need individual interventions to reduce their blood lead level. For example, a blood lead test would be counted as a screen for a child who has never been tested before, or whose previous levels have been less than ten.

Diagnostic test for lead poisoning
A venous blood lead test that is drawn to confirm the results of an elevated screening test.

Follow-up test for lead poisoning
A venous blood lead test that is drawn to monitor the trends of an elevated diagnostic blood lead level.

Reporting blood lead levels
Wisconsin law requires that any person performing blood lead tests on children less than 6 years of age report all results to the Department of Health and Family Services (WI Stat 254.13(2)). The Department works with laboratories to facilitate reporting of blood lead test results; however, it remains the responsibility of each provider to assure that the laboratory they utilize for blood lead analysis is in compliance with the law. HFS 181 (Wisconsin Administrative Rule) outlines in detail the information that must be provided by the physician to the laboratory, and reported to the Department by the lab. (See Appendix)

CLPP(P)
Childhood lead poisoning prevention (program)

BLL
blood lead level

EBL
elevated blood lead level

Risk assessment
A visit to the home by a certified risk assessor (usually from the health department) to identify lead hazards. A written report is prepared that documents the findings and recommends steps to take to control or reduce the lead hazards.

Lead hazard reduction activities
Any actions taken that will reduce or eliminate lead hazards either temporarily (interim controls) or permanently (abatement).

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These recommendations were developed by an Advisory Committee in 1997 and first released to Wisconsin health care practitioners in 1998. The Advisory Committee has representatives from public health, Managed Care Organizations, physicians, and the Wisconsin Medicaid Program.

The Division of Health Care Financing has collaborated with the Division of Public Health Wisconsin Childhood Lead Poisoning Prevention Program in linking program data to determine blood lead testing and lead poisoning among Medicaid eligible children. This linking has demonstrated that Wisconsin Medicaid children are at a higher risk of lead poisoning than non-Medicaid children. This revised booklet clarifies the recommendations to strongly indicate the requirements for lead testing and the funding available for recommended testing.

For questions regarding data about Medicaid eligible children and lead testing, contact

Randall Zirk (608) 266-5478. For questions regarding lead testing, poisoning, and management of lead poisoning contact the Wisconsin Childhood Lead Poisoning Prevention Program (608) 266-5817.
Recommendation for Wisconsin
(Outside the cities of Milwaukee & Racine)

Each family should be asked the 4 Easy Questions when a child is seen for well-child check-ups at around 12 and 24 months of age. A test should be done if any answer indicates a risk of exposure or if the child is on Medicaid. Children receiving Medicaid are considered high risk for lead exposure.

A child between the ages of 36-72 months, with no known history of a blood lead test, should be asked the 4 Easy Questions. A test should be done if any answer indicates risk of exposure or if the child is on Medicaid. If the test result is <10μg/dL, no further testing is needed.

In a clinic setting, the choice could be made to test all children around 12 and 24 months without using the 4 Easy Questions.

Physicians in clinical practice and local health departments are encouraged to collaborate to determine testing, billing and information sharing practices around lead screening and testing.

<table>
<thead>
<tr>
<th>AGE</th>
<th>RECOMMENDATION</th>
</tr>
</thead>
</table>
| 12 months and 24 months | Ask the 4 Easy Questions  
If any one answer indicates a risk of exposure or if the child is on Medicaid—blood lead test now!  
If result is ≥10μg/dL begin Medical Management of EBLs*  
If a child has tested normal (<10μg/dL) at 12 and 24 months, and there is no known increase in lead exposure, further blood lead screening is not recommended.  
36-72 months | If no record of previous test, ask the 4 Easy Questions.  
If any one answer indicates a risk of exposure or if a child is on Medicaid—blood lead test now!  
If result is ≥10μg/dL begin Medical Management of EBLs*  
If result is <10μg/dL, no further testing is needed.  |

*See “Treating a Child for Lead Poisoning”, pp. 6-9
# Blood Lead Screening Guidelines for Wisconsin

**4 Easy Questions**

<table>
<thead>
<tr>
<th></th>
<th>Test if any answer is:</th>
<th>Don’t Test if all answers are</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Does the child now live in or visit a house or building built before 1950 or have they ever in the past? (include places such as day care, home of friends, grandparents or other relatives)</td>
<td>Yes or Don’t Know</td>
</tr>
<tr>
<td>2</td>
<td>Does the child now live in or visit a house or building built before 1978 with recent or ongoing renovations or have they ever in the past? (include places such as day care, home of friends, grandparents or other relatives)</td>
<td>Yes or Don’t Know</td>
</tr>
<tr>
<td>3</td>
<td>Does the child have a brother, sister or playmate who has/had lead poisoning?</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>Is the child enrolled in (or eligible for) Medicaid or WIC?</td>
<td>State and federal Medicaid policies require lead testing of all Medicaid children at around ages 12 and 24 months and between 36-72 months with no previous test.</td>
</tr>
</tbody>
</table>
Recommendations for the Cities of Milwaukee & Racine

"3 before 3"

Each child should have a blood lead test three times before the age of three years; around 12 months, 18 months, and 24 months.

Children between the ages of 36-60 months who are uninsured or receiving Medicaid or WIC should continue with annual blood lead tests through 60 months of age.*

Other children between the ages of 36-60 months should have blood lead tests if there is no record of a previous test, if they live in housing built before 1978 with recent or ongoing renovation, or they have a sibling or playmate who has lead poisoning.

<table>
<thead>
<tr>
<th>AGE</th>
<th>RECOMMENDATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 3 years</td>
<td>Test around 12 months</td>
</tr>
<tr>
<td></td>
<td>Test around 18 months</td>
</tr>
<tr>
<td></td>
<td>Test around 24 months</td>
</tr>
<tr>
<td>3-5 years</td>
<td>Test all children receiving Medicaid*, WIC or who are uninsured at:</td>
</tr>
<tr>
<td></td>
<td>Around 36 months (3 years)</td>
</tr>
<tr>
<td></td>
<td>Around 48 months (4 years)</td>
</tr>
<tr>
<td></td>
<td>Around 60 months (5 years)</td>
</tr>
<tr>
<td>Other 3-5 year olds:</td>
<td>At each age, at each well-child visit:</td>
</tr>
<tr>
<td></td>
<td>• Test if no record of prior test</td>
</tr>
<tr>
<td></td>
<td>• Test if live in or regularly visit house built before 1978 with recent or ongoing renovations before</td>
</tr>
<tr>
<td></td>
<td>• Test if child has sibling or playmate with lead poisoning</td>
</tr>
<tr>
<td></td>
<td>• Test if living in a house built before 1950 (Racine only)</td>
</tr>
</tbody>
</table>

*Screening and rates of lead poisoning in these cities indicates a need for more frequent testing, including the high risk Medicaid population. Annual testing of Medicaid children, as recommended for the cities of Milwaukee & Racine, will be covered by the Wisconsin Medicaid Program, but is not required.
Are Older Children at Risk for Lead Poisoning?

Older children (over 72 months) generally no longer display the age-related behavior (crawling, mouthing, hand-to-mouth activity) that increases exposure to lead dust and paint chips. In addition, it is assumed that the brain at this age is less vulnerable to lead toxicity. Therefore, routine screening is not recommended for children older than 6 years. However, children over 6 who present for a clinic visit may warrant screening if they continue to exhibit excessive mouthing behavior or for whom an exposure to lead is reported.

Are There Other Times When Blood Lead Testing is Recommended?

In addition to recommended routine screening, BLL screening is also indicated when:

- A child’s likelihood of exposure has increased. For example, if a family has moved to an older home, or has begun a remodeling project in a pre-1978 home.
- Parents have knowledge of a child’s lead exposure and request screening. If parents express concern about their child’s potential exposure from any source, a blood test should be done.

What Every Family Needs to Know

Every family with children less than 2 years old should be provided with the following information. This knowledge can help them take steps to prevent their children from being lead poisoned. Followed by screening, this is the first and most important intervention physicians can provide to their patients and families.

1. The highest lead poisoning risk for children is exposure to lead paint dust and chips from lead paint in old houses.
2. Lead poisoning can have long-term effects on learning and behavior.
3. Most children who are lead poisoned show no symptoms. The only sure way to know is to have a blood lead test done.
4. The best treatment for lead poisoning is to get rid of the source of lead.
5. Wash children’s hands frequently—especially before eating and napping and after play.
6. Good nutrition—foods high in calcium, iron, and vitamin C, and low in fat—can help keep lead out of a child’s blood.
7. Use a wet rag, paper towels, or mop to wash dust and loose paint chips from window wells, woodwork, and floors. Use household detergent and rinse with clean water. Clean dust rags separately from other laundry or throw away.
Monitoring Blood Lead Levels

If the blood lead level on routine screening is elevated, a venous blood lead test should be obtained in the following time period:

<table>
<thead>
<tr>
<th>If the screening test is:</th>
<th>Obtain a diagnostic venous test in:</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-19 ug/dL</td>
<td>3 months</td>
</tr>
<tr>
<td>20-44 ug/dL</td>
<td>1 week to 1 month*</td>
</tr>
<tr>
<td>45-69 ug/dL</td>
<td>24-48 hours*</td>
</tr>
<tr>
<td>≥70 ug/dL</td>
<td>IMMEDIATELY</td>
</tr>
</tbody>
</table>

*The higher the screening blood lead level, the more urgent the need for a diagnostic test.
Use of Serial Blood Lead Levels and Erythrocyte Protoporphyrin Levels

With chronic or prolonged lead exposure, the BLL represents only 1-2% of the lead in the body; the majority of the lead is in the tissue and the bone. Erythrocyte protoporphyrin (EP) can provide additional information on body tissue levels.* For example, a child with a BLL of 33 and an EP of 200 has a much higher total body burden of lead than a child with a BLL of 33 and an EP of 30 or 40. This indicates more than an acute, one-time exposure to the source of lead poisoning.

After medical (chelation) and/or environmental (risk assessment and hazard reduction) treatment has been initiated, EP levels should be drawn along with follow-up BLLs. Because of the steady state of equilibrium of bone lead with blood lead, it can be very frustrating to monitor the slow decreases in a BLL. The EP, however, should continue to decline as the body tissue lead stores are being depleted, even if the BLL remains steady, rebounds, or drops at a slow rate because of the reequilibrium between blood and tissue. If the EP and the BLL rise after treatment, this would indicate a new exposure to lead.

Serial EP and blood lead levels are important components in the treatment of children with blood lead levels ≥20μg/dL. Combined with the BLL, EP indicates the extent of the total body burden of lead and is useful post-chelation to follow progress in decreasing the total body lead burden and ensuring no new lead exposure.

* Iron deficiency and hemolytic anemia will also cause an elevated EP, so these must be ruled out.

Treatment for Lead Poisoning

Early interventions, often in the form of determining the source of lead exposure and teaching the family how to avoid it, can have a great impact on preventing the BLL from rising. Ongoing evaluation of the child and referral for supportive programs as needed can decrease the long-term effects on learning and behavior.

There are treatment plans that physicians can initiate at all blood lead levels. The following pages list steps in the medical management of lead poisoned children linked to the blood lead level. All interventions applied at the lowest BLL range should be included at higher levels, with additional services added as the BLL rises.

Margaret Layde, M.D., Associate Director, Downtown Health Center in Milwaukee (414) 277-8900 is available to physicians/health care providers throughout the state for consultation on treating children with elevated blood lead levels.
Medical Management of Elevated Blood Lead Levels
Interventions listed in bold type are explained in more detail on the pages that follow. These interventions are building blocks; as the blood lead level rises, interventions are added to those already used.

10-19 ug/dL
• Educate the family about lead poisoning and identify possible sources of exposure
• Educate the family about steps they can take to decrease lead exposure
• Refer to Public Health
• Evaluate iron status and treat as needed
• Follow-up test: 2-3 months
• If two or more tests are 15-19 ug/dL, treat as if the BLL is ≥ 20 ug/dL
• Long-term follow-up

20-44 ug/dL
• Diagnostic evaluation for lead
• Serial BLL and EP levels
• Follow-up test: Every 1-2 months until ending criteria** are met

45-69 ug/dL
• Treatment with chelation
• Follow-up test: 10-14 days post chelation; weekly for 6-8 weeks; monthly for 4-6 months, every 1-2 months until ending criteria** are met

70ug/dL
THIS IS A MEDICAL EMERGENCY
• Arrange for treatment in a facility with pediatric ICU capabilities

**Criteria for Ending Blood Lead Testing
The Centers for Disease Control and Prevention (CDC) recommends that for a child with lead poisoning, the frequency of blood lead testing can be decreased when all of the following criteria are met:
• The BLL has remained <15µg/dL for 6 months
• Lead hazards have been removed
• There are no new exposures.

Blood lead tests should then be obtained regularly (about every 3 months) until 36 months of age, then as needed.
Components of Medical Management

Educate the family
Tell the family what the blood level is, about lead poisoning and its effects. Provide information about lead sources and the following strategies to decrease lead exposure:
- Provide foods high in iron, calcium and Vitamin C and low in fat to slow the absorption of lead into the blood.
- Wash child's hands frequently, especially before eating, napping and after play.
- Supervise where and what children play with to monitor for lead exposure. Wash toys that are mouthed frequently.
- Keep areas where the child spends time free of lead dust and paint chips by regular wet cleaning.

Refer to Public Health
Names and addresses of all children with blood levels ≥10 μg/dL should be referred to the local public health department. They will assure information is provided to them on:
- Follow-up blood lead testing schedules
- Possible sources of lead hazards
- Steps parents can take to decrease lead exposure and/or toxicity

Public health staff will provide the following services to families of children with diagnostic blood levels ≥20 μg/dL or with two levels of 15-19 μg/dL:
- Environmental investigation of the child's home by a certified risk assessor to identify sources of lead exposure
- Nursing case management and follow-up with the family

Diagnostic Evaluation for Lead
A full diagnostic evaluation for lead includes the following information:
- History of clinical symptoms
- Nutritional status, including diet history
- Assessment of lead exposures
- Previous blood lead levels and family history of lead poisoning
- Complete age-appropriate physical exam with special attention to hearing, neurology, speech and language, developmental assessment.

Treatment With Chelation
Chelation is recommended for BLLs of ≥45 μg/dL; chelation at lower BLLs is under study. A child must be in a lead-safe environment during and after chelation as lead absorption may be increased during chelation therapy. Consultation with state and local health department childhood lead poisoning prevention programs is strongly recommended to facilitate environmental assessment and follow-up (see “Resources” for contact phone numbers).

At BLLs of 45-69 μg/dL, commonly used chelating agents are Calcium EDTA or succimer. At BLLs ≥70μg/dL, Calcium EDTA with BAL is recommended. Re-treatment may be necessary depending on blood lead test results 7-21 days post chelation.

Serial EP and BLL levels will be helpful in monitoring post chelation blood lead trends to determine if an elevation is due to rebound or re-exposure.

Long-Term Follow-up
Lead poisoning can result in a chronic condition that requires regular assessment. Lead can affect a child's behavior and ability to learn. These effects may be subtle or may not become apparent until the child is in a structured learning setting. As pre-school and school-age years approach, continue to assess for learning delays, need for early intervention, other educational support or behavioral modification programs.

A Wisconsin Physician's Guide to Blood Lead Screening and Treatment of Lead Poisoning in Children
Resources for Childhood Lead Poisoning Prevention & Treatment

Wisconsin Childhood Lead Poisoning Prevention Program (608) 266-5817
Milwaukee Health Department – Childhood Lead Poisoning Prevention Program (414) 286-5987
Racine Health Department – Childhood Lead Poisoning Prevention Program (414) 636-9201
Margaret Layde, M.D. Downtown Health Center, Milwaukee (414) 277-8900
The National Lead Information Center 1-800-424-LEAD
Wisconsin Citizen Action Parents Against Lead Task Force (414) 272-2562
HUDS Healthy Home Hotline 1-800-HUDs-FHA
EPA Lead Hotline 1-800-Lead FYI


“Preventing Lead Poisoning in Young Children”, Centers for Disease Control and Prevention, Atlanta: CDC, 1991.

Wisconsin law specifies the information about the patient and how the sample was collected, along with reporting time periods. The health care provider submitting a sample of blood for lead analysis must provide the information specified in the law to the laboratory. The Department works with laboratories to facilitate blood lead test reporting, including this information. Refer to HFS 181.06, WI Adm. Code for complete information on reporting of blood lead tests.

The following information about the patient:
- First name, middle initial and last name
- Month, day and year of birth
- Gender, male or female
- Race: Z=unknown, W=White, B=Black, A=Asian, N=Native American, O=Other
- Ethnicity Z=unknown, H=Hispanic, N=Non-Hispanic
- Street address must be provided, if available. A post office box is not an acceptable alternative
- Medical assistance number, if applicable
- Name and address of the patient's physician, if other than the provider drawing the blood sample

The following information about the blood lead sample:
- Month, date and year the blood sample was collected
- Method of blood sample collection, venous or capillary

For a patient under 18 years of age:
- Parent or guardian's first name, middle initial, and last name
- Parent's or guardian's area code and phone number

For a patient 16 years of age or older who is employed:
- The occupation, the employer's name, street address, city or town, state and zip code

The following information about the health care provider submitting the blood sample:
- The name of the provider's facility or practice
- Street address, city or town, state, zip code
- Area code and phone number

For detailed information on current requirements for reporting of blood lead levels to the Department of Health and Family Services, contact the Wisconsin Childhood Lead Poisoning Prevention Program at (608) 266-5817.
**APPENDIX**

**SOURCES OF LEAD EXPOSURE**

**Traditional Remedies/Cosmetics**

*Used:*

In Latino communities for abdominal pain called empacho (yellow/orange powders): alarcon, azarcon, cora, greta, liga, rueda

In Asian Indian communities for intestinal disorders: ghasard (brown powder), bali goli (flat black bean), kandu (red powder)

In Hmong communities for fever or rash: pay-loo-ah (red powder)

In Arab communities as a cosmetic, treatment for skin infections and umbilical stump: kohl or alkohl (powder)

If possible, obtain a sample of the product. Samples can be analyzed at the State Occupational Health Laboratory, **608/224-6210.**

**Occupations/Industries With Potential Lead Exposure**

Ammunition/explosives maker
Auto repair/mechanic
Auto body work
Battery maker
Building or repairing ships
Cable/wire stripping, splicing, or production
Construction
Ceramics worker (pottery, tiles)
Chemical plant worker
Firing range worker
Leaded glass factory worker
Industrial machinery/equipment
Jewelry maker or repair
Junkyard employee
Lead miner
Melting metal (smelting)
Painter
Paint/pigment manufacturing
Plumbing
Pouring molten metal (foundry work)
Radiator repair
Remodeling, repainting, or renovating houses or buildings
Removing paint (sandblasting, scraping, sanding, using a heat gun or torch)
Salvaging metal or batteries
Welding, burning, cutting or torching
Steel metalwork
Tearing down buildings or metal structures (demolition)

Occupational exposure can be investigated by the U.S. Department of Labor/OSHA or the Wisconsin Division of Public Health, **608/266-0417**

**Hobbies With Potential For Lead Exposure**

(hobbies may include the previously listed occupations)

Remodeling, repairing or renovating home
Removing paint or varnish from furniture
Stripping/painting bicycles, cars or boats
Soldering lead pipes or plumbing repair
Working on car near the home
Melting lead for fishing sinkers or bullets
Soldering electric parts or jewelry
Applying glaze to pottery or ceramic objects
Making stained glass
Using artist's paints for pictures or jewelry
Firing guns at a shooting range
For further information contact:

Wisconsin Childhood Lead
Poisoning Prevention Program
Division of Public Health
Bureau of Environmental Health
P.O. Box 2659
Madison, WI  53701-2659
608/266-5817