Delaware Division of Public Health
Department of Health and Social Services

Guidelines for Screening and Management of Blood Lead Levels at or above the Blood Lead Reference Value in Children

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Purpose

Lead exposure is a significant public health concern, particularly in areas with older housing stock and socioeconomic disparities. The goal of Delaware Division of Public Health's (DPH) Childhood Lead Poisoning Prevention Program (CLPPP) is to reduce adverse health effects through prevention, early identification, and early intervention.

The purpose of this guideline is to serve as a resource for providers in Delaware working to prevent, screen, diagnose, and manage lead poisoning in children. It is important to note that each child is unique, and their circumstances are different. Providers are to use their best clinical judgement in making management decisions for their patients using a shared decision-making approach that takes into account evidence-based practice, and the values and specific circumstances of patients and their families.

Background

- **Lead Exposure Risks in Delaware**: A significant proportion of Delaware's housing stock was built before 1978 (when lead-based paint was banned). Children living in pre-1978 housing are at risk for elevated blood lead levels from paint. Other sources of lead exposure include (but are not limited to) contaminated soil, leaded water pipes, and imported products.
- **Health Effects**: No safe level of lead exposure exists for children. Blood lead levels (BLLs) ≥3.5 µg/dL are associated with neurodevelopmental delays, reduced IQ, behavioral issues, and learning difficulties.
- **CDC Reference Value**: The Centers for Disease Control and Prevention (CDC) uses a blood lead reference value (BLRV) of **3.5 µg/dL** to identify children for whom intervention may be required.
- **Delaware Context**: The DPH CLPPP supports screening, surveillance, and environmental interventions. Clinical Providers are critical partners in this effort.

Screening Recommendations

Universal Screening:

In keeping with federal guidelines, all Medicaid-enrolled children must have their BLL tested at age 12 months and 24 months (or 24-72 months if they have never been screened).

Additionally, the Delaware Division of Public Health requires:

1. Screening at ages 12 and 24 months for all children.
2. Screening of all children at least once before age 72 months.

DPH also recommends:

3. Screening of children (under age 18) who do not have a record of prior BLL screening (such as those who moved to Delaware as older children).
4. Testing of all children at any age who have signs and symptoms suggestive of lead poisoning.
5. Repeat testing of children who are at new or ongoing risk of exposure to lead (see risk factors below). The timing and frequency of testing will be determined by the clinician based on assessment of ongoing exposure risk.

Lead Poisoning Risk Factors

Certain risk factors have been identified for elevated BLL and include:

- Living in or regularly visiting homes built before 1978, especially pre-1950 homes.
- Sibling or playmate with elevated BLL.
- Recent immigrant, refugee, or foster care status.
- Parent/caregiver with occupational or hobby-related lead exposure (e.g., construction, painting, battery recycling).
- Use of imported foods, spices, cosmetics, or remedies.
- Pica behavior or neurodevelopmental conditions.

Screening for BLL

Initial screening

- Follow proper blood collection techniques such as CDC's *Mission Unleaded* protocol.
- Use capillary blood (finger-prick) or venous blood for initial screening.

Confirmatory Testing:

BLL at or above the BLRV from a capillary sample:

Confirm **all capillary results (≥3.5 µg/dL)** with either one of:

- Venous blood draw.
- Repeat capillary testing.

If an initial capillary test returns a BLL at or above the BLRV, providers should perform a confirmatory test following the time intervals in Table 1 below.

A confirmatory test may be done by repeat capillary testing or by venous blood draw. Capillary testing for confirmation should be considered for patient factors (such as the patient is deemed likely not follow through with venous blood draw), or provider/facility factors such as access to phlebotomists able to obtain venous samples from young children.

Table 1: Recommended interval for confirmatory BLL testing (venous/capillary)

Initial (Screening			
Capillary	3.5–19 µg/dL	Within 1 month or less	Capillary or Venous
Capillary	≥20 µg/dL	Within 1 week or less	Capillary or Venous
Capillary	≥45 µg/dL	Within 48 hr. or less	Capillary or Venous
Venous	Any level	No confirmatory test needed. Take action if needed based on the result	N/A

BLL at or above the BLRV from venous sample:

Confirmatory testing is not needed if an initial screening venous BLL is elevated above the BLRV. Instead, the provider should take appropriate action to manage the elevated BLL (See Table 2 "management" below).

History and Physical Exam

History and Physical Exam are crucial components of screening for lead poisoning and identifying those at risk for lead poisoning. A proper history and exam should be taken on all children below 6 years of age (but particularly in those with laboratory or symptomatic evidence suggestive of lead poisoning). The purpose of this is to:

- Identify potential lead sources (e.g., housing, water, parental occupation, imported products) that the child may be exposed to.
- Identify other family members/siblings with history or symptoms suggestive of lead poisoning.,
- Assess for signs and symptoms of lead poisoning (may include irritability, fatigue, and developmental delays).
- Evaluate for comorbidities like iron deficiency or other anemia.

Appendix 1 provides a list of questions that can be used to evaluate for lead exposure.

Additional Testing

Additional testing may be needed based on patient's clinical presentation and may include (but not be limited to):

- For BLL≥20 µg/dL, consider an **abdominal X-ray** to check for ingested lead-based paint chips, especially in children with pica.
- Test for **iron deficiency** (ferritin, hemoglobin).

Recommended Management Based on Blood Lead Level

Table 2: Recommended Actions Based on Blood Lead Levels
(Adapted from CDC and AAP)

BLL(µg/dL)	Actions
<3.5 **µg/dL (CDCs BLRV)**	**Provider responsibilities** • Provide education about common sources of lead exposure and information on how to prevent exposure • During well-child visits, check development to make sure age-appropriate milestones are being met. • During well-child visits, discuss diet and nutrition with a focus on iron and calcium intake. • Conduct follow-up blood lead testing at recommended intervals based on the child's age. • Submit all child blood results and patient information to DPH in accordance with DE regulations. **DPH CLPPP Responsibilities** • Upon request, provide educational materials to provider offices for distribution to patients/families.
3.5–9 **µg/dL**	**Provider responsibilities** • Follow the recommendations above for BLL at or above the BLRV of 3.5 µg/dL. • Obtain an environmental exposure history to identify potential sources of lead and counsel the family on how to minimize exposure. • Screen the child for iron deficiency and manage as appropriate. • Discuss the child's diet and nutrition with a focus on calcium and iron intake. Refer caregivers to supportive services, as needed (e.g., Special Supplemental Nutrition Program for Women, Infants, and Children). • Assess child's developmental milestones and refer to services as needed. • Report all blood lead results (including patient information and test information) to the DPH CLPPP by phone at 302-744-4546 (option 5) or by email to DELeadprogram@delaware.gov (If initial screening was by capillary sample), perform a confirmatory test within one month or less. A confirmatory

	test is not required if initial screening was done on a venous sample. • Provide follow-up BLL testing at recommended intervals. See the schedule shown in Appendix 3. **<u>DPH CPPP responsibilities</u>** • DPH will mail educational information to families of all children with confirmed and unconfirmed Blood Lead level at or above the BLRV • For confirmed cases at or above the BLRV, DPH case managers will contact families and perform case intake, gather information regarding the child and conditions that may cause lead exposure, provide education to the families and encourage follow-up testing. • DPH case managers will help in referring children to developmental intervention and nutrition services. • Arrange for a lead paint and drinking water investigation of the home to identify potential sources of lead, if built prior to 1978. • DPH coordinates home inspections, remediation, and abatement, as appropriate. • Monitor follow-up testing and provide consultation, as needed.
10–19 **µg/dL**	**<u>Provider responsibilities</u>** • Follow the recommendations above for BLL 3.5-9µg/dL. **<u>DPH CLPPP responsibilities</u>** • Perform all tasks outlined above for BLL ≥3.5 µg/dL. • Arrange for an environmental investigation of the home to identify potential sources of lead (prioritized for persons with a BLRV≥ 15 µg/dL).
20–44	**<u>Provider responsibilities</u>** • Follow recommendations above for BLL 3.5–19 µg/dL; and • Perform a complete history and physical exam, assessing the child for signs and symptoms related to lead poisoning; and • Consider performing an abdominal X-ray to check for lead-based paint chips and other radiopaque foreign bodies. This is important for young children who tend to swallow or eat non-food items.

	• Contact a Pediatric Environmental Health Specialty Unit (PEHSU). PEHSUs provide information on protecting children and reproductive-age adults from environmental hazards. Delaware is in PEHSU region 3 (Housed at Villanova University) and the PEHSU may be reached by calling: ➔ **Phone**: 610-519-3478 ➔ **Toll-Free**: 833-362-2243 • Call the Poison Control Center (1-800-222-1222) for guidance or refer the child to a tertiary hospital center, particularly if presenting with signs/symptoms of lead poisoning, as bowel decontamination and/or chelation therapy may be indicated. • Follow recommendations above for a BLL 3.5–19 µg/dL related to nutrition and prevention counselling. ➔ Depending on the status of the child, this may be done during the same visit or during subsequent visits. Importantly, providers should reiterate prevention and nutrition counselling points to parents/patients on an ongoing basis over time • Prioritize (same day) reporting results to DPH and refer the family to DPH for an environmental investigation of the home and a lead hazard reduction program. Call to report by phone at 302-744-4546. Call to report even if results have been sent in by fax or through the lead portal. • Fax/email results to DPH CLPPP by phone at 302-744-4546 or by fax to 302-739-3839 or by email to DHSS_DPH_Lead_Questions@delaware.gov. • (If initial screening was by capillary sample), perform a confirmatory test within one week or less. A confirmatory test is not required if initial screening was done on a venous sample. • Following initial management of the patient, continue to provide follow-up visits to assess patient status and to provide BLL testing at recommended intervals. See the schedule shown in Appendix 3. **DPH CLPPP responsibilities** • Treat case as a matter of urgency- Prioritize over cases with lower BLL.

	• Connect with the family to obtain an environmental exposure history to identify potential sources of lead. • Arrange for an environmental investigation of the home to identify potential sources of lead. • Ensure that other children in the household get screened for elevated BLL and connected to care. • Work with stakeholders to connect the child to resources/programs that would help prevent ongoing exposure of the child to lead sources. Stakeholders include, but are not limited to parents, schools, and other state agencies.
≥45	**Provider responsibilities** • Perform a complete history and physical exam, assessing the child for signs and symptoms related to lead poisoning. • Call the Poison Control Center (1-800-222-1222) for guidance and/or refer the child urgently to a tertiary hospital center for further management. • If time permits and the patient will not be immediately transferred to a tertiary center, consider performing an abdominal X-ray to check for lead-based paint chips and other radiopaque foreign bodies. • Prioritize (same day) reporting results to DPH and refer the family to DPH for an environmental investigation of the home and a lead hazard reduction program. Call to report by phone at 302-744-4546. Call to report even if results have been sent in by fax or through lead portal. • Fax/email results to DPH CLPPP by phone at 302-744-4546 or by fax to 302-739-3839 or by email to DHSS_DPH_Lead_Questions@delaware.gov. • Contact a Pediatric Environmental Health Specialty Unit (PEHSU). PEHSUs provide information on protecting children and reproductive-age adults from environmental hazards. Delaware is in PEHSU region 3 (Housed at Villanova University), and the PEHSU may be reached by calling: ➔ **Phone**: 610- 519-3478 ➔ **Toll-Free**: 833- 362-2243 • Following initial management of the patient, continue to provide follow-up visits to assess the patient's status and to provide BLL testing at recommended intervals. See the schedule shown in Appendix 3. • Follow recommendations above related to nutrition and prevention counselling.

	➔ Depending on the status of the child, this may be done during the same visit or during subsequent visits. Importantly, providers should reiterate prevention and nutrition counselling points to parents/patients on an ongoing basis over time. **DPH CLPPP responsibilities** • Treat case as a matter of urgency- Prioritize over cases with lower BLL. • Connect with the family to obtain an environmental exposure history to identify potential sources of lead. • Arrange for an environmental investigation of the home to identify potential sources of lead. • Ensure that other children in the household get screened for elevated BLL and connected to care. • Work with stakeholders to connect the child to resources/programs that would help prevent ongoing exposure of the child to lead sources. Stakeholders include, but are not limited to parents, schools, and other state agencies.

Prevention of Childhood Lead Poisoning

Primary Prevention:

- Educate families on reducing exposure:
  - Regular handwashing, especially before meals.
  - Wet cleaning of floors, windowsills, and surfaces.
  - Avoiding peeling paint and ensuring lead-safe renovations (EPA-certified contractors).
  - Testing home water for lead (contact DPH or local water utility).
  - Avoiding imported spices, cosmetics, or remedies.

- Promote a diet rich in iron, calcium, and vitamin C.

Environmental Intervention:

- Refer all cases with a BLL at or above the BLRV (≥3.5 µg/dL) to the DPH CLPPP (302-744-4546) for environmental investigation and remediation.
- DPH coordinates home inspections, remediation, abatement, and lead-safe housing resources.

Nutritional Support:

- Address iron deficiency with supplementation (per AAP guidelines).
- Ensure adequate calcium and vitamin C intake.
- Refer to the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) for nutritional support if needed.

Special Populations

1. **Pregnant Women and Newborns**:
    - Screen pregnant women at the first prenatal visit in high-risk areas.
    - If maternal BLL ≥5 µg/dL, monitor newborn BLL at birth and follow up and
        - Counsel mother on lead poisoning prevention, including (but not limited to) avoiding certain imported spices, remedies, and
        - Refer to DPH for environmental investigation.
2. **Immigrants and Refugees**:
    - Screen all immigrant/refugee children within 90 days of arrival.
    - Use culturally appropriate education materials (available via DPH).

Contact Information for Local Resources

- **Delaware Division of Public Health Lead Poisoning Prevention Program**: 302-744-4546 option 5 | [Lead Poisoning Prevention Program – Delaware Health and Social Services – State of Delaware – Division of Public Health]
- **Pediatric Environmental Health Specialty Unit (PEHSU) – Region 3**: 1-888-227-5921 | [PEHSU Region 3 - PEHSU - Pediatric Environmental Health Specialty Units]

- **Poison Control Center**: 1-800-222-1222
- **CDC Childhood Lead Poisoning Prevention**: www.cdc.gov/nceh/lead
- **AAP Lead Exposure Resources**: www.aap.org/lead
- **Delaware Lead-Safe Housing Resources**: Contact DPH for certified contractors and financial assistance.

Document Review Schedule

This guideline will be reviewed every two years or as new evidence emerges from the CDC, AAP, or Delaware-specific data.

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Appendix 1: Lead Exposure Risk Questionnaire

Administer at well-child visits (6 months–6 years).

This questionnaire is intended to be used to identify when it would be appropriate to administer additional blood lead testing to children. This is not to be used to circumvent the legal requirements to test Delaware children at 12 and 24 months, and at least once before 72 months of age.

Dependent upon the answers provided by parents/guardians to the following questions, providers should consider ordering a blood lead test.

Providers should obtain information from parents to identify whether:

1. Child lives in or regularly visits a home built before 1978?
2. Child's sibling or playmate ever had a blood lead level at or above the BLRV?
3. Child has a parent/caregiver/household member with a job or hobby involving lead (e.g., construction, painting, battery recycling)?
4. Child uses imported foods, spices, cosmetics, or remedies?
5. Child exhibits pica behavior?
6. Child has a neurodevelopmental condition?
7. Child a recent immigrant, refugee, or in foster care?
8. Child has ever had any prior screening done for lead levels?

Appendix 2: Delaware's Zip Codes with the Highest Risk of Childhood Lead Poisoning

Based on historical data, the zip codes below have had the highest rates of childhood lead poisoning. However, even children outside of these zip codes may have lead poisoning.

- 19805, 19802, 19801 (Wilmington)
- 19901, 19904 (Dover)
- 19702 (Newark)
- 19720 (New Castle)
- 19701 (Bear)
- 19973 (Seaford)
- 19947 (Georgetown)

Appendix 3: Schedule for follow-up blood lead testing

(From Recommended Actions Based on Blood Lead Level | Childhood Lead Poisoning Prevention | CDC) Accessed 5/5/25

Following a test confirming a BLL at or above the BLRV, interventions to address the elevated BLL should begin immediately. Children should then be retested as noted below to ensure that BLL is decreasing:

Schedule for follow-up blood lead testing

Venous blood lead levels (µg/dL)	Early follow up testing (2–4 tests after initial test above specific venous BLLs)	Later follow up testing after BLL declining
≥3.5–9	3 months*	6–9 months
10–19	1–3 months*	3–6 months
20–44	2 weeks–1 month	1–3 months
≥45	As soon as possible	As soon as possible

Note: changes in BLLs due to seasonal weather changes may be more apparent in colder climate areas. Greater exposure in the summer months may necessitate more frequent follow ups.

*Some case managers or healthcare providers may choose to repeat blood lead tests on all new patients within a month. Repeated testing may confirm that the child's BLL is decreasing.