

Childhood Lead Exposure and Poisoning

Medical Management Recommendations

- There is no safe level of lead in the blood. The CDC reference for an elevated blood lead level (BLL) is 5 µg/dL.
- Exposure to lead can have a wide range of effects on a child's development and behavior.
- Any BLL of 5 µg/dL or higher requires intervention to prevent further lead exposure and increase in blood lead levels.
- Any capillary blood lead level ≥5 µg/dL should be confirmed with a venous blood lead test.

Recommended Schedule for Obtaining Confirmatory Venous Test After Capillary Test

Capillary BLL	Confirm Capillary Test with Venous Blood Test:
0 – <5 µg/dL	No confirmation needed. Repeat test according to DHHS Blood Lead Screening Plan.
5 – 9 µg/dL	Within 3 months*
10 – 44 µg/dL	Within 1 month*
45 – 69 µg/dL	Within 24 - 48 hours*
≥ 70 µg/dL	Immediately as an emergency test*

*The higher the BLL on a screening test, the more urgent the need for confirmatory testing.

Medical Management Recommendations for Confirmed Blood Lead Levels

Confirmed BLL	Follow-up Venous Test Schedule	Recommended Actions Based on Confirmed Venous BLL
< 5 µg/dL	No follow-up needed. Continue to test according to DHHS Blood Lead Screening Plan	<ul style="list-style-type: none"> • Review lab results with family. For reference, the geometric mean blood lead level for children 1-5 years old is less than 2 µg/dL. • Repeat blood lead level in 6-12 months if the child is at high risk or risk changes during the timeframe. • Provide anticipatory guidance and discuss common lead exposure sources. Paint in homes built prior to 1978 is most common source of lead exposure.
5 – 9 µg/dL	Within 1-3 months* Long-term follow-up: 6-9 months**	<ul style="list-style-type: none"> • Provide education: environmental lead sources, potential health effects, importance of follow-up testing, and preliminary advice on reducing exposures. • Monitor blood lead level until BLL is <5 µg/dL and lead exposures are controlled.
10 – 14 µg/dL	Within 1-3 months* Long-term follow-up: 3-6 months**	<ul style="list-style-type: none"> • Screen for iron deficiency with appropriate laboratory testing (CBC, ferritin). • Provide nutritional counseling related to iron, calcium, and vitamin C. Encourage consumption of fruit and iron-enriched foods. Consider multivitamin with iron. • Perform structured developmental screening evaluations at child health maintenance visits, as lead's effect on development may manifest over years.
15 – 19 µg/dL	Within 1-3 months* Long-term follow-up: 1-3 months **	<ul style="list-style-type: none"> • Consider abdominal x-ray based on the environmental investigation and history (e.g. history of pica or excessive mouthing behaviors). • Consider testing other children in the home who may be exposed.
20 – 44 µg/dL	Within 2-4 weeks* Long-term follow-up: 1-3 months**	<ul style="list-style-type: none"> • Refer confirmed BLLs ≥10 µg/dL to state or local health department for environmental investigation. • Refer family to services as needed and if eligible: WIC; home visitation; early development/early intervention if developmental delays diagnosed or suspected.
45 – 69 µg/dL	Within 1 week or as medically indicated*	<p>URGENT: Follow guidance above, plus:</p> <ul style="list-style-type: none"> • Oral chelation therapy as indicated. If chelating, consider hospitalization if a lead-safe environment cannot be assured. • Chelation should be done in consultation with an expert. Contact Pediatric Environmental Health Specialty Unit (1-800-421-9916) or Poison Control Center (1-800-222-1222).
≥ 70 µg/dL	As soon as possible*	<p>MEDICAL EMERGENCY: Hospitalize and provide chelation therapy once confirmed with venous blood lead test. Contact Pediatric Environmental Health Specialty Unit (1-800-421-9916) or Poison Control Center (1-800-222-1222).</p>

*The higher the venous blood lead level, the more frequent follow-up testing is needed.

**Long-term follow-up should only begin after first 2-4 tests, blood lead levels are declining, and child is in a lead-safe environment.

Lead Exposures and Health Risks in Children

- **Blood levels at or below 10 µg/dL** are associated with a wide range of subclinical effects on a child's development and behavior, such as inattention, hyperactivity, and decreased cognitive function.
- **Even levels at or below 5 µg/dL** are associated with decrements in cognitive functions, as measured by IQ scores and academic performance.
- At blood lead levels >40 µg/dL, clinically evident effects such as anemia, abdominal pain, nephropathy, and encephalopathy can be seen. Lower blood lead levels may cause adverse effects on the central nervous system, kidney, and hematopoietic system.
- Lead exposure can be viewed as a lifelong exposure, even after blood lead levels decline. Bone acts as a reservoir for lead.
- Childhood lead exposure has potential consequences for adult health and is linked to hypertension, renal insufficiency, and increased cardiovascular-related mortality.

Managing Elevated Blood Lead Levels in Children

Management for lead exposure should be provided for all children with a confirmed BLL of 5 µg/dL or higher to prevent increases in lead levels. While there are many sources of lead, most children with elevated BLLs live in or regularly visit a home with deteriorating lead paint. Successful management and/or treatment depends on eliminating the child's exposure. Primary management of lead exposure includes:

1. Finding and eliminating the source of the lead;
2. Instruction in personal and household hygiene measures;
3. Optimizing the child's diet and nutritional status;
4. Close follow-up, including repeat testing to monitor blood lead level.

Sources of Lead

Paint and Dust	Occupations and Hobbies	Soil and Water	Cultural/Other Sources
<ul style="list-style-type: none"> • Chipping or peeling lead paint and its dust is the most common source of lead exposure • Homes built before 1978 may contain lead-based paint • Even tiny amounts of dust from lead paint can cause a child's blood lead levels to rise • Renovation creates large amounts of hazardous lead dust • Exposures can occur at home, daycare, or a relative's home 	<ul style="list-style-type: none"> • Lead dust can be brought home from household member's job or hobby: • Making items that contain lead: bullets, batteries, stained glass • Foundries and scrap metal • Indoor firing ranges, reloading shotgun shells, bullet casting • Construction, painting, remodeling, or demolition 	<ul style="list-style-type: none"> • Bare soil, especially in areas near old homes, industrial sites, or busy roads • Lead paint can contaminate soil around perimeter of house • Lead can enter drinking water as it passes through household plumbing. Homes built before 1986 may have lead in plumbing. 	<ul style="list-style-type: none"> • Traditional or folk medicines • Imported cosmetics, especially kohl/surma, sindoor, or kumkum • Spices brought in or sent from other countries. • Glazed ceramic cookware and food storage containers • Exposure that occurred in another country

Lead Poisoning Prevention Tips for Families

- **Keep children away from lead:** Find lead sources in home. Keep children away from peeling, chipping paint and contaminated soil. Homes built before 1978 can be tested for lead by a certified inspector or using a test kit from a home improvement store.
- **Wash hands, toys, and floors often:** Wash children's hands often, especially before meals and sleeping. Wash toys often. Routinely wet wipe/wet dust floors, tables, and windowsills to remove lead dust.
- **Renovate safely:** Renovation in older homes can create hazardous lead dust. Make sure lead-safe work practices are used.
- **Serve healthy foods:** Provide regular meals and foods rich in iron, calcium, and vitamin C.
- **Avoid products that might contain lead:** Avoid using home remedies, spices, and cosmetics brought or sent from other counties. Avoid using imported pottery and ceramics for food and drinks if you don't know if it contains lead.

For More Information

- Nebraska DHHS Childhood Lead Poisoning Prevention Program: Call 1-888-242-1100 (option 3) or www.dhhs.ne.gov/lead.
- Douglas County Health Department: Call 402-444-7825 or www.douglascountyhealth.com
- Greater Nebraska: Contact local public health department: Find LHD contact information at: www.dhhs.ne.gov/lhd.

References

- AAP, 2016. Prevention of Childhood Lead Toxicity. Pediatrics. 2016;138(1):e20161493. <https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/lead-exposure/>
- Advisory Committee for Childhood Lead Poisoning Prevention, 2012. Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention. https://www.cdc.gov/nceh/lead/acclpp/blood_lead_levels.htm
- Pediatric Environmental Health Specialty Units, 2013. Recommendations on Medical Management of Childhood Lead Exposure and Poisoning. https://www.pehsu.net/Childhood_Lead_Exposure.html
- National Toxicology Program. 2012. Monograph on Health Effects of Low-Level Lead. <https://www.niehs.nih.gov/health/topics/agents/lead/index.cfm>