

Lead Exposure in Children

Medical Management Recommendations

- Exposure to lead can cause learning difficulties, behavioral problems, and other cognitive effects in children.
- The CDC Blood Lead Reference Value is 3.5 µg/dL.
- Any capillary blood lead level (BLL) ≥ 3.5 µg/dL should be confirmed with a venous test.
- Confirmed BLLs above reference value require action to prevent further lead exposure and increases in BLL.

When to Confirm Capillary BLLs	
Initial Capillary BLL (µg/dL)	Confirm with Venous Blood Test
3.5 – 9	Within 3 months*
10 – 19	Within 1 month*
20 – 44	Within 2 weeks*
≥ 45	Within 24 - 48 hours*

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

Schedule for Follow-up BLLs		
Confirmed BLL (µg/dL)	Re-test first 2-4 tests	Re-test after BLLs declining
3.5 – 9	3 months*	6–9 months
10 – 19	1–3 months*	3–6 months
20 – 44	2–4 weeks	1–3 months
≥ 45	As soon as possible. Consult with expert.	

*Some providers may choose to repeat BLL within a month to ensure the level is not rising more quickly than anticipated.

Medical Management Recommendations for Confirmed Blood Lead Levels

Confirmed BLL	Recommended Actions Based on Confirmed BLL
< 3.5 µg/dL	<ul style="list-style-type: none"> • Anticipatory guidance about common sources of lead exposure and how to prevent exposure. • Routine assessment of developmental milestones and nutritional status. • Repeat blood lead level in 6–12 months if the child is at high risk or risk changes during the timeframe.
3.5 – 19 µg/dL	<ul style="list-style-type: none"> • Re-test BLL at recommended intervals to ensure BLL is not rising and lead exposures are controlled. • Take environmental history to identify potential sources of lead. Provide education on exposure prevention. • Consider testing young siblings and other children in the home who may be exposed. • Ensure iron sufficiency with testing and treatment. Consider multivitamin with iron as indicated. • Provide nutritional counseling related to calcium and iron. Refer to services as needed (e.g. WIC). • Perform structured developmental screening and monitoring. Refer to early intervention for evaluation if developmental delays suspected or diagnosed. • Report case to local health department and coordinate management. • Refer to local health department for environmental investigation if confirmed BLL is ≥10 µg/dL. Some health departments may perform environmental investigations for confirmed BLLs ≥3.5 µg/dL.
20 – 44 µg/dL	<p>Follow recommendations for BLL 3.5-19 µg/dL as listed above, plus:</p> <ul style="list-style-type: none"> • Complete history and physical exam assessing for signs and symptoms related to lead. • Consider abdominal x-ray based on history (e.g. history of pica or excessive mouthing behaviors). • Contact state or local health department for guidance.
≥ 45 µg/dL	<p>URGENT: Follow guidance above, plus:</p> <ul style="list-style-type: none"> • Complete history and physical exam including detailed neurological exam. • Obtain abdominal X-ray and initiate bowel decontamination if indicated. • Consider chelation therapy and/or hospitalization. Child should be discharged to a lead-safe environment. • Consult with an expert about chelation therapy. Contact Pediatric Environmental Health Specialty Unit (1-800-421-9916) or Poison Control Center (1-800-222-1222).

Source: Adapted from: CDC, Recommended Actions Based on Blood Lead Levels: <https://www.cdc.gov/nceh/lead/advisory/acclpp/actions-blls.htm> and Pediatric Environmental Health Specialty Unit: https://www.pehsu.net/Lead_Exposure.html

Management of Blood Lead Levels in Children

Primary management for lead exposure in children should include:

- Finding and eliminating the source of the lead.
- Instruction in personal and household hygiene measures.
- Optimizing the child's diet and nutritional status.
- Repeat testing to monitor blood lead level.

Health Effects in Children

Exposure to even low levels of lead less than 10 µg/dL can have a wide range of effects on a child's development and behavior. Lead's impact on development may manifest over years. Childhood lead exposure has potential consequences for adult health.

Blood lead level	Sufficient evidence or casual determination of children's health effects
Below 5 µg/dL	Cognitive function: Decreases in IQ, academic achievement, specific cognitive measures Externalizing behaviors: Increased incidence of attention-related and problem behaviors
Below 10 µg/dL	Effects listed above, PLUS: Decreased hearing; Reduced postnatal growth; delayed puberty.
10 – 40 µg/dL	Effects listed above, PLUS: Slower nerve conduction; Decreased hemoglobin, anemia.
40 – 80 µg/dL	Effects listed above, PLUS: Abdominal pain, constipation, colic, anorexia, vomiting.

Source: Adapted from President's Task Force on Environmental Health Risks and Safety Risks to Children. Key Federal Programs to Reduce Childhood Lead Exposures and Eliminate Associated Health Impacts, Nov 2016.

Sources of Lead Exposure

- **Lead Paint and Dust:** Chipping, flaking, and peeling lead paint and its dust in older homes built before 1978.
- **Renovation and Remodeling:** Renovation in older homes with lead paint creates large amounts of hazardous lead dust.
- **Soil:** Bare soil, especially in areas near old homes, industrial sites, or busy roads.
- **Imported Products:** Traditional medicines such as Ayurvedic medicines, bali gali, pay-loo-ah, azarcon; Imported foods and spices from outside the U.S.; Cosmetics and powders such as surma, kohl, sindoor, kumkuma; Imported glazed pottery and cookware.
- **Parent Occupations and Hobbies:** Foundries and manufacturing metals; Ammunition production, casting bullets, and firing ranges; Welding, scrap metal, and battery recycling; Home remodeling and renovation; Stained glass making, pottery making.
- **Water:** Homes built before 1986 may have lead in plumbing, solder, and pipe fittings.

Lead Exposure Prevention Guidance for Families

- **Keep children away from lead:** Keep children away from peeling, chipping paint and contaminated soil.
- **Wash hands and toys often:** Wash children's hands often, especially before meals and sleeping.
- **Keep it clean:** Routinely wet wipe/wet dust floors, tables, and windowsills to remove lead dust. Take off shoes when entering the home to prevent bringing lead-contaminated soil in from outside.
- **Don't bring lead home from job or hobby:** Change work clothes and wash face, hands skin before going home.
- **Renovate safely:** Renovation in older homes can create hazardous lead dust. Ensure 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 imported home remedies, spices, cosmetics, and glazed pottery.

For More Information

- Questions? Contact Nebraska Childhood Lead Poisoning Prevention Program: 402-471-2937 or www.dhhs.ne.gov/lead.
- Douglas County Health Department: 402-444-7825 or www.douglascountyhealth.com/lead-poisoning-prevention.
- Greater Nebraska: Contact local public health department: Find LHD contact information at www.dhhs.ne.gov/lhd.

References:

CDC, 2022. Recommended Actions Based on Blood Lead Levels. <https://www.cdc.gov/nceh/lead/advisory/acclpp/actions-blls.htm>.
Pediatric Environmental Health Specialty Units, 2021. Management of Childhood Lead Exposure: https://www.pehsu.net/Lead_Exposure.html
AAP, 2016. Prevention of Childhood Lead Toxicity. Pediatrics. <https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/lead-exposure/>
National Toxicology Program. 2012. Monograph on Health Effects of Low-Level Lead. <https://www.niehs.nih.gov/health/topics/agents/lead/index.cfm>