Nebraska Department of Health and Human Services

HEALTH ALERT NETWORK Update

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TO: Primary care, Laboratories, Pediatricians, Hospitals, Clinics, FQHCs and Public Health

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RE: Update to CDC's Blood Lead Reference Value for Children

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Summary
Exposure to lead can cause serious harm to a child's health. The amount of lead measured in blood, a blood lead level (BLL), is used as an indicator of exposure to lead. In October 2021, the Centers for Disease Control and Prevention (CDC) **updated the blood lead reference level (BLRV) in children from 5 micrograms/deciliter (mcg/dL) to 3.5 µg/dL.** In January 2022, the Childhood Lead Poisoning Prevention Program at the Nebraska Department of Health and Human Services (NDHHS) adopted the change. NDHHS recommends healthcare facilities and laboratories update their reference ranges accordingly. NDHHS is sharing information from the CDC about the change in the blood lead reference value, along with information about testing recommendations and reporting requirements.

Background
No safe blood lead level in children exists. Even small amounts of lead in the blood can result in damage to the brain and nervous system, slowed growth and development, and learning and behavior problems. Lead exposure in children has been shown to affect IQ, ability to pay attention, and academic achievement. There has been an overall declining trend in blood lead levels over the past several decades. However, lead exposure risk remains a significant public health concern in children. According to preliminary data for calendar year 2021, 1,151 children in Nebraska had a blood lead level at or above 3.5 µg/dL.

Risk Factors for Lead Exposure
There are still millions of locations in the U.S. with persistent lead hazards. Lead-based paint in older housing remains a significant risk factor for children in Nebraska. About 6 in 10 homes in Nebraska were built before 1978, the year when lead paint was banned. Disparities in BLLs exist with certain groups of children being at a higher risk for lead exposure. Populations with an increased risk include children from some racial and ethnic minority groups, children living in low-income households, and children who live in older housing. Children who are immigrants, refugees, or recently adopted from outside of the U.S. are also at a higher risk for lead exposure, as well as children whose parents/caregivers may be exposed to lead through their work or hobbies.

About the New Blood Lead Reference Value
In 2012, CDC adopted a blood lead reference value (BLRV) as a way of identifying the 2.5% of U.S. children ages 1–5 at greatest risk of lead exposure. The BLRV is based on the 97.5th percentile of the BLL distribution among children 1–5 years old in the U.S. from the two most recent cycles of data from the National Health and Nutrition Examination Survey (NHANES). At that time, the BLRV for children was 5 micrograms per deciliter (mcg/dL). In 2021, CDC reviewed the most recent data from the 2015-2018 NHANES cycles and accepted the Lead Exposure and Prevention Advisory Committee (LEPAC) recommendation to update the BLRV to 3.5 µg/dL.

The BLRV is not a clinical reference value defining an acceptable range of BLLs in children, nor is it a health-based toxicity threshold. The BLRV is used as a screening tool to: (1) identify children who have higher levels of lead in their blood compared with most children, and (2) assess the effectiveness of prevention efforts.

Recommendations for Healthcare Providers
NDHHS, in conjunction with the CDC, recommend all health care providers adopt the blood lead reference value of 3.5 µg/dL. For children with BLLs at or above this blood lead reference value, NDHHS recommends providers perform child-specific response actions listed in the NDHHS updated Medical Management Recommendations for Lead Exposure in Children. The actions include:

- Ascertain possible sources of exposure by taking an environmental history, provide nutritional counseling related to iron and calcium intake, and consider laboratory evaluation of iron status when appropriate.
- Provide guidance on exposure reduction and link patients and families to local public health departments for additional services such as environmental inspections and remediation when indicated.
- Encourage steps that families and individuals can take to protect children from sources of lead.
- Conduct follow-up testing to ensure BLLs are not increasing (see recommendations for follow-up testing schedule).
- Assess developmental progress at regular intervals and provide referrals to supportive services as needed.

Lead Testing Recommendations
Testing children for lead exposure is a critical prevention tool, as lead exposure is often asymptomatic. Continue blood lead testing of children as required by Medicaid and recommended by public health:

- Children enrolled in Medicaid (Required):
  - Test at 12 months of age and again at 24 months. Test if a child 3-5 years of age has no record of lead test.
- Children living in high-risk communities:
  - Test at 12 months of age and again at 24 months. Test if a child 3-5 years of age has no record of lead test.
- Children with an identified risk factor based on a risk questionnaire:
  - For all other children aged 1-5 years, administer risk questionnaire. Test if parent answers 'yes' or 'don't know' to a lead risk questionnaire.

Detailed lead testing recommendations including high-risk communities are provided at https://dhhs.ne.gov/Pages/Lead-Resources-for-Health-Care-Professionals.aspx.

Reporting Requirements for Blood Lead Tests
Blood lead level tests are listed as a reportable disease in the state of Nebraska under Nebraska Reportable Disease Regulations (173 NAC 1). All entities (laboratories, hospitals, or providers) that conduct blood lead analysis are required to report all blood lead test results regardless of the result to NDHHS within 7 days.

Additional Resources

- NDHHS Recommendations for Testing, Medical Management, and Case Management https://dhhs.ne.gov/Pages/Lead-Resources-for-Health-Care-Professionals.aspx
- CDC: Recommended Actions Based on Blood Lead Level https://www.cdc.gov/nceh/lead/advisory/acclpp/actions-blls.htm
- CDC: Blood Lead Reference Value https://www.cdc.gov/nceh/lead/data/blood-lead-reference-value.htm

- CDC MMWR: Update of the Blood Lead Reference Value — United States, 2021. https://www.cdc.gov/mmwr/volumes/70/wr/mm7043a4.htm

For More Information
For questions on lead exposure, testing, or management, call the Nebraska Lead Hotline at (402) 471-0386 or visit the NDHHS lead website at www.dhhs.ne.gov/lead.

Lead Exposure in Children

Medical Management Recommendations

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- There is no safe level of lead in the body. Exposure to lead can affect a child's development and behavior.
- Most children in Nebraska should have blood lead level (BLL) tests at ages 1 and 2 years old.
- The CDC blood lead reference value is 3.5 µg/dL. A capillary BLL ≥ 3.5 µg/dL should be confirmed with a venous blood lead test.
- A confirmed BLL of 3.5 µg/dL or higher requires action to prevent further lead exposure and increases in BLL.

Initial Capillary Blood Lead Level
Schedule for Obtaining Venous Sample

Capillary BLL	Confirm with Venous Blood Test
<3.5 µg/dL	No confirmation needed. Repeat test according to Blood Lead Screening Plan.
3.5 – 9 µg/dL	Within 3 months*
10 – 19 µg/dL	Within 1 month*
20 – 44 µg/dL	Within 2 weeks*
≥ 45 µg/dL	Within 24 - 48 hours*

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

Initial Venous Blood Lead Level
Schedule for Follow-up Testing

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

*Some providers may choose to repeat BLL on all new patients 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	• Anticipatory guidance about common sources of lead exposure and how to prevent exposure. • Routine assessment of developmental milestones and nutritional status with a focus on iron and calcium intake. • 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	• 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 exposure. 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. • Provide nutritional counseling related to calcium and iron. Encourage consumption of fruit and iron-enriched foods. Refer to supportive services as needed (e.g. WIC). • Perform structured developmental screening and monitoring, as lead's impact on development may manifest over years. Refer to early intervention for evaluation if developmental delays suspected or diagnosed. • Refer to state or local health department for environmental investigation if confirmed BLL is ≥10 µg/dL or as indicated by local health department.
20 – 44 µg/dL	**Follow recommendations for BLL 3.5-19 µg/dL as listed above.** • 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 or for guidance.
≥ 45 µg/dL	**URGENT: Follow guidance above, plus:** • 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

Lead Exposure in Children

Information for Healthcare Providers

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Management Elevated Blood Lead Levels in Children

Management for lead exposure should be provided for all children with a confirmed BLL of 3.5 µg/dL or higher. Primary management of lead exposure 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.

Lead Poisoning Prevention Tips for Families

- **Keep children away from lead:** Find lead in the home. Keep children away from peeling, chipping paint and contaminated soil.
- **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. Take off shoes when entering the home to prevent bringing lead-contaminated soil in from outside.
- **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 do not know if it contains lead.

Sources of Lead Exposure

Paint and Dust	Parent Occupations and Hobbies	Soil and Water	Cultural and Other Sources
• Chipping or peeling lead paint and its dust is the most common source of lead exposure • Homes built before 1978 can contain lead-based paint, varnishes, and stains • Renovation creates large amounts of hazardous lead dust	• Construction, painting, remodeling, and demolition are some professions that can bring home lead • Manufacturers of bullets, ceramics, and electrical components (all contain lead) • Foundries and scrap metal • Indoor firing ranges, reloading shotgun shells, bullet casting	• Bare soil, especially in areas near old homes, industrial sites, or busy roads • Homes built before 1986 may have lead in plumbing, solder, and pipe fittings	• Traditional / 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

Health Risks of Lead Exposures 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 and 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.

For More Information

- Nebraska 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:
CDC, 2021. 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. 2016;138(1):e20161493. 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