Lead

- Soft, blue-gray heavy metal
- Occurs naturally but much of its presence in the environment stems from historic use in paint and gasoline and from industry
- The most widespread source of lead exposure for children is in lead-based paint and dust that remains in older buildings
How lead affects children’s health

Brain
Any exposure is linked to lowered IQ, ADHD, hearing loss, and damaged nerves. Acute exposures can cause convulsions, loss of body movement, coma, stupor, hyperirritability, & death.

Heart
Studies suggest that adults who endured lead poisoning as children had significantly higher risks of high blood pressure 50 years later.

Blood
Lead inhibits the body’s ability to make hemoglobin, which can lead to anemia. This reduces oxygen flow to organs, causing fatigue, lightheadedness, rapid heartbeat, dizziness, & shortness of breath.

Hormones
Lead disrupts levels of vitamin D, which can impair cell growth, maturation, and tooth and bone development.

Stomach
Severe lead exposure can create intense abdominal pain and cramping.

Reproductive System
A moderate exposure can not only lower sperm count, but also damage them. Chronic exposures can diminish the concentration, total count, and motility of sperm, though it’s unclear how long these effects last after the exposure ends.

Kidneys
Chronic exposures can cause chronic inflammation, which can lead to kidney failure, bloody urine, fever, nausea, vomiting, drowsiness, coma, weight gain, confusion, rash, and urinary changes.

Bones
Lead may impair development and the health of bones, which can slow growth in children.
Children are the most vulnerable

Young developing children are much more sensitive to the adverse effects of lead.

- Especially harmful to developing brains and nervous systems
- Children absorb more of the lead they are exposed to
- Young children exhibit more hand-to-mouth behavior, increasing their exposure and intake
- Most often there are no symptoms
Lead toxicity

Association of IQ and Children’s Blood Lead Levels at 60 Months of Age

Source: Canfield R, et al. NEJM 2003;348:1517-1526
Potential sources of lead exposure

- Paint in Pre-1978 Homes
- Lead Dust
- Soil
- Drinking Water
- Job Exposures
- Traditional Remedies
- Costume Jewelry
- Recalled Toys
- Imported Spices
- Imported Pottery
- Hobbies
Testing practices across the U.S., 2017

NOTE: This map shows state policies for children not enrolled in Medicaid.

Source: Safer Chemicals, Healthy Families. 2017
RECOMMENDATIONS FOR BLOOD LEAD TESTING OF CHILDREN IN WASHINGTON STATE
The Department of Health recommends screening children using the below algorithm at 12 and 24 months of age.

Does the child have any of the following risk factors:

- Lives in or regularly visits any house built before 1950.*
- Lives in or regularly visits any house built before 1978 that has recent or ongoing renovations or remodeling.
- From a low income family (defined as incomes <130% of the poverty level)**
- Known to have a sibling or frequent playmate with elevated blood lead level.
- Is a recent immigrant, refugee, foreign adoptee, or child in foster care.
- Has a parent or principal caregiver who works professionally or recreationally with lead. (See sidebar for examples.)
- Uses traditional, folk, or ethnic remedies or cosmetics (such as Greta, Azarcon, Ghasard, Ba-baw-san, Sindoor or Kohl.)

* Screening may not be indicated if the home has previously undergone lead abatement or tested negative for lead after remodeling.

** Federal law mandates testing for all children covered by Medicaid.

---

LEAD RISK EXPOSURE EXAMPLES:
Occupations and Hobbies:
- Remodeling and demolition
- Painting
- Work or visit gun range
- Mining, smelting, battery recycling
- Making lead fishing weights or ammunition
- Stained glass
- Soldering and welding

Consumer Products:
- Pottery or porcelain with lead glaze
- Informally imported foods, candies and spices
- Antique furniture and inexpensive jewelry

---

Healthcare providers should consider testing additional children per clinical judgment, such as:

- Child whose parents have concern or request testing (including older children that have risk of exposure.)
- Child living within a kilometer of an airport or lead emitting industry or on former orchard land.
- Child with pica behavior.
- Child with neurodevelopmental disabilities or conditions such as autism, ADHD, and learning delays.

---

Healthcare providers are encouraged to use the Department of Health’s Lead Risk Index Map to better understand which areas in their community are at higher risk for lead exposure. See https://fortress.wa.gov/doh/wtn/WTNIBL/

Interpretation and Medical Management of Blood Lead Levels:
If blood lead level is ≥5 mcg/dL: See PEHSU Recommendations on Medical Management of Childhood Lead Poisoning
History of action levels

There is no safe level of lead in blood

In January 2012, the Advisory Committee on Childhood Lead Poisoning Prevention (ACCLPP) recommended:

- Language change from “level of concern” to “reference level”
- Reference level set at ≥5 µg/dL*

CDC adopted recommendation and WA State changed rules accordingly

* Represents the 97.5 percentile from NHANES data
Testing rates by states, 2016

Annual Testing Rate of Children Under 72 Months of Age, 2016
in states reporting annually to CDC

Source: CDC National Childhood Blood Lead Surveillance Data
https://www.cdc.gov/nceh/lead/data/national.htm
Blood lead testing rates

Blood lead testing rates of children <72 months of age in Washington
Blood lead testing rates

Blood lead testing rates by county (2014-2018)
Elevated blood lead levels

Elevated blood lead level rates of children <72 months of age in Washington

Elevated is defined as ≥5μg/dL
Elevated blood lead level rates

Elevated blood lead level rates by county (2014-2018)

Legend (Measure 1)

- % with results => 5µg/dL
- 0 - < 1.34
- 1.34 - < 2.01
- 2.01 - < 2.26
- 2.26 - < 3.6
- 3.6 - 8.21
- Not Reliable

Elevated is defined as ≥5µg/dL
Distribution of the percent of cases ≥5 μg/dL assigned to Local Health Jurisdictions in a 10 year period (2006-2015)

- King: 33.0%
- Pierce: 7.5%
- Yakima: 6.5%
- Spokane: 5.6%
- Whitman: 4.7%
- Snohomish: 3.25%
- Franklin: 3.2%
- Adams: 3.4%
- Cowlitz: 4.0%
- Grant: 4.0%
- Pierce: 3.25%
- King: 33.0%
Prevention: Keep it clean and maintained

• Damp dust and change water frequently
• Inspect home regularly and fix chipping, flaking, peeling and deteriorated paint using lead-safe work practices
• Remove shoes before entering the house
• Take care of minor problems before they become major
Prevention: Healthy diet

- Eat regular meals
- Eat foods rich in iron, calcium and vitamin C
**Effects on children**

- Kids absorb up to 70 percent of lead, adults about 20 percent
- Often undetected; no obvious symptoms
- Can lead to learning disabilities, behavioral problems, malformed bones, slow growth
- Very high levels can cause seizures, coma, death

**Sources**

- Lead-based paint, contaminated dust in homes built before 1978
- Drinking water from lead pipes
- Contaminated food
- Soil (lead does not biodegrade, decay)
  - Toys*

**What parents can do**

- Have child screened if there is concern of lead exposure
- Frequently wash child's hands, toys, pacifiers
- Only use cold tap water for drinking, cooking
- Test paint, dust in home if it was built before 1978
Resources

Clinical screening algorithm
http://www.doh.wa.gov/Portals/1/Documents/Pubs/334-394.pdf

WA lead exposure risk map
https://fortress.wa.gov/doh/wt/wtn/WTNIBL/

PEHSU medical management guidelines
http://www.pehsu.net/_Childhood_Lead_Exposure.html

DOH lead website
www.doh.wa.gov/lead
Elisabeth Long, MPH
Lenford O’Garro, MS, RS

Office of Environmental Public Health Sciences
Washington State Department of Health

elisabeth.long@doh.wa.gov
lenford.o’garro@doh.wa.gov

www.doh.wa.gov/lead