Lead Poisoning Prevention Program
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Medical Case Management of Lead-Poisoned Adults
HealthCare Provider Information

Adult Case Definition: Adults (≥ 18 years of age) venous blood lead level ≥ 25 µg/dL, or any exposure to lead with symptoms of lead poisoning.

For childhood lead poisoning (≤ 17 years old) see document titled: Medical Evaluation and Recommendations for Children with Elevated Blood Lead Levels.

OSHA Lead Standard (29 CFR 1910.1025)	
The OSHA Lead Standard (29 CFR 1910.1025) requires that employees exposed to potentially hazardous levels of lead in the workplace be medically evaluated.	
Laboratory Disease Reporting Requirements	
Labs must report **all** blood lead test results directly to the Oregon Department of Human Services (DHS) within 7 days (ORS 433.004, OAR 333-018-0015). Reporting of elevated levels within 1 working day is recommended. Laboratories are also encouraged to report ZPP (zinc protoporphyrin) test results to DHS. DHS follows up on occupational exposures meeting the noted case definition and refers non-occupational reports to the local health department for follow-up. Local health departments are notified of occupational case reports, but no additional follow-up by these agencies is required.	
Medical History	
Job history:	With particular attention to lead exposure and past lead exposure (childhood, occupational and non-occupational). Employers and employees should check MSDS charts. See below for jobs/hobbies that may involve lead.
Medical history:	With special attention to cardiovascular, gastrointestinal, hematologic, renal, neurological, and reproductive systems.
Personal History:	Hygiene habits, smoking, alcohol consumption, hobbies/non-occupational sources.
Physical Exam:	A thorough physical exam, with special attention to teeth, gums, cardiovascular, gastrointestinal, hematologic, renal, neurological, and reproductive systems.
Blood pressure:	Obtain measurement as part of exam.
Pulmonary status:	Check if exposure is to airborne lead and respiratory protection will be used.
Laboratory Testing	
Blood analysis:	Blood lead level (BLL)-Take immediately for pregnant women and workers contemplating having children (BLL is best reflection of current lead exposure).
	Hemoglobin, hematocrit, red cell indices, and examination of peripheral smear morphology.
	Zinc protoporphyrin level (ZPP) or free erythrocyte protoporphyrin (FEP).
	Electrolytes, bicarbonate.
	BUN and serum creatinine.
Urinalysis:	Routine urinalysis with microscopic exam.

Reproductive system:	Pregnancy test or sperm evaluation, if requested by the employee.
Special testing:	Any other test provider deems necessary. As needed: Peripheral neuropathy (may include nerve conduction velocities or consultative neurology assessment).
Signs and Symptoms	
Mild to moderate toxicity:	Anemia, lethargy, hypertension, abdominal discomfort, vomiting, constipation, nausea, weight loss, fatigue, irritability, headache, difficulty concentrating, sleep disturbances, muscular exhaustibility, tremor, weight loss, male infertility, impotence, risks for pregnant female: low birth weight and small head circumference in newborn.
Severe toxicity:	Paresis or paralysis, severe abdominal cramps, inhalation toxicity may lead to severe respiratory distress, convulsions, encephalopathy, coma, and death.
Sources of Lead Exposure	
Industries/Hobbies	Home remodeling or painting; manufacturing/recycling batteries, metal?, making/handling ammunition; smelters or mines; radiator, battery, or automobile repair; soldering, welding, or cutting metal; PVC plastics, crystal glass, or ceramics production; producing or working with lead-based paint (marine, industrial, artist's), sanding or stripping of old paint (pre-1978), demolition of old buildings, indoor shooting ranges, making/handling fishing sinkers, bridge repair. Employers must carefully check MSDS charts, especially if new materials are used.

OR-OSHA and DHS Public Health- Medical Monitoring, Evaluation, & Reporting Recommendations

Condition	Response
Worker assigned to area where lead concentration in air is above action level: 30 µg/m3 lead in air (8 hr. average) for more than 30 days per year (includes workers wearing correct personal protective equipment).	Evaluate employee prior to exposure to lead. Workers contemplating having children may need counseling prior to beginning job. Test blood lead level at least every 2 months for the first 6 months, then every 6 months. Provide annual medical exam.
Worker with a BLL of ≥ 25 µg/dL:	Action level for DHS case follow-up. Oregon DHS provides educational follow-up with worker.
Worker with a BLL of ≥ 40 µg/dL any time within the last 12 months:	Medical examination and evaluation for organ toxicity performed annually. Perform complete lab panel. BLL at least every 2 months until 2 consecutive tests are < 40 µg/dL. Workers of reproductive age may need special counseling. Work place should be immediately evaluated using industrial hygiene practice. . DHS will continue follow-up activities until BLL < 25 µg/dL.
Worker with BLL 50 - 59 µg/dL or worker with a medical condition which places the employee at increased risk of material impairment to health from exposure to lead:	May indicate medical removal from work. Monitor monthly. Consider referral for toxicology evaluation. OR-OSHA's Lead Standard requires removal of worker from the lead environment when the average of the previous three blood sampling tests (or the average of all blood lead tests conducted over the previous six months whichever is longer) is ≥ 50 µg/dL. DHS will continue follow-up activities until BLL < 25µg/dL.

Worker with BLL > 60 µg/dL:	Recommend removal from lead environment. Employee should not return to lead environment until two consecutive BLL's are < 40 µg /dL. DHS will continue follow-up activities until BLL < 25 µg/dL.
Worker with symptoms of lead poisoning:	Evaluate immediately.
Worker is pregnant:	Evaluate immediately.
Worker with difficulty breathing while wearing a respirator:	Evaluate immediately.

Treatment Considerations

Most cases of lead poisoning in adults can be managed with removal from exposure to the lead source and supportive care of symptoms. OSHA prohibits prophylactic chelation. There is however general agreement that for diagnostic and therapeutic purposes adult patients with extremely high BLL levels of 80 to 100 µg/dL may benefit from treatment with a chelating agent. The drug of choice for treatment of lead poisoning is Succimer, or Chemet®. Second choice is D-Penicillamine.

Consultation with a medical toxicologist or the Oregon Poison Center at 1-800-222-1222 is strongly recommended for specific chelation guidelines. In general, chelation is considered in the following instances: 1) Patient is symptomatic; 2) Patient has consistently high blood lead levels; and 3) Patient with elevated blood lead level that has fertility related concerns, but is not pregnant. Hospitalization for chelation is rarely necessary. Situations requiring hospitalization include: 1) Patient with encephalopathy; 2) Patient with acute respiratory toxicity; 3) Patient who has inhaled fumes from molten lead; and 4) Patient who has massive acute ingestion of lead. Hospitalized patients may benefit from parenteral treatment with other chelators. BAL (dimercaprol) or $CaNa_2EDTA$ may be used. Consultation with a medical toxicologist is strongly recommended.

Follow-Up Guidelines

Follow-up should be tailored to the individual. Repeated blood lead testing should be conducted for as long as patient is exposed, symptomatic, or has a BLL ≥ 25 µg dL. Testing schedule should be based on work tasks and exposures. Medical treatment or industrial hygiene interventions are commonly necessary for persons with long-term exposure. Workers should not eat, smoke or drink while working with lead and should wash their hands and face before performing any of these activities. Individuals with occupational exposure should shower and change clothes at work to prevent take-home exposure of children and other members of the household.

Follow-up should include investigation of others exposed at work and household contacts of exposed individuals, particularly children. Blood lead testing should be conducted according to the Centers for Disease Control and Prevention (CDC) guidelines. Copies of the guidelines are available at Oregon DHS (see contact information).

Contact Information

Oregon Lead Poisoning Prevention Program Telephone: 971.673.0440 Fax: 971.673.0457 Web: healthoregon.org/lead	Reporting and follow-up of adult and childhood lead poisoning cases.
Oregon Department of Occupational Safety & Health Telephone: 503.229.5910 Web: www.orosha.org	Workplace compliance/information.
Additional information: ATSDR Web site	www.atsdr.cdc.gov/toxprofiles/phs13.html