

U.S. Preventive Services Task Force

Screening for Elevated Blood Lead Levels in Children and Pregnant Women: Recommendation Statement

Summary of Recommendation and Evidence

The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for elevated blood lead levels in asymptomatic children (*Table 1*). **I statement.**

The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for elevated blood lead levels in asymptomatic pregnant persons. **I statement.**

See the Clinical Considerations section for suggestions for practice regarding the I statements.

Rationale

IMPORTANCE

Elevated blood lead levels in children are associated with neurologic effects such as behavioral and learning problems, lower IQ, hyperactivity, hearing problems, and impaired growth.¹⁻⁴ In pregnant women, lead exposure can impair organ systems such as the hematopoietic, hepatic, renal, and nervous systems and increase the risk of pre-eclampsia and adverse perinatal outcomes.^{5,6} Many of the adverse health effects of lead exposure are irreversible.¹ Thus, the primary benefit of screening may be in preventing future exposures or exposure of others to environmental sources.

DETECTION

The USPSTF found adequate evidence that capillary blood testing accurately identifies children with elevated blood lead levels compared with venous blood testing. The USPSTF found adequate evidence that questionnaires and

other clinical prediction tools to identify asymptomatic children with elevated blood lead levels are inaccurate.

The USPSTF found inadequate evidence regarding the accuracy of questionnaires and other clinical prediction tools to identify asymptomatic pregnant women with elevated blood lead levels.

BENEFITS OF EARLY DETECTION AND INTERVENTION OR TREATMENT

The USPSTF found inadequate evidence on the effectiveness of screening for elevated blood lead levels in asymptomatic children 5 years and younger to improve health outcomes (e.g., cognitive or behavioral problems or learning disorders). The USPSTF found inadequate evidence on the effectiveness of interventions (e.g., counseling and nutritional interventions, residential lead hazard control measures, or chelation therapy) to improve intermediate (e.g., reduction in blood lead levels) or health outcomes in asymptomatic children with elevated blood lead levels.

The USPSTF found inadequate evidence on the effectiveness of screening for elevated blood lead levels in asymptomatic pregnant women to improve health outcomes (e.g., cognitive problems in children, perinatal outcomes, or maternal outcomes). The USPSTF also found inadequate evidence on whether the effectiveness of screening varies by gestational age. The USPSTF found inadequate evidence on the effectiveness of interventions (e.g., counseling and nutritional interventions, residential lead hazard control measures, or chelation therapy) to improve intermediate (e.g., blood lead levels or gestational hypertension) or health outcomes in pregnant women.

As published by the USPSTF.

This summary is one in a series excerpted from the Recommendation Statements released by the USPSTF. These statements address preventive health services for use in primary care clinical settings, including screening tests, counseling, and preventive medications.

The complete version of this statement, including supporting scientific evidence, evidence tables, grading system, members of the USPSTF at the time this recommendation was finalized, and references, is available on the USPSTF website at <https://www.usrpstf.org/>.

This series is coordinated by Kenny Lin, MD, MPH, deputy editor.

A collection of USPSTF recommendation statements published in *AFP* is available at <https://www.aafp.org/afp/uspstf>.

TABLE 1**Screening for Elevated Blood Lead Levels in Children and Pregnant Women: Clinical Summary of the USPSTF Recommendation**

Population	Children 5 years and younger and pregnant persons.
Recommendation	No recommendation. Grade: I (insufficient evidence)
Screening tests	Elevated blood lead levels can be detected by measuring capillary or venous blood lead levels. Capillary blood testing is recommended for initial screening. Patients with positive screening results from capillary blood samples should have confirmatory venous blood testing. Questionnaires to identify children at increased risk of elevated blood lead levels are poorly accurate. The most commonly used questionnaire is the Centers for Disease Control and Prevention screening questionnaire.
Treatment and interventions	Treatment options include residential lead hazard control measures, educational interventions (e.g., counseling on household dust control measures), environmental interventions (e.g., soil abatement, dust or paint removal, or removal of contaminated water sources), nutritional interventions, and chelation therapy. Finding the source of lead exposure is essential in preventing repeated or future exposures.

Note: For a summary of the evidence systematically reviewed in making this recommendation, the full recommendation statement, and supporting documents, go to <https://www.uspreventiveservicestaskforce.org/>.

USPSTF = U.S. Preventive Services Task Force.

in the identification of previously unknown sources of lead in the community, which could identify risk for lead exposure and protect other individuals.

Sources of lead exposure include leaded gasoline, lead paint, and contaminated water from lead plumbing. Other sources include living with a parent exposed to lead through work, pottery with lead glaze, and certain food or personal products (e.g., candy, herbal and other folk remedies, or cosmetics).¹

Elevated blood lead levels primarily affect children with a lower socioeconomic status and from minority communities because of the increased risk of housing-related exposure.^{1,7}

Potential Harms. Evidence on the harms of screening for elevated blood lead levels is limited. Potential harms are false-positive capillary blood test results, anxiety, inconvenience, and financial costs associated with return visits and repeated tests. Children with significantly elevated blood lead levels might receive chelation therapy, which is associated with a wide range of harms, including injection site pain or abscess, headache, paresthesia, tremors, rash, neutropenia, elevation of serum liver transaminase, hypertension, tachycardia, fever, nausea, vomiting, or other gastrointestinal upset.¹

Current Practice. There are no data on the proportion of clinicians who screen for elevated blood lead levels in children without symptoms.¹ The USPSTF found no data on the prevalence of screening for elevated blood lead levels in pregnant women in primary care settings.⁶ Bright Futures recommends screening in accordance with state law and universal screening at ages 12 and 24 months in states with no screening program in place.⁸ The Medicaid Early and Periodic Screening, Diagnostic, and Treatment program requires that all children receive a screening blood lead test at ages 12 and 24 months; children aged 36 to 72 months must receive a screening blood lead test if they have not been previously screened for lead poisoning.¹

SCREENING TESTS

Blood tests or questionnaires may be used to screen for elevated blood lead levels. Elevated blood lead levels can be

HARMS OF EARLY DETECTION AND INTERVENTION OR TREATMENT

The USPSTF found inadequate evidence on the harms of screening for or treatment of elevated blood lead levels in asymptomatic children or pregnant women.

USPSTF ASSESSMENT

The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for elevated blood lead levels in asymptomatic children 5 years and younger. Evidence is lacking, and the balance of benefits and harms cannot be determined.

The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for elevated blood lead levels in asymptomatic pregnant women. Evidence is lacking, and the balance of benefits and harms cannot be determined.

Clinical Considerations**PATIENT POPULATION UNDER CONSIDERATION**

This recommendation applies to children 5 years and younger and pregnant persons without symptoms of elevated blood lead levels.

SUGGESTIONS FOR PRACTICE REGARDING THE STATEMENTS

Potential Preventable Burden. Screening for elevated blood lead levels with blood tests or questionnaires could result

detected by measuring free erythrocyte or zinc protoporphyrin levels and capillary or venous blood lead levels. Capillary blood testing is recommended for initial screening. However, false-positive results can occur if capillary blood samples become contaminated. Patients with positive screening results from capillary blood samples should have confirmatory venous blood testing.¹

Questionnaires have been developed to identify children at increased risk of elevated blood lead levels. The most commonly used questionnaire is the Centers for Disease Control and Prevention screening questionnaire. The Centers for Disease Control and Prevention questionnaire asks 5 questions about the following: living in or visiting a house built before 1960 with chipping paint or undergoing renovation, having a sibling or close contact being monitored or treated for lead poisoning (defined as a blood lead level $> 15 \mu\text{g}/\text{dL}$), living with an adult exposed to lead through work or hobbies, and living near lead-based industry. A positive or "I don't know" answer to any of the questions indicates the need for a blood lead test.^{1,7} There are no validated questionnaires to identify pregnant women at high risk of lead exposure.⁶

TREATMENT

Patients with an elevated blood lead level should have confirmatory venous blood testing. Management is based on the lead level and symptoms. Treatment options include residential lead hazard control measures, educational interventions (e.g., counseling on household dust control measures), environmental interventions (e.g., soil abatement, dust or paint removal, or removal of contaminated water sources), chelation therapy, and nutritional interventions. Finding the source of lead exposure is essential in preventing repeated or future exposures.

In most settings, education and counseling are offered to children with blood lead levels ranging from 10 to $20 \mu\text{g}/\text{dL}$. Some experts also recommend nutritional counseling for children with blood lead levels in this range. Residential lead hazard control measures are usually offered to children with blood lead levels of $20 \mu\text{g}/\text{dL}$ or greater, while chelation therapy is offered to children with blood lead levels of $45 \mu\text{g}/\text{dL}$ or greater.¹

Educational interventions focus on parental counseling about lead exposure, hygiene, and household dust control measures to prevent the ingestion of dust and soil. Environmental interventions include specialized cleaning, repairs, maintenance, soil abatement (e.g., removal and replacement), painting, and temporary containment of lead hazards.¹

Calcium, dietary iron, and other supplements are thought to decrease the intestinal absorption of lead. However, the role of nutritional interventions (i.e., supplementation) in reducing blood lead levels remains unclear.¹

Chelation therapy is recommended for symptomatic patients with moderate or severe lead toxicity. Dimercaprol (or its less toxic analog, dimercaptosuccinic acid, also known as succimer) is a commonly used agent that removes lead from the blood and soft tissues. Penicillamine is less commonly used.¹

Management of elevated blood lead levels in pregnant women also varies depending on the lead level and consists of education and environmental interventions, nutritional interventions, and chelation therapy.⁶

This recommendation statement was first published in *JAMA*. 2019;321(15):1502-1509.

The "Other Considerations," "Discussion," "Update of Previous USPSTF Recommendation," and "Recommendations of Others" sections of this recommendation statement are available at <https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/elevated-blood-lead-levels-in-childhood-and-pregnancy-screening>.

The USPSTF recommendations are independent of the U.S. government. They do not represent the views of the Agency for Healthcare Research and Quality, the U.S. Department of Health and Human Services, or the U.S. Public Health Service.

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