

4 Roles of Child Health-Care Providers in Childhood Lead Poisoning Prevention

Roles of Child Health-Care Providers

1. Use and disseminate information from state and local public health agencies.
2. Give anticipatory guidance.
3. Perform routine blood lead screening, as recommended.
4. Provide family lead education.
5. Provide diagnostic and follow-up testing for children with elevated BLLs.
6. Provide clinical management for children when appropriate.
7. Participate in a follow-up team.
8. Collaborate with public health agencies.

In addition to routine screening and follow-up care, child health-care providers should perform blood lead testing when children have unexplained symptoms or signs that are consistent with lead poisoning.

Children with lead poisoning can present with seizures, other neurological symptoms, abdominal pain, developmental delay, attention deficit, hyperactivity, other behavior disorders, school problems, hearing loss, or anemia.

Editor's Note: In the following discussion of the roles of the child health-care provider, we provide the roles on left hand pages, and discussion on the facing right hand pages.

1. Use and disseminate information from state and local public health agencies.

Utilize information supplied by public health agencies on:

- Recommended screening.
- Educating families about lead.
- Follow-up care.
- Referral sources.

Information from public health agencies

Public health agencies will make recommendations about screening. These recommendations will be based on local risk for exposure to lead.

Screening policy should be based on data that are representative of the entire population, and not limited to a provider practice. Children should be screened according to state and local policy.

In the absence of a statewide plan or other formal guidance from health officials, universal screening for virtually all young children, as called for in the 1991 edition of *Preventing Lead Poisoning in Young Children* (CDC, 1991), should be carried out.

Public health agencies will supply:

- Lead-education materials that reflect local policies and exposure sources.
- Protocols for follow-up care for children with elevated BLLs. Comprehensive follow-up includes in-home assessment, education, environmental investigation, and reduction of lead exposure; supports clinical management; and is discussed in detail in Section 7.
- Referrals to local experts in the treatment of lead-poisoned children, and referrals to additional supportive services for families.

2. Give anticipatory guidance.

During prenatal care and during preventive care at 3-6 months and again at 12 months, provide information about:

- Hazards of deteriorating lead-based paint in older housing.
- Methods of controlling lead hazards safely.
- Hazards associated with repainting and renovation of homes built prior to 1978.
- Other exposure sources, such as traditional remedies.

Anticipatory guidance

Anticipatory guidance should be provided prenatally, when children are 3-6 months of age, and again when they are 12 months of age, because parental guidance at these times might prevent some lead exposure and the resulting increase in BLLs that often occurs during a child's second year of life.

When children are 1-2 years of age, parental guidance should be provided at well-child visits and when the personal-risk questionnaire is administered. (See Section 3.3 below.)

3. Perform routine blood lead screening as recommended.

3.1. Sampling method.

Screening should be done by a blood lead measurement of either a venous or capillary (fingerstick) blood specimen.

3.2 Recommended screening.

Follow health-department recommendations on screening. In the absence of recommendations from the health department, screen all children at ages 1 and 2 and children 36-72 months of age who have not been previously screened.

Choice of sample collection method

The choice of a sample-collection method (venipuncture or fingerstick) should be determined by the accuracy of test results, the availability of trained personnel, convenience, and cost. If children's fingers are cleaned carefully, capillary (fingerstick) sampling can perform well as a screening tool.

Screening recommendations

Universal screening will be recommended where the risk for lead exposure is widespread.

A sample universal screening recommendation:

Using a blood lead test, screen all children at ages 1 and 2 and all children 36-72 months of age who have not been previously screened.

Targeted screening will be recommended where risk is less or is confined to specific geographic areas or to certain subpopulations.

A sample targeted-screening recommendation:

Using a blood lead test, screen children at ages 1 and 2, and children 36-72 months of age who have not previously been screened, if they meet one of the following health-department criteria:

- *Residence in a geographic area (e.g., a specified zip code).*
- *Membership in a high-risk group (e.g., Medicaid recipients).*
- *Answers to a personal-risk questionnaire indicating risk.*

3.3. The personal-risk questionnaire.

In places *with targeted screening*, the health department may recommend routine use of a questionnaire to help identify children who should receive BLL screening.

Such a questionnaire should also be used at times other than the routine screening schedule if it is suspected that a child faces increased risk for lead exposure (e.g., because the family has moved to an older house).

The personal-risk questionnaire

A basic personal-risk questionnaire:

1. Does your child live in or regularly visit a house that was built before 1950? This question could apply to a facility such as a home day-care center or the home of a babysitter or relative.
2. Does your child live in or regularly visit a house built before 1978 with recent or ongoing renovations or remodeling (within the last 6 months)?
3. Does your child have a sibling or playmate who has or did have lead poisoning?

The health department may recommend additional or different questions for soliciting information about local sources of exposure.

3.4. Additional BLL screening.

In addition to recommended routine screening, BLL screening is also indicated when:

- A child's likelihood of exposure has increased.
- An older child has excessive mouthing behavior or an exposure to lead.
- Parents have knowledge of a child's lead exposure and request screening.

Indications for additional screening

Increased likelihood of exposure. Children's risk for lead exposure may increase, for example, because the family has moved to older housing or to a geographic area with a higher prevalence of older housing, or because the child lives in an older home that has recently been repaired or renovated.

Parental request. Parents may express concern about their children's potential lead exposure because of residence in older housing, nearby construction or renovation, an elevated BLL in a neighbor's child, or unusual household exposures. Such information may be valuable in highlighting potential exposure. A BLL test should be performed if there is reason to suspect that lead exposure has occurred.

4. Provide family lead education.

Provide families of children with capillary or venous BLLs $\geq 10 \mu\text{g}/\text{dL}$ with prompt and individualized education about the following:

- Their child's BLL, and what it means.
- Potential adverse health effects of the elevated BLL.
- Sources of lead exposure and suggestions on how to reduce exposure.
- Importance of wet cleaning to remove lead dust on floors, window sills, and other surfaces; the ineffectiveness of dry methods of cleaning, such as sweeping.
- Importance of good nutrition in reducing the absorption and effects of lead. If there are poor nutritional patterns, discuss adequate intake of calcium and iron and encourage regular meals.
- Need for follow-up BLL testing to monitor the child's BLL, as appropriate.
- Results of environmental inspection, if applicable.
- Hazards of improper removal of lead-based paint. Particularly hazardous are open-flame burning, power sanding, water blasting, methylene chloride-based stripping, and dry sanding and scraping.

Family lead education

Education should be reinforced during follow-up visits, as needed.

Health departments can often furnish educational materials to the health-care provider, including print materials in various languages.

5. Provide diagnostic and follow-up testing for children with elevated BLLs.

5.1 Diagnostic testing.

The following schedule is recommended.

Table 4.1. Schedule for diagnostic testing of a child with an elevated BLL on a screening test

If result of screening test ($\mu\text{g}/\text{dL}$) is:	Perform diagnostic test on venous blood within:
10-19	3 months
20-44	1 month-1 week*
45-59	48 hours
60-69	24 hours
70 or higher	Immediately as an emergency lab test

* The higher the screening BLL, the more urgent the need for a diagnostic test.

Diagnostic testing

A diagnostic test is the first venous BLL test performed within 6 months on a child with a previously elevated BLL on a screening test. If the diagnostic test is not performed within 6 months, the next test is considered a new screening test, and decisions about follow-up testing should be made on the basis of the new test, and not on the basis of the original screening test.

It is relatively common for children to have slightly elevated screening test results that do not persist on additional testing. For this reason, it is preferable to base interventions on the results of diagnostic testing.

Exception to the recommended schedule

If a child with an elevated screening test result is less than 12 months old, or if there is reason to believe that a child's BLL may be increasing rapidly, consider performing the diagnostic test sooner than indicated in the accompanying schedule.

5.2. Follow-up testing for children with elevated diagnostic BLLs.

- Children with diagnostic BLLs of 10-14 $\mu\text{g}/\text{dL}$ should have at least one follow-up test within 3 months.
- Children with diagnostic BLL tests of 15-19 $\mu\text{g}/\text{dL}$ should have a follow-up test within 2 months.
- If the result of follow-up testing is $\geq 20 \mu\text{g}/\text{dL}$, or if the child has had two or more venous BLLs of 15-19 $\mu\text{g}/\text{dL}$ at least 3 months apart, the child should receive clinical management (see next section).
- Children with diagnostic BLLs $\geq 20 \mu\text{g}/\text{dL}$ should receive clinical management, which includes additional follow-up testing (see next section).

Follow-up testing

A follow-up test is a venous BLL test used to monitor the status of a child with an elevated diagnostic BLL test.

Regular measurement of the BLL of a child with an elevated diagnostic test result is important because the BLL may continue to rise. Rising BLLs are especially likely in children 6 months to 2 years of age because this is the age group in which mouthing behavior is most frequent.

6. Provide clinical management for children when appropriate.

Clinical management includes:

- 6.1. Clinical evaluation for complications of lead poisoning.
- 6.2. Family lead education and referrals.
- 6.3. Chelation therapy, if appropriate.
- 6.4. Follow-up testing at appropriate intervals.

Clinical management

Clinical management is part of comprehensive follow-up care and is defined as the care that is usually given by a health-care provider to a child with an elevated BLL.

Office visits for clinical management should be complemented by activities that take place in the child's home, such as home visits by a nurse, social worker, or community health worker; environmental investigation; and control of lead hazards identified in the child's environment.

See Table 4.3. for a summary of comprehensive follow-up care.

Note: The accompanying recommendations about clinical management are based on the experience of clinicians who have treated lead-poisoned children. They should not be seen as rigid rules and should be used to guide clinical decisions.

6.1 Perform a clinical evaluation.

Table 4.2. Clinical evaluation

<i>Medical history.</i>
<p>Ask about:</p> <ul style="list-style-type: none"> • Symptoms. • Developmental history. • Mouthing activities. • Pica. • Previous BLL measurements. • Family history of lead poisoning.
<i>Environmental history.</i>
<p>Ask about:</p> <ul style="list-style-type: none"> • Age, condition, and ongoing remodeling or repainting of primary residence and other places that the child spends time (including secondary homes and day-care centers). Determine whether the child may be exposed to lead-based paint hazards at any or all of these places. • Occupational and hobby histories of adults with whom the child spends time. Determine whether the child is being exposed to lead from an adult’s workplace or hobby. • Other local sources of potential lead exposure.
<i>Nutritional history.</i>
<ul style="list-style-type: none"> • Take a dietary history. • Evaluate the child’s iron status using appropriate laboratory tests. • Ask about history of food stamps or WIC participation.
<i>Physical examination.</i>
<p>Pay particular attention to the neurologic examination and to the child’s psychosocial and language development.</p>

Clinical evaluation

Medical history. Developmental progress should be monitored carefully. If there are delays or lags, the child should be referred to an early intervention program for further assessment.

Environmental history. State and local health departments may provide additional questions about local exposure sources.

Nutritional status. Identified nutritional problems should be corrected.

- Deficiencies of calcium and iron may increase lead absorption or toxicity.
- A diet high in fat may result in increased lead absorption.
- Because more absorption of lead may be increased when the stomach is empty, the scheduling of smaller and more frequent meals may be helpful.

Physical examination. Findings of language delay or other neurobehavioral or cognitive problems should prompt referral to appropriate programs. Children may need early intervention programs and further examinations during the early school years to facilitate entry into an appropriate educational program.

6.2. Provide family lead education and referrals.

See Section 4 for topics that should be covered as part of family lead education.

Refer children for appropriate social services if problems such as inadequate housing, lack of routine health care, or need for early intervention educational services are discovered.

Family lead education and referrals

The first opportunity to educate families about the causes and consequences of a child's elevated BLL usually occurs in the health-care provider's office. Health-care providers should discuss both short-term repercussions of elevated BLLs (e.g., the need for follow-up testing and treatment, the need to control lead hazards in the child's environment) and long-term repercussions (e.g., the potential for future learning problems, the availability of early-intervention services).

Health departments may provide printed materials, flipcharts, and videos that can assist in the family-education process.

The health department may also provide referral sources, such as social-service agencies, parent-support groups, and housing services.

6.3. Provide appropriate chelation therapy.

A child with a BLL $\geq 45 \mu\text{g}/\text{dL}$ should be treated promptly with appropriate chelating agents and be removed from sources of lead exposure.

BLL testing for children undergoing chelation.

Before chelation therapy is initiated, a child with a BLL $< 70 \mu\text{g}/\text{dL}$ should have a second BLL test, performed on a venous specimen, to ensure that therapy is based on the most recent and reliable information possible. Children with screening BLLs of $60\text{--}69 \mu\text{g}/\text{dL}$ should have a venous BLL test within 24 hours.

Children with BLLs $\geq 70 \mu\text{g}/\text{dL}$ should have an urgent repeat BLL test, but chelation therapy should begin immediately, and not be delayed until the test result is available.

A child who is receiving chelation therapy should be tested at least once a month. When chelation is terminated, BLLs should be monitored frequently until sources of lead exposure have been identified and addressed.

Chelation therapy

Chelation therapy should be initiated immediately for all children with an initial screening-test result that is ≥ 70 $\mu\text{g}/\text{dL}$. If such an elevated BLL is obtained on a fingerstick sample, the health-care provider should order an immediate diagnostic test and consider initiating chelation while that test is being performed, *if there is reason to believe that the results of the screening test are accurate (e.g., if it was obtained by a skilled phlebotomist under controlled conditions)*.

6.4. Provide follow-up BLL testing at appropriate intervals.

Children who are receiving clinical management should be tested at 1- to 2-month intervals until these three conditions are met:

- 1) The BLL has remained $<15\mu\text{g}/\text{dL}$ for at least 6 months, and
- 2) Lead hazards, e.g., chipping, peeling, lead-based paint, traditional remedies, etc., have been removed, and
- 3) There are no new exposures.

When these conditions are met, children should be tested approximately every 3 months.

Children for whom these three conditions are met and who have reached 36 months of age no longer need to receive follow-up testing.

Follow-up testing

A follow-up test is a venous BLL test used to monitor the status of a child with an elevated BLL on a diagnostic test.

Children who are receiving clinical management should receive follow-up testing to monitor the effectiveness of services they receive (e.g., lead education, home visitation and environmental investigation, lead-hazard control, chelation therapy).

7. Participate in a follow-up team.

Table 4.3. Comprehensive follow-up services, according to diagnostic* BLL

BLL ($\mu\text{g}/\text{dL}$)	Action
<10	Reassess or rescreen in 1 year. No additional action necessary unless exposure sources change.
10-14	Provide family lead education. Provide follow-up testing. Refer for social services, if necessary.
15-19	Provide family lead education. Provide follow-up testing. Refer for social services, if necessary. If BLLs persist (i.e., 2 venous BLLs in this range at least 3 months apart) or worsen, proceed according to actions for BLLs 20-44.
20-44	Provide coordination of care (case management). Provide clinical management (described in text). Provide environmental investigation. Provide lead-hazard control.
45-69	Within 48 hours, begin coordination of care (case management), clinical management (described in text), environmental investigation, and lead hazard control.
70 or higher	Hospitalize child and begin medical treatment immediately. Begin coordination of care (case management), clinical management (described in text), environmental investigation, and lead-hazard control immediately.

* A diagnostic BLL is the first venous BLL obtained within 6 months of an elevated screening BLL.

The follow-up team and comprehensive follow-up services

Comprehensive services are best provided by a team that includes the health-care provider, care coordinator, community-health nurse or health advisor, environmental specialist, social services liaison, and housing specialist. Coordination of care, environmental services (i.e., identifying and controlling sources of lead exposure) and relocation to safe housing are typically provided or coordinated by the health department.

Because childhood lead exposure is likely to be associated with poor and deteriorating communities, children with elevated BLLs may also have problems such as inadequate housing, lack of routine medical care, and poor nutrition. Children may also need educational services, and the team may be instrumental in ensuring that children with a history of elevated BLLs receives early intervention or special education services for which they are eligible.

8. Collaborate with public health agencies.

Health departments and child health-care providers should interact in a number of ways:

- They should exchange information on local exposures to lead.
- Providers should put complete information on laboratory BLL test-requisition slips and should report children with elevated BLLs to the health department, as required.
- Health departments should collect lab data, analyze it, and prepare reports for providers and the public.
- Providers should encourage health departments to review data and to adjust screening recommendations as necessary.

Working with the health department

Some states require that laboratories report the results of all children's BLL tests, along with demographic and address information. These reports are the foundation of BLL surveillance systems and depend on complete and accurate information being placed on the lab slip by the provider.

On the basis of surveillance information and other information from health-care providers, state and local health departments will be able to review and improve screening recommendations so that they are as effective as possible.

