

Department for Public Health
Childhood Lead Poisoning Prevention Program (CLPPP)
Guidelines on Blood Lead Screening and Management of Elevated Blood Lead Levels

In May 2012, the Centers for Disease Control and Prevention (CDC) revised its recommendations on childhood lead poisoning prevention guidelines and at what blood lead level (BLL) initiates preventive interventions. The BLL once considered as the level of concern of 10-14.9 micrograms per deciliter ($\mu\text{g}/\text{dL}$) has been updated to what is now considered the reference value of $5\mu\text{g}/\text{dL}$, based on the 97.5th percentile of the population BLL in children aged 1-5 years of age (12 months \leq 72 months of age). A BLL of $5\mu\text{g}/\text{dL}$ initiates those interventions needed to prevent further lead hazard exposure, elevation in blood lead levels and the adverse health effects of lead in the body.

According to the CDC, childhood lead poisoning is still considered to be the most preventable environmental disease of young children. Yet an estimated 450,000 children in the United States have elevated blood lead levels (EBLL's) $\geq 5\mu\text{g}/\text{dL}$. Lead poisoning, a BLL of $\geq 15\mu\text{g}/\text{dL}$ can affect nearly every system in the body. A simple early childhood screening blood test can help to prevent a lifetime of irreversible adverse effects on the body.

LEAD POISONING PREVENTION AND MANAGEMENT

Environmental lead exposure continues to cause harm, particularly to young children and prenatal patients. These guidelines offer the physician guidance on the provision of verbal and blood lead screening and follow-up services for children 6 months up through 72 months of age. Prenatal lead screening and follow-up guidelines for pregnant are also included.

According to the CDC, case management of children ≤ 72 months of age and prenatal patients with an EBLL involves the coordination, provision and oversight of those services needed to reduce lead levels to $< 5\mu\text{g}/\text{dL}$. A hallmark of effective case management is ongoing communication with caregivers and other service providers. A cooperative approach is needed in solving any issues that may arise during efforts to decrease a patient's EBLL, and eliminate lead hazard exposure in the patient's environment.

PRIMARY PREVENTION OF LEAD POISONING

BLOOD LEAD SCREENING

KRS 211.903 refers to the blood lead screening of all high risk children for lead poisoning. Per KRS 211.900, "at-risk persons" shall mean all children 72 months of age and younger and pregnant women who reside in a dwelling or dwelling unit which were constructed and painted prior to 1978 (ban of lead as an additive to gas and paint in 1978), or reside in geographic areas defined by the cabinet as high risk or possess one or more risk factors identified in a lead poisoning verbal risk assessment.

Blood lead screening should be provided for all at-risk children less than and equal to 72 months of age and pregnant women. At risk populations include:

- **Medicaid** enrolled or eligible children ≤ 72 months of age and pregnant women.



- Those living in or visiting a **Targeted Zip Code Areas** more than 6 hours a week
- Those answering “Yes or Don’t Know” to one or more questions on the Lead Poisoning Verbal Risk Assessment.

Targeted zip code areas are those high-risk areas where patients are more likely to have exposure to lead paint hazards due to the prevalence of pre-1950 housing and percentage of the population living at or below the poverty level in a particular zip code. Housing structures build prior to 1950 are more likely to contain structural deficiencies that may lead to the deterioration of those surfaces containing lead paint and increase lead hazard exposure through paint chips and dust. Children living in or below the poverty level are more at-risk due to lower income families are more likely to live in deteriorating sub-standard housing.

Determining patient lead hazard risk factors should not be solely based on these targeted zip codes but by also using the **Lead Poisoning Verbal Risk Assessment**. A list of targeted zip code areas and the verbal risk assessment can be found at <http://chfs.ky.gov/dph/mch/cfhi/clppp.htm>.

LEAD POISONING VERBAL RISK ASSESSMENT

Review each of the lead poisoning verbal risk assessment questions at every preventive service for all children ages 6 months \leq 72 months to determine risk factors, if risk factors have changed and/or there are new risks. The American Academy of Pediatrics (AAP) recommends the verbal risk assessment to be performed at ages 6, 9, 12, 18, and 24 months, and ages 3, 4, 5, and at 6 years with appropriate action to follow if the response is positive or ‘don’t know’. AAP recommends and Medicaid requires blood lead testing at ages **12 and 24** months. The young child’s hand-to-mouth activity and of crawling/being on the floor increases a child’s risk of exposure to lead paint based hazards.

Pregnant Women

Review each of these questions at the positive pregnancy test visit or initial prenatal visit to determine if patient is at-risk.

A copy of the Lead Poisoning Verbal Risk Assessment Questionnaire can be found at <http://chfs.ky.gov/dph/mch/cfhi/clppp.htm>.

The questionnaire reviews potential patient lead hazard risks such as:

1. **Does the patient live in or visit a building built before 1978 with peeling/chipping paint or has undergone recent or ongoing remodeling (dust/chips)?**
2. **Does the patient or any other members of the household (child’s playmate/ brother/sister/ patient’s spouse) have a history of elevated blood lead levels or who has had lead poisoning?**
3. **Does the patient or someone who visits or in the household work in an occupation known or suspected to involve lead?** Common industries using lead include but are not limited to:

Auto mechanics/bodywork	Plumbing	Jewelry Making/Repair
Farm/Migrant Farm Work	Blowing Glass	Metal Sculpting
Furniture Refinishing	Gardening	Stained Glass
Renovation Work	Painting	Car/Boat repair
Painting Roads	Printing	Firing Ranges
Metal Work/Welding	Casting Aluminum	



Plastics manufacturing
Radiator Repair
Making Bullets/Sinkers/lead toys
Home Repairs/Remodeling

Ceramic Making
Battery Recycling/Smelting/Recycling
High Construction Area
Bridge Repair/Painting

Firearms/Firing Range
Electronic soldering
Smelting Metals/ Scrap yards

4. Does the patient use any folk remedies that may contain lead or use pottery or ceramic ware for cooking, eating, or drinking or participate in hobbies that may involve lead such as ceramic pottery, jewelry making, gardening or stained glass?

Imported Cosmetics: ▪ **Middle East, India, Pakistan, Africa** ▪ Kohl, Surma, Al Koh: a powder used both as a cosmetic eye make-up and applied to skin infections and the navel of a newborn child. And can be ingested when on hands ▪ Kajal: eye cosmetic when used can be ingested if on hands. ▪ Sindoor: a powder applied to face or scalp during ceremonies, mistakenly used as food

Foods: ▪ **Middle East:** ▪ Lozeena: a bright orange powder used by Iraqis to color rice and meat ▪ **Mexico** ▪ Chapulines (dried grasshoppers): can be chocolate coated; grasshoppers eat chilies that are contaminated with lead from soil and area silver mine fallout

Folk Remedies: ▪ **Hispanic** ▪ Azarcon aka: Ruedo, Corol, Maria Luiso, Alarcon, Ligo: used for intestinal illness. ▪ **Mexico** ▪ Greta: a yellow powder used for intestinal illness. ▪ **Dominican Republic** ▪ Litargirio: yellow peach powder used as a deodorant, foot fungicide, treatment for burns and wound healing. ▪ **Vietnam/ Hmong Community** ▪ Pay-loo-ah- a red powder given for rash or fever. ▪ **Asian/ Tibet/ India/Thailand** ▪ Ayurvedic medicine, ▪ Tibetan Herbal Vitamin ▪ **Asia:** Bo Ying compound (the “product”) manufactured by Eu Yan Sang (Hong Kong) for use in infants and children for treatment of influenza, fever, sneezing, and nasal discharge.

▪ **China** ▪ Jin Bu Huan: used to relieve pain, ▪ Po Ying Tan: used to treat minor ailments in children, Ba-Baw-San. ▪ **India** ▪ Ghasard: a brown powder given as an aid to digestion. ▪ **Thailand** ▪ Daw Tway is a digestive aid used in Thailand and Myanmar (Burma). ▪ **Iran** ▪ Bint Al Zahab: Rock ground into a powder and mixed with honey and butter given to newborn babies for colic and early passage of meconium after birth. ▪ **Saudi Arabia** ▪ Traditional Saudi Medicine: Orange powder prescribed by a traditional medicine practitioner for teething; also has an anti-diarrheal effect, ▪ Santrinj: An amorphous red powder containing 98% lead oxide used principally as a primer for paint for metallic surfaces, but also as a home remedy for "gum boils" and "teething." ▪ Bint Dahab: A yellow lead oxide used by local jewelers and as a home remedy, ▪ **Kuwait** ▪ Bokhoor: A traditional practice of burning wood and lead sulphide to produce pleasant fumes to calm infants. **Other:** ▪ Bala Goli: a round, flat, black bean dissolved in ‘gripe water’ and used for stomach ache. ▪ Kandu: a red powder used to treat stomach ache.

5. Does the patient live near a busy road/ highway?

Soil around the home could be contaminated by the leaded gasoline fallout, on the soil or in water (cisterns/wells) for many years following contamination and can get on a child’s hands. Lead can also be absorbed from the soil in fast growing plants such as kale, spinach, and other garden vegetables from the soil and then consumed by animals and humans and can lead to increase in blood lead levels.

If the verbal risk assessment is negative at each visit, a blood lead test should be routinely completed at the appropriate ages for at-risk children until the age of 72 months of age and include:

- **Medicaid** enrolled or eligible children \leq 72 months of age and pregnant women.
- Those living in or visiting a **Targeted Zip Code Areas:** more than 6 hours a week.
- Those answering “Yes or Don’t Know” to one or more questions on the **Lead Poisoning Verbal Risk Assessment.**

BLOOD LEAD SPECIMEN COLLECTION

NOTE: CDC recommends using a venous blood lead specimen. The finger stick collection technique is more prone to environmental contamination than the venous and will affect specimen results.

Contamination errors are common in trace metal analysis and precautions must be taken to eliminate or reduce errors in capillary specimens. Lead can be picked on work surfaces, from printed materials



or from the hands of the collector. It can also come from the hands and the clothes of the child you are screening. The key to effective lead screening is to collect uncontaminated blood specimens.

When collecting blood lead specimens, every collector should review the guidelines provided by the agency's analyzing laboratory and follow correct collection guidelines. **It is important that the technician/ nurse responsible for obtaining the blood sample is familiar with and assures the techniques for obtaining a high quality blood lead sample, see CDC video at http://www.cdc.gov/nceh/lead/training/blood_lead_samples.htm.** See also Blood Specimen Collection Guidelines at <http://chfs.ky.gov/dph/mch/cfhi/clppp.htm>.

Attention: Steps performed before, during, and after collection are of paramount importance.

- Lead is everywhere in the environment. Therefore, great care must be taken to remove lead from the hands of the *patient and collector* prior to collection. It will also prevent contamination of your collection site and work environment.
- Prepare your worksite in a sterile fashion prior to washing patients and your own hands for the specimen blood draw.
- It is recommended for screening children who are younger than one (1) year of age to use the heel of the infant as a puncture site. Guidelines for this procedure can be found at the National Committee on Clinical Laboratory Standards.

To reduce the odds of contaminating your capillary sample:

- Take special care when preparing your test area and supplies, use sterile fashion.
- As much as possible, use only supplies that have been certified as lead free.
- Label the liquid soap bottle that will be used for lead testing, "Use for Lead Testing Only".
- Handle all equipment with powder-free gloves. Powdered gloves may contaminate your sample.
- Keep all screening supplies—which include your lancet, gauze pads, band aids, tissues, alcohol pads, and micro-collection vials—in a clean plastic box with a snap lid for storage.
- When using bulk-packaged micro-collection vials, carefully pour the vials into a re-sealable plastic bag and close to store. Individually packaged kits or a full box of micro-collection vials can be stored as they are. All micro-collection containers from open packages should be stored in a covered plastic container.
- There are many types of micro-collection vials you can use to collect samples, but all must be prescreened or **certified as lead-free**.
- For Capillary tubes, most vials contain 200 to 300 micrograms per deciliter of blood, EDTA or Heparin tubes are required.
- For Capillary Scoop micro-collection vials, these should be used with extreme caution because they have a high potential for contributing to lead and tissue contamination.
- Choose a lancet with the appropriate depth to collect the proper amount of blood for the micro-collection vial you are using. Also, use retractable lancets that cannot be used more than once to avoid sticking a child unnecessarily.

HEALTH CARE PROVIDER CASE MANAGEMENT SERVICES



Case management follow up intervention is needed for every child with a confirmed blood lead level of 5ug/dL or greater and for every pregnant woman with a venous level of 5ug/dL or greater. Case management services should include follow-up blood lead levels, providing preventive education, referrals to nutrition services and home visits to help in identifying potential lead hazard sources. When a patient has been identified to have a blood lead level $\geq 15\mu\text{g/dL}$, **lead poisoning**, referrals should be made for to the local health department for comprehensive environmental lead home assessment to identify potential lead hazard sources and where samples are taken in and around any structure the patient spends 6 or more hours a week as well as to discuss preventive strategies with the family.

PREVENTIVE EDUCATION

Today lead poisoning is the number one preventable environmental health risk for children. As no amount of lead in the body is normal, and even low blood lead levels have been known to have adverse neurological effects in children, preventive education and strategies are important and should be initiated for blood lead levels even below 5 $\mu\text{g/dL}$. Education should be provided to all families with young children on **what lead is and what potential lead hazard sources are, routes of exposure, how to prevent childhood lead hazard exposures, dietary changes needed to aid in excreting any potential lead, lead safe home cleaning practices, and hand washing as this will help in preventing further lead hazard exposure, BLL elevation and the irreversible adverse health effects.**

Healthcare providers play a key role in lead poisoning prevention by providing lead poisoning prevention education to families during the preventive EPSDT visits starting at ages even before 6 months of age.

Preventive education includes:

WHAT IS LEAD?

Lead is a naturally occurring toxic element (metal) that can cause devastating harm to the human body. Lead is a potent neurotoxin and affects almost every system of the body, especially the developing brain and nervous system of unborn babies and children 6 years of age and under. CDC studies have shown that blood lead levels as low as 5ug/dL may result in adverse pregnancy outcomes, including spontaneous abortion, premature birth, stillbirth, birth defects, and decreased intellect and/or behavior problems in the child.

Blood lead levels are measured in micrograms per deciliter ($\mu\text{g/dL}$).

SOURCES OF LEAD HAZARD EXPOSURE

Children can be exposed to lead through several different sources. The primary source of lead exposure among U.S. children is the lead-based paint and lead-contaminated dust and soil found in and around pre-1950 deteriorating structures. Parents, family and friends can also unknowingly expose their families by bringing lead into the living area from clothes, skin, and hair from lead



exposure through their occupation or hobbies Lead dust can travel into the home from the family vehicle as well as on pets. Lead can also be found in water sources, thus also affecting fish and wildlife and those who consume them.

The 3 media to which people are most likely to be either directly or indirectly exposed to lead are:

- Deteriorated paint (pre 1978)
- Interior dust
- Exterior soil or dust

ROUTES OF EXPOSURE

Lead has several routes of exposure. Ingestion is the primary route for children. Ingestion can be a result of a child putting lead dust contaminated hands into their mouth, eating paint chips, or through mouthing an object that has exposed lead or lead paint or lead dust. Lead can also be inhaled, through dust and fumes. Lead vapor from paint removal with a heat gun or making bullets/sinkers is the fastest route to an EBLL. Although rare, it can also be absorbed dermally, through the skin.

Due to its sweet taste, lead has been used for centuries in cooking, and today is still used in some cultures. It is because of this sweet taste, when a child finds a source, such as a windowsill to chew on, they are more likely to return to that sweet taste, thereby increasing their lead hazard exposure and BLL.

- Primary route
Ingestion (#1)
- Secondary routes
Inhalation (Fastest)
Dermal (Rare)

LEAD POISONING PREVENTION DIET

Nutritional education plays a key role in helping the body to eliminate lead out of its system thereby decreasing a child's blood lead level. With the increase of calcium, iron, and vitamin C in the diet, lead is more likely to be excreted before it is able to be absorbed. A diet low in fat will help to keep the body from retaining lead, as fat slows the elimination of lead. Children with empty stomachs absorb more lead than children with full stomachs. Children should be provided with four to six small meals during the day.

Foods high in calcium will help to assure calcium bone stores are adequately full and prevent lead being mistakenly absorbed into empty calcium bone stores. Once lead is stored in the bone, the lead is slow to be released and most likely will not be pulled from the bone stores unless the body has an increased need for calcium such as with pregnancy, broken bone or through a disease process such as osteoporosis.

Adequate iron is also needed to decrease lead absorption. Anemia is often associated with EBLL's. It is important to discuss the need to increase iron and review those foods high in iron to help the family adjust the diet with those food items a child will most likely eat.



Vitamin C helps to increase excretion of lead through the urine. An increase in Vitamin C is needed for the absorption of iron. It is important to discuss the need to increase Vitamin C and review those foods high in Vitamin C to help the family adjust the diet with those food items a child will most likely eat.

HANDWASHING

Hand washing is a simple yet very effective preventive measure, especially during a young child's crawling and hand to mouth stage. For children living in or visiting high-risk conditions and having access to the potential lead hazards, each time a child puts contaminated fingers or object into the mouth, lead will be ingested. The higher the concentration of lead in the hazard such as paint dust and chips, and how many times the child puts its hands/fingers in their mouth, will determine how high and how fast a blood lead level will increase.

HOME CLEANING TECHNIQUES

Take Shoes off at the Door: Lead can be brought into the living space from outside areas on shoes. Place a tote that cannot be accessed (with a lid or on a shelf) by children at the door to put shoes in. This will help to prevent lead dust from coming in from the outside sources.

Daily Damp Dusting: Dust with a clean damp rag for each room to remove lead dust from surfaces and preventing the dust from blowing and spreading. Reusable rags should be washed twice and in a load by itself. Do not wash lead exposed items with the family wash.

Daily Vacuuming: Vacuum with a Hepa filter vacuum that can be purchased at most department stores. Vacuum slowly and thoroughly, spending at least one minute in a 2 square foot area. Initial shampooing of the carpet is also recommended. Vacuum daily to keep lead dust and chips at a minimum, focusing on areas that are child accessible and where the child spends most of their time.

After Vacuuming:

Daily Wet Mopping: For pre-1978 housing, clean the entire hard surface floor areas with a clean mop using fresh water and any household detergent for each room. **DISPOSE OF THIS MOP. CLEAN AND RINSE BUCKET THOROUGHLY.** Starting with a new mop, clean bucket and fresh water; mop the home daily, rinsing the mop and using fresh water for each room. This is needed to clean unseen lead dust off the floors.

Childs Play/Rest Area: Making a child's play area clean and safe is important in minimizing a child's lead hazard exposure.

- Wipe toys off at least once a week with a damp clean cloth and place in a clean, dry tote with a lid. Inspect the toys for loose parts and exposed paint surfaces, and dispose of these toys.
- Clean the child's play area every day: **Damp Dust, Vacuum, and Mop** the child's play areas.
- Scrub child accessible porches and walkways with detergent and a brush broom, and then hose down generously with water those areas where children play. This helps to remove dust and chips from accessible areas.
- Be aware children can access lead based paint dust and chips in areas of bare soil, where paint dust and chips have fallen from siding, windows, porches, garages, outbuildings. Covering bare



spots in the yard with 6 inches of soil, mulch, or gravel can help to prevent a child's access to this lead hazard. Planting grasses or landscape with plants in those accessible areas will help to prevent a child from playing in bare soil.

- Be sure to vacuum out car seats and floors thoroughly, shampooing these areas also help in the removal of lead in areas where a child spends time.
- Animals can roll in bare lead contaminated soil/areas and bring lead into child accessible areas, such as the home. Keeping animals outside, making areas lead safe for your animals as noted in the instructions above as well as assuring hand washing after handling a pet will help to prevent lead exposure.

TOYS

Toy recalls with lead risks can be found at www.CPSC.gov. The potential risk exposure is when the protective covering on the painted surface is broken and the lead paint is accessible to children mouthing the objects.

It is important to review with parent's information in providing only (lead) safe toys and items for infants and toddlers to mouth/chew on. As the child gets older, encourage the parents deter their child from putting things into their mouth or sucking on items unless it is food or drink.

LEAD PIPES

Older homes that contain lead pipes pose a health hazard to their families. Be aware that even in homes with no lead pipes, public water sources may contain lead from solder in pipes, junctions and water towers and it may settle into the bottom of water heaters. If a family's home has lead pipes, encourage parents to practice running the cold water for 2 minutes (use this to water plants or flush toilets), before the first morning use, to assure lead that has leached out of the pipe into the water is moved out of the pipes. Always use only cold water to cook with.

ELIMINATION OF LEAD FROM THE BODY

Lead is a potent neurotoxin that accumulates in soft tissues and bone over time. Shortly after lead enters into the body it will travel in the blood to the soft tissues- liver, kidneys, lungs, brain, spleen, muscles, and heart. Lead is eliminated in the urine and feces.

- 60% loss in urine
- 30% loss in feces
- 10% loss in hair, nail growth, and sweat

About 99% of the lead taken into the body of an adult will leave in the waste (urine, feces, hair/nail growth and sweat) within a few weeks, but only about 32% will be eliminated from a child's body. The irreversible damage caused by lead depends on the amount and how long lead stays in the body.

STORAGE OF LEAD IN THE BODY



After several weeks, most lead, if not excreted, will be stored in the bones and teeth. Lead will mistakenly store at those sites that normally bind calcium. If the body is not getting an adequate supply of calcium, lead will readily absorb and bind in those empty calcium binding sites. The half-life of lead stored in bone if pulled from the calcium stores is 3-5 years.

CHELATION THERAPY

Chelation therapy is medication used to pull out lead by binding with the heavy metal to be able to be excreted out of the body's system. Chelation therapy can be given by mouth "Succimer" or parenteral "EDTA" at the hospital as well as given to the family to administer at home by mouth. Succimer has a strong "rotten-egg" odor and is unpleasant for the child to take. It is important to review the need for completing all doses of the medication and ways to help the parent administer this medicine at home.

Chelation therapy generally should be reserved for individuals with high BLL's and/or significant symptoms or signs of toxicity. A pediatrician experienced with managing children with lead or heavy metals (lead specialist) should be consulted prior to starting chelation therapy. Medical and case management should be maintained during chelation therapy.

Common adverse effects of chelation therapy are abdominal distress, transient rash, elevated liver enzymes, and neutropenia.

SIGNS AND SYMPTOMS

According to CDC, blood lead levels as low as 5µg/dL has been shown to cause hearing loss, IQ decline, impaired growth, learning disabilities, and behavioral problems. Since lead poisoning often occurs with no obvious symptoms, it frequently goes unrecognized. At very high levels, lead poisoning can cause seizures, coma, and even death.

Early symptoms of lead toxicity can include but are not limited to poor growth, headache, weakness, irritability, malaise, stomach cramps/ache, and sleeplessness, loss of appetite, vomiting, and weight loss. Later symptoms can include, but are not limited to abdominal pain, dizziness, pain in joints, staggering, paralysis, convulsion, blindness and loss of motor control.

LEAD AND PREGANCY

A special concern for pregnant women is in that possible past bone lead accumulation from an exposure as a child or while in a high risk hobby or occupation may be released into the blood during pregnancy and affect the developing fetus. The calcium bones stores may release lead into the blood during pregnancy as the body's need for calcium increases. CDC studies have shown that lead levels as low as 5µd/dL may result in adverse pregnancy outcomes including spontaneous abortion, premature birth, stillbirth, birth defects, and decreased intellect and/or behavior problems in the child. Simple education measures such as increasing calcium in the diet can help prevent fetal exposure from this particular exposure.



Using the lead poisoning verbal risk assessment, it is important to assure blood lead screening for at-risk prenatal patients. It is also important to assure adequate calcium intake for ALL prenatal patients to assure unknown past bone lead accumulations are not released during pregnancy.

For more information on Pregnancy and Lead, please see the CDC Lead and Pregnancy publication on our website: <http://www.cdc.gov/nceh/lead/publications/leadandpregnancy2010.pdf>.

SECONDARY PREVENTION

Secondary prevention strategies and efforts work to reduce the effects of lead in patients with identified elevated blood lead levels (EBLL's).

ENVIRONMENTAL MANAGEMENT FOR ELEVATED BLOOD LEAD LEVELS

Once an EBLL has been identified, environmental management through home visits is one component of an on-going process related to the elimination of lead poisoning as a public health problem. Home visits and visual investigations help to:

- Identify areas in the home that could potentially be a source for lead exposure;
- Provide suggestions and educational materials to the family in an effort to make the home lead-safe;
- Reduce the patient's current BLL to less than 5µg/dL by reducing or eliminating the amount of lead exposure;

Healthcare providers should encourage families to have their pre 1978 housing tested for lead before an EBLL is identified as well as assure that patients identified as having EBLL's receive appropriate and timely environmental investigations. Interventions during home visits include:

- Informing the patient/parent/guardian/care giver of child's blood lead level; review level of understanding; monitoring of blood lead levels,
- Reviewing what lead poisoning is and common sources of lead, provide educational materials;
- Reviewing health education and preventive lead poisoning strategies, provide suggestions in an effort to make home lead safe and to reduce the amount of lead exposure;
- Reviewing lead poisoning prevention diet,
- Reviewing patient's physical status, including behavior problems/changes, nutritional status and specific habits such as placing fingers in mouth or eating dirt or paint chips;
- Visualize the patient's home environment and child play areas to identify potential sources of lead; is the home pre-1978 and have chipping, peeling paint or dust throughout home and discuss emergency measures to reduce the patient's lead hazard exposure;
- Assure the well-being of the child by referring to appropriate agencies; services may include social services for emergency or temporary housing agencies.

Home visits should be conducted for all children, who after receiving preventive education and 12 weeks, continue to have blood lead level remaining at $\geq 5\mu\text{g/dL}$ and for pregnant women with a BLL of

VISUAL INVESTIGATION OF THE PRIMARY ADDRESS:



The initial home visit/visual investigation should be initiated by home visiting staff following time frames listed below (See Table 1) according to CDC’s recommendations. However, KYCLPPP recommends timeframe of two (2) weeks for BLL’s 5-14.9ug/dL to visualize potential sources of lead and to review preventive education with the parent/guardian/care giver and to minimize childhood lead hazard exposure and prevent a further increase in EBLL and lead poisoning.

Table 1: Home Visit and Visual Investigation

Blood Lead Level	Time Frame for Home Visit and Visual Investigation
BLL 5-14.9ug/dL	4 weeks of 2nd BLL in this range
15-19.9 µg/dL	2 weeks; refer for comprehensive lead risk Inspection
20-44.9 µg/dL	1 weeks; refer for comprehensive lead risk Inspection
45-69.9 µg/dL	48 hours; refer for comprehensive lead risk Inspection
≥70 µg/dL	24 hours; refer for comprehensive lead risk Inspection

At the time of the investigation, preventive education (see Preventive Education section) should be reviewed with the parents/guardians/care giver. Temporary measures to reduce further exposure are recommended to keep the child away from the potential sources. If the child’s BLL should increase to lead poisoning (≥15 ug/dL), it is required per KRS 211.905 to have potential lead based hazards investigated and for homeowners to correct any identified lead hazards within sixty (60) days.

Temporary measures may include but are not limited to:

- Blocking child from potential hazardous area with a barrier, (i.e. door, child gate);
- Using furniture to block child’s access to the hazard (i.e. furniture in front of a chipping window sill);
- Use of duct or masking tape and plastic or cardboard to cover an area of chipping/peeling surface until permanent work can be conducted;
- Daily damp dust, wet mop and vacuum with a hepa vac especially in the child’s play area;
- Wipe child’s toys clean, keep toys in clean dry tote, and placing tote in clean play area and limiting the child’s play to this area; (especially if child is crawling and/or in hand-to-mouth exploration stage);
- Keep child’s hands washed with soap and water, (germ gel does not remove lead), wash hands before snacks and meals and before any nap or bedtime (especially if child is crawling and/or in hand-to-mouth exploration stage);
- Exploring the possibility to relocate child(ren) and pregnant women from the home while renovation/remediation work is in progress.

A thorough visual investigation of the child’s home can help to identify possible sources of lead. The investigation visualizes both the interior and exterior environment of the child with attention given to child accessible painted surfaces, dust and soil. Other potential sources of lead should be considered during the investigation i.e., water, family occupation, hobbies, etc.

COMPREHENSIVE ENVIRONMENTAL LEAD RISK HOME INSPECTIONS:



For children identified with *confirmed* lead poisoning, BLL's $\geq 15\mu\text{g/dL}$, a Comprehensive Environmental Lead Home Inspection is required. An inspection of the dwelling(s) where a child routinely spends more than six (6) hours per week **must** be completed and is required according to KRS 211.905, to determine the existence of lead-based hazards. Priority should be given to the child's primary place of residence. A referral to a certified risk assessor is needed to complete a Comprehensive Environmental Lead Home investigation. This investigation should be conducted within the appropriate time frames per CDC's recommendations as listed in Table 2.

Table 2: Comprehensive Lead Risk Inspection

Blood Lead Level	Time Frame for Inspection	Type of Assessment
$\geq 70 \mu\text{g/dL}$	Within 24 hours	Comprehensive Lead Risk Inspection
45-69.9 $\mu\text{g/dL}$	Within 48 hours	Comprehensive Lead Risk Inspection
20-44.9 $\mu\text{g/dL}$	Within 1 weeks	Comprehensive Lead Risk Inspection
15-19.9 $\mu\text{g/dL}$	Within 2 weeks	Comprehensive Lead Risk Inspection
Persistent BLL at 5-14.9 $\mu\text{g/dL}$	Within 4 weeks	Comprehensive Lead Risk Inspection

A lead risk inspection report can take up to 30-90 days to process and receive.

CASE CLOSURE

Case closure is determined according to the initial or an increased blood lead level and can be closed as follows:

- BLL 5-14.9 $\mu\text{g/dL}$ – **BLL has not been above 14.9 $\mu\text{g/dL}$** : Case closure occurs when BLL is less than 5 $\mu\text{g/dL}$, repeat follow up BLL as indicated until child is ≤ 72 months of age.
- BLL 15 $\mu\text{g/dL}$ and greater– Case closure occurs when BLL is less than 5 $\mu\text{g/dL}$ for **at least 6 months**; environmental hazards have been addressed; and there are no new environmental hazards.

For prenatal lead exposure, case closure ends for the pregnant woman at delivery of the infant. If the BLL is $>15\mu\text{g/dL}$ at the time of delivery, the new mother's follow-up care will be with the patients' primary care provider. The newborn will need to be tested at the time of delivery using a cord blood sample. Protocols for case management follow-up are to be initiated for newborns with BLL's $\geq 5\mu\text{g/dL}$.

REPORTING BLOOD LEAD LEVELS

Per KRS 211.902, all blood lead levels $\geq 2.3\mu\text{g/dL}$ are to be reported electronically to the Cabinet. Healthcare providers should assure that their analyzing lab is reporting all blood lead levels to the Cabinet for Health and Family Services electronically through the CLPPP lab data reporting system within 7 days. Lab requisitions need to be filled out accurately and completely to assure that all necessary reportable information (see below) is being reported to the cabinet.

PORTABLE LEAD LAB ANALYZERS



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The use of the portable lead lab analyzer such as the Lead Care or Lead Care II, establishes an agency as a lab. Therefore, all agencies using this analyzer will need to report **all** blood lead levels to the Cabinet as it only reads to 3.3µg/dL. Please refer to the manual on reporting instructions and contact the Childhood Lead Poisoning Prevention Program for reporting details.

COMPLETION OF LABORATORY SUBMISSION FORMS

Please fill out lab requisition forms accurately and completely, including your agency as the provider. According to KRS 211.902, the reporting information is to be provided electronically by the lab within 7 days and should include:

- Provider Name
- Provider Address
- Provider Phone Number
- Date of Collection (tested)
- Type of Specimen (Venous or Capillary)
- Blood Lead Result
- Client First Name
- Client Last Name
- Client Middle Initial
- Client Date of Birth
- Sex
- Race
- Full Address: Number of Dwelling; Street Name (avenue, street, parkway, park, boulevard, road, highway, lane, etc) No P.O. box numbers.
- City
- State
- Zip Code
- Social Security Number
- Insurance Provider and Identification Number

Healthcare providers should assure that your analyzing lab is also reporting your agency's blood lead results directly to the Cabinet for Health and Family Services per KRS 211.902.

For additional information, please contact by:

Mail : **Childhood Lead Poisoning Prevention Program (CLPPP)**
Division of Maternal and Child Health
275 East Main Street, HS2GWA
Frankfort Kentucky 40621

Contact: **Phone:** (502) 564-2154

Website: <http://chfs.ky.gov/dph/mch/cfhi/clppp.htm>.

Fax: (502) 564- 5766

RESOURCES

[AAP Lead Poisoning Prevention Blood Lead Screening Schedule and Verbal Lead Risk Assessment Guidelines: \[https://www.aap.org/en-us/Documents/periodicity_schedule.pdf\]\(https://www.aap.org/en-us/Documents/periodicity_schedule.pdf\).](#)

[Lead Exposure in Children: Prevention, Detection, and Management: Committee on Environmental Health: Pediatrics, 2005, <http://pediatrics.aappublications.org/content/116/4/1036>.](#)

[CDC Prenatal Screening /Prevention Tips:](#)



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- Guidelines for the Identification and Management of Lead Exposure in Pregnant and Lactating Women (2010) : <http://www.cdc.gov/nceh/lead/publications/LeadandPregnancy2010.pdf>
- <http://www.cdc.gov/mmwr/pdf/wk/mm6133.pdf> : Lead Poisoning in Pregnant Women Who Used Ayurvedic Medications from India — New York City, 2011–2012
- <http://www.cdc.gov/nceh/lead/tips/pregnant.htm>

Publications:

1. May 2012 CDC Response to Advisory Committee on Childhood Lead Poisoning Prevention Recommendations in “Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention” http://www.cdc.gov/nceh/lead/ACCLPP/CDC_Response_Lead_Exposure_Recs.pdf
2. Recommendation of the Advisory Committee on Childhood Lead Poisoning Prevention: Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention: http://www.cdc.gov/nceh/lead/ACCLPP/Final_Document_030712.pdf
3. National Center for Healthy Housing (NCHH) CDC Response to the Advisory Committee on Childhood Lead Poisoning Prevention (ACLPP) Summary Chart: <http://www.nchh.org/Portals/0/Contents/NCHH%20CDC%20ACCLPP%20Response%20Summary%20Chart.pdf>
4. Screening Young Children for Lead Poisoning: Guidance for State and Local Public Health Officials. (CDC, 1997) <http://www.cdc.gov/nceh/lead/publications/screening.htm>
5. Managing Elevated Blood Lead Levels Among Young Children: Recommendations from the Advisory Committee on Childhood Lead Poisoning Prevention. (CDC, 2002) http://www.cdc.gov/nceh/lead/CaseManagement/caseManage_main.htm
6. Eliminating Childhood Lead Poisoning: A Federal Strategy Targeting Lead Paint Hazards: <http://www.cdc.gov/nceh/lead/about/fedstrategy2000.pdf>
7. **CDC:** [http://www.cdc.gov/nceh/lead/publications/.](http://www.cdc.gov/nceh/lead/publications/)

Educational Brochures:

1. <http://www.cdc.gov/nceh/lead/ACCLPP>
2. Blood Lead Levels Fact Sheet: http://www.cdc.gov/nceh/lead/ACCLPP/Lead_Levels_in_Children_Fact_Sheet.pdf
3. [http://www2.epa.gov/lead/documents-and-outreach-materials.](http://www2.epa.gov/lead/documents-and-outreach-materials)
4. <http://chfs.ky.gov/dph/mch/cfhi/clppp.htm>
5. Adult Blood Leads: www.cdc.gov/niosh

Prevention Tips: <http://www.cdc.gov/nceh/lead/tips.htm>

CDC Lead Branch: <http://www.cdc.gov/nceh/lead/about/program.htm>

- **Tools and Training:** <http://www.cdc.gov/nceh/lead/toolstraining.htm>.

Environmental:

National Center for Healthy Housing: <http://www.nchh.org>

Home Visiting: Pediatric Environmental Home Assessment (PEHA) Training:

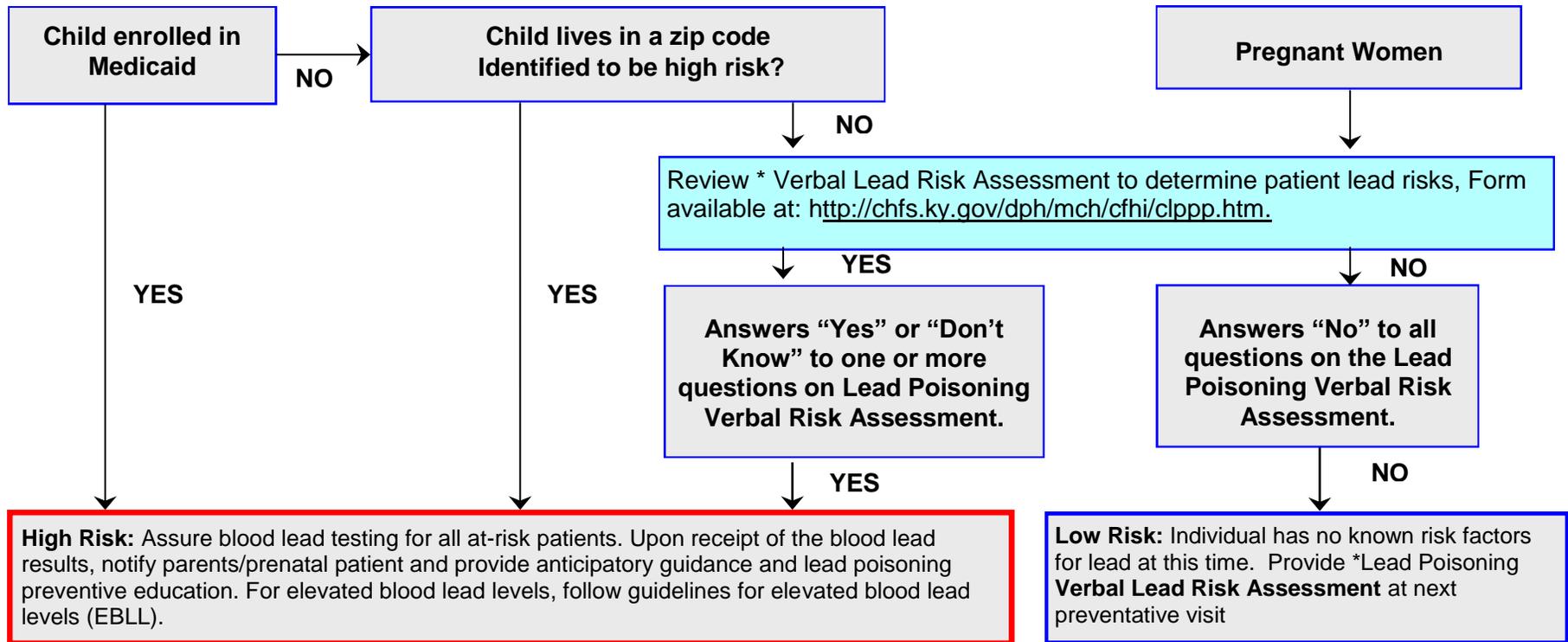
[http://healthyhousingsolutions.com/training-course/pediatric-environmental-home-assessment/.](http://healthyhousingsolutions.com/training-course/pediatric-environmental-home-assessment/)

Lead in Drinking Water: <http://www.cdc.gov/mmwr/pdf/other/su6104.pdf>



Kentucky Public Health

**KENTUCKY DEPARTMENT FOR PUBLIC HEALTH
GUIDELINES ON BLOOD LEAD SCREENING AND MANAGEMENT OF ELEVATED BLOOD LEAD LEVELS (EBLL)**



*American Academy of Pediatrics (AAP) recommends a lead poisoning verbal risk assessment be performed at ages 6, 9, 12, 18, and 24 months, and ages 3, 4, 5, and at 6 years (<72 months of age) with appropriate action to follow if 'yes or don't know' response to any question. AAP recommends and Medicaid requires blood lead testing at ages 12 and 24 months.

NOTE: According to the Centers for Medicare & Medicaid Services' Early and Periodic Screening, Diagnosis and Treatment (EPSDT) guidelines, all EPSDT examinations must include a blood lead laboratory test for children at 12 and 24 months of age and anytime under the age of 72 months if not previously tested. http://www.cms.hhs.gov/medicaidearlyperiodicscrn/02_benefits.asp. Refer to your LHD EPSDT policy for screens/reimbursement.

Use of the Lead Poisoning Verbal Risk Assessment to determine if a prenatal patient is at-risk; at-risk prenatal patients should be tested at the positive pregnancy test or with the initial prenatal lab visit. See CDC's Lead and Pregnancy2010 Prenatal Guidance at: <http://www.cdc.gov/nceh/lead/publications/LeadandPregnancy2010.pdf>



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Blood Lead	BLOOD LEAD LEVEL	ASSESSMENT	INTERVENTIONS	FOLLOW-UP	
	Less than 5 µg/dL 0-4.9µg/dL	Not considered lead poisoning <i>(No amount of lead in the body is normal. Even low blood lead levels can cause adverse neurological effects such as loss of IQ points and learning disabilities. It is very important that education on ways to prevent lead poisoning begin at this level)</i>	<ul style="list-style-type: none"> • PROVIDE LEAD POISONING PREVENTION EDUCATION: Review with parent/guardian: “What lead is, effects of, potential sources, temporary measures, dietary interventions, hand washing, housecleaning techniques”. • Continue to review risk assessment questions at each preventive health visit up to ≤72 months of age. • Complete routine blood lead testing for at-risk patients (Medicaid, Targeted Zip Code areas, and positive response on verbal lead risk assessment). • Assure blood lead testing at 12 and 24 months on all Medicaid recipients/ at-risk patients. • Refer for WIC services. • <i>Contact State CLPPP NCI if you have questions</i> 	<ul style="list-style-type: none"> • Retest at next periodicity visit if risk factor continues or changes • Medicaid recipients or children who reside in a targeted screening area: <ol style="list-style-type: none"> 1. Routine blood lead level obtained at 12 and 24 months of age. 2. Blood lead level obtained on all children 25 months– ≤72 months of age who have never been screened. 	
	BLL's 5–14.9 µg/dL				
	5–9.9 µg/dL	CONFIRM BLL	<ul style="list-style-type: none"> • <i>Confirm BLL within 12 weeks or sooner</i> 	<ul style="list-style-type: none"> • <i>Assure confirmation BLL</i> 	
	10-14.9 µg/dL	CONFIRM BLL	<ul style="list-style-type: none"> • <i>Confirm BLL within one week to one month</i> 	<ul style="list-style-type: none"> • <i>Assure confirmation BLL</i> 	
	Confirmed 5–14.9 µg/dL	Elevated Blood Lead Level (EBLL): CDC Reference Value based on the 97.5 th percentile of the population BLL in children aged 1-5 years of age (12 months –≤72 months of age).	<ul style="list-style-type: none"> • With a confirmed BLL in this range: PROVIDE LEAD POISONING PREVENTION EDUCATION: Review with parent/guardian: “What lead is, effects of, potential sources, temporary measures, dietary interventions, hand washing, housecleaning techniques”. • Refer for WIC services. <p><u>Home Visits:</u></p> <ul style="list-style-type: none"> • A Visual Investigative Home Visit must be made within 30 days or sooner of confirmed EBLL result to help families identify potential child accessible lead based health hazards. • Fax completed case management and Visual Investigative Home Visit report forms to CLPPP NCI • <i>Contact State CLPPP NCI if you have questions</i> 	<ul style="list-style-type: none"> • Repeat blood lead level in 12 weeks of the initial, if BLL remains in this range repeat every 12 weeks until blood lead level is ≤ 5 µg/dL or as ordered by the physician. • Establish a tracking system that assures retesting. Provide Case management follow-up interventions. • For medical case closure see case closure section. • Environmental: Lead hazards have been addressed. 	



**KENTUCKY DEPARTMENT FOR PUBLIC HEALTH
GUIDELINES ON BLOOD LEAD SCREENING AND MANAGEMENT OF CHILDHOOD ELEVATED BLOOD LEAD LEVELS (EBLL)**

BLOOD LEAD LEVEL	ASSESSMENT	INTERVENTIONS	FOLLOW-UP
Blood Lead	<p>Confirmed Elevated Blood Lead Level as defined by KRS 211.900.</p> <p>≥15µg/dL Specimen Criteria Venous Specimens are uncontaminated, preferred by CDC and considered confirmed</p> <p>First capillary specimen at this level will need to be confirmed.</p> <p>A 2nd Capillary is acceptable; however, special care is needed when obtaining a capillary confirmation for lead poisoning (See Blood Lead Specimen Guidelines).</p>	<ul style="list-style-type: none"> • Confirm blood lead level within one week • PROVIDE LEAD POISONING PREVENTION EDUCATION: Review with parents: “What lead is, effects of, potential sources, temporary measures, dietary interventions, hand washing, housecleaning techniques”. • Refer for WIC Services <p>Once Lead Poisoning is Confirmed:</p> <ul style="list-style-type: none"> • Refer for Medical Nutrition Therapy, lead prevention diet counseling should be provided within 2 weeks to assure prevention of further lead absorption. • Refer to a primary care provider (PCP) for medical evaluation. For BLL’s ≥25µg/dL, please provide PCP with letter/information on lead specialist consult. • A Visual Investigative Home Visit <i>must be made</i> within one week of confirmed EBLL result <u>to visually identify potential lead based health hazards and provide the family with preventive education and guidance on potential lead hazards until a CRA can be completed.</u> • Refer to a *Certified Risk Assessor to perform an environmental lead hazard risk inspection within 2 weeks of LHD receiving confirmed EBLL results. • Fax completed Case Management and Visual Investigative Home Visit report forms to CLPPP NCI <u>after confirming result.</u> • <i>Contact CLPPP NCI if you have any questions</i> 	<ol style="list-style-type: none"> 1. Assure confirmation blood lead specimen (see Criteria) within one week. Repeat blood lead levels at 1–2 month intervals until blood lead level is less than 5µg/dL for 6 months or as ordered by the physician. 2. Establish a tracking system that assures follow-up retesting. 3. Provide Case management follow-up interventions. 4. CASE CLOSRE: See case closure section. 5. Environmental: Lead hazards have been addressed.



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GUIDELINES ON BLOOD LEAD SCREENING AND MANAGEMENT OF CHILDHOOD ELEVATED BLOOD LEAD LEVELS (EBLL)**

BLOOD LEAD LEVEL	ASSESSMENT	INTERVENTIONS	FOLLOW-UP
Blood Lead	45–69.9 µg/dL	<ul style="list-style-type: none"> • Confirm BLL within 48 hours • Same as listed above except refer to PCP for medical evaluation within 48 hours. 	<ul style="list-style-type: none"> • Submit venous confirmation specimen within 48 hours. • During and post chelation therapy, retest monthly until: • Blood lead level is less than 5µg/dL for 6 months (capillary specimens are acceptable). • Or as s ordered by the physician. • Establish a tracking system that assures retesting. • Provide Case management follow-up interventions. • CASE CLOSURE: See case closure section. • Environmental: Lead hazards have been addressed.
	70µg/dL and above	<p>Confirmed EBLL BLL_≥ 15 µg/dL</p> <p style="text-align: center;">MEDICAL EMERGENCY</p>	<ul style="list-style-type: none"> • Confirm BLL within 24 hours • Same as listed above except refer to PCP for medical evaluation within 24 hours.

