Chapter 6

Nursing Case Management of a Child with Lead Poisoning

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Introduction

This chapter describes nursing case management activities for the child with lead poisoning. The purpose of case management for lead poisoning is to eliminate the source of lead exposure for the child as quickly as possible and provide optimal benefit for the child’s long-term success. One goal of case management for lead poisoning is to assure that children receive appropriate diagnostic and treatment services (including medical, environmental and other services). This involves coordination of efforts among multiple service providers. Case management involves assessment, problem identification, planning, monitoring, evaluation, referral, and advocacy. It is based on the efforts of an organized team that may include the public health nurse (PHN), the child’s caregivers, the medical provider, a lead risk assessor (RA) or lead hazard investigator (LHI), and others, including educators, social workers or housing agency staff. Effective case management includes ongoing communication with caregivers and other service providers, and cooperative approaches to solving any problems that may arise during efforts to decrease a child’s BLL and eliminate lead hazards in the child’s environment.

In January 2012, the Centers for Disease Control and Prevention (CDC) established a new reference value for a child’s blood lead level (BLL) of 5 mcg/dL. The CDC also published recommendations for actions based on the new reference value (see Table 6.1). All children with a BLL >5 mcg/dL should receive some form of intervention to reduce their exposure to lead hazards. The intensity and depth of this intervention will vary depending on local policies and resources. Where feasible, the LHD should first give priority to children with the highest BLLs. Beyond this, interventions should be targeted at those under 2 years of age because lead exposure is more likely to result in a rapid increase in BLLs in very young children.

Table 6.1 CDC and Wisconsin recommended actions based on blood lead level

<table>
<thead>
<tr>
<th>Venous Blood Lead Level (mcg/dL)</th>
<th>Interventions</th>
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</table>
| <5                               | • Lead education – dietary and environmental  
• Environmental assessment* for pre-1978 housing  
• Follow-up BLL monitoring |
| ≥ 5 – 44                         | Actions for previous level plus:  
• Environmental investigation and lead hazard reduction  
• Complete health history and physical exam  
• Lab work – iron status and consider hemoglobin or hematocrit  
• Neurodevelopmental monitoring  
• Abdominal x-ray (if particulate lead ingestion is suspected) with bowel decontamination if indicated  
• Erythrocyte protoporphyrin laboratory test at BLL of 20 mcg/dL or greater** |
| 45 – 69                          | Actions for previous level plus:  
• Erythrocyte protoporphyrin laboratory test  
• Oral Chelation therapy (consider hospitalization if lead-safe environment cannot be assured) |
<table>
<thead>
<tr>
<th>Venous Blood Lead Level (mcg/dL)</th>
<th>Interventions</th>
</tr>
</thead>
</table>
| ≥ 70                          | • Hospitalize and commence chelation therapy (following confirmatory venous blood lead test) in conjunction with consultation from a medical toxicologist or a pediatric environmental health specialty unit  
• Proceed according to actions for 45-69 mcg/dL |

*The scope of an "environmental assessment" will vary based on local resources and site conditions. This would include at a minimum a visual assessment of paint and housing conditions, but may also include testing of paint, soil, dust, water and other lead sources. This may also include evaluating potential exposure from items in the home such as imported cosmetics, traditional remedies, medicinal powders, pottery, food, toys, hobbies and occupational exposures.

** An EP test should routinely be obtained on any child with a diagnostic BLL ≥20 mcg/dL, and paired with any follow-up BLLs that are drawn (see Figure 8.1. Usefulness of Eryththrocyte Protoporphyrin Tests in Children with Elevated Lead Levels).

Source: “Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention,” Centers for Disease Control and Prevention (CDC), January 4, 2012

While BLL alone does not always indicate the need for complex interventions, the higher the BLL the greater the diversity of services usually required. The emphasis of these services depends on the medical, social, environmental, and financial needs of the family. In Wisconsin, the local health department (LHD) contracting with the Department of Health Services (DHS) to provide childhood lead poisoning prevention services is required to provide nursing case management activities for all children with an “elevated blood lead level” (EBLL). An EBLL is defined in Wis. Stat. 254.11(5m) to mean one venous BLL ≥20 mcg/dL or two venous BLLs ≥15 mcg/dL that are drawn at least 90 days apart.

Home visits are the optimal venue in which to assess the source of a child’s lead exposure. If resources are limited, the LHD may be able to provide letters or phone calls to families of children with lower levels of lead exposure (e.g., BLLs of 5-14 mcg/dL). Other LHDs may be able to conduct an assessment of the child and education with the family during a public health office visit or WIC clinic visit.

The PHN most often plays a central role in assessing the child and assuring effective interventions are provided to limit the child’s lead exposure. Once a child is identified with an EBLL, the nurse case manager should do the following:

1. Visit the child’s residence (and other sites where the child spends significant amounts of time) at least once. A second visit to the home is strongly recommended.
2. Assess factors that may impact the child’s BLL (including the conditions of painted surfaces in the dwelling, other potential sources of lead, nutrition, access to services, family interaction, and caregiver understanding).
3. Assess the child’s health and developmental status.
4. Provide education to the parents/caregivers.
5. Refer the family to other service providers as appropriate.
6. Coordinate services and communicate with members of the case management team.
7. Evaluate the outcome(s) of interventions and referrals; revise the care plan as needed.

A RA/LHI should also visit the child’s residence to conduct a thorough investigation of the home and identify sources of environmental lead exposure (see Chapter 7. Environmental Assessment). The case management team can then use the results of this investigation to develop a plan to protect the child and correct hazardous conditions.

Chapter 6.3
Treatment of childhood lead poisoning can have many complicating factors. The LHD staff can contact the WCLPPP (608-266-5817) for consultation on cases that do not conform to normal procedures and interventions, or when unfamiliar with unusual exposure sources, chelation, or other treatment and follow-up protocols.

**Assessing the Child**

Assessment of the child with lead poisoning is a vital component of nursing case management. The assessment provides the basis to plan interventions to reduce lead exposure and make appropriate referrals. The assessment includes the child’s health status, development status, behavior, nutrition and risk factors for lead exposure. Another important part of this assessment is to determine the primary concerns of the family related to lead poisoning, and identify other family issues that may influence the child’s BLL.

Assessing the lead-poisoned child in the home environment allows observation of possible sources of lead exposure and the child’s access to any deteriorated painted or varnished surfaces.

**Assessment of Health Status**

An assessment of the overall health of the child with lead poisoning provides a baseline and allows the PHN to identify concurrent medical conditions that may influence the child’s response and resiliency to lead poisoning. The assessment includes obtaining a thorough health history from the parent/caregiver and a limited physical assessment. The PHN should determine if the child has a history of lead exposure/poisoning. Blood lead results can be viewed through the Wisconsin Immunization Registry or can be obtained by contacting the WCLPPP.

**Developmental and Behavioral Assessment**

Because the primary toxicity of lead poisoning in young children is to the brain and central nervous system, the PHN should conduct a developmental screening test (such as Ages and Stages Questionnaire) during the home visit. The PHN can also refer the child to a local community program that administers developmental screening tests. This assessment will determine a baseline by which future changes can be weighed, as well as identify the need for referrals to assist the child and family in addressing any delays as soon as possible. If delays are noted in the screening test, a referral should be made to the child's physician or the Birth to Three Program for a thorough developmental assessment. (See Chapter 10 for more information on developmental assessment and interventions.)

**Nutritional Assessment**

Nutrition is an important factor in managing lead poisoning. Certain nutrients, such as iron and calcium, may reduce the child’s absorption of lead. Children with elevated blood lead levels are often at risk for poor nutrition, and their caregivers should receive nutritional counseling to help these children obtain a well-balanced and age-appropriate diet. (See Chapter 9 for more information on nutrition and lead poisoning.)

**Assess Other Risk Factors for Lead Exposure**

The PHN should look for and ask about risks for lead exposure in the child’s environment. Lead-based paint and lead-contaminated dust are the primary sources of exposure for children. If the PHN visits the child’s home before the lead risk assessor/hazard investigator conducts the
property investigation, the PHN should walk through the interior and exterior of the residence with the parent/caregiver to look for possible lead hazards. If the PHN identifies possible sources of lead, the parent/caregiver can be instructed on how to use a home test kit, e.g., 3M™ LeadCheck Swabs or ESCA Tech D-Lead® to identify the presence of lead in the environment.

Other risk factors for lead exposure may include, but are not limited to, the following:

- Iron deficiency (often co-exists with lead poisoning and can potentiate central nervous system effects).
- A history of pica, persistent chewing on varnished or painted surfaces, evidence of frequent hand-to-mouth activity (such as thumb sucking), or accidental ingestion of any non-edible substance.
- Infrequent handwashing, especially after play, before eating and napping.
- Use of imported cosmetics or home/traditional remedies that may contain lead.
- Home has vinyl mini/vertical blinds that may contain lead.
- Parents or other household members engage in a lead-related occupation or hobby.

For more information on other risk factors for lead exposure, see Chapter 3.

**Educational Interventions for Parents/Caregivers**

Educational interventions with parents/caregivers are vital to prevent or limit children’s exposure to lead (see Chapter 4. Primary Prevention and Educating for Behavior Change). Many parents/caregivers have little understanding of the risks of lead poisoning, the sources of lead, the impact of lead toxicity on young children, and steps they can take to prevent lead exposure.

Public health professionals are often the most knowledgeable resource within a community about childhood lead poisoning. Therefore, public health staff may be the primary source of information for families of lead-poisoned children. This information should include the following important topics:

- Child’s BLL and what it means.
- Sources of lead exposure.
- Reducing the sources of lead to decrease the duration of exposure.
- Role of the risk assessor and what will happen during and as a result of the environmental investigation for lead hazards.
- Temporary measures the parent can take to decrease lead exposure (wet cleaning areas with lead paint chips and dust; blocking access to lead hazards; handwashing before naps, meals, and after play; using only cold tap water for food and formula preparation, and flushing pipes each morning).
- Follow-up blood lead testing schedule (see Table 6.2).
- Medical examination.
- Neurodevelopmental assessment.
• Adequate intake of certain nutrients, such as iron and calcium.
• Potential for the child to develop learning or behavior problems at a later age.
• Testing of siblings under 6 years of age.
• Testing pregnant women who live with someone with an elevated blood lead level.
• Chelation protocols if appropriate.

Table 6.2 Schedule for follow-up blood lead testing

<table>
<thead>
<tr>
<th>Venous Blood Lead Level (mcg/dL)</th>
<th>Early Follow-up Testing (2 – 4 tests after identification)</th>
<th>Later Follow-up Testing After Blood Lead Level Declining</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 5 – 9</td>
<td>3 months *</td>
<td>6 – 9 months</td>
</tr>
<tr>
<td>10 – 19</td>
<td>1 – 3 months *</td>
<td>3 – 6 months</td>
</tr>
<tr>
<td>20 – 24</td>
<td>1 – 3 months *</td>
<td>1 – 3 months</td>
</tr>
<tr>
<td>25 – 44</td>
<td>2 weeks – 1 month</td>
<td>1 month</td>
</tr>
<tr>
<td>≥ 45</td>
<td>As soon as possible</td>
<td>As soon as possible</td>
</tr>
</tbody>
</table>

*a Seasonal variation of BLLs exists and may be more apparent in colder climate areas. Greater exposure in the summer months may necessitate more frequent follow-ups.
* Some case managers or clinicians may choose to repeat blood lead tests on all new patients within a month to ensure that their BLL is not rising more quickly than anticipated.

Source: "Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention," Centers for Disease Control and Prevention (CDC), January 4, 2012

The National Center for Healthy Housing has a new tool (2013), *Childhood Lead Poisoning: What You Should Know about Your Child’s Blood Lead Test Results*, which is very useful to share with parents. This factsheet explains how to interpret the child’s blood lead test result and gives recommendations for action for an elevated blood lead level. On the reverse side of the factsheet is a comprehensive checklist that is intended for parents to understand what’s expected when working with their child’s health care provider and how to identify possible sources of lead in and around their home. The checklist includes questions regarding both paint and non-paint sources of lead.

### Developing a Plan of Care

Based on the above assessments, the nurse case manager should develop a plan of care with the family that describes steps needed to lower the EBLL, prevent re-exposure and identify services needed to treat the lead poisoning. Areas the plan should cover include the following:

1. Reduction/elimination of environmental hazards
   • Assessment of all possible exposure sources.
   • Temporary/short-term hazard reduction (including temporary relocation to lead-safe housing if needed).
   • Long-term hazard elimination (including permanent relocation to lead-safe housing if needed).
   • Identification and removal of non-residential exposures.
2. Improvement of nutrition
   • Caregiver counseling.
   • Referral to WIC or other community food resources
3. Caregiver lead education
   • Counseling re: lead and lead-exposure risks, decreasing identified risks, importance of follow-up blood lead tests.
4. Medical follow-up care
   • Child with lead poisoning.
   • Siblings or other at-risk children living in home.
5. Follow-up of other identified problems
   • Counseling/referral for medical services, early intervention and developmental assessment, housing services, social services, Head Start, and parent support.

The case manager need not directly provide all follow-up care, but she/he is responsible for seeing that needed care is provided, including medical follow-up, and follow-up on referrals for other identified problems. Ongoing review and revision of the plan of care should be done with the family. When the plan of care is developed, the PHN should complete the Nursing Case Management Report (F-44771A; see Appendix A) and send it to WCLPPP.

Referrals to Community Resources

An important aspect of the case manager’s role is making referrals. The case manager is responsible for connecting the family of a child with lead poisoning with services and resources that are available in the local community, or at the state or national level. The need for the following referrals should be considered:

✓ Ongoing source of health care if the child doesn’t have a primary care provider.
✓ Agencies that can provide a thorough developmental evaluation and/or treatment if delays were noted on the screening test. These agencies may include Birth to Three, Early Head Start, Head Start or other early childhood programs.
✓ Nutrition counseling or WIC.
✓ Financial assistance from local housing or weatherization agencies for lead hazard reduction work on the property.
✓ Blood lead testing for pregnant women and other children <6 years of age in the household who share exposure to lead hazards.

The case manager’s role is not limited to assisting with lead exposure prevention. It may also include helping families gain access to resources to address other issues.

If the child’s medical provider is unfamiliar with treatment protocols, he/she can be referred to the Poison Center (1-800-222-1222) for consultation with a practitioner experienced in treating children with lead poisoning.
Coordinating Services

A diagnosis of lead poisoning in a child may plunge the family into a whirlwind of activity, worry, guilt, expense and frustration. The case manager can serve as an anchor during this experience, providing emotional support, assuring effective communication between those participating in the treatment of lead poisoning, and coordinating services for the family.

Supporting the Family

Families may need ongoing reassurance and support to help them meet the needs of their child with lead poisoning. Parents may feel guilt about having caused the lead poisoning because they were not aware of the dangers of lead before their child was exposed. They may also be uncertain as to what they can do to help their child.

The case manager should:

- Assess whether the family understands the diagnosis of lead poisoning and the implications that lead exposure may have on the child’s learning abilities and behavior over time.
- Provide support to the parent/caretaker as they implement medical, environmental, and other interventions to treat the lead poisoning.
- Empower the family to assume responsibility for actions within their control to lower the child’s BLL and enhance learning opportunities for the child.

Communication Among Multi-disciplinary Team Members

The case manager performs the role of prime communicator between the multiple professions that are providing services to the child and family. Several strategies are suggested to keep the entire team updated on the status of the child, the environment, and the family. Not only does this facilitate the work of all team members, but it keeps the child as the focus, preventing the services from becoming categorical or overlapping.

- Exchange information regularly with the child’s primary health care provider. Make sure that he/she is aware that public health services are being provided to the child and family, and what those services include. Request information from the physician, such as the results of the physical assessment of the child.
- Convene case conferences on lead poisoned children being served by the LHD. Include the risk assessor, WIC nutritionist, early childhood program staff, social services, and any others that are providing services to the child and/or family. Discussion and problem solving should revolve around the outcomes defined by the plan of care, (medical, environmental, nursing, nutritional, developmental, educational, etc.), and any ongoing issues and concerns.

Evaluation of Care

The PHN should evaluate the plan of care on an ongoing basis and modify the plan as needed to assure progress toward the desired outcomes. This evaluation includes monitoring the child’s health status and assuring that environmental interventions are completed in the shortest time possible to limit the child’s exposure to lead.
Specific measures that can be used to evaluate progress include, but are not limited to, the following:

- The child’s BLL is decreasing.
- The child is living in a lead-safe environment.
- The child is receiving supportive services for other identified medical conditions, developmental delays or behavior problems.
- The parent/caregiver has adequate knowledge of prevention and management of lead toxicity.

**Case Closure**

It often takes an extended period of time to achieve all elements of case management for lead poisoning. The child’s case follow-up and the property investigation follow-up are two primary components of case management. The child’s case record should not be closed until it is determined that the child lives in a lead-safe environment. This determination is made by the risk assessor/lead hazard investigator through a visual assessment and clearance testing (see Chapter 7). In some instances, the family may have moved out of the home where the initial lead exposure occurred and into a home where no lead hazards exist.

The WCLPPP has adopted the following *minimum* case closure criteria for an EBLL case:

- The child’s BLL has remained <15 mcg/dL for at least six months.
- Lead hazards have been controlled or eliminated within the child’s environment.
- There are no new lead exposures.

The PHN can also administratively close the child’s case record when:

- The family moves and a referral has been made to the receiving LHD jurisdiction.
- The parent/caregiver refuses further public health intervention.
- The family moves and cannot be located.

After closing the child’s case record, the PHN should complete the [Nursing Case Closure Report](#) (F-44771B; see Appendix A) and send it to WCLPPP.
References


Centers for Disease Control and Prevention (2012), CDC Response to Advisory Committee on Childhood Lead Poisoning Prevention Recommendations in "Low Level Lead Exposure Harms Children: A Renewed Call of Primary Prevention, *U.S. Department of Health and Human Services*.


