

*Maine Statewide Plan for
Childhood Lead Screening*

Revised July 2004

Childhood Lead Poisoning Prevention Program

Environmental Health Unit

Bureau of Health

Maine Department of Health and Human Services

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I. Introduction

Scope and Effects of Childhood Lead Poisoning

Childhood lead poisoning is a major, preventable environmental health problem in the United States; yet, nearly 1 million children living in the U.S. have blood lead levels high enough to cause irreversible health damage. As recently as 1997, the U.S. Centers for Disease Control and Prevention (CDC) estimated that 890,000 US children under age six have elevated blood lead levels (BLL). This represents 4.4% of the total number of children under age six.

Lead poisoning affects almost every system in the body, usually with no clear symptoms. Even comparatively low levels of blood lead can damage the central nervous system, kidneys, and reproductive system. These harmful effects are associated with decreased intelligence, impaired neurobehavioral development, decreased stature and growth, and impaired hearing acuity¹.

Because lead is a non-digestible heavy metal and has a very low clearance rate from the body, lead particles gradually accumulate in all systems, organs and tissues in the human body. The longer the exposure time and the higher the lead concentration in the blood system, the more detrimental the effects will be on the individual.

Lead exposure is especially harmful to young children since 90% of brain growth and development occurs by age four. The accumulated lead concentrations interfere with the normal development of the brain, the central nervous system, and other organs. The

¹ Centers for Disease Control, National Center for Environmental Health web site,

<http://www.cdc.gov/nceh/lead/factsheets/leadfacts.htm>

deleterious effects of lead on the nervous system significantly affect this early brain growth and development. Impaired cognition and learning disabilities are typical neurological results of elevated blood lead levels in children. Recent studies suggest that these harmful effects occur at lower blood lead levels than we previously believed. Physiology and behavior compound the risk of exposure in children. Children under age six are more likely to have elevated BLLs than adults for two primary reasons:

- ✓ Young children absorb up to 50% of ingested lead, as opposed to adults who may only absorb 5-10%; and
- ✓ Children are at a developmental stage that includes frequent hand-to-mouth activity.

Young children can consume lead dust by inhalation or by ingestion. Minute amounts of lead ingested through the 'mouthing' behavior of toddlers or by inhalation can accumulate in a child's body over time, through repeated exposure. Lead poisoning often goes undetected in children because the warning signs are similar to normal developmental behaviors such as irritability and hyperactivity. In fact, most lead poisoned children are completely asymptomatic. As a result, many children with elevated blood lead levels are not identified until permanent damage to the nervous system has occurred.

Elevated Blood Lead Levels

The definition of an elevated blood lead level (EBLL) has changed over time. Currently, an EBLL is defined as a lead concentration >10 µg/dl (micrograms per deciliter) of blood.

In the late 1970s, the average BLL for children under age six was 15 µg/dl. By the early 1990s, this average declined to just under 4 µg/dl². During the same period, however, the BLL considered "safe" was also declining—from 25 µg/dl to 10 µg/dl dl.

Research continues on the physiological and cognitive effects of lower blood concentrations of lead. For instance one recent study showed lead levels from 1-10 ug/dl to be associated with a 7.4 point drop in IQ. An increase in lead levels from 10 - 30 ug/dl was associated with an additional drop of about two to three points.^{3 4} Another recent study found adverse effects at levels as low as 2.5 µg/dl⁵. This suggests that additional reductions in environmental lead exposure may be necessary to provide adequate protection from lead poisoning risk.

II. Background Information

Defining High Risk for Lead Exposure in Maine

By far the most common source of childhood lead poisoning is paint manufactured before 1978. More than 80% of all homes built in the United States before that date were painted with lead paint. Before 1950, the amount of lead in paint was as much as 50% by

² Pirkle JL, Brody DJ, Gunter EW, et al. The decline in blood lead levels in the United States: the National Health and Nutrition Examination Surveys (NHANES). JAMA 1994;272:284-91 and 2)

³ Lanphear BP, Howard C, Eberly S, et al. Long-term effect of dust control on blood lead levels. Pediatrics 2000;106.

⁴ Canfield RL, Kreher DA, Cornwell C, Henderson CR Jr. Low-level lead exposure, executive functioning, and learning in early childhood. NEJM 2003; 1517.

⁵ Lanphear BP, Howard C, Eberly S, et al. Long-term effect of dust control on blood lead levels. Pediatrics 2000;106.

weight. Between 1950 and 1978, the paint industry slowly reduced the amount of lead in residential paint until the Consumer Product Safety Commission (CPSC) banned lead in residential paint in 1978. Unfortunately, there are currently close to 64 million U.S. residences still categorized as "leaded properties." This roughly constitutes about 40% of all U.S. housing.⁶ Approximately 36% of all Maine housing was built prior to 1950⁷.

The National Health and Nutrition Examination Survey (NHANES) III report defined high risk factors for childhood lead exposure as: residence in pre-1949 housing, poverty, and black or Hispanic race. The convergence of any of these factors increased the risk of exposure exponentially. While Maine shares many of the national risk factors, especially in regard to housing, it also differs in several substantive ways. For example, the population of Maine is 96.7% white. Race and ethnicity are not a significant predictor of childhood lead poisoning in Maine. A recent Maine study concluded that Maine children enrolled in Medicaid programs, a proxy for poverty status, were twice as likely to be lead poisoned⁸.

This factor is consistent with national statistics; however, Medicaid enrolled children in Maine are not concentrated in large urban areas, but are just as likely to live in small towns and rural communities throughout the state.

⁶ U.S. Department of Housing and Urban Development, *Moving Toward a Lead-Safe America: A Report to Congress of the United States*, Washington, DC, Feb 1997.

⁷ United States Census. 2000.

⁸ Sewall, S. *Childhood lead exposure in Maine 1994-1999*. Maine Medical Assessment Foundation. 2000.

The essentially rural nature of Maine provides many challenges not seen in other areas of the country. By examining data collected during environmental investigations for lead poisoned children between 2000 and 2002, the MCLPPP identified factors that appear common in lead poisoned children in Maine. Eighty-seven percent (87%) of these children were living in homes constructed prior to 1950. The primary lead hazards identified were lead-based paint and lead contaminated dust. The next most common exposures appeared to be from lead-contaminated soil and old furniture with lead-based paint. Notably, 55% (3-year average) of these homes had reported recent or ongoing renovations or remodeling activity. Uncontrolled renovation, re-painting or remodeling work can release high levels of toxic lead-contaminated dust into the home environment. Maine is known to have one of the highest home ownership rate in the country. It could be that a high proportion of young Maine families are purchasing old "fixer-upper" homes, proceeding to do the work themselves without knowledge of the proper precautions, and unknowingly exposing their young children to toxic levels of lead-contaminated dust particles.

Current Blood Lead Screening and Prevalence Rates

Maine's blood lead screening rates in children less than 6 years of age have dramatically increased in the past few years, giving us a more accurate picture of childhood lead poisoning in Maine. Comparing screening rates is somewhat complicated by a change in the definition of screening in 2001. Since 2001, Maine has adopted the new CDC Surveillance Branch definition of a screening test. Although the discrepancies are small, they must be noted.

In 1998, Maine screened 11.3% of all children less than 6 years of age. In 2002, the screening rate had risen to 16.7%.

The significance of this increase becomes even more striking when we turn our attention to the one-and-two year old population. According to the NHANES III report, one-and-two year old children are the most vulnerable ages for lead poisoning. The MMAF study conducted in 2000 concluded the same was true for Maine children, with two-year-olds at slightly higher risk⁹.

Since 2000, screening guidelines for Maine have emphasized routine assessment of the risk of lead exposure for all Maine children at the ages of one and two years old. In 2001, the state law was changed to require blood lead screening of all one and two year old children enrolled in Medicaid, reiterating the federal mandate. The law also requires a blood lead screening test for all non-Medicaid-enrolled one and two year olds, unless their healthcare provider can demonstrate via risk assessment questionnaire that the child is not at risk for lead exposure. In 2001, Maine screened 39.2% of its one-year-olds and 15.7% of its two-year-olds, with a blood lead screening test. By 2002, these percentages had risen to 45.1% of one-year-olds and 22.0% of two-year-olds.

The trend in increased screening rates may be attributable to the changes in state law mandating blood lead screening in Maine children. Other factors may also have impacted this course. Since 1999, the MCLPPP has partnered with physicians, Dr. Victoria Rogers and Dr. Christopher Stenberg, of the Barbara Bush Children's Center at the Maine Medical Center, to increase provider awareness behaviors around childhood lead screening. With funding from the Mattina Proctor Foundation, Dr. Victoria conducted a

two-year medical detailing project in which she personally visited pediatric health care provider offices across the state with information and training in screening young children for lead exposure. Concurrently, the Early, Periodic, Screening, Diagnosis and Testing (EPSDT) program in Maine's Medicaid agency, the Bureau of Medical Services, launched a campaign to inform all parents of one-and-two year old Medicaid-enrolled children of the need to have their children screened for lead exposure. At the same time, the EPSDT program monitored provider compliance with the blood lead screening law and provided feedback to providers who were not doing an adequate job of lead screening in the Medicaid population. Finally, increased visibility in this state and nationally has helped focus attention on the need for lead screening in vulnerable populations.

The proportion of Maine children with elevated blood lead levels has steadily declined while the blood lead screening rates have been increasing. In 1994, 14.1% of all children less than

6 years of age who received a blood lead screening test had a lead level that was > 10 µg/dl. In 2002, this proportion was down to 3.9%, almost one-fourth of the 1994 rate.

Population estimates for 1999 are preliminary.

1999 Population estimates used for year 2000 analysis.

Source: Population estimates - ODRVS, Maine Bureau of Health 1990 Census
Lead data - HETL, Maine Bureau of Health

Recently, in the most vulnerable population of one-and-two year olds, we observed comparable proportions. In 2001, 3.9% of the one-year olds tested and 5.9% of the two-year-olds tested had elevated blood lead levels; by 2002, 3.4% of the one-year-olds and 4.1% of the two-year-olds had elevated blood lead levels.

⁹ Sewall, S. Childhood lead exposure in Maine 1994-1999. Maine Medical Assessment Foundation. 2000.

It is troubling to note that the screening rate for two-year-old children in Maine is less than half that of the one-year-olds; yet, two-year-olds who are screened with a blood lead screening test are more likely to have elevated blood lead levels. This may simply represent a provider screening bias. Anecdotally, health care providers state that they are more likely to routinely screen all one-year-olds in their practice and to only screen two-year-olds who were previously poisoned or who subjectively seem at higher risk for lead exposure.

Care of the Lead Poisoned Child in Maine

Blood lead specimens must, under Maine law, be submitted to the state public health laboratory for analysis. Under an agreement with MCLPPP, the state public health laboratory electronically sends all blood lead test results to MCLPPP. Upon notification of an elevated blood lead result, the MCLPPP initiates comprehensive case management services.

Case Management Services

MCLPPP's nursing care coordinator manages the referrals to public and community health nurses throughout the state for all children with confirmed blood lead levels of 15+

µg/dl. Public and Community Health Nurses provide case management services for lead poisoned children in every town and community in Maine.

Sixty public health nurses, employed by the Maine Bureau of Health, located in seventeen regional offices, cover roughly the northern half of the state. Private, non-profit community health agencies, contracted by the Maine Bureau of Health, provide coverage in the southern half of the state. Twelve Public Health/ Community Health nurses are designated as “childhood lead poisoning specialists”. These 12 nurses provide consultation and resource information to their colleagues. The nurse specialists all attended the CDC-sponsored regional training on case management and attend appropriate state and regional workshops to stay current with issues and standards of care. MCLPPP also coordinates quarterly informational conference calls for the lead poisoning nurse specialists.

Clinical Support Services

Medical consultants, under contract with MCLPPP, offer consultations to all primary care providers of lead poisoned children on the protocols for the clinical management of lead toxicity. Every primary care provider treating a child with a confirmed blood lead level of 20+ µg/dl also receives a packet of information on the current standards of practice for treating lead poisoning in young children. In addition, the medical consultants provide training in lead poisoning treatment to pediatric residents.

Licensed lead inspectors are designated through cooperative agreements with the MCLPPP to conduct environmental investigations in homes where children are identified with confirmed blood lead levels of 20+ µg/dl. An MCLPPP environmental coordinator

manages the referrals for environmental investigations, provides quality oversight, and works with property owners to ensure that the required remediation is completed. Seven of these lead inspectors are employed through Community Action Agencies (CAA) while two others are with private enterprises. CAA agencies are also the administrators of Maine State Housing Authority (MSHA)'s Lead Hazard Control Grant (LHCG) program. Thus the lead inspectors are in a position to offer property owners applications for the LHCG funds if lead hazards are identified on the property. The cities of Portland, Lewiston and Auburn have independent LHCG funds that are offered to property owners in those communities.

With the availability of abatement monies, the majority of property owners in Maine comply with orders to abate. The few recalcitrant property owners that adamantly refuse to comply with the state law are referred to the state attorney general's office. The Maine Attorney General has the statutory authority to pursue court action in order to force the clean up of lead hazards. While few cases have been brought to court, they have been effective in the implementing the abatement process in identified properties.

III. Revising Maine's Statewide Screening Plan

In 1997, CDC issued a publication *Screening Young Children for Lead Poisoning: Guidance for State and Local Public Health Officials*. The manual listed six steps that state public health agencies should follow in the policy development activity of developing and implementing the statewide blood lead screening plan. These six steps are:

1. Form an Advisory committee.
2. Assess lead exposure and blood lead testing capacity.
3. Determine the boundaries of the recommendation areas.
4. Decide on appropriate blood lead testing.
5. Write the screening recommendations.
6. Implement the statewide plan.

Following the issuance of the CDC recommendation, the state of Maine worked with its existing Advisory Council to draft a statewide screening plan in accordance with CDC guidance. In 2002, the Maine legislature passed a blood lead screening law, necessitating the current revisions to Maine's statewide screening plan.

Revisions to Maine Law

Responding to pressure from citizen advocacy groups, the Maine legislature in 2002 passed a bill revising the Maine Lead Poisoning Control Act to include mandates for blood lead screening of all children at one and two years of age.

Title 22, Chapter 252, § 1317-D states, “The commissioner shall establish a lead poisoning risk assessment and blood lead testing program, referred to in this section as the “program,” for assessment of lead poisoning risks to children and the testing of blood lead levels in children in accordance with this section and within the limits of available funding”¹⁰. These provisions in this section inform and direct the changes to Maine's statewide blood lead screening plan.

Specifically, the provisions include a mandate to require “the testing of blood lead levels of all children not covered by the MaineCare program [Maine’s Medicaid program] at one and two years of age unless, in the professional judgment of the provider of primary health care, in conjunction with the use of the lead poisoning risk assessment tool, the child’s level of risk does not warrant a blood lead test...” This section also reiterates the federal mandate to screen all MaineCare [Medicaid] enrolled children at one and two years of age with a blood lead screening test, and charges the MCLPPP to develop a “simplified risk assessment tool.” The MCLPPP program is also required to distribute information on lead poisoning risk assessment to providers of health care to children.

Physician Task Force on Lead Screening

The Physician Task Force was formed in response to the legislative mandate, to assist the MCLPPP in developing the risk assessment tool, determining the most effective methods to inform health care providers, and to determine further recommendations for the legislature.

Physician Task Force Membership

Task Force members included leaders from state medical associations, major hospitals, insurers, local health departments, and representatives from the both the Bureau of Health (under which the MCLPPP functions) and the Bureau of Medical Services (Maine’s Medicaid administrative agency). *See Appendix C for a full list of Task Force members*

¹⁰ Maine Lead Poisoning Control Act.2002.

Legislative Charges

The Task Force was charged with three mandates:

1. Develop an appropriate risk assessment tool for use by health care providers.
2. Determine methods to distribute the tool and encourage screening among providers.
3. Submit additional recommendations to the legislature.

Factors Considered by the Task Force in Developing Recommendations

- **Public health infrastructure in Maine:** Maine has no county health departments and only two local health departments. Local public health functions are mostly coordinated through the state public health department in Augusta, and carried out by a variety of local agencies, both public and non-profit.
- **Blood lead testing capacity:** Primary health care providers conduct most of the pediatric blood lead testing in Maine. Lead screening clinics are held in the cities of Portland, Lewiston and Auburn under the auspices of the Lead Hazard Control Programs. WIC (Women, Infants, and Children) clinics provide risk assessments and encouragement to parents of young children to have a blood lead screening test if deemed at risk for lead exposure. All Headstart Centers in Maine require blood lead screening tests of enrolled children; some centers employ public health nurses to conduct the screenings on site.
- **Blood lead screening in the Medicaid population:** The federal CMMS (Center for Medicaid and Medicare Services) mandates blood lead tests for all Medicaid-enrolled children at one and two years of age. It has been difficult to determine the current blood lead screening rates in Maine for this population group. The MCLPPP

previously used billing data from the state public health laboratory, the Health and Environmental Testing Laboratory (HETL). Since Maine law requires all blood lead specimens for children less than 6 years of age to be submitted to the HETL, and since HETL bills the state Medicaid agency for analyses on specimens designated on Medicaid-enrolled children, it was assumed that we could accurately capture the Medicaid screening rate. However, recent information from healthcare providers and submitting laboratories suggests that Medicaid status is grossly underreported. The next step for the MCLPPP is to attempt a match between laboratory screening data and the Medicaid database.

- Maine demographics: Maine is a large, essentially rural state with no county health departments and two local health departments. The southern half of the state is more densely populated; the northern half of the state, while sparsely populated, also has fewer health care providers who cover large geographic areas. Race and ethnicity play a small role in assessing for risk although plans must take into consideration growth in Maine's non-white population especially in the southern regions. Medicaid status, a proxy for poverty, is widely scattered across the state. Medicaid recipients are more likely to live in older, less well maintained housing. Maine citizens have a high rate of home ownership but this also tends to be in older housing. Extensive home renovation/ remodeling activity is found in the homes of over half of Maine children with confirmed blood lead levels of 20+ $\mu\text{g}/\text{dl}$.¹¹

Task Force Accomplishments

1. Examination of baseline data

Initially the Task Force members examined the blood lead screening and elevated blood lead data presented by the MCLPPP epidemiologist. Dr. Rogers of the Kids Run Better Unleaded Project out of the Barbara Bush Children's Center presented the results of a provider survey to the Task Force members. The survey was conducted to determine Maine pediatric health care provider perception and practice about lead screening of young children.

2. Development of an interim risk assessment tool

Members of the Task Force on Lead Screening reviewed examples of risk assessment questionnaires recommended by the CDC and those in current use in other states.

Members expressed uncertainty whether the standard questions in use in other areas of the country could be predictive of lead poisoning in Maine children. They recommended a study to validate the specificity and sensitivity of questions for all known risk factors. In 2003, the Maine Internal Review Board (IRB) approved a lead questionnaire validation study. The validation study, undertaken in spring of 2003 is expected to be completed in the fall of 2004.

Meanwhile, the Task Force drafted an interim risk assessment questionnaire based on national models to be used by health care providers until the results of the validation study were known.

3. Recommendation of methods to inform health care providers

Finally, the Physician Task Force on Lead Screening made recommendations for a variety of approaches to acquaint pediatric health care providers with the provisions of

¹¹ Maine Childhood Lead Poisoning Prevention Program internal data. 2002.

the new state lead screening law, of the interim risk assessment tool and of the rationale for increased attention to routine blood lead screening in Maine children. Based on the Task Force recommendations, the MCLPPP conducted a mass mailing to all pediatric primary care providers in Maine with information on the new state law and copies of the interim risk assessment tool, including directions on how best to use a risk assessment questionnaire. The Commissioner of the Department of Human Services and the Director of the Bureau of Health held a press conference to publicize the Task Force recommendations and the new state law. The final suggestion of the Task Force was to draft articles on these new recommendations for placement in all health professional journals in Maine. The articles are expected to appear in the Fall 2004 issues.

IV. Implementing the Revised Statewide Screening Plan

Maine will be developing implementation strategies over the next year to inform the public and the medical community about these provisions, to ensure adequate resources and training of health care providers, and to determine if there are specific risk factors unique to Maine children. Subjects to be considered include the following:

Informing Health Care Providers and Parents

Maine health care providers must understand that a) childhood lead poisoning is still a problem in Maine. It is not confined exclusively to large urban areas. B) all MaineCare [Medicaid] enrolled children must have a blood lead screening test at one AND two years of age. It is not sufficient to only screen one-year-old MaineCare children. c) individual risk must be assessed for all non-MaineCare enrolled children. The risk

assessment tool developed by the Physician Task Force on Lead Screening may be used as a guide to assessing risk for lead exposure. If practicing in a high-risk community, the health care provider may choose to simply screen all one-and-two year olds with a blood lead screening test. d) childhood lead poisoning is not confined to low socioeconomic population groups. In the past, we have observed that some health care providers limit their lead screening to children in low socioeconomic groups. In fact, all children living in or visiting pre-1950 homes are at risk regardless of economic status.

Parents must know the risks of lead exposure to young children, understand that lead poisoning is usually asymptomatic and ask their health care provider for a routine lead screening test. Sufficient protection must in place so that parents are not afraid to have their children screened for lead exposure for fear of eviction by landlords or an increase in homeowner insurance rates.

Barriers to Lead Screening

- There are health care providers and parents who still believe that childhood lead poisoning is not a problem in a predominantly rural state like Maine. They equate lead poisoning with inner city tenements. In fact over one-third of Maine housing was built prior to 1950 when the most substantial amounts of lead in paint were used.
- There is also a common perception that childhood lead poisoning was eliminated back in the 1970s when there was another strong public health campaign around childhood lead poisoning. Data on childhood lead poisoning in Maine confirms the fact that at least 400 Maine children are identified with elevated blood lead levels each year.

- According to a survey conducted by the Kids Run Better Unleaded project, many health care providers are reluctant to collect blood lead samples in the office and instead give the parents lab slips to have the blood lead specimen collected at an off-site laboratory. We know that, for a variety of reasons, many parents do not follow through with a trip to the laboratory for the blood lead screening test.
- Staff in health care provider offices sometimes complains that the collection process is too messy, difficult or time consuming.

The MCLPPP, in partnership with the Kids Run Better Unleaded project staff, is addressing the barriers in health care provider offices by offering training to office staff in simple capillary blood lead collection techniques.

Blood lead screening is also conducted at some Headstart Centers. Although most Headstart enrolled children are beyond the critical exposure age of one and two years, it affords an opportunity to screen children who may have previously been missed.

Some local health departments such as those in Portland, Lewiston and Auburn offer lead screening clinics for children not screened by their primary care providers.

Attempts at discreet blood lead screening clinics in other areas have been ineffective in attracting parents. Few parents bring their children to the screening clinics and few elevated blood lead levels are detected in these children, rendering this not a cost effective approach.

V. Monitoring, Evaluating and Revising the Statewide Screening Plan

The MCLPPP will continue to collect all Maine blood lead screening and testing data in young children. Analysis of the data occurs on at least an annual basis to determine

screening and prevalence rates, along with geographic and demographic distributions.

The MCLPPP is in the process of using the results of recent analyses to determine the high-risk geographic areas and population groups, if any, in Maine. The results of the risk assessment validation study will also help to provide information about the primary areas of risk in the state. The MCLPPP will notify communities and health care providers of any high-risk areas of concern that are identified. Particular attention to screening may need to occur in these areas.

Data analysis results will also be used to periodically review this statewide screening plan and the screening provisions in Maine state law. Changes in the distribution or prevalence of childhood lead poisoning in Maine may necessitate changes in state policies.

The State of Maine remains committed to eliminating childhood lead poisoning. As we work with our partners to develop strategies that are designed to prevent lead poisoning before it occurs, we will continue to be vigilant in our lead screening efforts. No child should be lead poisoned; and, any child who is lead poisoned must be quickly identified and receive adequate services to prevent further exposures and to minimize the long-term effects of the poisoning. Our children are truly our future. They deserve the best that we can offer.