

Guidelines for the Identification and Management of Pregnant Women with Elevated Lead Levels in New York City

Recommendations of the New York City Peer Review Panel on Lead and Pregnancy

Convened by The Mount Sinai Center for Children's Health and the Environment

For The New York City Department of Health and Mental Hygiene

Lead Poisoning Prevention Program

Abundant scientific evidence accumulated over the past four decades indicates that lead in a child's body can adversely affect the developing brain. The consequences seen in children are loss of intelligence, shortening of attention span and disruption of behavior. This damage can occur at blood lead levels (BLLs) less than 10 $\mu\text{g}/\text{dL}$, concentrations previously thought to be safe. Lead freely crosses the placenta from the maternal to the fetal circulation, and elevated blood lead levels during pregnancy can affect the development of the infant. In addition to cognitive and developmental delays in the offspring, elevated BLLs in pregnant women are associated with spontaneous abortion, premature birth and pregnancy-induced hypertension.

Prevention of lead poisoning in pregnant women and their offspring has been a growing area of concern for the New York City (NYC) Department of Health and Mental Hygiene (DOHMH). For several years, the DOHMH has been providing services for lead-poisoned pregnant women. In response to the lack of available guidance on the identification and management of pregnant women with elevated BLLs, the DOHMH engaged the Mount Sinai School of Medicine's Center for Children's Health and the Environment to convene a panel of experts to develop evidence-based recommendations on lead poisoning and pregnancy for health care providers. The panel also was charged with assessing the current services provided for lead-poisoned pregnant women by the DOHMH and making recommendations for areas of further development.

Below is a summary of the key findings and recommendations for prenatal care providers, pediatric providers and for the DOHMH. The complete report is posted on the DOHMH website at: www.nyc.gov/lead.

I. Recommendations for Prenatal Care Providers in NYC

Prevention and Identification

Key Findings: It is estimated that between 0.5% and 2% of women giving birth in the United States today have BLLs greater than or equal to (\geq)10 $\mu\text{g}/\text{dL}$, the Centers for Disease Control and Prevention's level of concern. In NYC, certain risk factors appear to be associated with pregnant women having elevated BLLs. These risk factors include: birth outside of the United States, use of imported remedies, foods, spices, cosmetics and glazed pottery, pica behavior, recent home renovation and occupational hazards. Of note, more than half of all births in NYC are to mothers who were born outside of the United States whereas about 95% of lead-poisoned pregnant women in NYC receiving case management from the DOHMH were born outside of the United States.

Key Recommendations:

- *Risk Assessment* (Required by NYS Law Part 65-1.5, Effective December 22, 1993):
 - Assess every pregnant woman in NYC for the risk of lead exposure at the initial prenatal visit, paying particular attention to the risk factors identified by the panel.
 - Obtain a blood lead level (BLL) on any woman found to be at risk.
- *Anticipatory Guidance:* Provide every pregnant woman with anticipatory guidance, including information on sources of lead exposure, proper nutrition and on ways to reduce lead exposure.
- *Documentation:* Document the results of the risk assessment and the BLL.

Follow-up and Management

Key Findings: The literature suggests that maternal BLLs $\geq 5 \mu\text{g}/\text{dL}$ may be associated with identifiable exposures. Based on animal studies, even the most commonly used chelating agents are potential teratogens. The relationship between the lead levels in breast milk to the BLLs in infants is not completely understood.

Key Recommendations:

- *Source Reduction:* Attempt to identify potential sources of lead exposure by interviewing the pregnant woman and provide counseling on source reduction if the BLL is $\geq 5 \mu\text{g}/\text{dL}$.
- *Nutrition Counseling:* Provide nutrition counseling as part of routine prenatal care, especially in cases of lead poisoning. Nutrition counseling is not, however, a substitute for source reduction.
 - Advise adequate calcium intake from dietary or supplemental sources for all pregnant women. Maintaining adequate calcium stores is particularly important for lead-poisoned pregnant women, because calcium may decrease the mobilization of maternal bone lead stores and decrease gastrointestinal absorption of lead.
 - Advise iron supplementation for any pregnant woman with iron deficiency anemia. Maintaining adequate iron stores is particularly important for lead-poisoned pregnant women, because iron may decrease gastrointestinal absorption of lead.
- *Monitoring BLLs:*
 - Base frequency of BLL monitoring in a pregnant woman on the initial BLL, the chronicity of exposure, risk factors for continued, repeat or future exposure and possible clinical interventions.

Certain risk factors for exposure, especially pica, may warrant increased follow-up or counseling, regardless of the patient's BLL.

- Obtain either a maternal BLL or an umbilical cord lead level (UCLL) at the time of delivery if the mother's BLL was ≥ 15 $\mu\text{g}/\text{dL}$ at any time during pregnancy.
- Re-test the mother 1 month postpartum if during the pregnancy the BLL was ≥ 15 $\mu\text{g}/\text{dL}$. Follow-up testing should be dictated by the results of that BLL.
- *Monitoring Protoporphyrin Levels:* Consider monitoring free erythrocyte protoporphyrin (FEP) levels during pregnancy when the BLLs are ≥ 25 $\mu\text{g}/\text{dL}$ to help differentiate between acute and chronic exposure in the absence of iron deficiency anemia. FEP levels rise in the setting of chronic exposures.
- *Coordination of Care:* Contact the pediatric health care provider responsible for the follow-up of the neonate to coordinate care if the UCLL or maternal BLL at delivery is elevated.
- *Chelating:*
 - If the BLL is ≥ 45 $\mu\text{g}/\text{dL}$, consider chelating in the late 2nd or 3rd trimester of pregnancy to reduce the body lead burden of the mother.
 - Always chelate in a hospital in consultation with a lead poisoning specialist experienced in providing chelation therapy.
 - Reserve chelation prior to the late 2nd or 3rd trimester for life threatening intoxications.
- *Breastfeeding:*
 - Based on The Academy of Breastfeeding's current recommendation, consider temporarily discontinuing breastfeeding if the maternal BLL is ≥ 40 $\mu\text{g}/\text{dL}$, in consultation with a lead poisoning specialist.
 - Make every effort to maintain the mother's milk supply during the hiatus.

II. Recommendations for Pediatric Providers: Infant Follow-up and Management

Key Findings: The literature demonstrates that maternal BLLs correlate very closely with umbilical and neonatal BLLs.

Key Recommendations:

- *Monitoring BLLs:* Base frequency of BLL monitoring in infants (0-6 months of age) prenatally-exposed to lead on the initial infant's, maternal or umbilical lead level as well as risk factors for the infant's continued, repeat or future exposure to lead.
- *Exposure Reduction:* Provide exposure reduction education to the parents with the goal of reducing potential lead sources in the infant's environment.
- *Developmentally Stimulating Environment:* Provide guidance to the parents of prenatally-exposed infants on ways to promote and resources that can help foster a developmentally stimulating environment for the child.

III. Recommendations for the NYC DOHMH Lead Poisoning Prevention Program

Key Findings: As of August 2004, the NYC DOHMH has provided case management to any pregnant women with a venous BLL of ≥ 15 $\mu\text{g}/\text{dL}$. Case management includes assessment through interview to identify potential sources of exposure, source reduction counseling, consultation with the woman's health care provider to ensure follow-up BLL monitoring for the women and postnatal testing of their infants.

Key Recommendations:**Education and Communication**

- *Education for Providers:*
 - Educate prenatal care providers about lead poisoning risk factors, environmental history taking and appropriate management of elevated BLLs.
 - Develop a risk assessment questionnaire for use by prenatal care providers.
- *Education for Pregnant Women:*
 - Develop educational materials on lead poisoning risk factors, nutrition and the importance of source reduction, including a comprehensive list of possible lead sources from paint and non-paint sources, and print in multiple languages.
 - Update guidance documents for household members engaged in occupations that could result in lead exposure.
 - Recommend pregnant women avoid areas undergoing lead-based paint hazard reduction.
 - Provide resources to parents of prenatally-exposed children recommending ways to provide developmentally stimulating environments.

Interventions

- *Investigation:* Provide investigative intervention to any pregnant woman with a venous BLL ≥ 15 $\mu\text{g/dL}$.
- *Lead-Safe Work Practices:* Require lead-safe work practices in homes during renovation and repair following NYC, HUD and EPA guidelines and standards.

Collaborations

- *Prenatal Care Providers:* Collaborate with prenatal care providers in the management of pregnant women with BLLs ≥ 15 $\mu\text{g/dL}$.
- *Professional Organizations:* Collaborate with professional organizations to create educational materials to be given to all pregnant women.
- *Other Agencies:* Partner with other agencies that provide services to low income and immigrant groups of pregnant women within NYC to foster a systematic approach to identification of pregnant women at risk and distribution of educational materials to these at risk populations.

Further Research and Discussion

- *Identification of Risk Factors:* Conduct a systematic population-based assessment of BLLs in suspected high-risk groups of pregnant women in New York City, coupled with an in-depth assessment of the risk factors for lead exposure in these high-risk groups.
- *Improving Risk Communication:* Consult with cultural anthropologists and form focus groups to improve risk communication to various communities and develop strategies for primary prevention.
- *Evaluation of the Role of Vitamin C:* Conduct further research to evaluate the role of vitamin C supplementation in relation to fetal exposure to lead.