ACCLPP
Lead and Pregnancy Work Group
Status Report

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Today's Presentation

- Review of charge
- Associations represented
- Time and progress
- Subgroups
- Literature review summaries
- Next steps
- What is needed from Advisory Panel

Charge to the Work Group

Recommendations will be made on:

- prevention of lead exposure for women of child-bearing ages and pregnant and lactating women
- risk assessment and screening of pregnant women
- medical, public health and environmental management
- breast feeding
- follow-up of infants and children of mothers with elevated blood lead levels.
- further research and health education needs in this field

Approach

- Review existing evidence
- Evaluate data and issue recommendations for: prevention, risk assessment, screening, medical & environmental management, breastfeeding, and follow-up of EBLLs
- Describe data gaps
- Recommendations for research and health education needs

Representation on Work Group

- American College of Obstetricians & Gynecologists
- American College of Nurse Midwives
- American Academy of Family Physicians
- American Academy of Pediatrics
- Association of Occupational and Environmental Clinics
- American Public Health Association
- Council of State & Territorial Epidemiologists
- National Institute of Occupational Safety & Health
- Pediatric Environmental Health Centers
- Local health departments

Subgroups

- **Subgroup 1**

  Prevalence Risk and Screening

  Facilitator: Dr. Mary Jean Brown

- **Subgroup 2**

  Maternal, Pregnancy and Child Outcomes

  Facilitator: Dr. Joel Forman

- **Subgroup 3**

  Management, Treatment and Other Interventions

  Faciltator: Dr. Carla Campbell

Subgroup 1: Prevalence, Risk and Screening Recommendations to be Made

- **Should pregnant women be screened for lead poisoning?**
  - If so, at what point in pregnancy should screening occur?
  - Are there questions that can predict which woman should be screened?
- **What culturally sensitive interventions should be recommended to reduce exposure to potential sources?**

Subgroup 2: Maternal, Pregnancy and Child Outcomes
Recommendations to be Made

- At various blood lead levels, what guidance should medical providers be providing to:
  - women of child-bearing age regarding delaying of pregnancy?
  - pregnant women about potential outcomes?

Subgroup 3: Management, Treatment and Other Interventions Recommendations to be Made

- **What are the components of intervention?**
  - Eliminating sources
  - Changing behavior (e.g., pica)
  - Reducing absorption following exposure (e.g., nutrition)
  - Decreasing retention and toxicity/increasing excretion (e.g., chelation)
- **What is the follow-up and intervention schedule (for clinicians and for public health agencies) at various BLLs for pregnant and lactating women and for the neonate?**
- **At what BLL, if any, should women not be breastfeeding?**

Estimated Timeline

Task	Estimated Completion
Workgroup Initiated	April 2004
Literature Reviews	March 2005
Draft Report on Summary of Literature	September 2005
Formulation of Recommendations	December 2005
Draft Report on Recommendations	June 2006
Final Report	December 2006

In-Person Meetings

- July 14, 2004 (New York)
- November 19, 2004 (New York)
- April 15, 2005 (Boston)
- September 16, 2005 (Boston)
- December 14, 2005 (Philadelphia)
- Future meetings to be scheduled

Literature Review

- Work-in-Progress
- Over 750 articles related to Lead & Pregnancy
- NYC Review, CDC Review, additional articles identified
- Draft summary documents for each subgroup circulated

Subgroup 1.
Prevalence, Risk, and Screening

This group was asked to review literature including, but not limited to:

- Distribution of BLLs and other measures of lead body burden in: women of childbearing-age, pregnant women at various gestational ages, lactating women, newborns
- Risk factors/sources of lead exposure in pregnant and lactating women and the neonate
- Relationship between:
  - maternal blood/bone lead levels and newborn blood lead levels
  - pregnancy BLLs and postpartum BLLs?

Literature Review – Prevalence Risk and Screening

Basic Assumptions

- **Blood lead levels have declined in US populations**
- **Blood lead levels of US women of childbearing age generally low:**
  - Geometric mean: 1.02 (95% C.I.: 0.97 – 1.06)
- **Exposure to lead remains a problem**
  - Additional research on adverse impacts at lower levels
  - Subpopulations continue to be at risk
  - Continued emergence of research on bone lead mobilization during pregnancy and lactation

Lead Levels During Pregnancy

- Evidence of U-shaped curve in blood lead levels
- Evidence of contribution of bone lead to blood lead during pregnancy (and lactation)
- Mobilization of lead from bone to plasma may not be adequately reflected by whole blood levels
- Plasma is main biologically active compartment from which lead crosses cell membranes
- Maternal lead is highly correlated with umbilical cord lead

Lead Levels During Lactation

- Bone lead levels appear to decrease with increasing months of lactation (history) suggesting that lactation stimulates release of lead from bone
- Breastfeeding practices and bone lead levels are important predictors of blood and breast milk lead levels over the course of lactation
- Nutritional status may be an important modifier of these effects
- Some evidence that calcium supplementation may decrease bone resorption during lactation

Risk Factors for Elevated Blood Lead Levels In Pregnant & Lactating Women

- **Residence near lead mines and smelters**
- **Recent immigration from area with elevated ambient lead contamination**
- **Possible Lifestyle and health Factors**
  - alcohol, smoking, coffee, tea, gravidity, prenatal care, dietary calcium, educational level, SES
- **Cultural Practices**
  - Lead glazed pottery (for cooking, storage)
  - Pica, dirt, clay, starch, pottery
  - Traditional medicines and therapies
- **Take Home Occupational Exposures**
- **Previous lead exposure (bone mobilization)**

Subgroup 2.
Maternal, Pregnancy & Child Outcomes

This group was asked to review literature including, but not limited to:

- Impact of lead exposure on
  - fertility and reproductive system integrity
  - maternal health (gestational hypertension)
  - pregnancy outcomes (early fetal loss – i.e. spontaneous abortion & stillbirth, preterm
  - delivery, gestational age, birth weight, birth length, head circumference, congenital malformations)
  - infant growth and neurodevelopmental (cognitive, motor, behavioral) outcomes due to prenatal exposure

Impact on Fertility and Reproductive System Integrity

- Lead is potent reproductive toxicant
- Biological mechanisms uncertain
- Reproductive System – possible effects: delayed puberty/endocrine disruption
- Increased time to pregnancy for blood lead levels $\geq$ 10µg/dl

Impact on Maternal Health during Pregnancy: Hypertension

- Lead linked to hypertension in non-pregnant adults
- Hypertension is common complication of pregnancy
- Lead may exert damage to kidney or vascular system
- Gestational hypertension ≥140mmHg/90mmHg after 20 weeks gestation in woman with previously normal BP
- Pre eclampsia: (1) ≥ 140mmHg/90mmHg after 20 weeks gestation and (2) proteinuria ≥300 mg/24 hours

Impact on Maternal Health: Hypertension

- Lead exposure has been associated with increased risk of gestational hypertension
- Magnitude of effect, level at which risk increases are uncertain
- Association between lead exposure and severe hypertension or preeclampsia is unknown.

Impact on Pregnancy Outcomes

- **Data linking occupational lead exposure and early fetal loss dates back to 1860**
- **Relationship between lower levels of exposure and fetal loss is less certain**
- **Relationship between lead exposure and preterm birth is unclear**
- **Lead exposure appears to increase risk of reduced birth weight**
- **Limited and inconsistent evidence of effect of lead exposure on:**
  - Head circumference, birth length
  - congenital malformations

Impact on Infant growth

- Evidence of impacts on infant growth
  - Reduced infant growth rate
  - Reduced attained weight
- Some conflicting evidence
  - Could be consistent with an adverse effect of prenatal lead on birthweight, if later growth represents "catch-up" growth

Impact on Neurodevelopment

- **Cognitive Development**
  - Prenatal (umbilical cord; maternal bone) lead levels associated with cognitive development delays. More data needed.
- **Behavioral Outcomes**
  - Some evidence of association between lead levels and behavior of young children. More data needed.

Subgroup 3. Management, Treatment & Other Interventions

<u>This group was asked to review literature including, but not limited to</u>:

- **Breast milk exposure including:**
  - Amount transmitted to baby
  - Benefits vs. hazards of breast feeding when blood lead levels are elevated.
- **Effectiveness of nutritional supplementation during pregnancy and lactation**
- **Indications/Contraindications/Adverse effects of chelation on: pregnant woman, fetus, neonate**

Lead Exposure from Breast milk

- Assumption: Benefits of breastfeeding
- Lactation likely increases mobilization of lead from bone
- Difficult to measure lead in break milk – due to potential for contamination and inaccurate laboratory methods
- Breast milk lead lead levels are significantly correlated with maternal blood lead levels
- Concentration of lead in breast milk are low compared to concentration in maternal blood

Nutritional Status and Lead Levels in Pregnant & Lactation

- Few well-designed studies to assess the effect of nutritional status on lead levels in pregnancy and lactation
- Limited evidence suggests that calcium supplementation during pregnancy & lactation reduce maternal blood lead levels

Chelation in Pregnancy & Lactation

- **Little information on the effects of chelation in pregnancy and lactation:**
- **7 case reports**
  - All appeared to be treated in second trimester
  - Most treated with $CaNa_2EDTA$
  - In all cases, $CaNa_2EDTA$ resulted in a decline in maternal blood lead levels
  - 6/7 resulted in birth of healthy newborn
- **Potential toxicities of chelating agents on fetus must be considered**

Pica

- Common practice in some parts of the world (Africa, Asia, Central America)
- May be hard to identify
- May be caused by or affect micronutrient status
- Health problem primarily when contaminated substances are consumed

Next Steps

- **Nov. 1** Any written comments due from ACCLPP
- **Nov. 15** Subgroups to circulate final drafts to workgroup
- **Nov. 30** ACCLPP comments to be incorporated into new subgroup documents
- **Dec. 14** Workgroup meeting (Philadelphia) Primary goals:
  - Discuss any outstanding literature review issues and comments from ACCLPP
  - Develop recommendations

Comment Period

- Submit comments in writing to:
  Jessica Leighton jleighto@health.nyc.gov

- Deadline: **November 1, 2005**