



Michigan Department of Health & Human Services

The Flint Lead Response: The Role of Education

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Putting people first, with the goal of helping all Michiganders lead healthier and more productive lives, no matter their stage in life.

Outline

- Lead as a Toxin
- Health Effects of Lead
- Provider Screening and Follow-up
- A Discussion: the Role of Education

Lead Poisoning-It Still Matters!

- Lead poisoning remains **the greatest environmental health risk** to Michigan children under age 6
- Nearly **3,000** children between the ages of 0-16 were identified as lead poisoned in 2014
- Lead neuro-toxicity is irreversible

Lead Poisoning is 100% Preventable

How are Children Lead Poisoned?

- Paint (chips and dust)
- Other sources of lead poisoning include:
 - Drinking water (lead pipes or solder)
 - Soil
 - Caregiver hobbies and occupations (automotive, welding, stained glass, metallurgy and use of firearms)
 - Pottery
 - Jewelry
 - Folk remedies



How are MI Children Lead Poisoned?

- Historically, > 90% of cases from lead paint
 - Aging housing stock and peeling, chipping paint easily ingested
 - Lead dust and small particulates (even when paint is not peeling) easily inhaled
 - Childhood hand-to-mouth behaviors increase risk
- In Flint, drinking water a potential source since mid-April 2014

Lead Poisoning Risk Factors

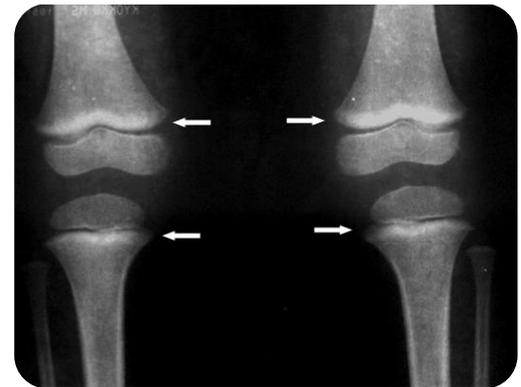
- Living in a house built before 1950
- Living in a house built before 1978 that has been remodeled in the past year
- Living with a sibling or playmate with lead poisoning
- Living with an adult whose work or hobby involves lead or who uses home remedies



Metabolism of Lead

- Main absorption is gastrointestinal
- Absorption is similar to iron/calcium
- Absorption rates/uptake depend on age and size of child and type of exposure (chronic vs. acute)
- 65-70% total body lead is stored in bone in children
 - Blood half-life is about 1 month
 - Bone half-life is 10-30 years

Longbone Radiograph of knees - “lead lines” in three-year-two-month-old girl with blood lead level of 10.6 $\mu\text{g}/\text{dL}$. Notice the increased density on the metaphysis growth plate of the knee, especially in the femur.



Acute Symptomology

(many children will not present symptoms)

Early clinical symptoms:

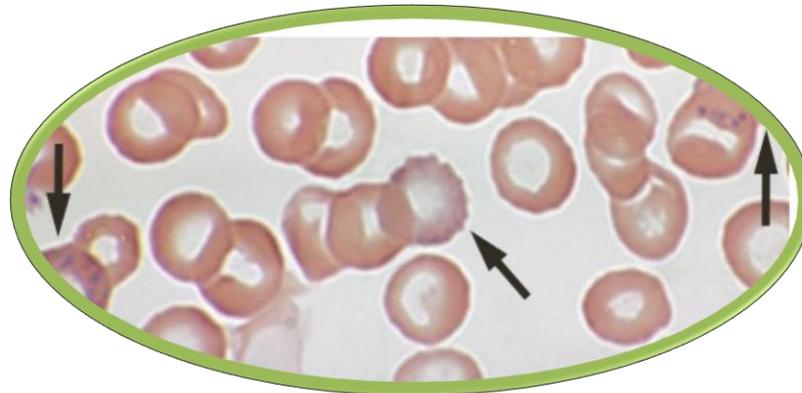
- Anemia
- Anorexia
- Abdominal pain
- Constipation

Toxicity symptoms

- Changes in mentation (encephalopathy)
- Confusion
- Ataxia
- Seizures
- Coma
- Death

Known Effects

- Blood Cells: **Anemia**
 - Iron insufficiency leads to more lead absorption
 - Iron deficiency anemia often associated with higher lead-levels
- Interferes with **hemoglobin synthesis**
 - If iron-deficient, lead substitutes for iron



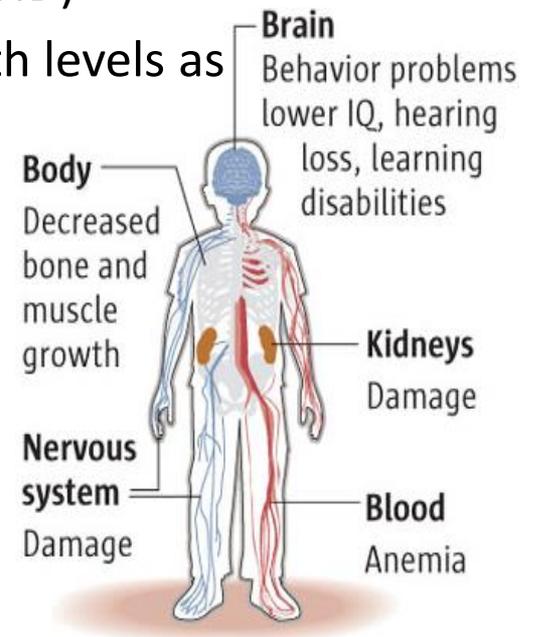
Known Effects

- **Neurologic System: Neurotoxicity**

- Violence and aggressive behavior
- Learning disorders
- Attention Deficit Hyperactivity Disorder (ADHD)
- Reduction in IQ by as many as 5-8 points with levels as low as 10

- **Behavioral Outcomes**

- Juvenile delinquency
- Elevated school drop-out rates
- Direct effect on behavior
- Potential link to criminal behavior



Flint and the Impact of Water Lead- the Unknowns

- We do not know what quantity of lead each child exposed to
- We do not know how much any exposure from water and/or other sources in the environment
- We do not know who or how many may exhibit long-term effects
- Lead exposure is one of many stressors on children's development

Flint Provider Actions

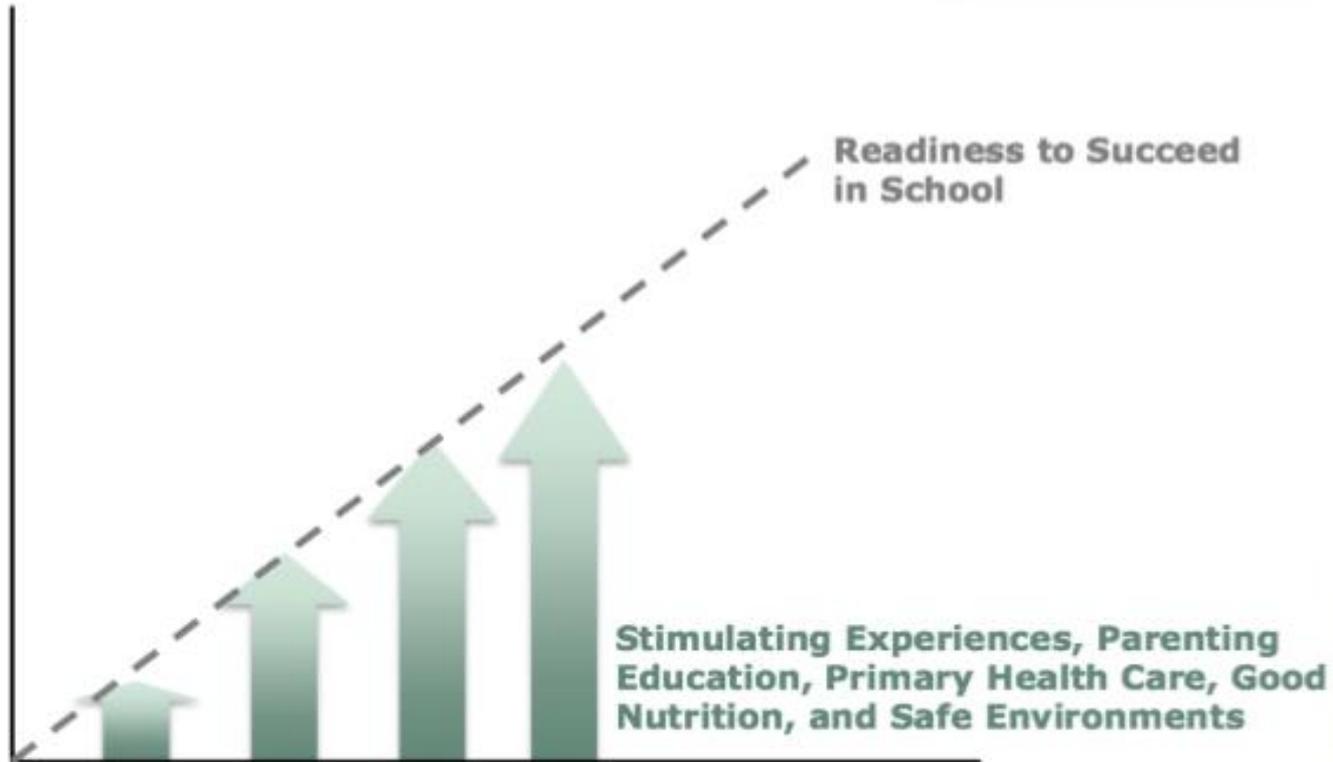
- **Test all Flint** < 6 years of age if have not had a test since April 2014.
 - Tests may not detect those exposed to Flint water without filters over past month
 - Regardless of current test results, are population of Flint considered potentially exposed from period of April 2014 until use of filters, etc
 - Tests will identify full cohort that has an elevated blood level (EBL)
 - Case identification will identify source (water, soil, paint, etc)
- Conduct **follow-up testing** to ensure lead levels decrease
- Offer education and anticipatory guidance to parents on safe cleaning practices and healthy eating

Testing Guidance

Not Yet Tested	BLL <5	BLL 5-14	BLL 15-44	BLL >44
Screen all children with risk factors	Review lead levels with family	<ul style="list-style-type: none"> Review lead levels with family Confirm results with venous blood sample Review results with family 		Review lead levels with family
	Provide anticipatory guidance	<ul style="list-style-type: none"> Perform environmental history. Consider other children who may be exposed Consider iron sufficiency. Provide nutritional counseling r/t calcium and iron Provide anticipatory guidance Refer to case management 		Treatment at this level should be performed in consultation with an expert at Children's Hospital of Michigan in Detroit
		Retest 1-3 months to ensure BLL is not rising	Retest venous sample monthly until levels are <15, repeat every 1-3 months until <5	Follow up as directed by expert

Test all Medicaid children at ages 1 and 2. Children who were not tested between 1 and 2 must be tested at least once between ages 3 and 6.

We know what works....



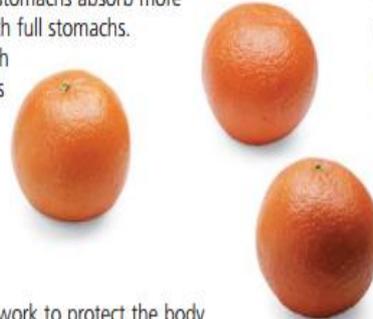
<https://www.aap.org/en-us/advocacy-and-policy/federal-advocacy/Documents/Panel%201%20-%20Shonkoff%20Center%20on%20the%20Developing%20Child%20Presentation.pdf>

Nutrition

- Iron, Calcium, Vitamin C diets
- Promote enrollment and participation in pre-existing nutrition resources
 - WIC, SNAP, Double-up Food Bucks, etc
- Expand WIC eligibility and access

Regularly Eat Healthy Foods

Children with empty stomachs absorb more lead than children with full stomachs. Provide your child with four to six small meals during the day. The following nutrients can help protect your child from lead poisoning:



Iron-Rich Foods

Normal levels of iron work to protect the body from the harmful effects of lead. Good sources of dietary iron include:

Lean red meats, fish, and chicken
Iron-fortified cereals
Dried fruits (raisins, prunes)

Calcium-Rich Foods

Calcium reduces lead absorption and also helps make teeth and bones strong. Good sources of dietary calcium include:

Milk
Yogurt
Cheese
Green leafy vegetables (spinach, kale, collard greens)

Vitamin C-Rich Foods

Vitamin C and iron-rich foods work together to reduce lead absorption. Good sources of vitamin C include:

Oranges, orange juice
Grapefruits, grapefruit juice
Tomatoes, tomato juice
Green peppers



http://www.epa.gov/sites/production/files/2014-02/documents/fight_lead_poisoning_with_a_healthy_diet.pdf



Content adapted from Mona Hanna--Attisha, MD MPH FAAP, Hurley Children's Hospital, Michigan State University College of Human Medicine- presentation to Governor's After-Action Team, December 15, 2015

Potential Long-term Education Responses

- Subsidize quality childcare options
- Early On: Automatic referral and assessment
- Enroll all in early head start, head start
- Pre-school and Flint Pre-Promise- make universal
- Strengthen special education capacity/trained personnel

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Potential Long-term Education Responses

- Invest in school health/wellness/behavioral health
- Improve school nurse:student ratio
- Model lead safe school campaigns
- Lead-mitigating school nutrition
- Place MDHHS employee at every school?

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Questions?