Early Childhood Lead Exposure in Cuyahoga County: Screening, Prevalence, and the Impact on Kindergarten Readiness

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Note: The birth and lead data used in this report come from the Ohio Department of Health. This should not be considered an endorsement of this study or these conclusions by the Ohio Department of Health.
Today’s presentations will focus on secondary and tertiary prevention, but primary prevention is critical.

### The Levels of Prevention

<table>
<thead>
<tr>
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<th>PRIMARY Prevention</th>
<th>SECONDARY Prevention</th>
<th>TERTIARY Prevention</th>
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<tbody>
<tr>
<td><strong>Definition</strong></td>
<td>An intervention implemented before there is evidence of a disease or injury</td>
<td>An intervention implemented after a disease has begun, but before it is symptomatic.</td>
<td>An intervention implemented after a disease or injury is established</td>
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<td><strong>Intent</strong></td>
<td>Reduce or eliminate causative risk factors (risk reduction)</td>
<td>Early identification (through screening) and treatment</td>
<td>Prevent sequelae (stop bad things from getting worse)</td>
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Overview of Presentation

1. To what extent are children in Cuyahoga County being tested for lead?
2. What is the prevalence of elevated blood lead levels among children in Cuyahoga County?
3. How does an elevated blood lead level affect children’s kindergarten readiness?
To what extent are children in Cuyahoga County being tested for lead?
Lead Testing Rates by Age and Birth Cohort for Children Born in Cuyahoga County

Proportion of Birth Cohort Test for Lead by Age 1, Age 2, Age 3, Age 4, and Age 5.
Sample consisted of kindergarteners attending public schools in Cleveland and 11 inner-ring suburban districts from 2011-12 to 2016-17, N=35,334. Of these, 18,070 were covered by Medicaid for the first two years of life.
What is the prevalence of elevated blood lead levels (EBLLs) among children in Cuyahoga County?
In 2016, Cuyahoga County accounted for 14% of Ohio's lead tested children, but 41% of Ohio children with elevated blood lead levels.
Annual Percent of Children (ages 0-5) with an EBLL by Year

EBLL = 5 or more micrograms of lead per deciliter of blood (≥5 μg/dL)
Cumulative Percent of Children in Each Birth Cohort Who Ever Had an EBLL by Age 5

EBLL = 5 or more micrograms of lead per deciliter of blood (≥5 µg/dL)
Annual Lead Testing and EBLL Rates By Race

% screened at least once - Black/African American
% screened at least once - White
% with EBLL - Black/African American
% with EBLL - White
How does an elevated blood lead level affect children’s kindergarten readiness?
Sample consisted of kindergarteners attending public schools in Cleveland and 11 inner-ring suburban districts from 2011-12 to 2016-17, who also attended high-quality preschool for 18+ months. N=1,478

85% of children had no history of EBLLs or had not been tested. More than half were ‘on-track’ for language and literacy when they entered kindergarten.

Among the 15% who had a history of EBLLs, only one-fourth were ‘on-track’.
After controlling for a variety of individual, family and neighborhood level covariate factors, results confirm that children with an EBLL history are less prepared for kindergarten than their peers:

Children with an EBLL history had 0.5 times the odds of scoring ‘on-track’ for language and literacy.

They also scored approximately 10 points lower on the social foundations for learning domain of the KRA.
What about children with an EBLL history who scored ‘On-track’?

• 26% of children with an EBLL history scored ‘on-track’ for language and literacy

• They had the same average blood lead level as their peers who were ‘not on-track’

• But fewer of the children ‘on-track’ had experienced adverse events in the early childhood period, such as:
  • Being born premature or at low birth weight
  • Prolonged exposure to poverty
  • Residential mobility
Key Takeaways

• Although testing rates have improved in recent years, rates for children on Medicaid are far below the mandate at critical early ages.

• 4 in 10 Ohio children with an EBLL live in Cuyahoga County. Nearly 11% of Cuyahoga children born in 2012 had an EBLL by age 5.

• Black children have higher rates of EBLL than white children do.

• Even among children receiving a high dose of high-quality preschool, an EBLL has a substantial impact on kindergarten readiness.
Thank you!

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Study Design and Sampling Approach

SAMPLE

<table>
<thead>
<tr>
<th>Preschool at 3 &amp; 4</th>
<th>Kindergarten Cohorts</th>
<th>Kindergarten Outcomes</th>
<th>1st grade Outcomes</th>
<th>3rd grade Outcomes</th>
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<tr>
<td>Quality</td>
<td>2011-2012</td>
<td>Kindergarten Readiness</td>
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Kindergarten Readiness Outcome

• Kindergarten Readiness Assessment – Literacy (KRA-L)
  • 2011-12 to 2013-14
• Kindergarten Readiness Assessment (KRA)
  • 2014-15 to 2016-17
• For comparability, State created a crosswalk between two versions of assessment for language and literacy component
  • Raw scores grouped into ‘On-track’ and ‘Not on-track’ categories that are intended to predict a child’s likelihood of passing a reading diagnostic assessment requirement at third grade
Percent of children on Medicaid with at least one lead screen by age, N=16,263

- 50% by 13 mons
- 75% by 20 mons

Age (in months)
Percent of children on Medicaid with a second lead screen by age, N=12,620

50% by 27 mons
75% by 39 mons

Age (in months)