June Article of the Month

Assessing Child Lead Poisoning Case Ascertainment in the US, 1999–2010

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ABSTRACT

Background:

Lead is an elemental metal that has well-known harmful effects on brain and cognitive development. Humans are exposed to lead through contaminated drinking water, food, paints, soil, and even common consumer products. Children are especially at risk to higher exposures to lead because (for their size) they eat, drink, and breathe more, than adults. They also engage in unique behaviors such as crawling and putting their hands and objects into their mouths which can result in higher exposures. When exposed, children also absorb more lead into their bodies than adults do, and those who are malnourished or have iron deficiency absorb even more.

There is no safe level of lead exposure[1]. Because children are undergoing crucial development stages, exposure in childhood can cause irreversible damage that can impact them into adulthood. Lead has been found to cause a wide spectrum of cognitive and behavioral issues including reduced attention span, increased antisocial behavior, and reduced educational attainment[2].

While the effects of lead on children are well-known, there is concern that many children in the United States (US) with elevated blood lead levels (EBLLs) go undetected. For example, although screening is required for all Medicaid recipients, in 2001 only 17% of estimated EBLL cases for these recipients were actually diagnosed[3]. Individual states generate their own screening and testing guidelines. Many states rely on clinicians to determine which children to test. Clinicians may not have easy access to the screening guidelines to make this determination, and/or their perceptions of the community risk among the children they serve may be inaccurate. Moreover, in states where testing is required for Medicaid recipients, it is not always enforced.

Objective:

The purpose of the study was to compare the number of reported child EBLL in 39 US states with EBLL prevalence estimates in order to assess the adequacy of state reporting efforts.

Methods:

Between 1999 and 2010, 39 states and the District of Columbia participated in the Center for Disease Control's Childhood Lead Poisoning Prevention Program (CDC CLPPP). During this time period, states submitted the following information to CLPPP: number of children tested for EBLL and the number of children with results above the blood lead threshold of 10 µg/dL. Because this threshold was considered

the level of concern at the time of state reporting, EBLL was defined as equal to or greater than 10 μg/dL in the study analysis.

State reports of EBLL for the 1999-2010 time period were obtained from the CDC CLPPP in June 2016. Reporting rates for some states in a given year were incomplete thus flagged as nonreporting for analysis purposes.

Using the latest statistical data made available by the National Health and Nutrition Examination Survey (NHANES) and the Roberts and English model, this model incorporates factors such as race or ethnicity and residence in housing built pre-1978, prevalence estimates for EBLL for each state were established. These prevalence estimates were then used to assess the validity of reported EBLL cases among children 12 months to 5 years of age.

Results:

Between 1999 and 2010, an estimated 1.2 million children had EBLL in the US. However, only half of these children were reported to the CDC CLPPP. Of those not reported, about 45% of cases occurred when states were not reporting and 55% were incomplete.

Midwestern and Northeastern states reported the greatest number of EBLL cases but the greatest number of estimated EBLL cases were in the South. A total of 23 states reported less than half of expected EBLL cases and only 11 states actually reported less than 20% of cases. Overall, states missed a substantial amount of estimated child EBLL cases (36% of children) due to under-detection and underreporting of EBLL.

Conclusion:

This study indicated that 1 in 3 children believed to have EBLL during 1999-2010 went unreported, and that the South had the most children estimated to have EBLL but the lowest numbers reported. Under-testing for blood lead levels, specifically EBLL, is an ongoing and pervasive problem.

POLICY IMPLICATIONS

Over the last four decades, policies to eliminate or reduce lead in commerce have contributed to significant reductions in blood lead concentrations for the general population. CDC estimates that there are approximately half a million children who have blood lead concentrations of 5 μg/dL (the current level of concern) or higher. This study indicates that this is a serious underestimate of the problem.

Given the “serious consequences of untreated EBLL for the entire life course” of a child, improved screening and testing of children in all states should be implemented and enforceable. Not only would this provide officials with the actual prevalence and distribution of childhood EBLLs in order to direct sufficient and targeted lead exposure reduction efforts, but it would ensure that the families of every child detected are provided information about how to eliminate or reduce further exposures and about helpful resources and services to mitigate possible adverse effects.

While testing is important for treating children already poisoned, it is critical that the US focuses on prevention before more children are harmed. In addition, EBLLs cost the US $50 billion per year in terms of treatment, special education, and other outcome costs[4]. Members of Project TENDR (Targeting

Environmental Neurodevelopmental Risks), a collaborative effort of leading scientists, health professionals and children's and environmental advocates, have recently published *Establishing and Achieving National Goals for Preventing Lead Toxicity and Exposure in Children*. The group recommends that the US government ensures that by 2021 no child has a blood lead level greater than 5 µg/dL, and that by 2030, no child has a blood lead level greater than 1 µg/dL. Their publication outlines four recommended actions in order for the US to achieve those goals, including: the adoption of health-based action levels and standards for lead in drinking water, paint, dust, and soil; the remediation of sources of lead exposure; and the phasing out or banning of all current lead containing products.

REFERENCES

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