



Department of Health and Social Services
Karleen Jackson, Commissioner
Jay Butler, MD, Chief Medical Officer
3601 C Street, Suite 540
Anchorage, Alaska 99503

<http://www.epi.Alaska.gov>

Division of Public Health
Beverly Wooley, Director

Local telephone number 907-269-8000
24 Hour Emergency 1-800-478-0084

Editors:
Joe McLaughlin, MD, MPH
Bradford D. Gessner, MD, MPH

Bulletin No. 07 March 07, 2008

Blood Lead Epidemiology and Surveillance Non-Occupational Exposures in Adults and Children — Alaska, 1995–2006

Introduction

Harmful health effects of lead exposure include intellectual and behavioral deficits in children, and cardiovascular, central nervous, renal, reproductive, and hematologic system damage in adults. Alaska regulations require laboratories and health care providers to report all blood lead level (BLL) results ≥ 10 micrograms per deciliter ($\mu\text{g}/\text{dL}$) to the Section of Epidemiology; however most laboratories report all BLL results.¹ The Centers for Disease Control and Prevention (CDC) considers BLLs ≥ 10 $\mu\text{g}/\text{dL}$ to be of health concern for children aged < 6 years, and BLLs ≥ 25 $\mu\text{g}/\text{dL}$ to be of health concern for adults. The State of Alaska considers BLLs ≥ 10 $\mu\text{g}/\text{dL}$ to be of concern for all individuals aged < 18 years.

Methods

We evaluated all children aged < 18 years with BLLs ≥ 10 $\mu\text{g}/\text{dL}$ and all non-occupationally exposed adults aged ≥ 18 years with BLLs ≥ 25 $\mu\text{g}/\text{dL}$ from 1995–2006. To avoid duplication, only the highest BLL per person was included in analysis. Only venous draws were used. Exposures were determined by place of work listed on the laboratory report (for occupational exposures) or as identified during follow-up investigations (for occupational and non-occupational exposures). “Unknown exposures” refers to exposures that did not have a follow-up conducted or that were undetermined during follow-up. P-values were calculated using the Chi-square test for trend of difference in proportions.

Results

Children aged < 6 years

We received BLL reports on 1,141 children aged < 6 years and 17 (1.5%) had a BLL ≥ 10 $\mu\text{g}/\text{dL}$. Of the 17 children with elevated BLLs, 6 (35%) were boys, 10 (59%) were girls, and 1 (6%) was unknown. The median BLL was 12.3 $\mu\text{g}/\text{dL}$ (range: 10–21 $\mu\text{g}/\text{dL}$). Exposure sources included foreign/adoptee from abroad for 6 (35%), playing with air gun pellets for 2 (12%), pica (eating non-nutritive substances) for 2 (12%) and unknown for 7 (41%).

Children aged 6–17 years

We received BLL reports on 882 children aged 6–17 years and 74 (8.4%) had a BLL ≥ 10 $\mu\text{g}/\text{dL}$. Of the 74 children with elevated BLLs, 50 (67%) were boys, 22 (30%) were girls, and 2 (3%) were unknown. The median BLL was 15 $\mu\text{g}/\text{dL}$ (range: 10–37 $\mu\text{g}/\text{dL}$). Exposure sources included indoor firing range for 55 (74%), foreign/adoptee from abroad for 3 (4%) and unknown for 16 (22%).

Non-occupationally Exposed Adults aged ≥ 18 years

We received BLL reports on 5,835 non-occupationally exposed adults and 64 (1.1%) had a BLL ≥ 25 $\mu\text{g}/\text{dL}$. Of the 64 adults with elevated BLLs, 59 (92%) were male and 5 (8%) were female. The median BLL was 30 $\mu\text{g}/\text{dL}$ (range: 25–133 $\mu\text{g}/\text{dL}$). Exposure sources included, indoor firing range for 15 (23%), casting lead for 3 (5%), both firing range and casting lead for 1 (1.5%), bodily retention of a bullet for 1 (1.5%) and unknown for 44 (69%). A person who cast lead as a hobby had the highest documented level (133 $\mu\text{g}/\text{dL}$).²

All age groups

Across all age groups, the majority (81%) of known non-occupational elevated lead exposures involved people exposed on indoor firing ranges, followed by children who were born or adopted abroad (10%), and people casting lead as a hobby (3.4%).

When evaluated by four-year blocks, the proportion of persons tested who had an elevated BLL significantly increased among children aged < 6 years ($p=.02$) and among children aged 6–17 years ($p<.001$), and significantly decreased among adults ($p<.001$) (Figure). Among children aged < 6 years tested from 1997–2001, the proportion who had elevated BLLs was lower in Alaska than in the United States (1.5% vs. 5.1% respectively).³

Discussion

In the contiguous United States, the major sources of lead exposure among children aged < 6 years are lead-contaminated dust, deteriorated lead-based paint, and lead-contaminated soil.⁴ These exposure sources are not frequently encountered in Alaska;⁵ the highest proportion of reported exposure sources among Alaska children aged < 6 years are for those born or adopted from abroad.

The primary hypothesis for the marked increase in the proportion of elevated BLLs among children aged 6–17 years is that in recent years the Section of Epidemiology has performed more frequent targeted investigations of children exposed to lead at indoor firing ranges, which is how most (74%) of these children were exposed. A recent study looking at lead exposures among indoor firing range users in Alaska found that several firing ranges practiced inadequate lead exposure prevention measures, and people who used these ranges were at increased risk for having an elevated BLL.⁶

This report is subject to at least three data limitations. Alaska does not perform universal lead screening for children, so some children with elevated lead exposures might not receive testing. The denominators used in results calculations represent only people tested (including participants in targeted investigations), and are not representative of the entire Alaska population. Due to differences in the detection limit among clinical laboratories and the large number of samples with lead levels below those detection limits, we only report summary statistics such as means and medians for elevated BLLs.

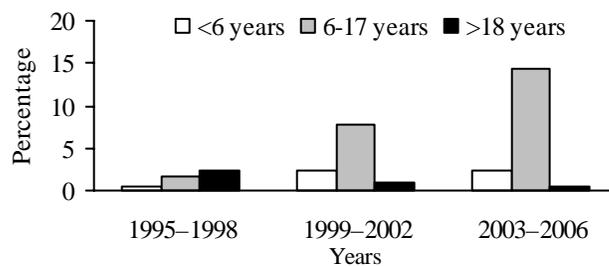
Recommendations

1. Health care providers should assess lead exposure risk among their patients, test patients who are at risk for lead toxicity, and report elevated BLLs to the Alaska Section of Epidemiology.
2. All indoor firing ranges in Alaska should follow proper maintenance practices and have adequate ventilation systems.
3. People casting lead as a hobby should use personal protective equipment and adequately ventilate their workspace.
4. Health care providers should refer patients who wish to learn more about the hazards of lead exposure to the following website: <http://www.atsdr.cdc.gov/cabs/lead/index.html>

References

1. State of Alaska, Conditions Reportable to Public Health. 7 AAC 27.014. Reporting of blood lead test results. Available: <http://www.touchngo.com/igicntr/akstats/aac/title07/chapter027/section014.htm>
2. Cottage Industry Causes Acute Lead Poisoning., State of Alaska, Section of Epidemiology, Bulletin No. 17, November 19, 2001. Available: http://www.epi.hss.state.ak.us/bulletins/docs/b2001_17.htm
3. Centers for Disease Control and Prevention [Surveillance for Elevated Blood Lead Levels Among children—United States, 1997–2001]. MMWR 2003; 52(SS10): [1–21]. Available: <http://www.cdc.gov/mmwr/preview/mmwrhtml/ss5210a1.htm>
4. Centers for Disease Control and Prevention [Interpreting and Managing Blood Lead Levels < 10 $\mu\text{g}/\text{dL}$ in Children and Reducing Childhood Exposures to Lead]. MMWR 2007; 56(RR08): [1–14;16]. Available: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5608a1.htm>
5. Robin, L et al. Statewide assessment of lead poisoning and exposure risk among children receiving Medicaid services in Alaska. *Pediatrics*. 1997;99;4:e9. Available: <http://pediatrics.aappublications.org/cgi/reprint/99/4/e9>
6. Centers for Disease Control and Prevention [Lead Exposure on Indoor Firing Ranges Among Students on Shooting Teams—Alaska, 2002–2004]. MMWR 2005; 54(23): [577–579]. Available: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5423a1.htm>

Figure. Proportion of Persons Tested Who Had an Elevated BLL, by Age Group and Four-Year Block — Alaska, 1995–2006



(Contributed by Sophie Wenzel, MPH, Environmental Public Health Program, Section of Epidemiology)