State of Alaska Epidemiology Bulletin

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

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Adult Blood Lead Epidemiology and Surveillance: Occupational Exposures — Alaska, 1995–2006

Introduction

Adults who are chronically exposed to lead are at increased risk for cardiovascular, central nervous, renal, reproductive, and hematologic system damage. Alaska regulations require laboratories and health care providers to report all blood lead level (BLL) results ≥10 micrograms per deciliter (µg/dL) to the Section of Epidemiology (SOE); however, most laboratories report all BLL results.[1] The Centers for Disease Control and Prevention (CDC) considers BLL ≥10 µg/dL to be of health concern for children, and BLLs ≥25 µg/dL to be of health concern for adults. The Occupational Safety and Health Administration (OSHA) requires biannual BLL testing for employees potentially exposed to lead in the workplace. For employees whose BLL is ≥40 µg/dL, blood lead testing is required every 2 months, until two consecutive tests show a level <40 µg/dL.[2] For employees with a BLL ≥50 µg/dL, OSHA requires medical removal from work until two consecutive blood tests show a level <40 µg/dL.[2] Some employers apply more stringent testing standards.

Methods

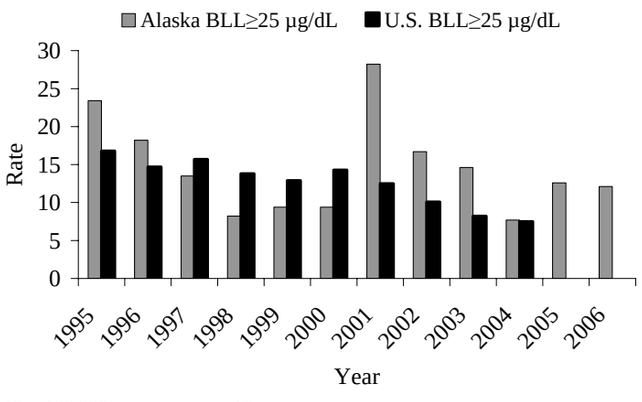
We evaluated all occupationally-exposed workers aged ≥16 years with BLLs ≥25 µg/dL from 1995–2006. To avoid duplication, only the highest BLL per worker for each calendar year, and cumulative calculations for 1995–2006 were included in the data analysis. The type of occupational exposure was determined by place of work listed on the laboratory report or as identified during follow-up investigations for BLLs ≥25 µg/dL. Occupational status was not determined for BLL reports <25 µg/dL that had no place of employment listed. Alaska mean annual BLL prevalence rates and annual rate trends were compared with U.S. rates, using 1995–2004 data (U.S. data were not available for 2005 and 2006).[3-6] Alaska rates were based on SOE lead surveillance and U.S. Bureau of Labor Statistics population data. U.S. rates were based on CDC Adult Blood Lead Epidemiology Surveillance and U.S. Bureau of Labor Statistics data.

Results

During the evaluation period, 19,733 blood lead reports on 8,603 people aged ≥16 years were received. Of these, 11,491 (58.2%) reports were from 2,710 workers; the median BLL was 9 µg/dL (range: 0–56 µg/dL). Of the 2,710 workers tested, 308 (11.4%) had a BLL ≥25 µg/dL, and 39 (1.4%) had a BLL ≥40 µg/dL (Table). Of the 308 workers with BLLs ≥25 µg/dL, 293 (95%) were male, 289 (94%) worked in the mining industry, 15 (5%) in demolition, 2 (<1%) on firing ranges, 1 (<1%) in automotive repair, 1 (<1%) in remediation services; the median BLL was 30 µg/dL.

The mean annual BLL rate was significantly lower in Alaska than in the U.S. for BLLs ≥40 µg/dL (1.4 vs. 2.7 per 10^5 workers, respectively; p<0.01), but not for BLLs ≥25 µg/dL (14.9 vs. 12.7 per 10^5 workers, respectively; p=0.4; Figure). The prevalence rates for BLLs ≥40 µg/dL and BLLs ≥25 µg/dL decreased in the U.S. (p<0.001 for both), but not in Alaska (p=0.3 and 0.5, respectively).

Figure. Prevalence Rates* of BLLs ≥25 µg/dL Among Workers, by Year — Alaska and United States, 1995–2006



*Per 100,000 workers aged ≥16 years.

Discussion

In Alaska, the majority of adults with BLLs ≥25 µg/dL were males who worked in mining. The occupational distribution of elevated BLLs in Alaska contrasts with national data, where the highest annual average number of adults with BLLs ≥25 µg/dL in 2003–2004 were among manufacturing (69%), construction (19%), and mining (7%) workers.[6] This difference is due largely to the high number of workers employed in the metal ore mining industry in Alaska and the low number of workers employed in other industries commonly associated with lead exposure elsewhere in the nation.

Although Alaska's mean prevalence rate for BLLs ≥40 µg/dL was lower than the mean U.S. rate from 1995–2004, this was not the case for BLLs ≥25 µg/d. Furthermore, unlike the U.S., Alaska's prevalence rates for BLLs ≥25 µg/d have not been following a consistent downward trend. These data suggest that Alaska is not on target to meet the CDC Healthy People 2010 objective to reduce to zero the number of adults with BLLs ≥25 µg/dL.[5] This is particularly concerning in light of the fact that negative health effects, such as increased risk of cardiovascular disease and cognitive impairment, that are due to chronic exposure to lead at levels previously thought to be safe are becoming more apparent.[7] It is uncertain why the Alaska rate of BLLs ≥25 µg/dL was so high in 2001; however, one likely contributing factor was an increase in the number of contractors hired on to work at one large metal ore mine in Alaska that year.

This report is subject to at least two important limitations. First, elevated BLLs may be under-recognized and underreported due to noncompliance with OSHA and state reporting regulations. Second, workers who are self-employed, sole proprietors and not incorporated are not required by OSHA to participate in medical monitoring.

Recommendations

1. Health care providers should offer blood lead testing to any patient whose occupation puts them at elevated risk for lead exposure (e.g., mining, demolition, firing range jobs, automotive repair and remediation services) and who is not being regularly tested by their employer.
2. Health care providers and laboratories should report all BLLs ≥10 µg/dL to the Alaska Section of Epidemiology by phone (1-800-478-1700) or by mail (3601 C St, Suite 540, Anchorage, Alaska 99503).
3. Employers should strictly enforce OSHA safety and exposure prevention regulations for all workers, with the ultimate goal in mind to reduce to zero the number of workers with BLLs ≥25 µg/dL.
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

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Table. Number of Reports, Tested Workers and Workers with Elevated BLLs Reported to the Section of Epidemiology — Alaska, 1995–2006

Year	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*1995–2006*
*Number of occupational reports**	*384*	*939*	*1,059*	*737*	*1,491*	*1,185*	*1,613*	*938*	*493*	*839*	*974*	*839*	*11,491*
*Number of workers***	*285*	*540*	*666*	*482*	*887*	*823*	*1,026*	*610*	*318*	*564*	*647*	*603*	*2,710*
*Number of workers with BLL ≥25 µg/dL***	*66*	*52*	*39*	*24*	*28*	*28*	*85*	*51*	*45*	*24*	*40*	*39*	*308*
*Number of workers with BLL ≥40 µg/dL***	*7*	*4*	*7*	*2*	*0*	*2*	*9*	*4*	*5*	*0*	*6*	*3*	*39*

*Only BLL ≥10 µg/dL are reportable by law. Occupational status was not determined for blood lead level reports <25 µg/dL that had no listed place of employment.
**Workers with multiple blood lead reports in a single calendar year are counted once in each year a result is received. For the 1995–2006 column, each worker is counted only once for the entire time-period, therefore annual totals do not add up to the number in the 1995–2006 column.

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