Childhood Lead Poisoning in Colorado

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A review of information from January 2003 to December 2004

Diet and Lead Poisoning

If a child and an adult are both exposed to a source of lead, the child will likely absorb more lead.

As we know, young children explore their surroundings with their hands and mouths to a greater extent than adults. This behavior allows them to take in more environmental contaminants, like lead. Unfortunately, the gastrointestinal absorption of lead is greater in children, too.

The absorption of lead can be increased if the child is deficient in nutritional sources such as iron and calcium. To minimize the absorption of lead, children with elevated blood lead levels should be assessed and treated, if appropriate, for iron deficiency, and their diet should be rich in iron, calcium and vitamin C.

In the developing central nervous system, effects of lead poisoning are often irreversible.

Recent studies have shown that IQ may decline 1 to 5 points with an increased blood lead level of 10 µg/dL (micrograms per deciliter).

The absorption of lead can be increased if the child is deficient in nutritional sources such as iron and calcium.

Inside this issue

Lead Report Format Changes

You may have noticed that this report is slightly different than previous surveillance data reports. Data sets have become so large that we have had to reduce the size of data sets by looking at recent years' data instead of data over an extended period. For this version, we are looking at 2003 and 2004 data.

As in the past, we continue to unduplicate the data and look at report counts by the county in which the reported physician practices. We do this since not every child in the state is tested for lead, and up until July 2004, all lead levels were not required to be reported.

When to Rescreen for Lead

Recommended Schedule for Obtaining a Confirmatory Venous Sample,* according to the Centers for Disease Control and Prevention in *Managing Elevated Blood Lead Levels Among Young Children, March 2002*

Screening test result (µg/dL)	Perform a confirmation test within
10-19	3 months
20-44	1 week-1 month
45-59	48 hours
60-69	24 hours
>70	Immediately

*** A finger stick is an acceptable method of collecting a sample for lead testing.**

Schedule for Follow-up Blood Lead Testing

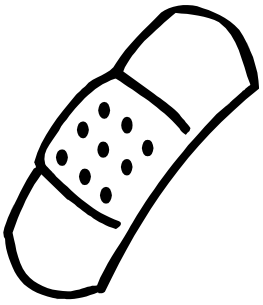
Venous blood lead level (µg/dL)	Early follow-up (first 2-4 tests after identification)	Late follow-up (after BLL begins to decline)
10-14	3 months	6-9 months
15-19	1-3 months	3-6 months
20-24	1-3 months	1-3 months
25-44	2 weeks– 1 month	1 month
>45	ASAP	Chelation with subsequent follow-up

Who Should be Tested?

Medicaid-eligible children are **required** to receive a blood lead test at **12 AND 24 months** or between the ages of 3 and 6, if not previously tested.

Children eligible for **Child Health Plan Plus, Colorado Resident Discount Program, or who reside in these high-risk zip codes should be tested: 80203, 80204, 80205, and 80216.** Also, low-income children between 3 and 6 years old who have never been screened for lead should be tested for lead poisoning.

Refugee children between 1 and 6 years old eligible for Domestic Health Screenings at Denver area refugee clinics will be screened. A repeat test is recommended three to six months later for normal results, AND those with elevated results should receive immediate retesting and follow-up.



Recommendations for Children with Confirmed (venous) Elevated Blood Lead Levels

Blood Lead Level (µg/dL)				
10 - 14	**15 - 19**	**20 - 44**	**45 - 69**	**>70**
Lead education -Dietary -Environmental Follow-up blood lead monitoring	Lead education -Dietary -Environmental Follow-up blood lead monitoring Proceed according to actions for 20-44 µg/dL if: -A follow-up BLL is in this range at least 3 months after initial venous test **or** -BLLs increase	Lead education -Dietary -Environmental Follow-up blood lead monitoring Complete history and physical exam Lab work: -Hemoglobin or hematocrit -Iron status Environmental investigation Lead hazard reduction Neurodevelop-mental monitoring Abdominal X-ray (if particulate lead ingestion is suspected) with bowel decontamination if indicated	Lead education -Dietary -Environmental Follow-up blood lead monitoring Complete history and physical exam Lab work: -Hemoglobin or hematocrit -Iron status -FEP or ZPP Environmental investigation Lead hazard reduction Neurodevelop-mental monitoring Abdominal X-ray with bowel decontamination if indicated Chelation therapy	Hospitalize and commence chelation therapy Proceed according to actions for 45-69 µg/dL

The following actions are NOT recommended at any blood lead level:

- Searching for gingival lead lines
- Testing of neurophysiologic function
- Evaluation of renal function (except during chelation with EDTA)
- Testing of hair, teeth, or fingernails for lead
- Radiographic imaging of long bones
- X-ray fluorescence of long bones

Source: Centers for Disease Control and Prevention, *Managing Elevated Blood Lead Levels Among Children: Recommendations from the Advisory Committee on Childhood Lead Poisoning Prevention, March 2002*

Figure 1
A Different Way of Looking at Things

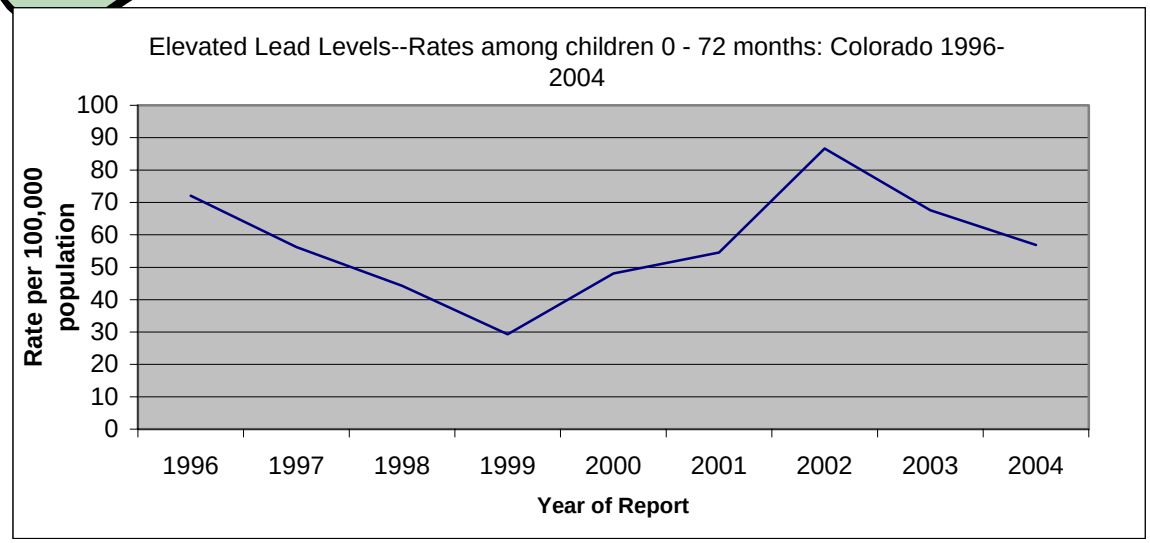


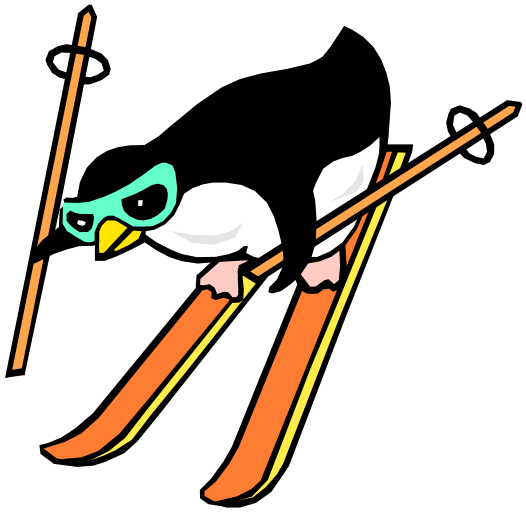
Figure 1 includes rates calculated with test data and should be interpreted with caution. The duplicate cases cause the rates to be inflated. Prevalence data, which is unduplicated, may be a better indicator of trends in Colorado.

Table 1
Childhood Blood Lead Testing by Year in Colorado

	1996	1997	1998	1999	2000	2001	2002	2003	2004
Total tested	5,997	5,320	4,382	4,043	6,974	9,462	13,717	14,521	19,459
Elevated ≥ 10 µg/dL	285	225	180	121	202	237	384	307	262

The information in Table 1 includes all tests reported, including the number of test results with elevated lead levels. This is not equivalent to the number of children with elevated lead levels, because some children may have tested more than one time within a year or between years.

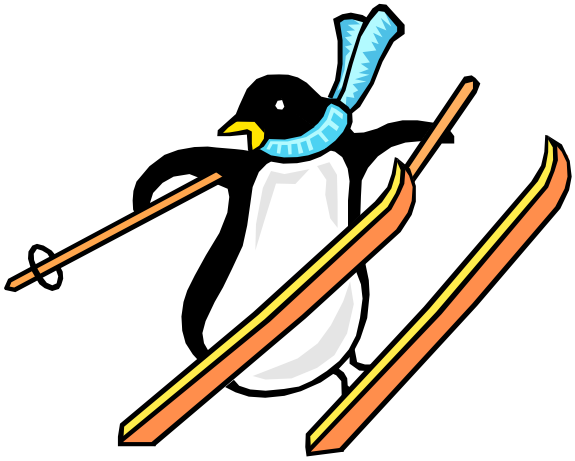
Table 1 shows a 224 percent increase in the number of tests reported between 1996 and 2004. This can be attributed largely to increased outreach, testing, and a greater awareness of the problem. It may also be attributed to new laws requiring laboratories to report all blood lead levels.



Lead Sources Identified by Lead Home Investigation

Lead home investigations are recommended for children with confirmed blood lead levels ≥ 20 µg/dL, or two capillary levels ≥ 15µg/dL taken within three months.

County of Investigation	Number of Investigations for 2004	Lead Sources Identified (as reported by local county and state health department staff)
Adams	2	Mexican vitamins
Arapahoe	1	Foreign exposure, paint, soil
Boulder	1	Adult occupation, pica during pregnancy
Delta	1	Paint, soil
El Paso	1	Remodeling, adult occupation
Jefferson	1	Remodeling, soil, home remedios, exposure to galvanized fence
Mesa	1	Foreign exposure, possible remedios
Montrose	1	Keys, adult occupation
Pueblo	2	Paint, soil, cooking pot, adult occupation
Rio Grande	1	soil
Weld	1	Possible home remedies (remedios)
Denver	Not Reported	



Please Note

This data is presented and analyzed by the county of the physician who ordered the test because reported child address information has been limited. Fourteen percent of 2003-2004 data contained both child and provider address information. With further analysis, 85% of the time, the provider and child county matched.

Counties with fewer than 5 tests are not listed, but their numbers are counted in the total section. Yearly totals may vary due to late reporting and elimination of multiple reports. Age of children at test (0-72 months) are counted. Only the number of elevated blood lead levels (≥ 10µg/dL) are included in the rate calculation. Population estimates are from the Demography Section of the Colorado Division of Local Government.

Analysis Methods for Physician County Data

If more than one lead test is reported for a single child, only one blood test is counted using the following criteria:

1) The highest venous test in a timeframe; or

2) If no venous tests are available, the second of two capillary tests within 12 weeks; or

3) If none of the tests in the specified date range follow within 12 weeks of a prior test, then the first capillary within the timeframe, if only capillary tests were performed.

Table 2
Reported Lead Data by Physician County for Children 0-72 months 2003-04

Reported Physician County	*2003 –2004 Average Population estimate 0-6 years old	2003-04 Average Elevated Rate per 100,000	2003-04 <10 µg/dL	2003-04 ≥ 10-14.9 µg/dL	2003-04 ≥ 15µg/dL	2003-04 Total tested
Adams	44,726	8.9	1,285	3	5	1,293
Alamosa	1,557	31.6	464	0	1	465
Arapahoe	51,284	26.3	2,763	20	7	2,790
Boulder	24,359	26.7	1,738	10	3	1,751
Broomfield	4,911	0	76	0	0	76
Chaffee	1,077	0	15	0	0	15
Cheyenne	173	0	8	0	0	8
Conejos	879	0	53	0	0	53
Delta	2,429	0	36	0	0	36
Denver	65,272	150.7	12,906	128	68	13,102
Dolores	145	0	10	0	0	10
Douglas	28,731	7.0	120	3	1	124
Eagle	5,156	0	12	0	0	12
El Paso	56,694	4.4	1,468	1	4	1,473
Fremont	3,125	16.3	89	1	0	90
Garfield	5,480	27.5	707	2	1	710
Gunnison	1,075	47.3	7	0	1	8
Jefferson	44,844	14.4	2,414	10	3	2,427
Kit Carson	663	0	21	0	0	21
Lake	870	1033.2	518	12	6	536
La Plata	3,440	29.1	142	2	0	144
Larimer	22,760	26.4	1,395	8	4	1,407
Las Animas	1,330	0	61	0	0	61
Lincoln	402	248.9	53	1	1	55
Logan	1,963	25.2	76	1	0	77
Mesa	11,171	13.3	965	1	2	968
Moffat	1,320	0	14	0	0	14
Montezuma	2,318	0	27	0	0	27
Montrose	3,437	14.6	243	0	1	244
Morgan	3,347	44.9	113	3	0	116
Otero	1,958	0	59	0	0	59
Pitkin	1,057	0	10	0	0	10
Pueblo	14,081	21.3	419	4	2	425
Rio Grande	1,290	77.6	208	1	1	210
Routt	1,681	0	59	0	0	59
Saguache	653	77.6	81	1	0	82
Summit	2,244	45.4	63	1	1	65
Teller	1,699	0	19	0	0	19
Weld	24,165	45.9	1,947	18	4	1,969
Total	**457,678**	**38.0**	**30,682**	**231**	**116**	**31,029**

Eliminating Childhood Lead Poisoning in Colorado

Blood lead levels have decreased significantly in the U.S., mainly due to the elimination of lead from gasoline and paint in the 1970s. The nation's goal to eliminate childhood lead poisoning by the year 2010 will be achievable only with the cooperation of health, environmental, and housing agencies on implementing a lead elimination strategy.

In Colorado, several federal, state, and local agencies, along with nonprofit and other businesses, have come together to develop a strategic plan to eliminate childhood lead poisoning.

After several months of planning and preliminary meetings, a steering committee developed an outline of the strategic plan. A stakeholder meeting was held in Denver in February 2005 and more than 100 people from around the state attended to work on developing goals and objectives for incorporation into the state's lead elimination plan. Several hundred more people expressed interest in assisting with the plan, but were unable to attend the meeting.

There are many sources of lead in Colorado, including paint, dust, soil, home remedies, pottery, and occupational exposures.

Comments and suggestions from all participants were included, edited and sent out to all interested stakeholders for further review.

The steering committee hopes to incorporate comments and have a finished plan by the end of summer. We will use this document as a guide to eliminate lead poisoning in Colorado.

Studies Link Delinquent Behavior and Lead Poisoning

Problems that children suffer related to elevated blood lead levels may include distractibility, poor organizational skills and, perhaps, even hyperactivity.

For many years, researchers have looked at the relationship of cognitive deficits and aggression in children with lead exposure.

Dr. Herbert Needleman, a researcher who looked at the link between lead poisoning and delinquent behavior, concluded, "When environmental lead finds its way into the developing brain, it disturbs neural mechanisms responsible for regulation of impulse." Needleman found in his study that male adolescents with increased bone lead levels self-reported more delinquent acts. In the Cincinnati Lead Study, prenatal and early postnatal blood lead levels were significantly associated to the boys' self-reporting of delinquent and anti-social behaviors.

Source: ABC News, Lead in Environment Causing Violent Crime, Feb. 18, 2005.

"When lead finds its way into the developing brain, it disturbs neural mechanisms responsible for regulation of impulse."

Lead in Pregnant Women

Many people know that lead can cause serious developmental problems in young children. We even know that protecting children from lead exposure is very important and that occupations and hobbies may be exposure sources from adult to child.

Recently, Howard Hu and his colleagues were the first to assess how stores of lead in bones of pregnant women are associated with later brain development of their infants. They have concluded that lead stored in the bones of pregnant women is linked to the risk for impaired cognitive development in infants.

Their research implies that a child may still be at risk for lead poisoning, and the health effects associated with it, even if she or he hasn't been exposed to lead after birth. Hu found that the placenta is not a barrier to lead.

Hu was the principal investigator of this study, *Maternal Bone Lead as an Independent Risk Factor for Fetal Neurotoxicity: A Prospective Study*. Pediatrics, Volume 110, No. 1, July 2002, pp 110-118.