

“GET THE LEAD OUT OF VERMONT”

**REPORT OF THE COMMITTEE ON
IDENTIFICATION AND INTERVENTIONS**

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Report of the Committee on Identification and Interventions

Process

The Identification and Intervention Committee met approximately every two weeks between January and July 2006 to discuss ways to prevent lead poisoning of Vermonters, to ensure that all who are poisoned are identified, and to enhance the response of the State and others when Vermonters have elevated blood lead levels.

Committee members brought substantial expertise to the discussion. They came from a variety of professional backgrounds and included representatives from the Burlington and Bellows Falls lead programs, the Children's Forum, the Vermont Chapter of the American Academy of Pediatrics, a family physician, the coordinator of the Vermont Department of Health (VDH) Childhood Lead Poisoning Prevention Program (CLPPP), the director of a VDH District Office, the CLPPP case manager who conducts home visits after a child is lead poisoned, and the CLPPP staff member who coordinates the blood lead surveillance program. Appendix A lists the names and affiliations of members of the Identification and Interventions Committee.

In addition to drawing on the expertise of Committee members, the Committee received an oral report from Lori Cragin, a doctoral intern at VDH, on the recent peer reviewed research on the effects of lead poisoning, and a written report from four graduate students at the Dartmouth Center for Evaluative Clinical Sciences, entitled "The Costs of Lead Poisoning in Vermont." The former report forms the basis of the next section on the health effects of lead poisoning. A copy of the latter report is available with the electronic version of the report located at the Attorney General's website at www.atg.state.vt.us.

The Committee relied on the experience and expertise of (1) Dr. Bruce Lanphear, the director of the Environmental Health Center at Cincinnati Children's Hospital Medical Center, as well as a professor of environmental health at Cincinnati Children's and the University of Cincinnati; (2) Dr. Michael Shannon, Chief of the Division of Emergency Medicine at Children's Hospital Boston and Co-Director of the Pediatric Environmental Health Center; his research has focused on various aspects of medical toxicology, including pediatric environmental health and the relationship of lead poisoning to iron-deficiency anemia; (3) Paul Hunter, the long-time director of the Massachusetts Childhood Lead Prevention Program; and (4) Robert McLeod, Program Manager of the Vermont Occupational Safety and Health Act (VOSHA) program. Each of these experts participated in a phone conference call with committee members.

Health Effects of Lead Poisoning

Sources of lead in Vermont. Lead can occur naturally in our environment, however, most of what is found is a result of the decisions of humans. Environmental levels of lead have increased more than 1,000-fold over the past three centuries as a result of human activity.*¹ Lead-based paint in housing is the primary source of lead poisoning in Vermont where

* The basis for the assertions found in the text are collected at the end of this report. The numbering is not sequential because the same research supports multiple assertions. A glossary of terms can be found in Appendix B.

approximately 35% of houses were built prior to 1950 and 69% prior to 1978, the year the federal government banned lead from residential paint. Although more US and Vermont children are poisoned by exposure to lead dust from lead-based paint in and around older homes than by any other source, lead can also be found in roadside soil, water, air and food.² Children can become lead poisoned when they play in contaminated soil and directly ingest it or track it into the home.² Lead can also be found in food grown in soils contaminated with lead and can enter drinking water from lead pipes or from the fixtures or solder used to join metal pipes.

Exposure to lead can result from occupational exposure (e.g. construction, demolition, salvage work, painting, radiator repair, and working with batteries) and from secondary occupational exposure (e.g. family member of those working with lead). Lead particles may be carried home on clothing, shoes, hair, etc., putting family members in jeopardy.² Other sources of lead exposure include food and liquids stored in leaded crystal or pottery or from lead-soldered cans, hobbies that involve lead (e.g. furniture refinishing), cosmetics, home remedies that are popular in some cultures, toys, fishing weights, smoking and lead shot.²

Lead as a health hazard. Unfortunately, despite the overall reduction in childhood blood lead levels, the mean blood lead level remains greater than the natural background levels in humans³ and lead poisoning still remains a serious environmental health hazard. Lead exposure can cause irreversible damage⁴ that results in long-lasting or permanent consequences. Lead bioaccumulates and is not biodegradable. It is deposited in bones where it maintains a half-life of up to 19 years.⁵ Lead is a pervasive and ubiquitous metal that serves no useful purpose in the human body, where its presence can affect every organ system.¹

Based on limited evidence from human studies and sufficient evidence from animal studies, the Department of Health and Human Services has determined that lead and lead compounds are “reasonably anticipated to be human carcinogens.”¹ The EPA identifies lead as a “probable human carcinogen,” and the International Agency for Research on Cancer (IARC) has determined that lead is “probably carcinogenic to humans.”¹

Children at greatest risk. Children are considered more vulnerable than adults to the effects of lead exposure and are at the greatest risk of ingesting lead.¹ Vital neurodevelopmental processes, such as cortical functional differentiation, synaptogenesis, myelination and programmed apoptosis occur during fetal development and continue until a child is three years old.^{6,7} Children frequently ingest lead by crawling on floors contaminated with lead dust and putting their hands or other objects in their mouths. Additionally, children absorb almost 50 percent of ingested lead, compared to adults, who absorb 5-10 percent.¹

Medical studies of children reveal that lead results in:

- decreases in IQ^{8,9}
- decreases in reading and arithmetic skills¹⁰
- decrements in domains of attention, executive function, visual-motor integration, social behavior and motor skill¹¹
- increases in caries¹² and colic¹³
- altered immune system function^{14,15}
- impaired metabolism of vitamin D¹⁶
- low birth length and head circumference^{17,18} and

- delayed growth and pubertal development in girls.^{19,20}

Lead exposure has also been shown to be associated with school failure, delinquency, and criminal behavior in children.^{21,22} High levels of lead have resulted in hyperirritability, ataxia, convulsions, stupor, coma and even death.¹

Unfortunately, it takes very little lead to poison a child. Dust equivalent to a few grains of sugar taken over time can cause a blood lead level of 10 $\mu\text{g}/\text{dL}$ or more.²³ A paint chip the size of a small fingernail can cause a spike of 20 $\mu\text{g}/\text{dL}$ if absorbed.²⁴ If a penny were made of lead and converted into pure lead dust, then, using the definition of lead contamination for floors, the dust would contaminate 700 rooms measuring 10 feet by 10 feet.²⁵

Adults. In adults, elevated BLLs have resulted in:

- decreases in performance of nervous system functions²⁶
- increased blood pressure²⁷⁻²⁹
- cardiovascular disease³⁰
- anemia³¹
- impaired renal function^{32,33}
- thyroid dysfunction³⁴
- cancer³⁰
- cataracts³⁵
- reproductive problems such as decreased fertility^{36,37} and
- increases in pre-term and small for gestational age births and spontaneous abortions.³⁸⁻⁴⁰

Other groups at risk. Lead poisoning is associated with other special groups as well. Recent immigrants from certain countries frequently have elevated blood lead levels. See Report of the Committee on Lead in Consumer Products and other Exposures, at II.B and C. Lead also poses a substantial threat to pregnant women and their developing fetuses because blood lead readily crosses the placenta.¹ During pregnancy and breast feeding, when calcium requirements are high, lead can be released from a mother's bones and be transferred to the baby.¹

Trends in the reduction of childhood blood lead levels and levels of concern. Over the past 25 years, impressive progress has been made in the reduction of childhood blood lead levels mainly as the result of the elimination of lead from gasoline, paint and dietary sources.⁴¹ As a result of this elimination, median blood lead levels in US children have fallen drastically. In the 1970's more than 85% of children under the age of 6 had a blood lead level of 10 $\mu\text{g}/\text{dL}$ or higher.⁴² By the 1990's, fewer than 5% of children under the age of 6 had a blood lead level of 10 $\mu\text{g}/\text{dL}$ or higher. This reduction has been referred to as one of the greatest environmental health success stories in the country.⁴³

At the same time as lead in the blood of young children has been decreasing, studies (described below) demonstrating the adverse effects of lead at progressively lower levels have caused public health agencies to reduce the level at which the government will intervene. Figure 1 indicates the changes in the childhood blood lead level of concern since 1960.

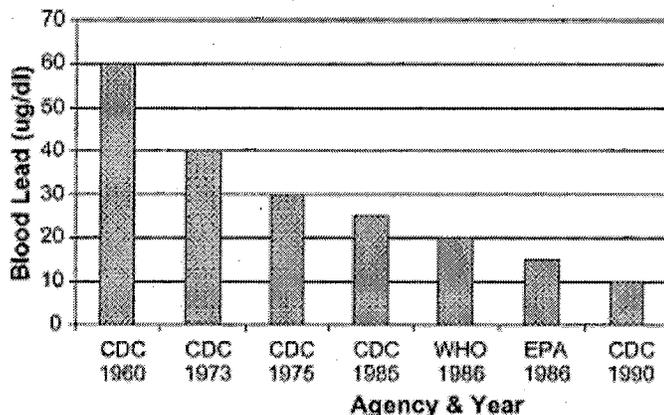


Figure 1. The gradual decline in acceptable blood lead levels in children.⁴⁴

Standards for adult workers have been decreased steadily as well: in the 1960s and 70s, the standard was 80 $\mu\text{g}/\text{dL}$; in the early 1970s OSHA proposed a standard of 60 $\mu\text{g}/\text{dL}$, and in 1978 adopted a standard of 50 $\mu\text{g}/\text{dL}$ for workers, requiring that workers be placed into a job with no exposure to lead until levels fall below 40 $\mu\text{g}/\text{dL}$.⁴⁵

Similarly, in the late 1950s, the standard for air lead levels was 200 $\mu\text{g}/\text{cubic meter}$; in 1974 OSHA proposed 150 $\mu\text{g}/\text{cubic meter}$ and shortly thereafter 100 $\mu\text{g}/\text{cubic meter}$, and in 1978 adopted a standard of 50 $\mu\text{g}/\text{cubic meter}$, requiring plants with airborne lead levels exceeding 30 $\mu\text{g}/\text{cubic meter}$ to begin monitoring blood lead levels of workers.⁴⁵

Medical research. Studies have recently demonstrated that more US children may be adversely affected by environmental lead than previously estimated.⁸ A threshold below which no adverse health effects are seen has not been identified.³ Studies have shown adverse health effects at blood lead concentrations less than 10 $\mu\text{g}/\text{dL}$, the current CDC level of concern.^{8,10,46} One 2003 article in the New England Journal of Medicine reports decreases in IQ of more than 7 points over the first 10 $\mu\text{g}/\text{dL}$ blood lead concentration and a further decline of 2 to 3 points as blood lead concentrations increase by 10 $\mu\text{g}/\text{dL}$ thereafter.⁸ Thus, not only are there adverse effects at low blood lead levels, it is now evident that the rate of decline in intellectual impairment is greatest at blood lead levels less than 10 $\mu\text{g}/\text{dL}$ (Figure 2).^{8,9,44}

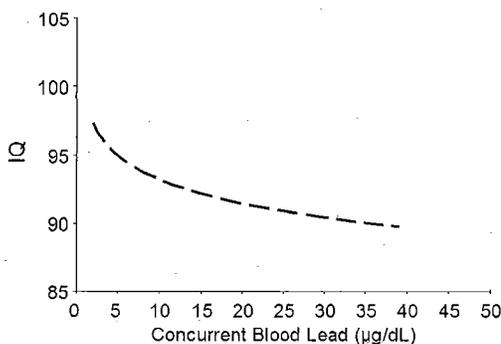


Figure 2. Relationship of Blood Lead Concentration and Children's Intellectual Function⁹

Although critics question the importance of small decrements in the IQ of individual children, these measures are thought to be blunt instruments for detecting subtle changes in brain function.⁴⁷ According to another 2003 article in the *New England Journal of Medicine*, any detectable effect occurring from a widespread exposure is cause for concern.⁴⁷

Federal perspective. At the present time these data have not been incorporated into federal policy. The Agency for Toxic Substances and Disease Registry (ATSDR) has yet to establish a minimum risk level (MRL) and the Environmental Protection Agency (EPA) has not instituted a reference dose.⁴⁴ The EPA states: "by comparison to most other environmental toxicants, the degree of uncertainty about the health effects of lead is quite low. It appears that some of these effects, particularly changes in the levels of certain blood enzymes and in aspects of children's neurobehavioral development, may occur at blood lead levels so low as to be essentially without a threshold."^{44,48} The Centers for Disease Control and Prevention (CDC) currently uses 10 $\mu\text{g}/\text{dL}$ as the blood lead concentration of concern even while acknowledging that the empirical evidence reveals adverse health effects at blood lead levels below 10 $\mu\text{g}/\text{dL}$.⁴⁹ Thus, the screening guideline of 10 $\mu\text{g}/\text{dL}$ should not be interpreted as a threshold for toxicity as no safe threshold has been identified and data are consistent with adverse effects well below 10 $\mu\text{g}/\text{dL}$.^{3,8,10}

Identification of and Interventions for Vermonters with Elevated Blood Lead Levels

Identification of Children with EBLs

Screening. The CDC recommends:

If greater than or equal to 27% of housing is pre-1950, but prevalence of children with blood lead levels greater than or equal to 10 $\mu\text{g}/\text{dL}$ is less than 12%, then universal screening should be recommended unless prevalence data are reliable and representative. If targeted screening recommended, the condition of the older housing stock should be monitored. Decline in housing should trigger universal screening. Sample universal screening recommendation: using a blood lead test, screen all children at ages 1 and 2, and screen all children from 36 – 72 months of age who have not been screened previously.

Vermont recommends:

Test all children at ages 1 and 2. The test at 2 may be omitted IF: the child is not insured by Medicaid or Dr. Dynosaur; and the child lives in housing built after 1978; and the child attends a child care in a building built after 1978.

In addition, Vermont has established a screening protocol for refugee children. All refugee children ages six months to 16 years are screened upon entry to the United States; children under six years are screened again three to six months later.

Most Vermont children who are screened for lead receive a finger-stick (capillary) screening test in the offices of their pediatrician or family doctor, or in a Public Health Clinic (WIC)

conducted in the 12 VDH district offices. Some physicians do a venous draw initially, but most do not as conducting a venous draw on a very young child is difficult to do and often traumatic for the child. New technology that will allow reliable screening with immediate results to be performed in a physician's office has just recently been approved by the U. S. Food and Drug Administration for use in more than 115,000 locations nationwide; how many of those will be accessible to Vermonters is not yet known.

Confirmation testing. Current VDH guidelines state that immediate action is required if screening results are 45 µg/dL or greater, and a confirmation test is required for all children with blood lead levels of 15 µg/dL and greater, and for all Medicaid children with BLLs of 10 µg/dL and greater. VDH staff work with families and physicians to ensure that confirmation testing is performed for children who meet those guidelines.

Vermont's Results. The Vermont Department of Health's Childhood Lead Poisoning Prevention Program (CLPPP) receives reports of all Vermont children's blood lead tests analyzed in state and private laboratories in the region. The number and percentages of Vermont children aged one through six who were tested for blood lead levels in 2004 appears in the chart below.

2004 Blood lead tests for children ages 0 to 5 years in Vermont

Age	Population	Blood Lead Levels of Children Tested						% of Population Tested
		< 5 µg/dL	5-9 µg/dL	10-14 µg/dL	15-19 µg/dL	20+ µg/dL	Total	
< 1 year	6317	338	101	12	2	0	453	7.2%
1 year	6818	3489	1332	119	39	28	5007	73.4%
2 years	6634	1430	828	75	15	14	2362	35.6%
3 years	6567	318	183	15	4	3	523	8.0%
4 years	7048	198	108	11	3	3	323	4.6%
5 years	6474	90	43	4	1	1	139	2.1%
Total	39858	5863	2595	236	64	49	8807	

Data includes only one blood lead test per child; the highest venous test result or, if there is no venous test, then the capillary test result.

Ages: < 1 year : <11 months old; 1 year: 11 - 22.99 months; 2 years: 23 - 34.99 months; 3 years: 35 - 46.99 months; 4 years: 47 - 58.99 months; 5 years: 59 - 70.99 months.

2004 Blood lead tests for children ages 0 to 5 years in Vermont by range of blood lead level

	Range of Blood Lead Level				
	≥ 0	≥ 5 µg/dL	≥ 10 µg/dL	≥ 15 µg/dL	≥ 20 µg/dL
# Children Tested at a BLL or Greater	8807	2944	349	113	49
% of Children Tested	100%	33.4%	4.0%	1.3%	0.6%

Unfortunately, more than 38% children who receive screening results greater than or equal to 10 µg/dL did not receive a confirmation test in 2004. Persons involved in lead prevention believe the reasons for this failure include the physicians' and/or parents' misperception that levels below 15 or 20 µg/dL are not important, the discomfort of a child receiving a venous blood draw, and the financial and other costs associated with making and keeping an appointment for a follow-up medical visit.

Interventions for Vermont Children with EBLLs: The CLPP Program

The primary purpose of Vermont's Childhood Lead Poisoning Prevention Program (CLPPP) is to eliminate childhood lead poisoning by focusing on reducing or eliminating sources of lead, testing and surveillance, and case management. To accomplish this, CLPPP provides community education, awards grants to regional lead programs, works with the medical community to improve rates of screening and confirmation testing, provides work plans and other services to reduce or eliminate sources of lead exposure, and manages cases involving children with blood lead levels of 10 $\mu\text{g}/\text{dL}$ and above. For a description of current actions taken in response to specific ranges of EBLLs, *see* Appendix C.

Staffing. CLPPP has four full-time staff members—a program coordinator, surveillance specialist, investigator/case manager, and lead education specialist. Staff dedicated part time to the program include: the environmental health program chief, a public health analyst, an administrative staff member who fields lead hotline calls, and an administrative assistant focused on EMP compliance. In addition, each VDH district office has a lead designee who has 5 hours per week allotted to carry out lead education activities locally, monitor local blood lead screenings of children, and ensure confirmation testing. The total combined statewide FTEs of CLPPP are 6.8.

Prevention. CLPPP conducts a host of prevention activities including but not limited to: monitoring and enforcing compliance with the Vermont Lead Law; developing and distributing education materials; and designing and implementing initiatives to reach at risk populations.

Surveillance System. Under the current lead law all blood lead tests performed on Vermont children must be reported to VDH. CLPPP receives reports of all Vermont children's blood lead test results analyzed in private laboratories in the region and in state laboratories in Massachusetts, New Hampshire, New York and Vermont. A database of all child blood lead test results is maintained by the program. The data is analyzed by VDH to monitor trends in elevations, testing and confirmation.

Case Management. CLPPP has one person to conduct lead investigations of severely poisoned children (20 $\mu\text{g}/\text{dL}$ or greater, confirmed by a venous draw) and to provide case management services for all children with test results of 10 $\mu\text{g}/\text{dL}$ and above. The case manager provides services to reduce exposure at the child's home or day care facility, and to ensure that children with elevated blood lead levels receive necessary medical follow-up. The types of services and the degree of urgency accorded depends upon the blood lead level.

Upon receiving a report of an elevated blood lead level, the case manager contacts the child's family, sends educational materials, and, if the level is 10 $\mu\text{g}/\text{dL}$ or above, works to ensure that the child receives a confirmation test. The case manager monitors the case until the child's blood lead level drops below 10 $\mu\text{g}/\text{dL}$. In these efforts, the case manager routinely works with the lead designees at the 12 VDH district offices to ensure confirmation tests are performed and makes referrals for follow-up services to the Family, Infant & Toddler Program (FITP) in Vermont's Department for Children and Families.

Services connected to the site of possible exposure run from providing educational materials by mail, to conducting a site investigation, including water, soil, and dust sampling and testing

lead levels throughout the child's home. A survey completed with parents or guardians during the investigation includes questions about non-paint sources of lead such as hobbies (e.g. making stain glass), sports (e.g. target shooting), and product usage (e.g. pottery for food storage).

After receiving the test results from a site visit, the case manager develops a work plan, setting out specific steps the landlord or homeowner must or should take to reduce exposure to lead at the site. At this time, Vermont's law on essential maintenance practices (EMPs) applies only to landlords. Recommendations for landlords include action steps and deadlines and inspection of the site to pass a clearance test conducted by the case manager upon completion of the action steps. Generally, the case manager is able to garner voluntary compliance from landlords; homeowners are not obliged by law to complete the work plan.

Identification and Interventions for Vermont Adults with EBLs

Under current Vermont law, doctors and laboratories are not required to notify VOSHA or VDH when an adult has a BLL, or even when the BLL of an employed adult reaches 50 $\mu\text{g}/\text{dL}$ (the level at which an employee must be removed from work). Although both agencies occasionally refer a poisoned adult to the other, there is no system of sharing information to prevent, detect, or manage elevated blood lead levels of adults in Vermont. Thus, VOSHA does not routinely notify VDH of any employer or worksite that has been identified as a potential source of occupational exposure, and VDH does not have a system for forwarding information or complaints to VOSHA to assist in compliance and education of employers.

Recommendations

The Identification and Interventions Committee identified 4 goals under which its recommendations fall.

1. Ensure that all Vermonters with lead poisoning are identified.
2. Raise awareness that no level of lead in blood is a safe level.
3. Ensure that effects of an elevated blood lead level are minimized.
4. Eliminate exposure to lead.

Following are the recommendations of the Identification and Interventions Committee under these four goals. In those instances in which the Committee felt an explanation of a recommendation would be useful, an explanation appears in italics immediately after the recommendation.

Many of the following recommendations should be adopted immediately – indeed, some have been implemented by the Vermont Department of Health during the course of this initiative. Others would require an infusion of new and substantial resources. In an effort to come up with the best solutions possible to the problems identified, the Committee strove to ignore the cost of any given solution during discussions. In that way, we as a state can make knowing choices between what should be done and what will be done.

Goal 1: Ensure that all Vermonters with lead poisoning are identified.

Recommendations regarding identification of children

- a. State should require universal screening of blood lead levels for children who are one and two years old, and for all children 36 to 72 months old who have not been previously tested.

This is the Committee's interpretation of the CDC recommendation. The Committee considered but declined to recommend that Vermont consider a system of targeted screening i.e. screening only of children who live in areas with substantial pre-1978 housing. Targeted screening has been adopted in some areas of the country that have very little pre-1978 housing. In contrast, Vermont has a high proportion of older housing, that housing is highly intermingled with newer housing, and Vermonters often recycle components of older housing into new housing, all of which make targeted screening ill-advised according to current data. Additionally, exposure to non-housing sources of lead found in most households (e.g. keys) has been identified as a source of lead poisoning, making it difficult to establish criteria for targeted screening. Of course, Vermont should regularly review its standards in accordance with Vermont and national data.

- b. State should eliminate any distinction between Medicaid and non-Medicaid recipients when setting requirements for screening and confirming elevated BLLs.

At this point in time, Vermont distinguishes between children who are on Medicaid and those who are not, by recommending universal screening of all children who are one year old, and of all children who are two years old who are on Medicaid or Dr. Dynosaur. The Committee believes that the distinction should be eliminated because it (1) does not serve children well since two year olds are the most likely to engage in the hand-to-mouth activities that lead to lead poisoning, and (2) is confusing for health care providers. Also, with universal screening, the current screening questionnaire can be eliminated.

- c. Depending on the Vermont data, after sufficient time with universal screening of one and two year old children, and on the CDC data on screening of three year olds nationally, Vermont should consider whether to require universal screening for three year old children.

Massachusetts has had universal screening for three year olds for many years; the Massachusetts CLPPP director reports that 10% of their new cases concern three year olds.

- d. VDH should recommend that doctors and patients obtain a confirmation test after a screening test indicates a BLL of 10 µg/dL or above within the below time frame:

BLL	Recommended Time for Confirmation
5-9 µg/dL	None required
10-19 µg/dL	Within 2 weeks
20-39 µg/dL	Within 1 week
40+ µg/dL	Within 48 hours

The Committee does not recommend that a second capillary test be deemed a confirmation test because capillary tests are more prone to contamination and more likely to produce inaccurate high BLLs.

The Committee considered the experience of other jurisdictions allowing for a second capillary test to be a confirmation of an EBLL, but without regard to possible problems getting Medicaid reimbursement, declined to adopt that standard.

There is no new medical technology on the horizon that is likely to make venous testing unnecessary for confirmations in the near future. Evidence based research indicates that hair, saliva, and urine test results are too inconsistent to be useful for screening or confirming EBLs. In addition, the CDC does not recommend relying on such tests for screening or confirming EBLs.

However, it is hard to take a venous blood sample from a small child, often requiring two skilled people to complete the test. Because contaminated capillary tests are likely to be higher than 9 µg/dL, the Committee does not recommend requiring a venous confirmation test for a BLL between 5 and 9 µg/dL.

Typically a venous test is conducted in a laboratory. Many parents with children with BLLs of 10 to 14 µg/dL do not get a venous confirmation test. The Committee discussed, and rejected as impractical or ill advised, a number of approaches to increasing confirmation testing, including having local health nurses do the venous test during a home visit and funding transportation to the lab for low income families.

In order to support decision-making by the patient, family and physician, and to maximize use of possible insurance coverage, the Committee also rejected the idea of VDH having a Standing Order from health care providers to allow labs to take a venous test and analyze samples at the request of VDH rather than at the request of a physician.

The only idea that seemed practical for increasing confirmation testing is that VDH district offices should work more closely with primary care providers to make sure that confirmation and follow up testing is done.

- e. VDH should retain or expand current programs for:
 - Screening special groups of adults and children (e.g. refugees, lead abatement workers, plumbers, and others with risk factors such as risky hobbies or a lot of hand/mouth activity);
 - Testing in public health clinics where WIC services are provided; and
 - Providing a WIC presence in pediatric offices.

Recommendations regarding identification of adults

- f. State should require health care providers and laboratories to report BLLs of adults to VDH.

- g. VDH should establish an adult blood lead surveillance system.
- h. VDH, given the necessary resources, should develop protocols for responding to elevated blood lead levels in adults whose BLL is greater than or equal to $25\mu\text{g/dL}$ (the trigger level set by CDC) or a more protective level set by VDH.
- i. Doctors should be required to notify VOSHA when the BLL of an employed adult reaches $50\mu\text{g/dL}$ (the level at which an employee must be removed from work) or a more protective level set by VDH or VOSHA.
- j. VDH and VOSHA should collaborate to prevent, detect, and manage elevated blood lead levels in Vermont. VOSHA should notify VDH of any employer or worksite that has been identified as a potential source of occupational exposure. VDH should forward information and complaints to VOSHA to assist in compliance and education of employers. Information and complaints should include but not be limited to:
- Notification of any adult blood lead level above the threshold of concern that potentially is associated with occupational exposure, including the name of the employer and the range of the blood lead level (i.e. $10\text{-}14\mu\text{g/dL}$) of an employee, without releasing the name of the employee;
 - Complaints received by VDH of unsafe work practices carried out by contractors or companies;
 - Name of parent's employers and child's blood lead range when occupational take home lead has been identified through case management as the potential source of lead that poisoned a child;
 - Name of parent's employer when a parent reports that they work in an industry exposed to lead hazards but have not received education and warnings about lead poisoning;
 - Epidemiological data on clusters of lead-poisoned individuals in geographic areas surrounding a lead utilizing industry; and
 - Reports of employers who lack appropriate monitoring of employee blood lead levels in regulated industries.

Other recommendations to enhance identification

- k. VDH, with local doctors preferably on the Board of the Vermont Chapter of the American Academy of Pediatrics or the Board of the Vermont Chapter of the American Academy of Family Physicians, should conduct regional grand rounds with pediatricians and family doctors, and/or should visit individual practices, to discuss the research on the health effects of lead poisoning and the need for universal screening.
- Many doctors have not been made aware of the recent research on the health effects of lead. Consequently, supplemental programs are needed. VDH is developing a power point presentation of the research to use for presentations.*
- l. VDH and the medical community should take steps to encourage medical and nursing schools to increase curriculum devoted to environmental health, and particularly the seriousness of lead poisoning.

- m. VDH should annually provide screening and confirmation data to health care providers by appropriate geographic area.
- n. State should require childcare providers (and their child health care consultants if they are required to have one) to ask parents for the dates the child was tested for blood lead level to determine whether a child under 72 months has ever been tested.
- o. For any child up to age six who has never been tested for lead, schools should encourage lead testing.
The CDC standard is for testing up to 6 years of age.
- p. State should include lead testing data in the immunization registry so that providers have ready access to lead test results. Once that is done, the State should require child care providers and schools to check the registry when enrolling a child in order to have that information when providing care or educational services.
No child should be excluded from a childcare facility or from school on the basis of not having had lead screening, but enrollment appears to be a good opportunity to educate parents and professionals about the risks of lead poisoning.
- q. On an annual basis, VDH should provide the Home Study Consultant of the Department of Education with information regarding the importance of lead screening so that that information can be included in the annual newsletter sent to homeschoolers in February.
- r. Through pilot projects, VDH should support government-approved new technologies to test BLLs, e.g. new testing equipment which produces immediate results.

Goal 2: Raise awareness that no level of lead in blood is a safe level.

Recommendations regarding education

- a. State should reduce the trigger for action by VDH from 10 µg/dL to 5 µg/dL.
The Committee makes this recommendation based on recent research of the health effects of lead poisoning to increase the likelihood that Vermonters will understand that no level of lead in blood is safe. Because of the serious consequences of lead poisoning even at low levels, the Committee makes this recommendation despite the fact that CDC has set its trigger for action at 10 µg/dL and no state to date has gone below that level.

This reduction in the trigger level will result in approximately 2,500 new cases in Vermont per year, plus the approximately 300 cases per year with the level greater than or equal to 10 µg/dL. However the recommendations for what action should be taken by VDH will not increase the workload of the case manager. See recommendations associated with Goal 3.

The Committee does not recommend that the trigger be set below 5 µg/dL because the laboratories have a high level of confidence in the test results only at 5 µg/dL and above. The Committee recommends that as laboratory testing advances, this trigger level should be reviewed and lowered. The Committee decided not to

recommend that the trigger be set at different levels depending on the age of the person tested.

- b. VDH's annual report to the Vermont Legislature on lead activities, which should be posted on a revised VDH website, should include:
- Information regarding the screening and confirmation rates by county or larger population centers;
 - Results of interventions, including the mean and median BLL levels, the number of homes investigated, the number of homes remediated, and other evaluative measures; and
 - Activities and recommendations of the Lead Poisoning Prevention Committee.
- c. State and partners should expand VDH's statewide campaign to educate the public about lead, including:
- Risks of renovation;
 - Risks for pregnant women and lactating women;
 - Information on how to prevent or minimize lead exposure, including more information on nutrition; and
 - Information on what to do about elevated blood lead levels.

An ad hoc Committee of VDH staff and partners should be formed to develop the details of the campaign, including review of a variety of opportunities for providing education such as English as a Second Language programs, the Vermont Cooperative Extension Services, work/training programs, Basic Essential Education programs.

In particular, the campaign should include recommendations for providing information regarding lead approximately eight weeks after a child is born, and ideas for how children of illegal immigrants and guest workers can be protected.

The cost of a comprehensive statewide media campaign is estimated to be \$350,000 or more annually.

At this time, information on the risks of lead during pregnancy and appropriate testing, is limited to nutritional and environmental (primarily risks of housing renovation) information. During the winter of 2007, the CDC is expected to issue recommendations providing guidance to health clinicians on when to test pregnant and lactating women, and what to do with the test results.

Currently, VDH provides parents of children in high risk areas with information on the risks of lead when their children are 6 to 9 months old and 9 to 12 months old; the Committee recommends that all parents get this information, and get it not at birth when parents deal with a barrage of new information, but sometime before the child is six months old.

- d. VDH should provide educational information on lead poisoning to parents or guardians of children with a screening test indicating BLLs of 5 $\mu\text{g}/\text{dL}$ or greater, and to adults with a screening test of 25 $\mu\text{g}/\text{dL}$ or greater, or above a lower level of concern established by VDH.

- e. VDH should expand the Tool Kit to include (1) criteria or “red flags” for when older children and adults should be tested for lead poisoning, and (2) model letters for doctors to use when sending screening test results to patients; the letters should be different for different levels of BLLs, and different depending on whether the results concern a child or an adult. The red flags and model letters should be available on the VDH website as well.
- f. VDH, in collaboration with the American Academy of Pediatrics and the American Academy of Family Physicians, should ensure that clinicians receive information on recalled consumer products.
 - Pediatricians should be getting this information from national AAP already. However, approximately 50% of Vermont children are seen by family practitioners rather than pediatricians, so both groups need to be included in all collaborative and information sharing activities.*

Goal 3: Ensure that effects of an elevated blood lead level are minimized.

Recommendations regarding interventions for children and adults

- a. VDH should expand clinical and environmental interventions depending on the degree of elevation of the blood lead level and the results of environmental testing. For children this should include, but may not be limited to:

BLL	Recommended Action
5-9 µg/dL	<ul style="list-style-type: none"> • Mail educational materials on how to reduce lead exposure • Offer a phone/educational consultation in mailed educational packet • If high risk is determined during phone consultation, offer home visit with sampling • If two consecutive blood lead results of 5-9 µg/dL, at least 3 months but no more than 12 months apart, pursue a home visit • Monitor retesting • Require property owners to come into compliance with the Vermont Lead Law
≥ 10 µg/dL	<ul style="list-style-type: none"> • If not confirmed within 1 month, call parent/guardian for educational phone visit • Mail educational material if not confirmed

All case management services including home visits and environmental testing should continue to be provided to families with a child with a confirmation test of 10 µg/dL or above.

Since April 2006, VDH has conducted home visits when a confirmation test is 10 µg/dL or above; prior to that time, visits were available only with confirmation tests at 15 µg/dL or above. Appendix C shows the current actions taken by VDH in response to specific ranges of EBLLs.

The Committee considered whether home visits should be provided for families in which a member has a BLL of 5 to 9 µg/dL, but rejected that expenditure of resources to low EBLLs, in favor of activities directed at reducing or eliminating sources of lead. See Recommendation 3d below.

VDH should develop a program for adults utilizing information from Massachusetts and other states with lead intervention programs for adults.

- b. VDH should update the risk assessment survey taking into account information contained in the report of the Committee on Consumer Products and Other Exposures.

- c. If resources permit, VDH should provide environmental sampling kits to all residents of homes in which a child has a BLL between 5 and 9 $\mu\text{g}/\text{dL}$.

A study in Cincinnati indicates that dust sampling done by laypersons can be effective. This would provide a method of finding out whether a home continues to be contaminated after the resident takes steps to eliminate dust containing lead without the need for a home visit by a VDH case manager. At \$25/kit, the cost of this program statewide just for dust wipes would be approximately \$50,000 per year.

- d. VDH case manager should issue work plans for both owner-occupied and rental properties in which a VDH case manager has conducted an investigation.

With a standard of 20 $\mu\text{g}/\text{dL}$ or above, 41% of EBLs in Vermont occur in owner-occupied housing, 59% in rental housing (2000 to 2005).

Massachusetts mandates abatement, including having a family move out during the abatement process, for all housing, whether owner occupied or a rental unit, when a household member has had an EBL of 25 $\mu\text{g}/\text{dL}$ or above; there are ongoing efforts in Massachusetts to reduce the trigger level.

One question that was never fully discussed or answered by the Identifications and Interventions Committee was whether the State should be able to bring an enforcement action against owners of owner-occupied properties who fail to complete a work plan issued by the VDH case manager, and what due process protections should be in place were the State to have that authority.

- e. VDH and AGO should promote legislation amending authority of VDH case manager to provide for mandatory compliance with work plans for both owner-occupied and rental properties at all elevated blood lead levels, rather than the current limited authority according to VDH to issue work plans calling for voluntary compliance.

This change would increase the protection of all Vermont children whether in owner occupied or rental housing. This would decrease the work load of the case manager with regards to landlords because under the current system an inordinate amount of time and energy is expended trying to get landlords to meet their obligations under the law.

- f. The VDH case manager should refer families with children ages zero to three years with EBLs to their community partner, Family Infant Toddler Program (FITP), for assessment and appropriate interventions.

- g. VDH should encourage FITP to lower the level for eligibility for services to 5 $\mu\text{g}/\text{dL}$, resources permitting.

FITP now does follow-up on a referral of an EBL of 20 $\mu\text{g}/\text{dL}$ or above.

Other recommendations to enhance interventions:

- h. State should provide VDH with sufficient resources to conduct investigations locally as the Department determines is necessary. At least one staff person in each district office should receive training sufficient to become a licensed lead risk assessor; because this is time-consuming training, this recommendation could be phased in starting with those offices with the highest prevalence of EBLs.

Training for environmental testing takes a week, requires licensing, and requires periodic refresher courses. However, a home visit by a district office staff member who is trained specifically to assess risk of lead poisoning and to provide information on lead poisoning prevention would create a more localized and comprehensive educational outreach program than is possible now with district office staff. An increase in the number of personnel hours would be required up from 5 hours per week per district office to as many as 40 hours per week per district office.

- i. State should make training for risk assessors and lead inspectors available to health officers in communities that have the will and resources to train their health officers.
- j. VDH should use public health students from Dartmouth Medical School, or some other source of reliable, non-staff time, to evaluate the effectiveness of the educational materials and home visits conducted by VDH staff, including how educational materials were utilized, what follow up actions the families took to minimize lead exposure, and whether referrals to Family Infant Toddler Programs were followed.
- k. Health care providers who conduct screening and confirmation tests for lead should be required to provide to the laboratory analyzing the sample the address of the person tested and the name and address of the provider; labs should be required to provide the same to VDH when reporting screening and confirmation test results.

This information will be easier to provide once the system of electronic lab reports is in place, but should be provided manually until that time to provide better surveillance information and to save significant time for the VDH case manager.
- l. The American Academy of Pediatrics should assemble a group of medical professionals to make recommendations regarding chelation and other medical treatment by July 1, 2007.
- m. Schools should create a follow-up plan for any child who has had an EBL as a younger child.

Goal 4: Eliminate exposure to lead.

Recommendations regarding prevention

- a. VDH and the Attorney General's Office (AGO) should pursue enforcement of violations of Vermont's lead law, 18 V.S.A. Chapter 38. In particular, VDH and AGO should review all violations of Vermont's lead law periodically to determine which cases should be handled by VDH and which by AGO. The outcome of individual actions of enforcement should be publicized through press releases which should be posted on the AGO and VDH websites.

- b. Vermont's lead law should be strengthened by adding fixed penalties for violations of the various requirements of the law, such as performing essential maintenance practices, filing an affidavit as to essential maintenance practices, conducting renovations in a lead safe manner, and completing work plans required by a VDH case manager. These penalties should increase in amount depending on the severity of the violations, the recalcitrance of the landlord or homeowner, and whether a child has had an EBLL and the degree of elevation, and should be reviewed periodically for possible enhancement.
- c. VDH should create the Lead Poisoning Prevention Committee to review and aid in the creation of state policies and programs regarding lead prevention. In particular, the committee could provide input on decisions of the State and community partners which draws upon the expertise of its members, such as how to obtain information with which to build the database, how to provide for electronic filing of EMP affidavits, how to create a program for certification of "lead safe" and "lead free," and whether the reimbursement levels for health care providers who screen and provide treatment for persons with EBLLs are fair. At a minimum, the committee should twice annually review the recommendations contained in the reports of this initiative to determine the extent to which the recommendations have been executed, deferred or rejected.

The Identification and Interventions Committee heard anecdotally that health care providers are not paid fair compensation for their lead prevention, testing and treatment services, and have difficulty being paid through insurance, whether Medicaid or private insurance. The Committee was unable to obtain hard data on this from either health care providers or state insurance regulators, and so refers consideration of this concern to the Lead Poisoning Prevention Committee.

- d. VDH should create a database containing at least the following information:
- Address of housing in which environmental testing indicates lead contamination, whether or not any person has had an EBLL at that housing;
 - Address of property and date range on construction;
 - Whether property is owner occupied or rented;
 - EMP affidavits on file;
 - Environmental test results;
 - Abatement activities;
 - Whether property is certified lead safe or lead free; and
 - EBLLs of adults and children, with address of home and work.
- e. The VDH website should include a notice that information regarding a particular piece of property, if available, may be obtained from VDH and provide a phone number or email address to obtain the information. Should the number of such requests become burdensome to VDH, VDH could make the information available on line.

VDH should continue to track the address and blood lead level of all housing in which a member has been tested for blood lead level.

Massachusetts has a "Lead Safe Homes Registry" which is available online and covers both owner occupied and rental housing.

- f. The State should develop a mechanism for reporting housing data to VDH through property tax records or another system.

- g. State should give VDH authority to obtain environmental testing data from property owners to determine the extent of lead contamination.

At a joint meeting of the Housing and Identification and Interventions Committees, the idea that all environmental test results should be sent to VDH was rejected at this time as burdensome and potentially having the effect of some property owners declining to test their properties when they otherwise would test. The Committees decided, however, that if the information is not going to go to VDH automatically, VDH needs to be able to obtain it.

The Identification and Interventions Committee is not entirely comfortable with rejecting the reporting of environmental testing and recommends that the Lead Poisoning Prevention Committee consider it further in the future.

- h. After determining, based on epidemiological risks, how to allocate limited resources as they become available, VDH should create an “environmental testing campaign,” offering home visits and environmental testing of housing with children six and under, and providing, on a fee or sliding scale basis, sampling kits for families to do their own environmental sampling in their homes. In particular, if resources permit, VDH should provide environmental sampling kits to all residents of homes with a child under age six which are located in high risk areas as defined by VDH.
- i. VDH should require that landlords, at their own expense, who have units in which an EBLL has been found in the past, have dust sampling of units on an annual basis done by a licensed and certified inspector (or, in some instances, less often depending on the interventions required). VDH should include the required timing of sampling in the final letter from the case manager after the interventions have been completed and verified by the case manager.
- j. In order to maintain “lead safe” status, homeowners should have to have their homes tested by a licensed and certified inspector on an established timeline.
- k. With additional resources, the State should promote abatement or partial abatement of contaminated housing, especially housing with children, rather than relying on essential maintenance practices to minimize future exposure to lead.
- l. Lead should be added to the list of topics covered in the existing meetings concerning environmental health issues attended by VDH and the Department of Environmental Conservation at the Agency of Natural Resources.

Endnotes

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Identification and Interventions Committee Participants List

No assumption of endorsement of the proposals in the report can be made by the appearance of a name on this list. The following persons participated in the initiative in a variety of manners: by regularly or occasionally attending committee meetings, by participating in discussions by email, by monitoring the work of a committee by email, by providing information or expertise, or by expressing opposition to proposals.

Bolt, Mary Lou	Vermont Department of Health, Rutland District Office
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Costantino, Bob	Vermont Department of Children and Families
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Glossary

1. “Blood lead level” or “ BLL” means the level of lead in blood as measured by micrograms per deciliter ($\mu\text{g}/\text{dL}$).
2. “Confirmation test” means a venous blood test performed to confirm an elevated blood lead level.
3. “Elevated blood lead level (EBLL)” means a blood lead level of $10 \mu\text{g}/\text{dL}$ or above, or any lower level set by the Commissioner of Health in the future. Although there is no safe level of lead, this will be the level that will trigger action by the Vermont Department of Health (VDH). *See Recommendation 2a.* As new technology for testing blood lead levels and research on the effects from lead become available lowering this threshold of action should be evaluated.
4. “EMPs” means essential maintenance practices, i.e. maintenance, remodeling and cleaning practices to reduce the likelihood that young children would be exposed to lead hazards, as defined in 18 V.S.A. § 1759 and regulations promulgated thereunder.
5. “Environmental testing” means testing of dust, soil, paint, water, and any new tests that are developed to determine the presence of lead in the environment.
6. “Abatement” means either complete removal of all architectural components with lead-based paint or covering such components in a manner that insures the lead-based paint will not be accessible under normal conditions for at least 20 years. Any such work is not considered completed until a final cleaning has been conducted and a certified lead inspector or risk assessor completes a clearance examination and determines the property to be safe.
7. “Lead poisoned” was never defined by the Identification and Interventions Committee for purposes of this report, although the Committee has consistently maintained that there is no safe level of level of lead in blood and that the threshold for action should be lowered from the current thresholds. (Under current Vermont law, “lead poisoning” means “a confirmed blood lead level in a child six years of age or younger greater than or equal to ten micrograms of lead per deciliter of whole blood, unless the commissioner finds by rule that a higher or lower concentration is necessary to protect public health;” “severely lead-poisoned” means a confirmed venous blood lead level in a child six years of age or younger that is greater than or equal to 20 micrograms of lead per deciliter of whole blood or as defined by the commissioner.” 18 V.S.A. Sec 1751(16) and (22).)
8. “Screening test” means a capillary (stick) or venous blood test performed to determine whether a patient has an elevated blood lead level.
9. “Provider Toolkit” means the “Provider’s Toolkit of Health Screening Recommendations for Children and Adolescents,” which is a resource of best practice recommendations distributed to all Vermont health care providers whose practices include children and adolescents. It is intended to support and augment the work with the Periodicity Schedule which was

developed following a comprehensive review of current preventive health recommendations, EPSDT requirements, and related state and school health regulations and policies.

10. "Reference dose" or "RfD" is a numerical estimate of a daily oral exposure to the human population, including sensitive subgroups such as children, that is not likely to cause harmful effects during a lifetime. RfDs are generally used for health effects that are thought to have a threshold or low dose limit for producing effects.

Vermont Department of Health Action Following a Reported Elevated Blood Lead Level	
EBL 10-19	<p>Capillary</p> <ul style="list-style-type: none"> ◆ Work with primary care provider (PCP) and family to ensure confirmation within 2 weeks ◆ Contact parents at least twice via phone and once in writing if confirmatory levels are not obtained ◆ If not confirmed within 1 month, call parent/guardian for educational phone visit, complete lead survey, and mail lead information as necessary ◆ If parents can not be reached by phone, mail lead information and lead survey form <p>Venous</p> <ul style="list-style-type: none"> ◆ Make home visit, providing lead information and doing dust wipes and soil and water sampling ◆ Written report to property owner and parent ◆ Require landlord to come into compliance with Essential Maintenance Practices and case management work plan ◆ If two consecutive venous results of 15-19µg/dL, at least 3 months but no more than twelve months apart, conduct full environmental investigation ◆ Monitor retesting and provide continuous reminders for retest until level falls below 10µg/dL
20-44	<p>Capillary</p> <ul style="list-style-type: none"> ◆ Work with PCP and family to ensure confirmation within 1 week ◆ Contact parents at least twice via phone and once in writing if confirmatory levels are not obtained <p>Venous Confirmation</p> <ul style="list-style-type: none"> ◆ Provide lead educational materials ◆ Conduct full environmental investigation ◆ Written report to property owner and parent ◆ Require landlord to make changes if rental housing ◆ Monitor retesting and provide continuous reminders for retest until level falls below 10µg/dL
45+	<p>Capillary</p> <ul style="list-style-type: none"> ◆ Work with PCP and family to ensure confirmation within 24 – 48 hours ◆ Contact parents at least twice via phone and once in writing if confirmatory levels are not obtained ◆ Track sample to lab and ensure immediate processing <p>Venous Confirmation</p> <ul style="list-style-type: none"> ◆ Refer family's primary care provider to Wendy Davis, MD and coordinate activities with her ◆ Provide lead educational materials ◆ Conduct full environmental investigation within 24 hours ◆ Written report to property owner and parent ◆ Require landlord to make changes if rental housing, or help ensure that family gets into lead-safe housing ◆ Work with family, PCP, and other services more closely ◆ Monitor retesting and provide continuous reminders for retest until level falls below 10µg/dL
70+	<p>Capillary</p> <ul style="list-style-type: none"> ◆ Work with PCP and family to ensure confirmation immediately as an emergency test ◆ Track sample to lab and ensure immediate processing <p>Venous</p> <ul style="list-style-type: none"> ◆ Same as 45+µg/dL