MARYLAND DEPARTMENT OF THE ENVIRONMENT

Lead Poisoning Prevention Program

Childhood Blood Lead Surveillance in Maryland

2004 Annual Report

September 2005

MARYLAND CHILDHOOD LEAD REGISTRY

2004 ANNUAL SURVEILLANCE REPORT

EXECUTIVE SUMMARY

The Maryland Department of the Environment's statewide Childhood Lead Registry (CLR) performs childhood blood lead surveillance for Maryland. The CLR receives the reports of all blood lead tests done on Maryland children 0 - 18 years of age, and provides blood lead test results to local health departments as needed for case management and planning.

Since 1995, the registry has released a comprehensive annual report on statewide childhood blood lead testing. This current report presents the childhood blood lead test results for calendar year 2004 (CY 2004). All numbers are based on blood lead testing on children. The CLR does not receive any reports on lead screening based on the lead risk assessment questionnaire.

CY 2004 Surveillance Highlights:

- Baltimore City had the highest level of lead testing (35.9%), followed by Caroline County (33.4%), and Somerset County (31.6%).

- Because of improvement in address information, the Registry will no longer use provider's zip code address to assign child's county of residence.

- Data management system improved. The Childhood Lead Registry is maintained in the "Systematic Tracking of Elevated Lead Levels and Remediation" (STELLAR) surveillance system, obtained from Centers for Disease Control (CDC) Lead Poisoning Prevention Program. More CLR staff work occurred this year on quality control and assurance activities to improve data quality and timeliness. More than 90% of blood lead tests were reported to registry electronically. Electronic updates are now regularly provided to the Department of Health and Mental Hygiene (DHMH) and local health departments.

- The number of children tested showed a significant increase statewide (from 76,721 to 105,549.

- The number of children with elevated blood leads in 2004 increased, but the rate of EBL continued to decline compared to 2003. The number of children with blood lead levels above 10 μg/dL, CDC's level of concern, increased to 1,811 or 1.7 % of children tested statewide from 1,719 but declined on a proportionate basis from 2.2% in 2003. Children with blood lead levels of 20 μg/dL and above, or "significant elevations", decreased to 230 from 237 and the percentage decreased to 0.2% from 0.3% of children tested statewide.

OVERVIEW

LEAD POISONING IN MARYLAND

Lead is one of the most significant and widespread environmental hazards for children in Maryland. Children are at the greatest risk from birth to age six while their neurological systems are being developed. Exposure to lead can cause long-term neurological damage that may be associated with learning and behavioral problems and with lowered intelligence.

There has been a steady decline in childhood lead poisoning in Maryland over the past decade at all levels of exposure. The reduction has occurred both statewide (Figure One) and in areas of highest risk such as Baltimore City.

Sources of Childhood Lead Exposure

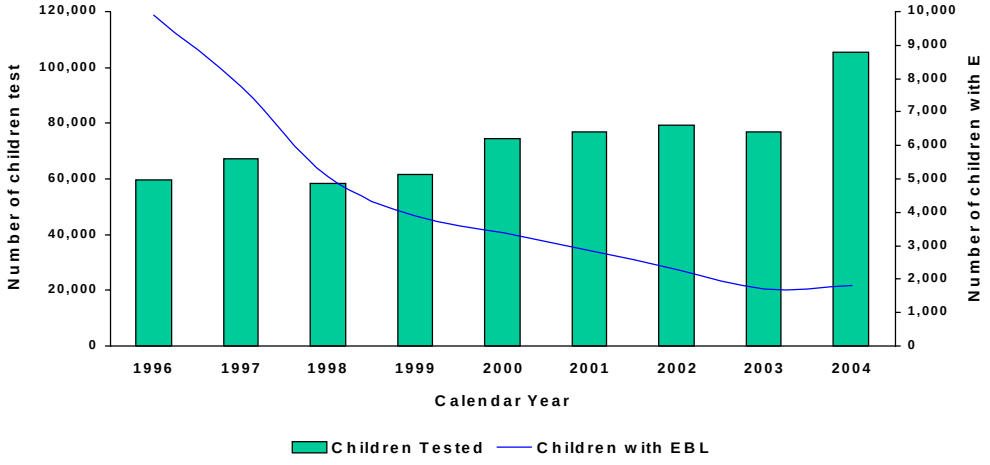
Lead paint dust from deteriorated lead paint or from renovation is the major source of exposure for children in Maryland. According to the US 2000 census, there are about 439,000 residential houses built before 1950 (95% likely to contain lead paint) and 692,000 houses built between 1950-1978 (75% likely to have lead paint.

Water, air, and soil, may provide low-level, "background" exposure, but rarely may cause childhood lead poisoning.

Imported products, parental occupations, hobbies, and imported traditional medicines occasionally may cause lead exposure among children.

Figure One

Number of Children 0-72 Months Tested for Lead and Number Reported to Have Elevated Blood Lead (EBL*): 1996-2004



* Blood lead level >=10 µg/dL

Much of the decline in blood lead levels is the result of lead poisoning prevention efforts. Increased enforcement of Maryland's "Reduction of Lead Risk in Housing" law (Table One), increased awareness by parents and property owners of the hazards of lead poisoning, and improved maintenance of rental housing.

Table One
Number of Certificates Issued for Pre-1950 Residential Rental Properties

Calendar Year	Number of Certificates
1996	6,349
1997	14,045
1998	11,914
1999	11,320
2000	11,157
2001[1]	19,349
2002	13,972
2003	12,517
2004[2]	17,949

Source: Maryland Department of the Environment, Lead Poisoning Prevention Program, Enforcement Division

1. The "Reduction of Lead Risk in Housing" law requires each pre-1950 rental dwelling to be issued a Full Risk Reduction certificate at turnover. In 2001, at least 50% of the owner's affected properties were required to be in compliance with the Full Risk Reduction Standard. 100% compliance is required in 2006.
2. Effective October 1, 2004, the law requires rent court Judges and local housing registry officials to not accept cases and applications from pre-1950 rental property owners who can not present lead certificates that indicate that their rental properties are in compliance with the Reduction of Lead Risk in Housing law.

Other factors contributing to the decline of blood lead levels are the movement of families away from older housing into more recently built city or suburban housing (Table Two), and outreach and education to families and health care providers.

Table Two
Percent Of Vacancy Of Housing Units

	1990		2000	
Statewide	**Total Units**	**Percent Vacant**	**Total Units**	**Percent Vacant**
1980+	408,082	9.7	727,020	6.6
1950-1979	1,009,851	6.2	979,083	7.1
Pre-1950	473,984	8.5	439,180	10.7
Baltimore City				
1980+	16,171	10.4	21,662	7.7
1950-1979	105,883	6.5	113,928	13.9
Pre-1950	181,652	10.3	164,887	15.1

Source: US Census Bureau, census of housing and population 1990, 2000.

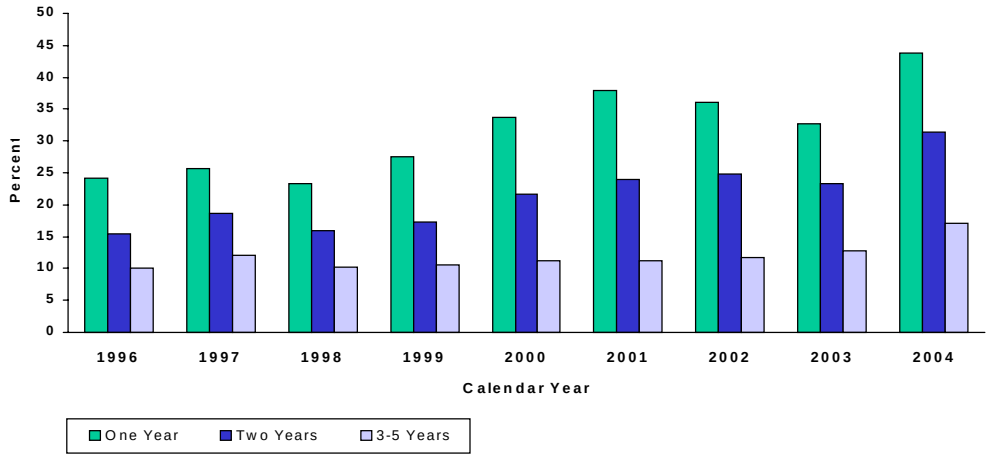
State laws and regulations with impact on childhood lead poisoning

- ✓ Requirements to perform lead hazard reduction at each turnover in rental housing built before 1950. [Environment Article (EA) §6-8]
- ✓ Outreach programs to parents, health care providers, and property owners, especially in at-risk areas. [EA§ 6-8, Health Article §18-106]

Maryland requires that children living in "at-risk" areas be tested at ages one and two years. The State has a targeted testing plan that identifies "at-risk areas." Universal blood lead testing applies to Baltimore City children (Ordinance 20 effective July 2000) and children on Medicaid (required by EPSDT). The percentage of one and two year old children tested increased (Figure 2). The increase in the testing of pre-school aged children can probably be attributed to parents and healthcare providers' response to the school enrollment testing requirement in Health Article 18-106, which became effective for the school year starting September 2003.

Figure 2

Percent of Children One and Two Years Old Tested for Lead vs. Children of Other Ages*



* Children 0-72 months old with highest blood lead test for each year.
Source: Maryland Department of the Environment, Childhood lead Registry, Statewide data: 1996-2004.

Identifying Children with Lead Exposure

The critical issue in childhood lead poisoning is early detection. Because there are no specific clinical symptoms, a blood lead test is the most reliable technique to identify children with elevated blood lead levels. If there is any suspicion that a child is exposed to lead, do a blood lead test.

Maryland's Lead Poisoning Prevention Program has well-established case management and environmental investigation protocols for follow-up of lead poisoned children. A summary of Maryland's case management protocol is presented in Appendix A. The protocol will change in February 2006 when the Notice of EBL portion of the Reduction of Lead Risk in Housing law drops the level of EBL of venous 15 µg/dL to EBL of venous 10 µg/dL.

Blood Lead Laboratory Reporting Requirement

The amended law and regulations* of 2001 and 2002 require that:

1-Following child's demographic data should be included in each blood lead test reported:

- Date of Birth
- Sex
- Address
- Test date
- Sample type
- Blood lead level

2- Blood lead results ≥20 µg/dL to be reported (fax) within 24 hours after result is known. All other results are to be reported every two weeks.

3- Reporting format should comply with the format designed and provided by the Registry.

4- Data should be provided electronically.

* EA 6-303, Blood lead test reporting (COMAR 26.02.01, Blood lead test reporting)

In calendar year 2004, 105,549 children 0-72 months were tested for lead exposure statewide. Table Three provides a summary of statewide statistics of blood lead testing in 2004, and Table Four provides the breakdown of blood lead testing and the status of lead poisoning by jurisdiction in 2004 Table Four-A provides numbers of children by age groups of 0-35 months and 36-72 months. Table Five shows summary results for 9 years at the State, Baltimore City and Counties levels.

Table Three
Calendar Year (CY) 2004 Statistical Report[1]

Item	Number	Percent (%)
Number to tests	130,117	
Number of children	105,549	100.0
Age		
Under One	10,981	10.4
One Year	33,011	31.3
Two Years	23,732	22.5
Three Years	13,450	12.7
Four Years	14,409	13.7
Five Years	9,966	9.4
Age Unknown[3]	0	0.0
Highest Blood Lead Level (µg/dL)		
0-4	93,401	88.5
5-9	10,337	9.8
10-14	1,210	1.1
15-19	356	0.3
20-24	127	0.2
>=25	118	0.1
Mean BLL (Geometric mean)	2.03	
Blood Specimen		
Capillary	14,274	13.5
Venous	82,019	77.7
Undetermined[4]	9,256	8.8

1. For detailed analysis and breakdown of numbers refer to Supplementary Data Tables 1-5.
2. The 130,117 tests were from 124,168 children 0-18 years, of whom 105,549 were 0-72 months old. Data in this statistical table is based on children 0-72 months.
3. Reports with missing or wrong date of birth are assumed to be from children under six years of age.
4. In supplemental data tables blood tests with sample type unknown were counted as capillary.

Table Four
Maryland Department of the Environment
Lead Poisoning Prevention Program: Childhood Lead Registry

Blood Lead Testing of Children 0-72 Months by Jurisdiction in 2004

County[1]	Population of Children 0-72 Months[2]	Children Tested[3]		Children with Elevated Blood Lead Level[4]		Children with Lead Poisoning[5]	
		Number	Percent	Number	Percent	Number	Percent
Allegany	4,747	1,329	28.0	24	1.8	3	0.2
Anne Arundel	41,895	6,806	16.2	27	0.4	6	0.1
Baltimore	57,205	14,947	26.1	108	0.7	10	0.1
Baltimore City	52,796	18,970	35.9	1,183	6.2	147	0.8
Calvert	6,504	838	12.9	0	0.0	0	0.0
Caroline	2,379	794	33.4	17	2.1	1	0.1
Carroll	12,938	1,323	10.2	13	1.0	1	0.1
Cecil	7,548	1,073	14.2	6	0.6	0	0.0
Charles	11,019	2,040	18.5	9	0.4	1	0.0
Dorchester	2,106	629	29.9	17	2.7	1	0.2
Frederick	17,865	2,796	15.7	22	0.8	2	0.1
Garrett	2,323	563	24.2	7	1.2	3	0.5
Harford	20,032	3,170	15.8	24	0.8	3	0.1
Howard	23,278	2,338	10.0	13	0.6	1	0.0
Kent	1,144	208	18.2	6	2.9	4	1.9
Montgomery	75,867	15,934	21.0	81	0.5	12	0.1
Prince George's	73,498	19,785	26.9	87	0.4	16	0.1
Queen Anne's	3,312	453	13.7	4	0.9	0	0.0
Saint Mary's	8,006	1,390	17.4	2	0.1	0	0.0
Somerset	1,508	477	31.6	10	2.1	3	0.6
Talbot	2,244	488	21.7	6	1.2	0	0.0
Washington	10,252	3,029	29.5	39	1.3	10	0.3
Wicomico	6,736	1,917	28.5	40	2.1	4	0.2
Worcester	2,904	675	23.2	11	1.6	2	0.3
County Unknown		3,577		55		0	
Total	**448,106**	**105,549**	**23.6**	**1,811**	**1.7**	**230**	**0.2**

1. County assignment in the order of priority is based on child's census tract, and child's zip code address.
2. Adapted from US Census Bureau age-sex population projection at the state level for 2004.
3. Blood lead reports with missing or wrong date of birth were assumed to be from children under six (6) years of age with exact age unknown
4. Any blood lead level ≥10 μg/dL.
5. Defined as a venous blood lead level ≥20 μg/dL.

Table Four-A
Maryland Department of the Environment
Lead Poisoning Prevention Program: Childhood Lead Registry
Blood lead Testing of Children 0-72 Months by Jurisdiction in 2004

				Children with Elevated Blood Lead Level		Children with Lead Poisoning	
	Population	Children Tested					
Age Group	**of Children**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Allegany County							
0-35 Months	2,443	1,025	42.0	20	2.0	3	0.3
36-72 Months	2,304	304	13.2	4	1.3	0	0.0
Total	4,747	1,329	28.0	24	1.8	3	0.2
Anne Arundel County							
0-35 Months	21,420	4,934	23.0	16	0.3	3	0.1
36-72 Months	20,475	1,872	9.1	11	0.6	3	0.2
Total	41,895	6,806	16.2	27	0.4	6	0.1
Baltimore County							
0-35 Months	29,020	9,797	33.8	75	0.8	6	0.1
36-72 Months	28,185	5,150	18.3	33	0.6	4	0.1
Total	57,205	14,947	26.1	108	0.7	10	0.1
Baltimore City							
0-35 Months	27,351	12,190	44.6	714	5.9	89	0.7
36-72 Months	25,445	6,780	26.6	469	6.9	58	0.9
Total	52,796	18,970	35.9	1,183	6.2	147	0.8
Calvert County							
0-35 Months	3,186	670	21.0	0	0.0	0	0.0
36-72 Months	3,318	168	5.1	0	0.0	0	0.0
Total	6,504	838	12.9	0	0.0	0	0.0
Caroline County							
0-35 Months	1,122	577	51.4	12	2.1	0	0.0
36-72 Months	1,257	217	17.3	5	2.3	1	0.5
Total	2,379	794	33.4	17	2.1	1	0.1
Carroll County							
0-35 Months	6,324	888	14.0	9	1.0	1	0.1
36-72 Months	6,614	435	6.6	4	0.9	0	0.0
Total	12,938	1,323	10.2	13	1.0	1	0.1

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				Children with Elevated Blood Lead Level		Children with Lead Poisoning	
	Population	Children Tested					
Age Group	**of Children**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Cecil County							
0-35 Months	3,790	682	18.0	5	0.7	0	0.0
36-72 Months	3,758	391	10.4	1	0.3	0	0.0
Total	7,548	1,073	14.2	6	0.6	0	0.0
Charles County							
0-35 Months	5,491	1,374	25.0	7	0.5	1	0.1
36-72 Months	5,528	666	12.0	2	0.3	0	0.0
Total	11,019	2,040	18.5	9	0.4	1	0.0
Dorchester County							
0-35 Months	1,057	385	36.4	8	2.1	1	0.3
36-72 Months	1,049	244	23.3	9	3.7	0	0.0
Total	2,106	629	29.9	17	2.7	1	0.2
Frederick County							
0-35 Months	8,916	1,829	20.5	15	0.8	1	0.1
36-72 Months	8,949	967	10.8	7	0.7	1	0.1
Total	17,865	2,796	15.7	22	0.8	2	0.1
Garrett County							
0-35 Months	1,164	344	29.6	5	1.5	2	0.6
36-72 Months	1,159	219	18.9	2	0.9	1	0.5
Total	2,323	563	24.2	7	1.2	3	0.5
Harford County							
0-35 Months	9,980	1,947	19.5	20	1.0	3	0.2
36-72 Months	10,052	1,223	12.2	4	0.3	0	0.0
Total	20,032	3,170	15.8	24	0.8	3	0.1
Howard County							
0-35 Months	11,458	1,536	13.4	10	0.7	0	0.0
36-72 Months	11,820	802	6.8	3	0.4	1	0.1
Total	23,278	2,338	10.0	13	0.6	1	0.0

Table Four-A
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				Children with Elevated Blood Lead Level		Children with Lead Poisoning	
	Population	Children Tested					
Age Group	**of Children**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Kent County							
0-35 Months	595	170	28.6	6	3.5	4	2.4
36-72 Months	549	38	6.9	0	0.0	0	0.0
Total	1,144	208	18.2	6	2.9	4	1.9
Montgomery County							
0-35 Months	38,826	9,917	25.5	44	0.4	8	0.1
36-72 Months	37,041	6,017	16.2	37	0.6	4	0.1
Total	75,867	15,934	21.0	81	0.5	12	0.1
Prince George's County							
0-35 Months	37,162	11,550	31.1	54	0.5	13	0.1
36-72 Months	36,336	8,235	22.7	33	0.4	3	0.0
Total	73,498	19,785	26.9	87	0.4	16	0.1
Queen Anne's County							
0-35 Months	1,659	333	20.1	3	0.9	0	0.0
36-72 Months	1,653	120	7.3	1	0.8	0	0.0
Total	3,312	453	13.7	4	0.9	0	0.0
Saint Mary's County							
0-35 Months	4,005	1,088	27.2	2	0.2	0	0.0
36-72 Months	4,001	302	7.5	0	0.0	0	0.0
Total	8,006	1,390	17.4	2	0.1	0	0.0
Somerset County							
0-35 Months	757	340	44.9	5	1.5	2	0.6
36-72 Months	751	137	18.2	5	3.6	1	0.7
Total	1,508	477	31.6	10	2.1	3	0.6
Talbot County							
0-35 Months	1,081	371	34.3	4	1.1	0	0.0
36-72 Months	1,163	117	10.1	2	1.7	0	0.0
Total	2,244	488	21.7	6	1.2	0	0.0

Table Four-A
Maryland Department of the Environment
Lead Poisoning Prevention Program: Childhood Lead Registry
Blood lead Testing of Children 0-72 Months by Jurisdiction in 2004

				Children with Elevated Blood Lead Level		Children with Lead Poisoning	
	Population	Children Tested					
Age Group	**of Children**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Washington County							
0-35 Months	5,239	1,699	32.4	23	1.4	6	0.4
36-72 Months	5,013	1,330	26.5	16	1.2	4	0.3
Total	10,252	3,029	29.5	39	1.3	10	0.3
Wicomico County							
0-35 Months	3,449	1,306	37.9	22	1.7	1	0.1
36-72 Months	3,287	611	18.6	18	2.9	3	0.5
Total	6,736	1,917	28.5	40	2.1	4	0.2
Worcester County							
0-35 Months	1,521	439	28.9	4	0.9	0	0.0
36-72 Months	1,383	236	17.1	7	3.0	2	0.8
Total	2,904	675	23.2	11	1.6	2	0.3
County Unknown							
0-35 Months		2,333		33		0	
36-72 Months		1,244		22		0	
Total		3,577		55		0	
Statewide							
0-35 Months	227,016	67,724	29.8	1,116	1.6	144	0.2
36-72 Months	221,090	37,825	17.1	695	1.8	86	0.2
Total	448,106	105,549	23.6	1,811	1.7	230	0.2

1. Population of children was adapted from US Census Bureau age-sex population projection at the state level for 2004.
2. Blood lead reports with missing or wrong date of birth were assumed to be from children under six (6) years of age with exact age unknown.
3. Elevated blood lead level defined as any blood lead level ≥10 μg/dL.
4. Lead Poisoning defined as a venous blood lead level ≥20 μg/dL.
5. County assignment was in the order of child's census tract, and zip code address.

Table 5: Childhood Blood Lead surveillance in Maryland: 1996-2004
Children 0-72 Months Old

Calendar Year		Population of Children	Blood Lead Tests		Elevated Blood Lead		Lead Poisoning	
			Number	Percent	Number	Percent	Number	Percent
1996								
	City	60,834	29,630	48.7	7,816	26.4	1,646	5.6
	Counties	369,538	27,006	7.3	1,264	4.7	160	0.6
	Unknown		3,110		804		24	
	Total	430,372	59,746	13.9	9,884	16.5	1,830	3.1
1997								
	City	58,262	21,423	36.8	5,983	27.9	1030	4.8
	Counties	362,935	44,546	12.3	1654	3.7	202	0.5
	Unknown		1,149		126		1	
	Total	421,197	67,118	15.9	7,763	11.6	1233	1.8
1998								
	City	56,759	17,753	31.3	3,949	22.2	669	3.8
	Counties	359,726	40,164	11.1	1,082	2.7	103	0.3
	Unknown		668		37		0	
	Total	416,485	58,585	14.1	5,068	8.7	772	1.3
1999								
	City	55,401	17,414	31.4	2,902	16.7	446	2.6
	Counties	363,511	43,524	12.0	925	2.1	102	0.2
	Unknown		591		77		7	
	Total	418,912	61,529	14.7	3,904	6.4	555	0.9
2000								
	City	50,380	18,033	36.8	2,198	12.2	266	1.5
	Counties	377,559	51,210	13.6	847	1.7	85	0.2
	Unknown		5,273		357		2	
	Total	427,939	74,516	17.4	3,402	4.6	353	0.5
2001								
	City	53,149	21,231	40.0	2,027	9.5	230	1.1
	Counties	387,289	55,470	14.3	814	1.5	58	0.1
	Unknown		41		0		0	
	Total	431,438	76,742	17.8	2,841	3.7	288	0.4
2002								
	City	52,744	16,595	31.5	1,558	9.4	183	1.1
	Counties	384,073	62,822	16.4	737	1.2	77	0.1
	Unknown		90		2		0	
	Total	436,817	79,507	18.2	2,297	2.9	260	0.3
2003								
	City	51,892	18,242	35.2	1,166	6.4	160	0.9
	Counties	386,076	58,470	15.1	552	0.9	77	0.1
	Unknown		9		1		0	
	Total	437,968	76,721	17.5	1,719	2.2	237	0.3
2004								
	City	52,796	18,970	35.9	1183	6.2	147	0.8
	Counties	395,310	83,002	21.0	573	0.7	83	0.1
	Unknown		3,577		55			
	Total	448,106	105,549	23.6	1,811	1.7	230	0.2

Appendix A
Case Management Protocol

Environmental investigations are required at 2 consecutive venous levels of ≥ 15 – 19 µg/dL or 1 venous level at ≥ 20 µg/dL.

Blood Lead Level	Local Health Department	Health Care Provider	Statewide Law Enforcement
< 9 µg/dL	Anything above zero indicates some exposure or contact with lead. No Community Health Nurse case management services are indicated.	• General education about lead and lead poisoning • Risk Assessment Questionnaire at all routine child health visits • Repeat blood lead level according to protocol	Footnote 2
10 – 14 µg/dL	This is the CDC level of concern. Provide education to decrease exposure, including information about Special Loans Housing Program.	As above plus • Educate to decrease exposure • Track blood lead levels according to CDC protocol	
15 – 19 µg/dL	If capillary test, coordinate with provider and guardian to validate with a venous blood lead test within 1 month. If venous test • Make telephone contact and do home visit within 30 days. • Provide educational materials to family (mail or in person) • Send Official Notice of Elevated Blood Lead, when applicable, to Tenant and Rental Property Owner • Coordinate with the provider and guardian for follow-up activities, such as housing and follow-up blood tests If two consecutive venous tests between 15-19 µg/dL at least 30 days of each other, treat as next level.	As above plus • Evaluate for iron deficiency • Take environmental history	As in footnote 2, plus MDE enforcement of Lead Risk in Housing law's subsections on Notice of Elevated Blood Lead
20 – 44 µg/dL	If capillary test, coordinate validation of level with a venous blood lead level within 1 week If venous test. • Contact and make a home visit in coordination with the Environmental Lead Sanitarian who will complete an environmental investigation within 5 working days • Discuss with the health care provider possible referral to tertiary care centers specializing in management of childhood lead poisoning • Provide appropriate referrals to other agencies (Social Services, Housing, etc.)	As above plus • Complete medical/nutritional history and physical examination • Obtain developmental / psychological evaluation • Consider chelation consultation	As above, plus MDE and local health department enforcement of • Notice of Violations • Lead Risk in Housing law, subsections on Qualified Offer
≥ 45 µg/dL	If capillary, contact provider within 2 working days. Inform provider to mark all specimens STAT (Highest Priority) and request immediate processing and report from laboratory. If venous, contact provider within 1 working day. Home visit within 2 working days.	As above plus • Consult with lead specialist • Perform urgent chelation	
> 70 µg/dL	Contact the health care provider within 24 hours. If capillary, confirm the result immediately with a STAT venous test. If venous, verify hospitalization as a medical emergency. Same as above. Home visit within 1 working day.	**Hospitalize: Medical emergency**:	

1) Maryland Department of the Environment Protocol, based on Centers for Disease Control and Prevention guidance
2) Environment Article §6-8, "Reduction of Lead Risk in Housing" subsections on Rental Property Registration, Risk Reduction Treatments at Turnover and Notice of Defect are ongoing primary prevention activities not triggered by blood lead levels.