

Army Quarterly Pediatric Lead Report (Calendar Year (CY) 2021 Quarter (Q2))

QUARTERLY HIGHLIGHT

2,301 Army Dependents
received a blood lead test between 1 April and 30 June 2021; 0.3% of those tests indicated an elevated blood lead level.

INTRODUCTION

Lead is a naturally occurring heavy metal, but can present an environmental and health hazard if it contaminates water, air, soil, or dust. The most common ways that people are exposed to lead are the inhalation or accidental ingestion of contaminated dust and soil as a result of aging or chipping lead-based paint.^{1,2} Lead-based paint was banned from use in 1978, but many homes built prior to the ban still exist in communities across the country. Other potential sources of lead exposure are contaminated water, ammunition, soldering equipment, as well as some foreign-made toys, ceramics, make-up, and packaged foods.

Lead is neurotoxic and can cause cognitive and behavioral issues, as well as gastrointestinal and hematological problems.^{2,3} Children are at higher risk of lead exposure because of more frequent hand-to-mouth behavior. They are also more susceptible to the harmful effects of lead since the brain is in a period of rapid development during childhood.

Because children are at higher risk if exposed to lead, the American Academy of Pediatrics (AAP) recommends that all children ages 6 months to 6 years old, inclusive, be screened via a parental questionnaire for increased risk of lead exposure at all routine well-child visits.³ Children who screen positive for an increased exposure risk should be tested for an elevated blood lead level (eBLL). Laws regarding lead exposure screening, testing, and reporting are established at the State level, and Army regulation directs installations to comply with State law.

In 2012, the Centers for Disease Control and Prevention (CDC) lowered the reference value for an eBLL from 10 to 5 micrograms per deciliter ($\mu\text{g}/\text{dL}$); however, the CDC continues to stress that there is no safe level of lead exposure.⁴ In October 2018, eBLLs became a reportable medical event (RME) for Army dependents 0 to 6 years old according to the Army Lead Hazard Management Control Program.⁵ Army dependents with eBLLs should be reported to the Disease Reporting System internet (DRSi) according to Armed Forces Health Surveillance Division (AFHSD) guidelines. This report tracks all available blood lead level (BLL) test results within the Army-Dependent population and monitors the occurrence of eBLLs.

METHODS

Laboratory Data

The Navy and Marine Corps Public Health Center (NMCPHC) provided available BLL laboratory results for Army dependents from the Composite Health Care System (CHCS) Health Level 7 (HL7) chemistry data system and Military Health System (MHS) Genesis. Records are dated according to the BLL collection date, and this report covers test results collected from 1 April through 30 June 2021 (CY2021 Q2). The data includes all BLL test results, above and below the eBLL cut-off, collected within the MHS, and captures test results for Army dependents who receive care at Army military medical treatment facilities (MTFs) and other Department of Defense (DOD) facilities. Test results were excluded from the analysis when the unit of measure or the result could not be determined, or the biological sample was not blood.⁶

Zinc photoporphyrin (ZPP), point of care (POC), and capillary blood tests were also not included as these tests are not considered in the case definition in the Armed Forces RME Guidelines and Case Definitions.⁷

Only BLL results for Army dependents ages 0 through 6 years old were analyzed for this report. According to the Armed Forces RME Guidelines and Case Definitions, a child can only be counted as an eBLL case once per calendar year.⁷ If an individual had more than one BLL result (e.g., duplicate record or follow-up blood test) during CY2021 2nd Quarter (Q2), the highest BLL result was retained. The frequency of BLL test results are displayed by BLL range (<5 µg/dL, 5-9 µg/dL, 10-19 µg/dL, ≥20 µg/dL), Public Health Command (PHC), and installation. Results ≥5 µg/dL are considered elevated. All CY2021 Q2 eBLL test results are reported.

Disease Reporting System, internet Data

Since 18 October 2018, eBLLs (≥5 µg/dL) have been reportable through the DRSi for children 0 to 6 years of age.⁵ DRSi is a Tri-Service reportable medical event system. Only Army dependent cases reported to DRSi are included in this report. Among Army dependents, DRSi cases with medical event report dates from 1 April through 30 June 2021 were counted.

Reporting Compliance

DRSi report dates can differ from the BLL test collection date. Taking this into consideration, cases with test collection dates during CY2021 Q2 were considered in the measure of compliance with the eBLL reporting policy. Reporting compliance was determined using the proportion of all eBLL laboratory results within CHCS and MHS Genesis collected during CY2021 Q2 that were also reported via a medical event report in DRSi.

Army Public Health Nurses Program Status Report (APHN-PSR)

Starting in April 2019, specific questions regarding Childhood Lead Exposure were included in the APHN-PSR to assess the Environmental Health Hazard Management Control Program. As part of installation safety and housing office-led environmental investigations, Installation Department of Public Health (Preventive Medicine Services) conduct parent/guardian interviews in conjunction with installation services after a child six years of age or younger is confirmed to have an eBLL. The APHN-PSR captures the following Lead Hazard Management Control Plan metrics: (1) number of pediatric BLL tests conducted in the past fiscal quarter reported to the state/local authorities; (2) number of confirmed elevated pediatric BLL test results in the past fiscal quarter reported to the State/local authorities per the State/local reporting requirements.

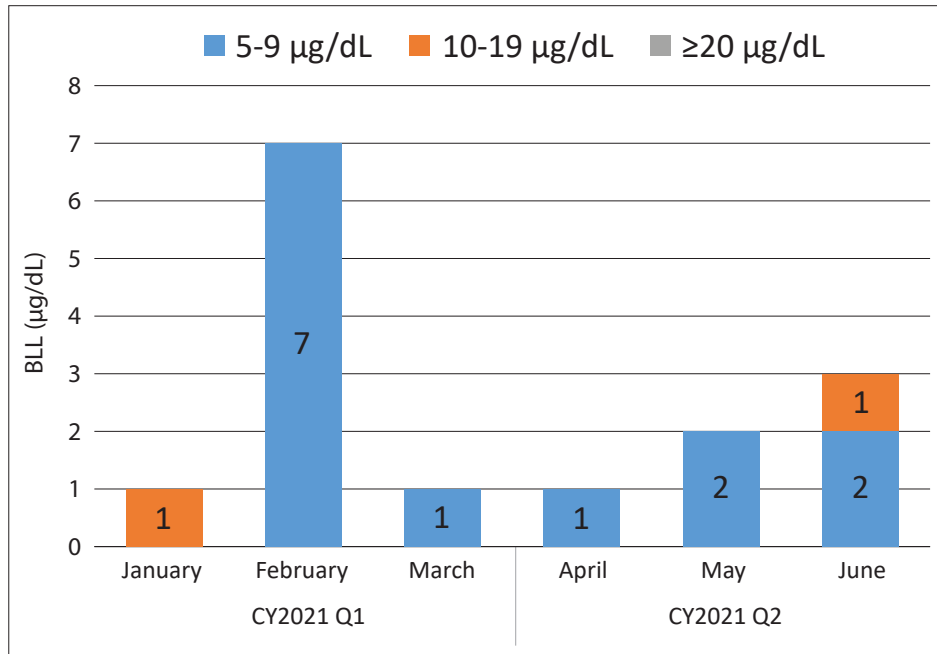
RESULTS

Laboratory Test Results

During CY2021 Q2, there were 2,301 Army dependents between 0 and 6 years old that received a blood lead test within the MHS, and seven of those results (0.3%) were elevated (BLL ≥5 µg/dL). In CY2021 Q2, no children exceeded the BLL at which chelation therapy is typically recommended (≥45 µg/dl). A similar number of Army dependents were tested during CY2021 Q2 compared to the same time last year; however, there were fewer elevated results in CY2021 Q2.

Table 1. Total Count of Pediatric (ages 0-6) Blood Lead Levels in Q2, CY2020-CY2021

BLL Ranges	CY2020 Q2	CY2021 Q2
<5 µg/dL	2364	2294
5-9 µg/dL	16	5
10-19 µg/dL	4	2
≥20 µg/dL	0	0
Total	2384	2301



Data source: CHCS HL7 and MHS Genesis

Figure 1. Number of Elevated Blood Lead Cases ($\geq 5 \mu\text{g/dL}$) by Month and Quarter in CY2021 Q2

With the highest test result from the first quarter of CY2021 retained for each dependent, Table 2 summarizes the BLLs by PHC and installation. Elevated BLL results came from Fort (Ft) Bliss (2), FtBragg (2), Ft Sill (1), Walter Reed National Military Medical Center (NMMC) (1), and Dover Air Force Base (AFB) (1). Appendix A shows a list of U.S. Air Force (USAF), Marine Corps, and Navy locations where Army dependents received BLL testing during CY2021 Q2.

Table 2. Pediatric (ages 0-6) Blood Lead Levels, by Region and Installation, CY2021 Q2

REGION	BLL Ranges				Total
	<5 µg/dL	5-9 µg/dL	10-19 µg/dL	$\geq 20 \mu\text{g/dL}$	
ATLANTIC					
Aberdeen Proving Ground	25	0	0	0	25
Carlisle Barracks	5	0	0	0	5
Ft Belvoir	58	0	0	0	58
Ft Benning	24	0	0	0	24
Ft Bragg*	318	2	0	0	320
Ft Campbell	62	0	0	0	62
Ft Detrick	9	0	0	0	9
Ft Drum	76	0	0	0	76
Ft Gordon	3	0	0	0	3
Ft Jackson	14	0	0	0	14
Ft Knox	52	0	0	0	52
Ft Lee	42	0	0	0	42
Ft Meade	32	0	0	0	32
Ft Rucker	20	0	0	0	20
Ft Stewart	55	0	0	0	55
Redstone Arsenal	6	0	0	0	6
Walter Reed NMMC*	6	0	1	0	7
West Point	23	0	0	0	23
CENTRAL					
Ft Bliss*	274	1	1	0	276
Ft Carson	35	0	0	0	35

Table 2 (continued). Pediatric (ages 0-6) Blood Lead Levels, by Region and Installation, CY2021 Q2

REGION	BLL Ranges				Total
	<5 µg/dL	5-9 µg/dL	10-19 µg/dL	≥20 µg/dL	
Ft Hood	347	0	0	0	347
Ft Irwin	9	0	0	0	9
Ft Leavenworth	9	0	0	0	9
Ft Leonard Wood	34	0	0	0	34
Ft Polk	41	0	0	0	41
Ft Riley	58	0	0	0	58
Ft Sill*	50	1	0	0	51
White Sands Missile Range	1	0	0	0	1
PACIFIC					
Camp Humphreys	2	0	0	0	2
Ft Shafter	37	0	0	0	37
Ft Wainwright	6	0	0	0	6
Schofield Barracks	172	0	0	0	172
EUROPE					
Grafenwoehr	6	0	0	0	6
Hohenfels/Amberg	2	0	0	0	2
Landstuhl	18	0	0	0	18
Vicenza	1	0	0	0	1
Vilseck	14	0	0	0	14
Wiesbaden	16	0	0	0	16
JOINT BASES					
Joint Base Elmendorf-Richardson	9	0	0	0	9
Joint Base Langley-Eustis	79	0	0	0	79
Joint Base Lewis-McChord	7	0	0	0	7
Joint Base Little Creek-Fort Story	2	0	0	0	2
Joint Base McGuire-Dix-Lakehurst	4	0	0	0	4
Joint Base Meyer-Henderson Hall	10	0	0	0	10
Joint Base San Antonio	110	0	0	0	110
USAF MTF**					
	82	1	0	0	83
NAVAL/MARINE CORPS MTF**					
	29	0	0	0	29

*e BLL result in CY2021 Q2

** list of USAF, Naval, and Marine Corps locations in Appendix A

DRSi Reporting Results

In DRSi, five eBLL cases among Army dependents have CY2021 Q2 report dates. Due to differences in the report date compared to the test collection date in the DRSi system, three children had a BLL test in CY2021 Q1 and two children had BLL tests in CY2021 Q2. Table 3 summarizes the locations of the cases.

Table 3. Locations Where Elevated Blood Lead Levels Were Reported through DRSi, CY2021 Q2

Installation	Number of eBLL reports
Ft Bragg	1
Ft Bliss	1
Ft Sill	3
Total	5

NOTE: Case counts are based on DRSi reporting date and may not reflect the counts in Table 1.

Reporting Compliance

Four out of the six new eBLL cases identified in the CHCS and MHS Genesis laboratory data system were reported to DRSi; a 67% reporting compliance for CY2021 Q2. Two of the cases were reported during CY2021 Q2. Two cases were reported after the end of the first quarter (30 June 2021) but are being counted towards the reporting compliance measure because the test collection dates fell within CY2021 Q2. Walter Reed and Dover AFB each had one unreported eBLL case from CY2021 Q2. A child with an eBLL in CY2020 with an elevated follow-up test result in CY2021 should be reported to DRSi again.

Army Public Health Nurses Program Status Report (APHN-PSR)

The results of the APHN-PSR indicated that a total of 731 BLL test results were reported to State and/or local authorities during CY2021 Q2 (Table 4). This question is relevant for installations located in State and local jurisdictions that require reporting of all BLL tests, including test results below 5 µg/dL (e.g., Louisiana, New York, North Carolina). PHC-Central reported the most BLL test results to State and local authorities (n=590) followed by PHC-Atlantic (n=138). Seven (1.0%) of those results were elevated.

Table 4. Blood Lead Levels Reported through the APHN-PSR, by Region and Installation*

REGION	Number of BLL tests reported to the State/local authorities	Number of eBLL tests reported to the State/local authorities
ATLANTIC		
JB Langley-Eustis	131	0
Redstone Arsenal	7	0
CENTRAL		
Ft Bliss	277	3
Ft Hood	112	0
Ft Huachuca	9	0
Ft Riley	53	0
Ft Sill	56	1
Joint Base San Antonio	83	0
EUROPE		
Baumholder	3	3

*Installations that are not listed did not report BLL tests or eBLL tests

DISCUSSION

Approximately 0.3% of the BLL tests performed in CY2021 Q2 (1 April – 30 June 2021) were elevated. A similar prevalence of elevated results was seen in the first quarter of CY2021. Among Army dependents tested within the MHS, the annual rate of eBLL in CY2020 was 5.1 per 1,000 child dependents. Since there is no safe level of lead in the blood, the Army will continue its Lead Hazard Management Control Program to prevent childhood lead exposure and monitor children with an eBLL to ensure each case receives proper treatment and management. Reporting eBLLs to DRSi is an important aspect of that control and prevention program, and military MTFs reached 67% reporting compliance this quarter. Children with an eBLL are reportable to DRSi once per calendar year. We are now in a new reporting year, and a new medical event report should be submitted for any cases reported in CY2020 with an elevated result on a repeat test in CY2021.

LIMITATIONS

This report may not include all Army Dependent BLL test results. BLL results were pulled one month after the end of Q2 to minimize the chance of missing any results collected during that quarter; however, it is still possible that some of the results were not certified by the time of the NMCPHC data pull. The inclusion of MHS Genesis laboratory data in this report is still new. The MHS Genesis data provided by the NMCPHC was included in this report to provide some visibility on the installations that have switched over to that system (e.g., Ft Carson, Ft Irwin, Ft Leavenworth, Ft Leonard Wood, Ft Riley, Ft Wainwright, JB Lewis-McChord, JB Elmendorf-Richardson, and Presidio of Monterey); however, the quality and completeness of this data is still being examined by the NMCPHC. In addition, only BLLs collected within the MHS are available through either CHCS or MHS Genesis, meaning blood samples collected and tested outside the MHS are not represented in this report. As the MHS reforms, some military MTFs may transition to providing care for Active Duty personnel only, which could further limit the availability of laboratory data for child dependents.

To improve BLL surveillance, the Army established a RME for eBLLs in children 0-6 years old. At this point in time, only the Army and the Air Force are reporting eBLLs through DRSi. The Navy is not reporting elevated lead exposure through DRSi, so it is possible that these cases will not be immediately visible to APHC. However, the data shows that there were no eBLLs among the Army dependents who received BLL tests at Navy/Marine Corps MTFs.

REFERENCES

1. "Protect Your Family from Exposures to Lead," United States Environmental Protection Agency (EPA). <https://www.epa.gov/lead/protect-your-family-exposures-lead#sl-home>
2. EPA. 2018. *Federal Action Plan to Reduce Childhood Lead Exposure and Associated Health Impacts*. President's Task Force on Environmental Health Risks and Safety Risks to Children. https://www.epa.gov/sites/production/files/2018-12/documents/fedactionplan_lead_final.pdf
3. Council on Environmental Health. 2016. Prevention of Childhood Lead Toxicity. *Pediatrics*. 138(1):e20161493. doi: 10.1542/peds.2016-1493
4. Schnur, J and RM John. 2014. Childhood lead poisoning and the new Centers for Disease Control and Prevention guidelines for lead exposure. *J Am Assoc Nurse Pract*. 26(5):238-247. doi: 10.1002/2327-6924.12112
5. Memorandum, Department of the Army, October 17, 2018; OTSG/MEDCOM Policy Memo 18-064. Subject: *Preventing Childhood Lead Exposure – Lead Hazard Management*.
6. Navy and Marine Corps Public Health Center EpiData Center Department. 2019. *NMCPHC-EDC-TR-061-2019, DOD Quarterly Pediatric Lead Report, CY 2018 Q4*.
7. Defense Health Agency. 2020. *Armed Forces Reportable Medical Events – Guidelines and Case Definitions*. <https://health.mil/Military-Health-Topics/Combat-Support/Armed-Forces-Health-Surveillance-Branch/Reports-and-Publications>

Appendix A

Table A-1. U.S. Air Force, Navy, and Marine Corps locations where Army dependents Received a Blood Lead Test

USAF Bases	Naval/Marine Corps Stations
Davis-Monthan AFB	Camp Lejeune
Dover AFB	Cherry Point
Dyess AFB	Indian Head
Eglin AFB	JB Charleston
Eielson AFB	JB Marianas Guam-Andersen
Goodfellow AFB	Jacksonville
Hanscom AFB	Norfolk
Hurlburt Field	Okinawa
JB Anacostia-Bolling	Portsmouth
JB Andrews	Quantico
Kadena AB	Suffolk
Keesler AFB	Virginia Beach
Little Rock AFB	
Luke AFB	
MacDill AFB	
Maxwell AFB	
McConnell AFB	
Osan AB	
Patrick AFB	
Peterson AFB	
Ramstein AB	
Scott AFB	
Sheppard AFB	
Tinker AFB	
Travis AFB	
USAF Academy	
Wright-Patterson AFB	