

Army Quarterly Pediatric Lead Report (Calendar Year (CY) 2021 Quarter (Q1))

QUARTERLY HIGHLIGHT

2,430 Army Dependents
received a blood lead test between 1 January and 31 March 2021; 0.4% 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 MHS Genesis. Records are dated according to the BLL collection date, and this report covers test results collected from 1 January through 31 March 2021 (CY2021 Q1). The data includes all BLL test results, above and below the eBLL cut-off, collected within the Military Health System (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 1st Quarter (Q1), 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 Q1 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 January through 31 March 2021 were counted.

Reporting Compliance

DRSi report dates can differ from the BLL test collection date. Taking this into consideration, DRSi cases with test collection dates during CY2021 Q1 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 the CHCS HL7 data system collected during CY2021 Q1 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

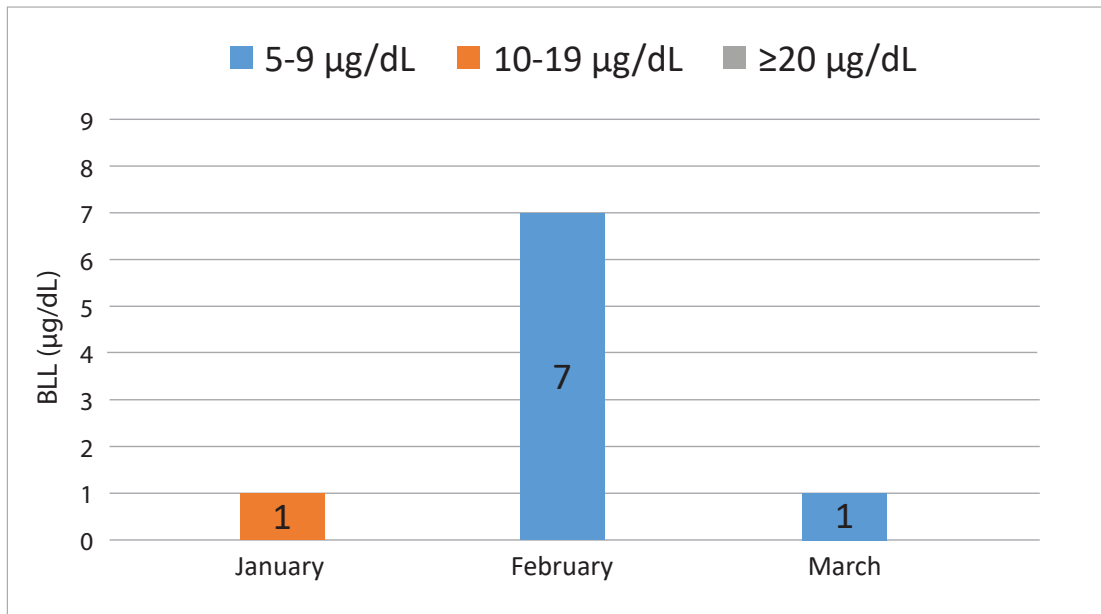
Laboratory Test Results

During CY2021 Q1, 2,430 Army dependents between 0 and 6 years old received a blood lead test within the MHS, and 9 of those results (0.4%) were elevated (BLL ≥5 µg/dL). In CY2021 Q1, no children exceeded the BLL at which chelation therapy is typically recommended (≥45 µg/dl). A similar number of BLL tests were completed in CY2021 Q1 compared to the same time period last year.

Table 1. Total Count of Pediatric (ages 0-6) Blood Lead Levels in Q1, CY2020-CY2021

| BLL Ranges | CY2020 Q1 | CY2021 Q1 |
|-------------------|------------------|------------------|
| <5 µg/dL | 2,437 | 2,421 |
| 5-9 µg/dL | 12 | 8 |
| 10-19 µg/dL | 1 | 1 |
| ≥20 µg/dL | 0 | 0 |
| Total | 2,450 | 2,430 |

Figure 1. Number of Elevated Blood Lead Cases ($\geq 5 \mu\text{g/dL}$) by Month in CY2021 Q1



Data source: CHCS HL7 and MHS Genesis

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 (1), Ft Bragg (1), Ft Leonard Wood (1), Ft Riley (1), Ft Sill (3), and Joint Base (JB) San Antonio (2). Appendix A shows a list of U.S. Air Force (USAF), Marine Corps, and Navy locations where Army dependents received BLL testing during CY2021 Q1.

Table 2. Pediatric (ages 0-6) Blood Lead Levels, by Region and Installation, CY2021 Q1

| REGION | BLL Ranges | | | | Total |
|-------------------------|---------------------|----------------------|------------------------|--------------------------|-------|
| | <5 $\mu\text{g/dL}$ | 5-9 $\mu\text{g/dL}$ | 10-19 $\mu\text{g/dL}$ | $\geq 20 \mu\text{g/dL}$ | |
| ATLANTIC | | | | | |
| Aberdeen Proving Ground | 23 | 0 | 0 | 0 | 23 |
| Carlisle Barracks | 4 | 0 | 0 | 0 | 4 |
| Ft Belvoir | 58 | 0 | 0 | 0 | 58 |
| Ft Benning | 20 | 0 | 0 | 0 | 20 |
| Ft Bragg* | 307 | 1 | 0 | 0 | 308 |
| Ft Campbell | 78 | 0 | 0 | 0 | 78 |
| Ft Detrick | 2 | 0 | 0 | 0 | 2 |
| Ft Drum | 72 | 0 | 0 | 0 | 72 |
| Ft Gordon | 5 | 0 | 0 | 0 | 5 |
| Ft Jackson | 16 | 0 | 0 | 0 | 16 |
| Ft Knox | 36 | 0 | 0 | 0 | 36 |
| Ft Lee | 35 | 0 | 0 | 0 | 35 |
| Ft Meade | 29 | 0 | 0 | 0 | 29 |
| Ft Rucker | 22 | 0 | 0 | 0 | 22 |
| Ft Stewart | 54 | 0 | 0 | 0 | 54 |
| Redstone Arsenal | 3 | 0 | 0 | 0 | 3 |
| West Point | 17 | 0 | 0 | 0 | 17 |
| Walter Reed NMMC | 4 | 0 | 0 | 0 | 4 |
| CENTRAL | | | | | |
| Ft Bliss* | 235 | 1 | 0 | 0 | 236 |
| Ft Carson | 71 | 0 | 0 | 0 | 71 |
| Ft Hood | 303 | 0 | 0 | 0 | 303 |
| Ft Huachuca | 3 | 0 | 0 | 0 | 3 |

Table 2 (continued). Pediatric (ages 0-6) Blood Lead Levels, by Region and Installation, CY2021 Q1

| REGION | BLL Ranges | | | | Total |
|------------------------------------|------------|-----------|-------------|-----------|-------|
| | <5 µg/dL | 5-9 µg/dL | 10-19 µg/dL | ≥20 µg/dL | |
| Ft Irwin | 9 | 0 | 0 | 0 | 9 |
| Ft Leavenworth | 41 | 0 | 0 | 0 | 41 |
| Ft Leonard Wood* | 81 | 1 | 0 | 0 | 82 |
| Ft Polk | 42 | 0 | 0 | 0 | 42 |
| Ft Riley* | 104 | 1 | 0 | 0 | 105 |
| Ft Sill* | 62 | 3 | 0 | 0 | 65 |
| PACIFIC | | | | | |
| Ft Shafter | 43 | 0 | 0 | 0 | 43 |
| Ft Wainwright | 16 | 0 | 0 | 0 | 16 |
| Schofield Barracks | 196 | 0 | 0 | 0 | 196 |
| EUROPE | | | | | |
| Grafenwoehr | 3 | 0 | 0 | 0 | 3 |
| Hohenfels/Amberg | 4 | 0 | 0 | 0 | 4 |
| Kaiserslautern | 3 | 0 | 0 | 0 | 3 |
| Landstuhl | 13 | 0 | 0 | 0 | 13 |
| Vilseck | 16 | 0 | 0 | 0 | 16 |
| Wiesbaden | 24 | 0 | 0 | 0 | 24 |
| JOINT BASES | | | | | |
| Joint Base Elmendorf-Richardson | 13 | 0 | 0 | 0 | 13 |
| Joint Base San Antonio* | 126 | 1 | 1 | 0 | 128 |
| Joint Base Langley-Eustis | 53 | 0 | 0 | 0 | 53 |
| Joint Base Lewis-McChord | 6 | 0 | 0 | 0 | 6 |
| Joint Base Little Creek-Fort Story | 1 | 0 | 0 | 0 | 1 |
| Joint Base McGuire-Dix-Lakehurst | 7 | 0 | 0 | 0 | 7 |
| Joint Base Meyer-Henderson Hall | 5 | 0 | 0 | 0 | 5 |
| Joint Base Anacostia-Bolling | 1 | 0 | 0 | 0 | 1 |
| USAF MTF*± | | | | | |
| | 131 | 0 | 0 | 0 | 131 |
| NAVAL/MARINE CORPS MTF*± | | | | | |
| | 0 | 0 | 0 | 0 | 24 |

*e BLL result in CY2021 Q1

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

DRSi Reporting Results

In DRSi, five eBLL cases among Army dependents have CY2021 Q1 report dates. Due to differences in the report date compared to the test collection date in the DRSi system, one child had a BLL test in CY2020 Q4 and four children had BLL tests in CY2021 Q1. Table 3 summarizes the locations of the cases.

Table 3. Locations Where Elevated Blood Lead Levels Were Reported through DRSi, CY2021 Q1

| Installation | Number of eBLL reports |
|------------------|------------------------|
| Ft Bragg | 1 |
| Ft Bliss | 1 |
| Ft Sill | 1 |
| JB Lewis-McChord | 1 |
| JB San Antonio | 1 |
| Total | 5 |

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

Reporting Compliance

Six out of the nine new eBLL cases identified in the CHCS and MHS Genesis laboratory data system were reported to DRSi. The Army had 67% reporting compliance for CY2021 Q1. Five of the cases were reported during CY2021 Q1. One case was reported after the end of the first quarter (31 March 2021) but is being counted towards the reporting compliance measure because the test collection date fell within CY2021 Q1. Each of the following installations had one unreported eBLL case from CY2021 Q1: Ft Leonard Wood, Ft Riley, and JB San Antonio. 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 1,013 BLL test results were reported to State and/or local authorities during CY2021 Q1 (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=938) followed by PHC-Atlantic (n=75). Five (0.5%) 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 | | |
| Ft Rucker | 23 | 0 |
| JB Langley-Eustis | 47 | 0 |
| Redstone Arsenal | 5 | 0 |
| CENTRAL | | |
| Ft Bliss | 285 | 1 |
| Ft Carson | 67 | 0 |
| Ft Hood | 352 | 0 |
| Ft Huachuca | 5 | 0 |
| Ft Riley | 2 | 0 |
| Ft Sill | 69 | 3 |
| Joint Base San Antonio | 158 | 1 |

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

DISCUSSION

Approximately 0.4% of the BLL tests performed in CY2021 (1 January – 31 March 2021) were elevated. A similar prevalence of elevated results was seen in the first quarter of CY2020. 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 elevated blood lead 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 Q1 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., JB Lewis-McChord, Presidio of Monterey, Ft Wainwright, Ft Irwin); 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

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5. Memorandum, Department of the Army, October 17, 2018; OTSG/MEDCOM Policy Memo 18-064. Subject: *Preventing Childhood Lead Exposure – Lead Hazard Management*.
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Appendix A

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

| USAF Bases |
|----------------------|
| Barksdale AFB |
| Davis-Monthan AFB |
| Dover AFB |
| Eglin AFB |
| Eielson AFB |
| Ellsworth AFB |
| Goodfellow AFB |
| Hanscom AFB |
| Hill AFB |
| Hurlburt Field |
| JB Andersen |
| JB Andrews |
| Kadena AB |
| Keesler AFB |
| Little Rock AFB |
| MacDill AFB |
| Maxwell AFB |
| McConnell AFB |
| Mountain Home AFB |
| Nellis AFB |
| Offutt AFB |
| Osan AB |
| Patrick AFB |
| Peterson AFB |
| Ramstein AB |
| Scott AFB |
| Tinker AFB |
| USAF Academy |
| Wright-Patterson AFB |

| Naval/Marine Corps Stations |
|-----------------------------|
| Camp Lejeune |
| Chesapeake |
| Indian Head |
| JB Charleston |
| Jacksonville |
| Kaneohe |
| Marianas-Guam |
| Milton |
| Okinawa |
| Patuxent River |
| Portsmouth |
| Quantico |
| Rota |
| Suffolk |
| Virginia Beach |