Adult Blood Lead Epidemiology and Surveillance (ABLES)

Program Description

ABLES is a long-standing state-based surveillance program of laboratory-reported adult blood lead levels (BLLs). From 1987 to 2013, NIOSH provided funding that resulted in the expansion of the ABLES program from 4 to 41 states. However, federal funding for State ABLES programs was discontinued in September 2013. In August 2015, funding to support adult BLL surveillance was resumed but at a reduced amount compared to the pre-2013 funding level. As of December 2015, 28 states collaborate with NIOSH to conduct adult BLL surveillance.

Lead-related health effects

Occupational lead exposure is an important health problem in the United States. Lead exposure causes acute and chronic adverse effects in multiple organ systems ranging from subclinical changes in function to symptomatic life-threatening intoxication. Moreover, evidence indicates that lead exposure at low doses can lead to adverse cardiovascular and kidney effects, cognitive dysfunction, and adverse reproductive outcomes. Current research has found decreased renal function associated with BLLs at 5 µg/dL and lower, and increased risk of hypertension and essential tremor at BLLs below 10 µg/dL. (National Toxicology Program. Health Effects of Low-level Lead Evaluation).

The objective

The public health objective of the ABLES program is identical to the Occupational Safety and

Health objective 7 in Healthy People 2020, which is to reduce the rate of adults (age 16 or older) who have blood lead levels (BLL) equal or greater than ten micrograms per deciliter (BLLs ≥10 µg/dL). The ABLES program aims to accomplish this objective by working with State ABLES programs to build state capacity to initiate or improve adult blood lead surveillance programs which can accurately measure trends in adult BLLs and which can effectively target interventions to prevent lead exposures.

Reference blood lead level for adults

In 2015, NIOSH designated 5 µg/dL (five micrograms per deciliter) of whole blood, in a venous blood sample, as the reference blood lead level for adults. An elevated BLL is defined as a BLL ≥5 µg/dL. This case definition is used by the ABLES program, the Council of State and Territorial Epidemiologists (CSTE), and CDC's National Notifiable Diseases Surveillance System (NNDSS). Previously (i.e. from 2009 until November 2015), the case definition for an elevated BLL was a BLL ≥10 µg/dL. The U.S. Department of Health and Human Services recommends that BLLs among all adults be reduced to <10 µg/dL. The U.S. Occupational Safety and Health Administration (OSHA) Lead Standards require workers to be removed from lead exposure when BLLs are equal or greater than 50 µg/dL (construction industry) or 60 µg/dL (general industry) and allow workers to return to work when the BLL is below 40 µg/dL. Data from the National Health and Nutrition Examination Survey (NHANES) show that the average BLL (geometric mean) of all adults in the United States in 2009–2010 was 1.2 µg/dL. See Reference Blood Levels for Adults, 2015-12-18; 2pages; 524 kb that illustrates these reference values.

OSHA Lead Standards give the examining physician broad flexibility to tailor special protective procedures to the needs of individual employees. Therefore, the most current guidelines for management of lead-exposed adults should be implemented by the medical community at the current CDC/NIOSH reference BLL of 5 µg/dL. Recommendations for medical management are available from the Association of Occupational and Environmental Clinics, California Department of Public Health, and the Council of State and Territorial Epidemiologist (CSTE) Occupational Health Surveillance Subcommittee.

State ABLES programs activities

ABLES state interventions to prevent lead exposures include:

- conducting follow-up interviews with physicians, employers, and workers
- investigating work sites
- providing technical assistance
- providing referrals for technical assistance and enforcement of the lead standards
- developing and disseminating educational materials and outreach programs.

ABLES states are required to have a mandatory state requirement that laboratories report BLL results to the State Health Department or designee. The lowest BLL to be reported varies from state to state. Most states require reporting of all BLLs. The reporting of all BLLs, elevated or not, is extremely useful for the analysis of these data and is recommended for any state planning to either initiate or change their reporting requirements.

ABLES partnerships

ABLES states are encouraged to develop effective working relationships with Environmental Public Health Tracking and Childhood Lead Poisoning Prevention programs within their state. Lead may be taken home from the workplace on clothes or in cars thus potentially exposing spouses and children. Children who come in contact with lead-exposed workers should be targeted for blood lead screening.

ABLES states are also encouraged to develop effective working relationships with other federal and state agencies involved in preventing lead exposure including OSHA, Department of Housing and Urban Development (HUD), Environmental Protection Agency (EPA), Department of Transportation (DOT), and Department of Defense (DOD).

Besides the 28 State ABLES programs, other partners collaborating with ABLES to achieve the Healthy People 2020 adult lead objective include:

- OSHA–Safety and Health Topics – LEAD
- CPWR. Center for Construction Research and Training
- Council of State and Territorial Epidemiologists – Occupational Health

To facilitate communications on issues involving lead exposure among adults, the ABLES program maintains a *listserv*, and meets once a year in conjunction with the Annual Conference of the Council of State and Territorial Epidemiologists.

ABLES Impact

In the United States, when the exposure source is known, approximately 95% of BLLs ≥25 µg/dL in adults are work related. Lead exposure occurs mainly in the battery manufacturing, lead and zinc ore mining, and painting and paper hanging industries. In 2008, OSHA updated its National Emphasis Program for Lead to reduce occupational exposures by targeting unsafe conditions or high hazard industries. OSHA utilized national ABLES program data to identify those industries where elevated BLLs indicated a need for increased national focus. State ABLES programs also work with OSHA by sharing lead exposure data, which OSHA then uses to initiate investigations and promote prevention interventions.

Over the last 18 years, a 54% decrease in the national prevalence rates of BLL ≥25 µg/dL has been documented using ABLES surveillance data. In 1994 the rate was 14.0 employed

adults per 100,000; in 2011 the rate was reduced to 6.4. In 2010, 40 state ABLES programs that provided data reported 31,081 adults with BLLs ≥10 µg/dL. Among these, 8,793 had BLLs ≥25 µg/dL, and 1,388 had BLLs ≥40 µg/dL. Based on data from 37 reporting states, ABLES established the 2010 baseline rate for Healthy People 2020 objective to reduce adult lead exposure. This 2010 baseline rate for BLLs ≥10 µg/dL is 26.4 adults per 100,000 employed adults.

Though rates of BLL ≥25 µg/dL have decreased, the work to prevent elevated BLLs is still far from complete. The ABLES data from 2010 establish that lead exposure remains a national occupational health problem, and that continued efforts to reduce lead exposures are needed. Because BLLs are often not available for many lead-exposed workers (e.g., the workers may not be tested or their tests may not be reported to public health authorities), ABLES data should be considered a low estimate of the true magnitude of elevated adult lead exposures in the United States. (See also Data into Action: NIOSH Blood Lead Surveillance Program Contributes to a Decline in National Prevalence Rates).

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