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Universal Lead Screening Requirement: A California Case Study

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Objectives. To estimate potential impacts of California Assembly Bill (AB) 1316: a requirement for universal screening and insurance coverage for child blood lead testing.

Methods. In April 2017 the California Health Benefits Review Program (Oakland, CA) analyzed AB 1316 for the California legislature, including a systematic review of lead screening effectiveness, commercial insurer surveys regarding screening coverage, and actuarial utilization and cost implication assessments.

Results. Universal screening requirements would increase child lead testing by 273%, raise affected populations' premiums by 0.0043%, and detect an additional 4777 exposed children 1 year after implementation.

Conclusions. The evidence for a net societal benefit of universal screening approach is limited and is not supported by prominent medical professional groups.

Public Health Implications. California expanded targeted screening to identify additional children at higher risk for lead poisoning on the basis of California-specific risk factors, while mitigating the potential harms of universal screening such as an increase in false positive tests and health care costs. (*Am J Public Health.* 2018;108:355–357. doi:10.2105/AJPH.2017.304239)

Chronic childhood lead exposure is linked to significant long-term consequences, including neurologic symptoms, behavioral disorders, cognitive delays, and lower educational attainment.¹ Sources of exposure include lead-based paint, contaminated water and soil, and imported goods.² Exposed children may be asymptomatic; therefore, physicians use verbal risk assessments and blood lead level (BLL) tests to determine exposure severity and appropriate treatment.² The Centers for Disease Control and Prevention acknowledges that there is no safe level of lead exposure but currently classifies 5 micrograms per deciliter or more of lead in the blood as “elevated.”² California guidelines suggest physicians consider public health case management referrals for BLLs of 10 micrograms per deciliter or more and treat BLLs of 45 micrograms per deciliter or more as urgent medical conditions.³ Through nationwide abatement policies such as the prohibition of leaded gasoline and paint, the prevalence of elevated BLLs has decreased across the United States from 7.6% in 1997 to 0.5% in 2015.⁴

In California, BLL screening is required for children enrolled in Medicaid and other public assistance programs and children deemed at risk because they live in a home built before 1978.³ In 2012, approximately 20% (603 357) of all California children aged 0 to 5 years were screened; 1.89% had BLLs of 5 micrograms per deciliter or more and 0.26% had BLLs of 10 micrograms per deciliter or more.⁵ However, recent estimates suggest that only 37% of California children with elevated BLLs are correctly identified, indicating that surveillance gaps exist.⁶

In response to high-profile exposure cases (e.g., Flint, MI), policymakers have been exploring mechanisms to address childhood

lead exposure. In 2017, 30 states introduced 205 bills to address lead exposure.⁷ Among the 6 lead-related bills introduced in California, Assembly Bill (AB) 1316 proposed expanding BLL testing to all children regardless of assessed risk and required insurance coverage for lead screenings. Because 10 states and the District of Columbia already require universal screening and 2 more considered similar legislation in 2017, we describe the potential impacts and current status of legislation requiring universal childhood lead screening in California.^{7,8}

METHODS

At the request of the California State Legislature, the California Health Benefits Review Program (CHBRP) conducted a comprehensive analysis of AB 1316.⁹ CHBRP includes University of California faculty who provide the legislature with independent analyses of health insurance-related bill impacts. CHBRP used 3 information sources for this analysis: a systematic literature review, a survey of California's largest health insurers, and utilization and cost data analyzed by contracted actuaries using Truven Health Analytics' 2014 to 2015 MarketScan claims database. The analysis was limited to state-regulated health insurance and excluded government-funded plans (e.g., Medicaid).

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RESULTS

The most recent US Preventive Services Task Force Guidelines recommend against universal BLL screening and conclude that there is insufficient evidence for or against screening children at increased risk.¹⁰ In addition, CHBRP found no recent literature that compared the effectiveness of universal versus targeted lead exposure screening.⁹ One 1997 study used mathematical simulations and found that at or above a 14% prevalence of elevated BLLs among those aged 1 year, the benefits of universal screening outweigh the costs.¹¹ In addition to higher testing costs, false positives and screening-related anxiety were identified as potential harms of universal screening.

Approximately 1 016 435 California children aged 0 to 72 months had health insurance subject to AB 1316, with all plans covering BLL screening. However, AB 1316 changed the standard of care to require universal BLL screening. Therefore, in the first year after AB 1316 implementation, it is estimated that 252 754 additional children would receive a BLL test, representing a 273% increase (Table 1). CHBRP also estimates that an increase in utilization of BLL tests would increase total net health care expenditures in the state by \$6.2 million in the first year, which would result in a 0.0043% average premium increase paid by enrollees or employers.

On the basis of California’s 2012 surveillance of elevated child BLLs (1.89% with BLLs ≥ 5 $\mu\text{g}/\text{dL}$ and 0.26% with BLLs ≥ 10 $\mu\text{g}/\text{dL}$), the additional 252 754 screenings attributable to AB 1316 conducted 1 year after the mandate may detect elevated BLLs (≥ 5 $\mu\text{g}/\text{dL}$) among an estimated 0.47% (4777) children with health insurance subject to AB 1316. Additionally, 0.06% (657) children may be found to have BLLs of 10 micrograms per deciliter more, the level at which California physicians may consider referrals for public health case management.

DISCUSSION

We found that universal screening in California may lead to an estimated additional quarter million children screened in the first year and nearly 5000 children identified with BLL of 5 micrograms per deciliter or more. In subsequent years, the number of new screenings may be smaller as the backlog of unscreened children diminishes. A minimal increase in health insurance premiums would ensure coverage for these screenings.

In April 2017, this analysis was submitted to the California Assembly Health Committee for use in their deliberations on AB 1316. Opposition to the bill was registered by the California Medical Association and the

American Academy of Pediatrics, which noted that the bill’s universal screening requirement contradicts current medical literature related to lead screening.¹² The revised bill requires targeted screening of high-risk children by expanding the criteria for determining risk, including factors such as time spent in a home, a school, or other building built before 1978; proximity to a former lead or steel smelter or industrial facility; and proximity to freeways or other heavily traveled roadways. The governor signed this version of the bill into law on October 5, 2017. Because of the shift in requirements from universal to expanded targeted screening, it stands to reason that the amended bill would lead to fewer additional screenings and subsequently fewer newly detected cases of child lead exposure than are estimated here. However, because BLL screening has a false positive rate of 3% to 9% of tests,⁹ the amended bill’s expanded targeted screening would likely produce a lower number of false positives than would universal screening.

PUBLIC HEALTH IMPLICATIONS

It is important to consider this policy decision in the broader context of lead screening nationally. Amid the declining prevalence of

TABLE 1—Utilization and Cost Implications of Legislation to Require Universal Blood Lead Level Screening: California, 2017

Variable	Baseline	First Year After Mandate	Increase or Decrease	% Change
No. enrollees with health insurance subject to AB 1316				
Total enrollees	13 175 000	13 175 000	0	0.0000
Total child enrollees (aged 0–72 mo)	1 016 435	1 016 435	0	0.0000
Utilization and unit cost				
No. enrollees receiving lead tests				
Aged 0–24 mo	63 651	313 504	249 853	393.0000
Aged 25–72 mo	29 014	31 915	2 901	10.0000
Total	92 665	345 419	252 754	273.0000
Expenditures, \$				
Premium expenditures	132 684 037 000	132 690 258 000	6 221 000	0.0047
Enrollee expenses	13 565 623 000	13 565 623 000	0	0.0000
Total expenditures	146 249 660 000	146 255 881 000	6 221 000	0.0043

Note. AB 1316 = California Assembly Bill 1316; CDI = California Department of Insurance; DMHC = California Department of Managed Health Care. Total includes enrollees in all DMHC- and CDI-regulated plans (13 175 000 in DMHC- and CDI-regulated plans of 24 048 000 in all plans subject to state benefit mandates is equivalent to 55%). These estimates are for the first year after the implementation of universal screening only; the number of additional screenings in subsequent years is expected to be less.

Source. California Health Benefits Review Program. *Analysis of California Assembly Bill 1316 Childhood Lead Poisoning: Prevention; A Report to the 2017–2018 California State Legislature.* Oakland, CA; 2017.

elevated BLLs, agencies such as the Centers for Disease Control and Prevention and the Centers for Medicare and Medicaid Services have reexamined universal screening and have opted to recommend targeted policies.² With legislation requiring universal screening enacted or under consideration in many states, these findings are important for legislators and advocates to consider in weighing the costs and benefits of such proposals. Although the costs of universal screening are not significant, the evidence to support a universal screening approach is limited and is not supported by prominent medical professional groups. Yet, the previous methodology employed in California was also criticized for requiring only 1 question regarding age of housing as a mechanism for identifying those at high risk.

By passing the amended version of AB 1316, California was able to expand targeted screening to identify additional children at higher risk for lead poisoning on the basis of California-specific risk factors, while mitigating potential harms of universal screening such as an increase in false positive tests and health care costs. In addition, future studies should explore the relationship between universal screening policies and the corresponding identification of additional children with elevated BLLs. Data sharing of rates of identified children with elevated BLLs and collection of zip codes when reporting elevated BLLs (as required per AB 1316) between state health departments and researchers could help in the effort to identify the most effective policies for elevated BLL identification. **AJPH**

CONTRIBUTORS

S. B. McMenamin conceptualized the brief, supervised preparation, and contributed to policy analysis. S. P. Hiller conducted the literature review. S. P. Hiller and R. Shimkhada conducted the public health impact analysis. S. P. Hiller and R. Shimkhada assisted with article preparation. E. Shigekawa conducted the policy analysis and contributed to the initial draft and revisions of the brief. T. Melander completed the first draft of the brief. R. Shimkhada interpreted the cost data.

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HUMAN PARTICIPANT PROTECTION

No protocol approval was necessary because no human participants were involved in this study.

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