Blood Lead Testing by Pediatricians: Practice, Attitudes, and Demographics

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ABSTRACT

Objectives. This study aimed to evaluate adherence and identify ways to improve concordance between blood lead testing guidelines and practice.

Methods. One hundred fifty-five pediatricians responded to a questionnaire assessing demographic, knowledge, and attitudinal factors relating to lead testing.

Results. Only 27% of the respondents adhered to the guidelines, and less than half knew all of the answers to three factual questions about the recommendations. Adherence was higher among physicians who knew the guidelines, were more recently trained, or had high proportions of Medicaid or minority patients.

Conclusions. Physician education and financial incentives hold the most promise for increasing adherence to blood lead testing guidelines. (*Am J Public Health.* 1997;87:1349–1351)

Introduction

Lead poisoning is a common and preventable pediatric health problem.[1] In 1991, the Centers for Disease Control and Prevention (CDC) issued guidelines calling for routine blood lead testing of children beginning at 12 months of age.[1] Despite the mandate, informal reports indicated widespread nonadherence to the recommendations. This study's aim was to evaluate pediatricians' adherence to the CDC guidelines and to identify demographic, knowledge, and attitudinal predictors of adherence.

Methods

All pediatricians with addresses in San Francisco or Alameda counties who were members of the American Academy of Pediatrics, and who were listed by the California Medical Association as delivering primary care (n = 224) were mailed a 14-item questionnaire in April 1993. Second and third mailings and a telephone call were directed to initial nonrespondents. The survey included multiple-choice questions on the physician's current practice regarding blood lead testing, knowledge about lead poisoning, and attitudes toward the CDC guidelines, as well as questions concerning demographic characteristics of the physician and his or her patient population. With regard to lead testing practices, physicians were given five practice options and asked to check all that applied. Chi-squared tests, Wilcoxon rank-sum tests, and logistic regression were used in analyzing data.

Results

The response rate was 86% (155 of 180). Of the respondents, 80% were White and 47% had completed residency before 1978. Sixty-four percent were in private practice; 18% practiced in academic, public, or community clinic settings; and 18% practiced in health maintenance organizations (HMOs). Other characteristics of the physicians and their patient populations are shown in Table 1.

Lead testing practices varied widely (Table 2). Only 27% of pediatricians reported ordering blood lead tests routinely for all asymptomatic children less than 6 years of age. Ten percent of the respondents reported generally ordering no tests at all, while the rest ordered tests based on a published questionnaire or on risk factors or symptoms. Although 72% of respondents knew that the CDC recommended testing all children at 12 months of age, only 64% knew that 10 μg/dl was then the lowest blood lead level associated with deficits in cognitive function. Only 26% of respondents were found to test for symptoms or past history of lead poisoning. Forty-six percent of respondents gave the correct answers to all three knowledge questions and were scored as knowing the CDC guidelines. Pediatricians who knew the CDC recommendations were almost four times as likely as those who did not to order tests universally ($P < .01$).

Table 1 shows associations between the practice of universal lead testing and demographic characteristics and attitudes. Universal testing was practiced more commonly by pediatricians who had more recent training ($P = .001$), who practiced in academic settings or public or community clinics ($P < .01$), who had more than 50% non-White patients ($P = .001$), or who had more than 50% MediCal patients ($P < .001$). Physicians in HMO settings were less likely than those in private or other types of settings to report testing universally ($P < .001$).

Pediatricians who agreed with the statements "Lead testing is not necessary for my patients" ($P < .05$) and "The venipuncture necessary for a lead test is not worth the trauma to the child or the inconvenience to parents" ($P < .05$) were less likely than others to test universally. However, there was no single attitude

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TABLE 1—Pediatricians' Demographic Characteristics and Attitudes Associated with Lead Testing Practices: Alameda and San Francisco Counties, California, 1993

Characteristic	Pediatricians with Characteristic, No. (%)	Pediatricians with Characteristic Who Universally Test, No. (%)	*P*
Gender			
Male	90 (58)	22 (24)	NS
Female	65 (42)	20 (31)	
Race			
White	123 (79)	91 (74)	NS
Non-White (including Hispanic)	31 (20)	10 (32)	
Year residency completed			
Since 1988	43 (28)	21 (49)	.001
1983–1987	22 (14)	5 (23)	
1978–1982	15 (10)	3 (20)	
Before 1978	76 (49)	13 (17)	
Practice setting			
Academic, public, or community clinic	28 (18)	22 (79)	<.001
Private practice	99 (64)	19 (19)	
Health maintenance organization	28 (18)	0 (0)	
Non-White patients, %			
<10	18 (12)	1 (6)	.001
10–25	31 (20)	4 (13)	
26–50	54 (35)	12 (22)	
51–75	32 (21)	15 (47)	
>75	20 (13)	10 (50)	
MediCal or county-funded patients, %			
<10	68 (44)	7 (10)	<.001
10–25	39 (25)	8 (21)	
26–50	18 (12)	6 (33)	
51–75	10 (6)	4 (40)	
>75	20 (13)	17 (85)	
Agreement with following attitudinal statements[a]			
Lead testing is not necessary for my patients	52 (34)	8 (15)	<.05
The venipuncture necessary for a lead test is not worth the trauma to the child or the inconvenience to the parents	33 (21)	4 (12)	<.05
Public health follow-up on lead poisoning cases is inadequate	74 (48)	20 (27)	NS
Medical intervention for lead poisoning is not effective	21 (14)	8 (38)	NS
Reimbursement for testing is inadequate	36 (23)	9 (25)	NS

Note. n = 155 pediatricians. Differences between pediatricians who did and did not universally test were evaluated with chi-squared tests (gender, race, and practice setting) or Wilcoxon rank-sum tests (date residency completed, percentage non-White patients, and percentage MediCal or county-funded patients). NS = not significant.
[a]Response categories included agree strongly, agree somewhat, disagree somewhat, disagree strongly, and no opinion. In this table, "agreement" combines the agree strongly and agree somewhat categories.

statement that could explain noncompliance for the majority of pediatricians who did not test universally. Logistic regression of predictors of testing practice (universal vs nonuniversal) showed that, after adjustment for demographic characteristics and knowledge, attitudes were not significant independent predictors of universal testing.

Discussion

This research is unique in delineating the gap between the lead testing policy recommended by a national public health agency and actual practice 2 years later. We found widespread nonadherence to the CDC guidelines for universal blood lead testing of children after there had been adequate time for dissemination. Knowledge about CDC guidelines was spotty, with only 46% of physicians answering correctly the three questions concerning the guidelines. Even more important, knowledge alone did not guarantee adherence to guidelines: only 27% of the pediatricians we studied adhered to the universal testing recommendation.

This study showed that nonadherence to the lead testing guidelines was associated with certain characteristics of physicians and their patient populations. Those physicians with less factual knowledge or with less recent training were less likely to adhere. This suggests that improving physicians' knowledge would be a necessary, although not sufficient, means of improving guideline adherence.

Adherence also seemed to follow financial incentives. The California Childhood Health and Disability Prevention program, which funds care for many of the state's poor children, requires a blood lead test starting at 12 months of age before the health care provider is reimbursed for a preventive visit.[2] Thus, it was not surprising that physicians in academic, public, or community clinic settings, or those with higher proportions of MediCal patients, were more likely to report universal testing. The private and HMO physicians who did not universally test may have believed that it was not warranted based on low prevalences of lead poisoning.[3,4] In fact, CDC guidelines suggest that, in populations with low prevalences of lead poisoning, selective approaches may be more cost-effective than universal testing.[1]

Caution is advised in applying these findings nationwide. While the study sample was representative of California pediatricians, it may not apply to pediatricians elsewhere in the United States, or to nonpediatrician child health providers.

We conclude that there is wide divergence between lead testing policy and real-life practice and that this gap could be addressed by better physician education and incentives.[5] Controversy about lead testing recommendations continues, and the guidelines seem likely to soon be revised.[6–11] As the guidelines are refined, further studies of physician practices and responses are needed so that the

TABLE 2—Associations between Pediatricians' Knowledge of Centers for Disease Control and Prevention (CDC) Guidelines and Blood Lead Testing Practices: Alameda and San Francisco Counties, California, 1993

Testing Practice	Overall Group (n = 155), No. (%)	Knew CDC Guidelines (n = 72), No. (%)	Did Not Know CDC Guidelines (n = 83), No. (%)	P
Universally for children less than 6 years old	42 (27)	32 (44)	10 (12)	<.001
Based on answers to a published questionnaire listing risk factors	50 (32)	21 (29)	29 (35)	NS
For patients I consider at risk (e.g., race/ethnicity, poverty, or folk remedies)	94 (61)	42 (58)	52 (63)	NS
For symptoms or past history of lead poisoning	41 (26)	20 (28)	21 (25)	NS
Generally no tests at all	16 (10)	5 (7)	11 (13)	NS

Note. n = 155 pediatricians. Percentages sum to more than 100 because respondents were asked to check all statements that described their testing practices. Chi-square tests were used to evaluate subgroup differences. NS = not significant.

gap between policy and practice can be effectively bridged. □

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