

**Feasibility and Effectiveness of Screening
for Childhood Lead Poisoning
in Private Medical Practice**

Screening for childhood lead poisoning has long been the domain of public health agencies serving disadvantaged urban populations. Greater understanding of the disease, however, has altered the scope of screening. Based on a wealth of recent data showing

that even low levels of lead exposure can cause lasting damage and that children of all socioeconomic, ethnic, and geographic descriptions may be exposed,¹⁻⁸ the Centers for Disease Control and Prevention (CDC) in Atlanta, Ga, in October 1991, redefined the population in need of screening to include all "children ages 6 to 72 months . . . unless it can be shown that the community in which these children live does not have a childhood lead poisoning problem."⁹ The CDC's recommendations have since been reinforced by other research and commentary.¹⁰⁻¹⁸ Nonetheless, some skepticism remains with regard to the need for and feasibility of widespread screening such that acceptance of the new CDC standard has been limited.^{13,19}

In 1991, the Milwaukee Lead Poisoning Prevention Program in Wisconsin adopted a strategy of universal screening based on the CDC's recommendations. However, public sector screening was not easily expandable and the majority of children, rich and poor alike, are served locally by physicians in private practice. Therefore, the Milwaukee Health Department, with the support of the Children's Hospital of Wisconsin in Milwaukee, implemented a vigorous campaign to encourage universal screening for childhood lead poisoning among private practice physicians. The following report describes our campaign and the observed trends in screening and new case findings over a 4-year period.

Methods. From January 1991 through June 1992, we devised and implemented a strategy to encourage and enable private practice physicians to routinely screen for lead poisoning in all age-eligible (6 months to 6 years) children in their practices. Initially, an informal survey of a convenience sample of local practitioners was performed to identify knowledge, attitudes, and practices regarding childhood lead poisoning, with special attention paid to identifying real or perceived barriers to office-based screening. Then, by combining the rosters of pediatricians, family practitioners, and general practitioners of the Milwaukee County Medical Society, the medical staff of the Children's Hospital of Wisconsin, and the *Milwaukee Yellow Pages* telephone directory and by excluding specialists and others who denied providing primary care to preschool-age children, we compiled a list of 230 physicians who provided primary care to the children of Milwaukee. A systematic attempt was made to visit the offices of each of the 230 physicians to meet with the physicians directly as well as with their nursing, laboratory, and clerical staffs to address practical aspects of blood collection, laboratory processing, billing, reporting, and follow-up. Problems identified during the office visits were addressed on an individual and system-wide basis. We acted as problem solvers and liaisons between physicians and health maintenance organizations, commercial and public laboratories, medical supply houses, and nursing and environmental bureaus of

the health department. To establish the validity and practicality of capillary blood lead levels, we conducted two small pilot studies comparing fingerstick capillary blood lead levels with those of simultaneously drawn venous blood. The studies showed excellent correlation between capillary and venous blood lead levels that assured local physicians that both methods were acceptable (Milwaukee Health Department, unpublished data, August 1991).

Either capillary or venous blood lead levels were accepted for the purpose of screening. However, all capillary specimens with blood lead levels of 1.21 $\mu\text{mol/L}$ (25 $\mu\text{g/dL}$) or higher required venous blood confirmation. Although the CDC considers blood lead levels as low as 0.48 $\mu\text{mol/L}$ (10 $\mu\text{g/dL}$) to be of concern,⁹ for the purposes of this report, a case of lead poisoning is defined as a child with a blood lead level of 1.21 $\mu\text{mol/L}$ (25 $\mu\text{g/dL}$) or higher noted for the first time. Elevated blood lead levels for previously identified cases were excluded from the analysis. We used a blood lead level of 1.21 $\mu\text{mol/L}$ (25 $\mu\text{g/dL}$) or higher as the operational definition because it is the level at which full intervention is currently applied in Milwaukee. Also, Wisconsin requires that only levels of 1.21 $\mu\text{mol/L}$ (25 $\mu\text{g/dL}$) or higher be reported to the public health department. Both physicians and laboratories are required to report blood lead levels of 1.21 $\mu\text{mol/L}$ (25 $\mu\text{g/dL}$) or higher.

All cases of lead poisoning reported in both the public and private sectors are recorded for each year from 1989 through 1992. In addition, all blood lead levels (as opposed to cases only) collected in the public sector are reported. Thus, exact denominator data are available for the public portion of the total population screened. All screenings in the public sector are recorded for the years 1989 through 1992. The case finding rate is calculated for each year by dividing the number of newly identified cases by the number of screenings. In mid-1991, the direct blood lead level replaced the less sensitive erythrocyte protoporphyrin screening test as the standard screening measure in Milwaukee.^{20,21}

Finally, in December 1992, a convenience telephone survey using a structured questionnaire was carried out with 109 of the 230 identified primary care physicians reached on the first telephone call to assess the rates of screening in their practices, the methods used, and their motivations for or against increased screening.

Results. From 1989 through 1992, lead poisoning cases identified by the public sector increased from 309 to 463, while those identified by the private sector increased from 114 to 796. Public sector screenings increased approximately 20% over the same period, from 6313 to 7616. Total private sector screenings were not reported. However, if it is assumed, conservatively, that the private sector had the same case finding rate as the public sector of 1992 (6.1%), private sector screenings would have to-

taled 13 114. Combined estimated screenings for 1992 would then be 20 720 or 34% of the entire population of 61 554 children 6 months to 6 years of age in Milwaukee, based on the 1990 census.

The **Table** lists new cases, public and private, identified for the years 1989 through 1992, the public sector screening totals, and the annual case finding rates. **Figure 1** shows the absolute numbers of and depicts the trends for new cases identified by the public and private sectors over the 4 years.

Figure 2 shows the distribution of blood lead levels for 7907 children screened by public sector services for one 12-month period, October 1991 through September 1992.

Of the 230 physicians identified as providing primary care to children in Milwaukee, only two groups (a total of four physicians) refused an initial office visit by us. Thus, 226 physicians were visited in their offices from July 1991 through June 1992. The length of the visits ranged from 15 minutes to 1 hour 15 minutes. The post-campaign telephone survey revealed that 95.4% (104/109) of physicians contacted stated that they had increased lead screening in their offices over the last 2 years. Three of the five physicians who had not increased screening had already been practicing universal screening. Universal screening (testing at least all 1-year-olds) was prac-

ticed by 58.7% (64/109) of physicians, and targeted screening (testing only those judged at risk by history) was practiced by 37.6% (41/109). Blood lead levels were the standard for all physicians except for one who used the erythrocyte protoporphyrin measure. One third (38 of 109) used predominantly capillary samples, while two thirds (71 of 109) used venous samples. The reasons most frequently cited for increased screenings were, in descending order, as follows: (1) CDC and American Academy of Pediatrics recommendations, (2) scientific evidence, (3) media attention, (4) requests from patients' parents, (5) health department promotions, and (6) availability of the fingerstick method. Ninety-eight physicians (89.9%) said that they would continue extensive screening.

Comment. In 1992, 796 children screened in the private sector were identified with blood lead levels of 1.21 $\mu\text{mol/L}$ (25 $\mu\text{g/dL}$) or higher. This represents an increase of over 600% in just 2 years in the number of cases of lead poisoning identified by private practice physicians. For the first time in the 20-year history of the Milwaukee Lead Poisoning Prevention Program, more new cases were identified by private practice physicians than by their public counterparts. Clearly, private physicians who care for children in Milwaukee now play a major role in lead poisoning screening and case identification. The rapid and dramatic change in clinical practice in Milwaukee demonstrates that screening for childhood lead poisoning is feasible in the private primary care setting. The large number of new cases identified demonstrates the effectiveness of such screening for case finding in a population such as Milwaukee's.

Unlike some jurisdictions, Wisconsin has no law that requires physicians to screen children for lead poisoning (*Pediatric News*, February 1992).²² Nevertheless, physicians in Milwaukee voluntarily changed their practice

Year	No. of Cases Identified		No. of Screenings in Public Sector	Public Sector Case Finding Rate, %
	Private Sector	Public Sector		
1989	114	309	6313	4.8
1990	127	253	6949	3.6
1991	240	368	7157	5.1
1992	796	463	7616	6.1

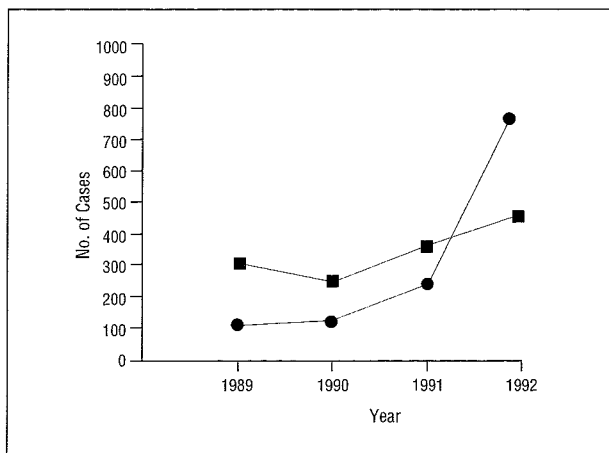


Figure 1. Number of cases of lead poisoning (blood lead level ≥ 1.21 $\mu\text{mol/L}$ [25 $\mu\text{g/dL}$]) in children identified by the public sector (squares) and the private sector (circles) in Milwaukee, Wis, for the years 1989 through 1992.

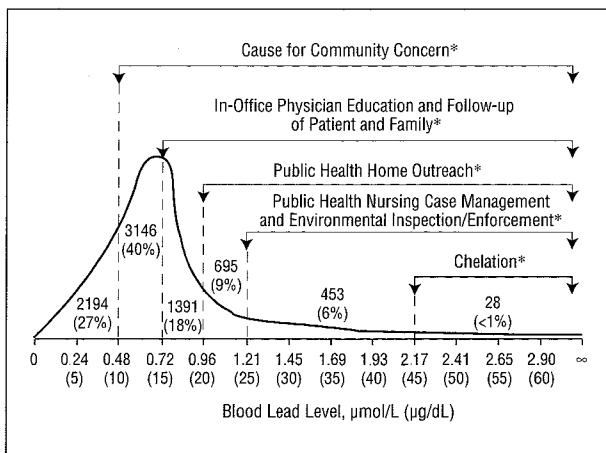


Figure 2. Distribution of blood lead levels for 7907 children screened by public sector services in Milwaukee, Wis, from October 1991 through September 1992. Asterisk indicates interventions adapted from Milwaukee Health Department Interventions and Recommendations.

patterns over a short period in accordance with CDC recommendations. We believe that this change was enhanced by the program of physician education and support carried out by the Milwaukee Health Department and the Children's Hospital of Wisconsin, although many other forces certainly contributed to the favorable outcome. The true impact of such a program may become clearer as screening rates over time are reported from other areas to be monitored by the CDC.^{23 24}

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