

INTRODUCTION

THE BATTLE AGAINST CHILDHOOD LEAD POISONING has been waged for decades. In the United States, at the dawn of the 21st century, victory is in sight but not yet in hand. The tragic truth is that childhood lead poisoning in the United States today is primarily concentrated among children in poverty, who can least bear its burden of diminished IQ and adverse effects on behavior and learning. If we are to identify and assist the children who are still being exposed to lead hazards, careful and conscientious screening of groups at risk is still a necessity. Unfortunately, routine screening of young children at disproportionate risk for lead poisoning is often overlooked, even by otherwise scrupulous and dedicated health care providers.

According to the Third National Health and Nutrition Examination Survey, Phase 2, children who are poor are more likely than other children to have elevated blood lead levels.¹ Further analysis of these data also showed that a child's status as a Medicaid beneficiary—probably because such status is an indicator of low income—was also associated with increased risk of having an elevated blood lead level; in fact, the higher a child's blood lead level, the more likely that he or she received Medicaid benefits.² In response to these findings, the federal government requires screening at the ages of 12 and 24 months for all children who receive Medicaid benefits. Children between the ages of 36 and 72 months with no record of prior screening must also receive a screening blood lead test.³ The American Academy of Pediatrics and the Centers for Disease Control (CDC) endorse this requirement.⁴ Nonetheless, according to the most recent data available, an estimated 81 percent of Medicaid-beneficiary children have not received the required screening.⁵ Thus, two out of three lead-poisoned children enrolled in Medicaid are never identified or treated.

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1. Centers for Disease Control and Prevention. *Update: Blood Lead Levels—United States, 1991–1994*. MMWR 1997; 46:141–6. Erratum: vol. 46, no. 7. MMWR 1997; 46:607.
2. US General Accounting Office, *Medicaid: Elevated Blood Lead Levels in Children*. GAO/HEHS-98-78, February 1998.
3. US Health Care Financing Administration, *State Medicaid Manual, Part 5: Early and Periodic Screening, Diagnosis, and Treatment (EPSDT). Section § 5123.2*, September 1998. Department of Health and Human Services, Health Care Financing Administration.
4. American Academy of Pediatrics. *AAP News*, 1999;15 (12) 6; Centers for Disease Control and Prevention, *Recommendations for Blood Lead Screening of Young Children Enrolled in Medicaid: Targeting a Group at High Risk*. Advisory Committee on Childhood Lead Poisoning Prevention (ACCLPP). MMWR 2000; 49 (No. RR-14):1–13.
5. US General Accounting Office, *Medicaid: Elevated Blood Lead Levels in Children*. GAO/HEHS-98-78, February 1998.

This report highlights strategies that states are developing to address this problem. A recurring theme in the strategies presented here is the centrality of reliable data systems

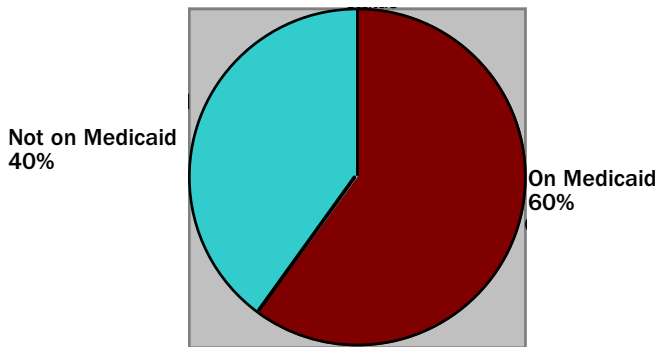
in improving lead screening. Such systems enable program staff to identify at-risk children, such as those who are Medicaid beneficiaries; to monitor and improve screening rates; and to track case-rates and follow-up care for those who are lead poisoned. Among the five states featured in this report, many were selected because of the extreme nature of the challenges they face in improving Medicaid lead screening. As a result, the reader of this report will notice wide variation in what constitutes “success” in meeting these challenges. At present, no state can claim to screen all of its children who are Medicaid benefi-

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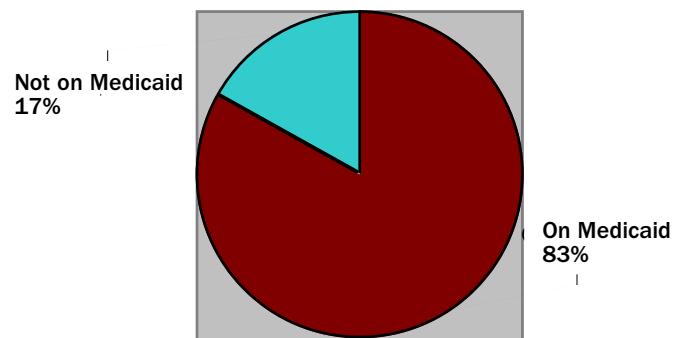
ciaries. But some states, notably those with long-standing state laws requiring screening of the entire pediatric population, can justifiably boast considerably higher screening rates than can some of the states highlighted in this report. It is the aim of this report to examine strategies that have been carried out under an array of circumstances that are relevant to as many states as possible—hence, the inclusion of strategies with results that, while promising, fall far short of the ideal mark of screening for all children in the Medicaid program as required by federal law.

One message that is clear throughout is that it is both very important and often very difficult to screen children who receive Medicaid benefits. Where more resources are required for this endeavor, these should be forthcoming. This report will have succeeded if it enhances understanding and promotes the actions necessary to reach those children who remain at risk for lead exposure.

Percent of children ages 1–5 with blood lead levels of 10 µg/dL and above, by Medicaid status



Percent of children ages 1–5 with blood lead levels of 20 µg/dL and above, by Medicaid status



Source: US General Accounting Office, *Medicaid: Elevated Blood Lead Levels in Children*. GAO/HEHS-98-78, February 1998.

BACKGROUND

Childhood lead poisoning in the United States today

Childhood lead poisoning remains a serious health threat in the United States, especially for children from low-income families. Exposure to lead increases the chances that a child will have learning and behavior problems. Harmful effects are seen at blood lead levels of 10 micrograms per deciliter ($\mu\text{g}/\text{dL}$). Most children are poisoned by lead hazards in their own homes, usually by ingesting lead dust from paint that is deteriorated or disturbed. And while regulations limiting lead use in paint, gasoline, food cans, and other consumer products have reduced lead exposure in the United States during the last 20 years, significant childhood exposure still occurs, primarily in older, distressed housing.

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How big is the problem?

Lead poisoning affects an estimated 890,000 preschoolers (about 4.4 percent of children one to five years of age) according to the most recent estimates from the Centers for Disease Control and Prevention (CDC).⁶ Some children are at high risk for lead exposure, while others are at very low risk. Nationwide, poor children are eight times more likely to be lead poisoned than children from upper-income families; black children are at five times higher risk than white children.

Why is screening important?

In the United States, lead poisoning is most often a *hidden* disease, making screening for lead exposure an important prevention tool. Most children in the United States with elevated blood lead levels do not have lead levels high enough to cause overt symptoms. But an increasing body of evidence associates serious adverse health effects with blood lead levels formerly thought to be safe. These effects, although serious, can be difficult to pinpoint. They include reductions in IQ and attention span and difficulties with learning and behavior. The severity of these health problems is directly related to the amount and duration of exposure to lead. *Routine screening among high-risk groups of children, using a blood lead test, is the only way to identify those with elevated blood lead levels, in order to halt their lead exposure and to ensure that they receive appropriate follow-up care.* As a result, public health and medical systems play a vital role in identifying and treating lead-poisoned children and catalyzing action to detect and control lead hazards to prevent further lead exposure.

6. Centers for Disease Control and Prevention. *Update: Blood Lead Levels—United States, 1991–1994.* MMWR 1997; 46:141–6. Erratum: vol. 46, no. 7. MMWR 1997; 46:607.

Why focus on children who receive health care benefits from the Medicaid program?

There is clear consensus among public health experts and epidemiologists that, as a group, young children whose health care is paid for by Medicaid are poor and, hence, are at higher risk for lead exposure than other groups, and thus screening this population is the right thing to do. Young Medicaid beneficiaries account for an estimated 60 percent of all children with elevated blood lead levels at or above the recognized level of concern

(10 µg/dL). And Medicaid-beneficiary children also make up an astounding 83 percent of all children with blood lead levels high enough to require individual follow-up—that is, blood lead levels of ≥ 20 µg/dL (see footnote 2).

HCFCA has taken several recent steps to increase blood lead screening.

The Medicaid program is an engine for promoting access to essential preventive health services, including lead screening, for the young, low-income children who are most likely to be exposed to lead. Thus, the efforts of Medicaid staff and health care providers are central to the national effort to guard these children from the lifelong burden imposed by lead poisoning.

What is being done to prevent lead poisoning in young children in Medicaid?

Since 1989, a screening blood test for lead poisoning has been required by federal law for children whose health care is paid for by Medicaid. But an estimated 81 percent of Medicaid-beneficiary children have not received the required screening, according to a 1998 GAO report. Thus, two out of three lead-poisoned children who are in the Medicaid program are never identified or treated (see footnote 2). The Health Care Financing Administration (HCFCA), the federal agency that oversees the Medicaid program, has taken several recent steps to increase blood lead screening, including streamlining requirements (all Medicaid recipients must be screened at 12 and 24 months of age)⁶ and requiring state Medicaid agencies to report annually on the number of children who received blood lead screening, using the HCFCA 416 report form.

Why are the lead-screening rates among children in the Medicaid program so low in some states?

Several reasons are often cited for low lead-screening rates among young Medicaid beneficiaries. These include:

- Systems to track screening and blood lead elevations among Medicaid beneficiaries are absent or not being used effectively. As a result, there is deficient evidence to describe both the lack of the service and its importance.

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6. US Health Care Financing Administration, *State Medicaid Manual, Part 5: Early and Periodic Screening, Diagnosis, and Treatment (EPSDT)*. Section § 5123.2, September 1998. US Department of Health and Human Services, Health Care Financing Administration.

- Health care providers are unwilling to screen because they do not believe that children are at risk for lead exposure, do not know about current policies from HCFA and from CDC, or are unclear about their roles in case-management and follow-up care, should they identify a child with an elevated lead level.
- Providers have contractual arrangements necessitating that children have their blood drawn at laboratories away from health clinics, making lead screening too logistically complicated for families to manage.
- Medicaid managed care contracts do not specify that lead screening must be performed at the ages of 12 and 24 months.
- Reimbursement and capitation rates for preventive services are too low to allow for the inclusion of lead screening, which is seen as being an unfunded “add-on” to existing required preventive services.
- Lead screening is not part of performance measurement for managed care plans and providers, and is neglected in favor of preventive services that are measured.

There are many ways in which states can work to address difficulties in blood lead screening among children in Medicaid.

What can states do to increase lead screening?

States can take a number of steps to address the problems cited above. These include the following:

- State information systems should make possible routine tracking of blood lead screening and estimation of prevalence of elevated blood lead levels among young Medicaid beneficiaries; managed care plans and health care providers should receive frequent screening and case bulletins.
- State Medicaid policies and program materials on lead screening should be up to date and widely available; managed care contracts should require lead screening and follow-up care; reimbursement and capitation rates should be adequate.
- Laboratory arrangements should be as convenient as possible for patients.
- Children identified with elevated blood lead levels should receive adequate follow-up care, with health care providers fully informed and participating.
- Lead screening rates of health care plans and providers should be measured and feedback provided and followed with appropriate incentives.

How Sites Were Selected for These Case Studies

The strategies in this report were selected because of their immediate relevance to the most pressing problems that states face in improving lead screening rates among young Medicaid beneficiaries. For gains to be made, improvements are necessary in two main areas: monitoring and tracking systems, and collaboration between the state Medicaid agency and childhood lead poisoning prevention programs that are generally located within state and local health departments. In a number of states, plans are afoot for bringing about such improvements. The states included in this report have developed and carried forward conscious strategies for better monitoring or for closer collaboration between state Medicaid agency personnel and the managed care plans and health care providers that serve Medicaid beneficiaries.

Note: In the interest of clarity, in each of these case studies, the agency responsible for administering the Medicaid program at the state level is generally referred to as “the state Medicaid agency.” The state agency responsible for maintaining a childhood lead poisoning prevention program, including a screening and surveillance component, is referred to as “the state lead program.” The reader should be aware that the agency housing each of these programs differs from state to state. In each case study where it is a significant factor, note is made of whether or not the state Medicaid agency and the lead program are housed in the same agency.

Case Studies in This Report

The Importance of a Clear Picture

How “putting lead poisoning on the map” brought improvements in lead screening among Oregon’s young Medicaid beneficiaries

The Importance of Getting the Facts

How the portable blood lead analyzer brought screening to a group of high-risk children in Washington State and helped investigators learn more about their lead risk

The Importance of Evaluation

How North Carolina used a collaborative evaluation project to help guide plans for improving Medicaid screening

The Importance of Synergy

How Wisconsin’s lead program and state Medicaid agency joined forces to improve lead screening and follow-up care

The Importance of Comparing Notes

How the Rhode Island lead program reaped the benefits of combining data from multiple sources

Abbreviations Used in This Report

CDC. The Centers for Disease Control and Prevention. This federal agency is part of the US Department of Health and Human Services and has cooperative agreements with state and local health departments for comprehensive childhood lead-poisoning prevention activities.

EPA. The United States Environmental Protection Agency. This federal agency implements federal laws on protection of air, water, and soil from pollution and funds some childhood lead-poisoning prevention activities in states.

EPSDT. The Early and Periodic Screening, Diagnostic, and Treatment Program. This program is part of Medicaid. Its provisions entitle children who are Medicaid beneficiaries to preventive health care services, including blood lead screening.

GAO. The United States General Accounting Office. This is the investigative arm of Congress, which exists to help Congress improve the performance of federal agencies.

HCFA. The Health Care Financing Administration. This federal agency is part of the Department of Health and Human Services and administers the Medicaid program in partnership with state Medicaid agencies.

SCHIP (or CHIP). The (State) Children's Health Insurance Program. Under this program, which is administered by HCFA and state Medicaid agencies, families whose incomes are too high to qualify them for Medicaid benefits may receive state subsidized health insurance benefits.

WIC. The Supplemental Food Program for Women, Infants, and Children. This program, administered by the federal Department of Agriculture, provides supplemental food to low-income families with children or pregnant women.

THE IMPORTANCE OF A CLEAR PICTURE

How “putting lead poisoning on the map” brought improvements in lead screening among Oregon’s young Medicaid beneficiaries

Background

Rates of lead screening in Oregon have remained low, regardless of the HCFA lead screening requirement.⁷ Many of Oregon’s health care providers discount the risk for pediatric lead exposure, even though Multnomah County (the county in which Portland is situated) ranks 48th in lead-exposure risk among all counties in the United States, according to an EPA risk model. (The model is based on the presence of old housing and poverty and on population size). In light of Oregon health care providers’ historic and vigorous resistance to routine lead screening, innovative efforts to improve screening services for Medicaid beneficiaries at particular risk were called for.

The lead program, located in the Oregon Health Division, and the state Medicaid agency, located in the Office of Medical Assistance Programs, are both within the Department of Human Services. The lead program maintains, as one of its key components, a complete database of children who have received blood lead testing and the results of such tests. The level of effort required to manage this database has been sustained since 1993, with state and federal resources devoted to maintaining completeness and accuracy in the data.

The state Medicaid agency maintains a complete database of children who are Medicaid beneficiaries. Pursuant to a recent change in the HCFA Form 416 reporting requirements, the state Medicaid agency must report annually on numbers of these children who have received lead screening. The two agencies agreed to combine elements of the lead screening database with elements of the Medicaid database as part of their approach to monitoring and improving screening of Medicaid beneficiaries.

The lead program and the state Medicaid agency linked their computerized databases to determine which young Medicaid beneficiaries had received lead screening and who among them had elevated blood lead levels. From the enhanced database that resulted, the lead surveillance coordinator constructed computerized maps showing the whereabouts of Medicaid beneficiaries, poisoned children, and neighborhoods with old, high-risk housing. The maps made possible the visual combination of the most important facts, helping decision makers and health care providers target resources to improve screening among high-risk children.

7. See Background for a history of HCFA’s lead screening and reporting requirements.

With an enhanced database, the lead surveillance coordinator was able to identify whether each child in his lead screening database was, in fact, a Medicaid beneficiary. He decided to take advantage of the visual power of a mapped display of data to make a forceful point about Medicaid lead screening. Using computer-based mapping technology to illuminate pockets of risk for lead exposure and cases of lead poisoning identified in and outside of these pockets, he demonstrated the distribution of risk and of screening events in the Medicaid pediatric population.

The maps clearly illustrated the clustering of cases and suggested the need for increased screening of Medicaid beneficiaries in certain zip codes.

The strategy's aim

The aim was to present layered displays of mapped information to illustrate the clustering of children identified with lead poisoning, in order to promote focused lead screening efforts by the overseers of managed care plans with contracts to serve Medicaid beneficiaries and their participating providers. The maps would also be used to assist in future decisions by the Oregon Health Division about lead screening policy.

How the strategy took shape

The lead surveillance coordinator in the Oregon Health Department approached his counterpart, who managed Medicaid data in the state Medicaid agency. The two prepared a prototype to demonstrate to their respective administrators how data elements would be combined and for what purposes. The prototype served as an efficient way to propose data sharing to higher ranking officials in the two agencies and to persuade them of the benefits of such cooperation.

The lead surveillance coordinator matched the blood lead test data in his database with Medicaid data to determine which Medicaid beneficiaries had received lead screening and which had elevated blood lead levels. (See the sidebar on Making Matches Among Different Databases.) For analytical purposes, the surveillance coordinator broke down zip codes into smaller units of analysis used for census data (census tract and census block group) in order to examine concentrations of particularly old housing. For the mapping display, he decided that zip code was preferable to the smaller units. (See the discussion of this issue below.) The coordinator generated computerized maps to show relationships among the data on zip codes, lead screening, and Medicaid status and plotted the location of children with elevated blood levels and children in Medicaid who had and had not received screening. (See the sidebar on Making Maps That Make a Point.)

Using colored transparent overlays on acetate sheets on an overhead projector, he showed these maps to managers and medical directors of Medicaid managed care plans, to task forces, advisory groups, and advocacy groups, and to epidemiologists in counties throughout the state. The maps clearly illustrated the clustering of cases and suggested the need

Making Matches Among Different Databases

For the lead surveillance coordinator, the goal of matching data from two databases was to answer the question “Which of the children who were on record as having had blood lead tests were also Medicaid beneficiaries?” While a simple matching strategy using only the names of children in each database might seem the obvious approach, this strategy has been shown to be unreliable for several reasons.

Names may be recorded differently or spelled differently in separate databases, so that records for the same child might not match. Conversely, two children might have the same name. To improve the reliability of the match, the best strategy is to generate for each record a “matching variable” combining elements that are nearly always present—for example, name and date of birth. Some matching variables result in more accurate and complete matching. In Oregon, a 95 percent success rate in generating true matches was achieved in two stages, using two different matching variables.

Step 1

Create the primary matching variable by combining the complete last and first names of each child with the date of birth.

Step 2

Merge the two databases using this variable, and write matched pairs to a new database.

Step 3

Pick up additional matches from among the remaining unmatched members of both source databases, by creating a less stringent secondary matching variable, combining the first three letters of the last name, first three letters of the first name, and the date of birth.

Step 4

Merge the two databases of unmatched children using this variable, and add any new matches to the database of matched pairs.

Step 5

As a validation step, the lead surveillance coordinator created an additional variable to identify whether the match was contributed by the primary or secondary matching variable and made a manual comparison of each matched pair, looking at the complete name in both databases. He found that over 95 percent of the matches were true matches. Thus satisfied, he combined matched pairs from both variables to create a file of probable matches.

Note: It is important to test various matching formulas, taking into consideration, for example, whether name conventions in some communities (among certain Asian or Hispanic populations, for instance) render some formulas less reliable than others.

for increased screening among Medicaid beneficiaries in certain zip codes. Invariably, his audiences were intrigued and many were inspired to ask further questions regarding targeting strategies.

Partnerships and resources

A major feature of this strategy was collaboration between data managers at the health department and at the state Medicaid agency. Approximately 20 percent of the surveillance coordinator's time over a period of one year went into the matching of the data and the development and presentation of the maps. In addition, the level of effort required to

The Oregon example demonstrates the importance of a practical relationship between staff of separate agencies.

maintain complete and accurate data on lead screening was significant, amounting to some 50 percent of the lead surveillance coordinator's time over several years. In addition to the coordinator, a full-time staff person was employed to collect information on demographics and follow-up care for children with elevated blood lead levels, and to enter data.

Sustained effort is central to this strategy. Without high-quality data that accurately reflect actual lead testing, the mapping strategy will not work and should not be attempted. Poor or misleading data on display in attractive maps are considerably worse than poor or misleading data locked away in a drawer. This curious fact stems from the very power of the visual image that is harnessed by the strategy described in this case study: it is possible to use fetching maps of poor data to persuade people erroneously.

Problems and solutions

The problem of collaboration across agency boundaries

Problem. Data that were needed to make a useful picture were housed in different agencies. Strict privacy and confidentiality rules might have scuttled plans for data sharing between agencies, even in the face of obvious benefit from such collaboration.

Solution. Starting at the staff level, rather than at the administrative level, allowed early identification and solution of problems. The lead surveillance coordinator in the Oregon Health Division is the staff person with responsibility for the database containing names and blood lead levels of children who received blood lead tests. He established a relationship with his counterpart at the state Medicaid agency. The two were quickly able to share information on record layouts and on important intra-agency relationships to determine what was feasible with regard to data sharing. Both understood database structure and the data components needed to create the maps. Together, the two developed a prototype of a combined data file and presented it to administrators, who readily supported the project because they could see its benefits and feasibility.

Making Maps That Make a Point

Step 1

Acquire mapping and geocoding software. (*Note:* Geocoding is one function within most mapping software. But separate geocoding software that is frequently updated is more accurate.)

Step 2

Use mapping software to generate a computerized map of the jurisdiction you would like to scrutinize.

Step 3

From census data files, available on the Internet, select the geographic units of analysis you will use. Zip code, census tract, and census block group are the units most commonly used.

Step 4

Using census data files, rank the selected units on the basis of percentage of older housing and poverty and other variables of interest. In this case study, “high-risk” zip codes were selected according to 1997 CDC recommendations—that is, zip codes in which at least 27 percent of housing units were built before 1950.

Step 5

Assign a single map color to each analytic unit (zip code, census tract, census block group) with similar characteristics.

Step 6

Use geocoding software to match the addresses in your lead surveillance database with spatial locations defined by x and y coordinates.

Step 7

Plot on the map the addresses of children who are Medicaid beneficiaries, children who have been screened, and children with elevated blood lead levels, using different symbols for each.

Step 8

Disseminate and discuss the resulting map, pointing out relationships between Medicaid beneficiaries, screening events, cases of lead poisoning, and “high-risk” zip codes. For example, use the map to discuss whether children with elevated blood lead levels are scattered all over the map or are clustered within the high-risk zip codes, and to compare screening rates.

Discussion. Sharing data across agency boundaries invariably surfaces as an issue in Medicaid lead screening. The principle illustrated by this case study is the primacy of a practical relationship between staff of separate agencies, *at the level at which the data are actually managed*. There were several clear advantages to this approach: efficient

The plan focused on those children who were most likely to be exposed and provided clear evidence of both the risk and the actuality of such exposure.

communication resulted because the data managers “speak the same language” and could quickly determine project feasibility and outlines; early development of a combined-data prototype made it relatively simple to demonstrate to busy administrators. And, with the advent of the HCFA requirement for annual reporting of Medicaid lead screening on the HCFA 416 form, the benefits of sharing data are even more apparent.

It is important to note that the lead surveillance coordinator identified to the state Medicaid agency the names of children who had received blood lead tests, but did not

furnish information on blood lead levels, thereby circumventing a problem with releasing confidential medical information.

The problem of geographic unit of analysis

Problem. Dividing a geographic area into analytic units raises competing claims. Within nearly any large geographic area, there are usually smaller areas with clusters of older, higher-risk housing. The problem is how to subdivide a geographic expanse in such a way that clusters of possible lead hazards are revealed, while maintaining a subdivision scheme that is simple and understandable to policymakers, health care plans and providers, and parents.

Solution. After analyzing the data at census-tract and census-block level to highlight variations, the surveillance coordinator chose zip code as the geographic unit for display of much of his information on age of housing and lead poisoning cases. The coordinator feels that, in a major urban area—such as that encompassed by Multnomah County (Portland, Oregon)—zip code is probably best.

Discussion. For data display purposes, zip codes have the advantage of being easily recognized by most people and tend to be relatively stable. In addition, in most urban areas, zip codes have approximately the same number of people. For data analysis purposes, census tract and census block-group might be preferable units because they generally are smaller and more homogeneous. (Homogeneity of the resident population is a defining principle of census units, but not of zip code, which is a unit created for expediting mail delivery). Using the finer census units to analyze data may reveal otherwise hidden clusters of lead exposure risk, such as older housing.

On the basis of his analysis of the smaller geographic units, the surveillance coordinator was satisfied that zip code adequately portrayed the clustering of older housing and cases of lead poisoning. He felt that any sacrifice of the accuracy of the smaller units was more than offset by the advantage of the zip code in making the information readily accessible to those who need it.

Measuring success

As a result of the presentation of the maps to staff of the Medicaid agency, health plans, providers, and members of various task forces and advisory groups, a plan was developed to study screening and case rates within the high-risk zip codes of Multnomah county. The initial definition of a high-risk zip code was one in which 27 percent or greater of the housing units were built before 1950. According to this definition, 85 percent of the zip codes in Multnomah County were high risk and were included in the study.

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During the 19-month study period, the health plans agreed to blood lead testing for all their Medicaid enrollees who lived in the target zip codes. Efforts were made to present the evidence of lead exposure risk to groups of managed care plan representatives, with hopes that they would communicate it to participating providers. Both screening and case identification were closely monitored by the lead surveillance coordinator. The results were presented regularly to the task force that contained representatives from managed care plans and the community, as well as to the Medicaid directors' group, which is a group of Medicaid staff and directors of managed care plans with Medicaid contracts.

For the entire study period, the rate of screening among one- and two-year-old Medicaid beneficiaries in the study zip codes was approximately 10 percent, which was twice that for Medicaid beneficiaries of the same age who lived outside the study zip codes. Once the study is complete, the data will be analyzed to determine if they can be used as a legitimate foundation for more refined targeting of screening efforts. Such an analysis will resolve the question of whether the collected data are representative of the population of Medicaid beneficiaries who live in the study area, with regard to demographics (age, race/ethnicity, for example) and age of housing. Although total numbers of screened children are small, if the data are representative they will be useful in making future decisions on screening this group of children.

Conclusion

In areas with low risk for lead exposure or where such exposures are highly localized, a contentious atmosphere often exists between pediatric health care providers and public

health agencies regarding lead screening. By focusing on the children who were most likely to be exposed and by providing clear evidence of both the risk and the actuality of such exposure, this strategy was tailored to address and resolve these tensions. The strategy is an expensive one, given the outlays in training and staff time to maintain, combine, analyze, and map data elements. On the other hand, in areas with isolated pockets of lead exposure, such a strategy may prove cost efficient, by promoting appropriate targeting mechanisms and using evidence to support the extra effort that providers must make to ensure the health of a high-risk subset of their patient population.

THE IMPORTANCE OF GETTING THE FACTS

How the portable blood lead analyzer brought screening to a group of high-risk children in Washington State and helped investigators learn more about their lead risk

Background

The state of Washington has a lead-risk profile that is substantially different from that of northeastern states. Overall, there is a low prevalence of lead poisoning in the state’s pediatric population. And whereas many children in the Northeast United States are lead poisoned in older, deteriorating urban industrial centers, in Washington State those with the highest risk for blood lead elevations are Hispanic children in the largely rural and agricultural counties in the center of the state.

The Washington lead program loaned surplus portable blood lead analyzers to clinics with high-risk patients in a successful effort to increase screening where other strategies had failed.

Efforts to promote blood lead screening in Washington have historically met with vigorous opposition from the state’s pediatric health care providers. Even efforts to target Medicaid beneficiaries have not proved successful. There has been little routine screening among this population despite a requirement by HCFA, the federal agency that oversees the Medicaid program. There is consensus among those who ensure preventive services for poor children—including the state Medicaid agency, its contracted managed care plans, and participating health care providers—that routine lead screening for all Medicaid beneficiaries would be a waste of scarce resources.

In response to 1997 guidance from CDC, a lead screening advisory committee was formed by the lead program to review existing data and to make recommendations for future lead screening. The committee recommended further screening among the children shown by previous screening and survey data to be at highest risk for lead exposure. Many of these children were seen in community health clinics. Data from screening in these clinics would provide a foundation for future lead screening guidelines.

The strategy’s aim

The lead program decided to try using its portable blood lead analyzers to screen high-risk children. The strategy had a number of purposes. Bringing lead screening to an unscreened, high-risk population was primary. A secondary purpose was to gather data about a population suspected of having a relatively high risk for lead exposure, but about whose blood lead levels not enough was known to support a routine screening policy.

An additional motive was to gather information about localized prevalence of blood lead elevations and to learn more about risk factors for these elevations among the target population. This information would be used in decisions about appropriate screening

In 1998 and 1999 Washington’s lead program bought five portable lead analyzers to perform targeted and statewide surveys of blood lead levels in children.

recommendations for the future. It was also expected that the strategy would increase health care providers’ awareness of lead poisoning in a relatively high-risk clinic population.

How the strategy took shape

The sequence of events that led to this strategy began with efforts by the lead program, situated in the Washington Department of Health. The lead program has managed a registry of all pediatric blood lead tests performed in Washington since 1993. Confronted with very low screening rates, in 1998 and 1999 the lead program purchased five portable lead analyzers

to perform targeted and statewide surveys of blood lead levels in children. The data from these surveys suggested a higher prevalence of blood lead elevations among Hispanic children living in nine counties in central Washington.

The lead program organized and managed an advisory committee to review the data and make recommendations for further lead screening. Upon review of the survey and routine screening data, the committee recommended further studies to determine ways to improve lead screening among the children identified as being at highest risk.

The lead program approached a number of community health clinics that serve both Medicaid-enrolled children and uninsured poor children in the target counties. Only a small amount of blood lead testing was taking place in these clinics. In addition to their belief that routine lead screening was unnecessary, clinic providers also cited the cost of such screening as an obstacle.⁸

The lead program offered to provide portable analyzers for the clinics and to pay for test kits during a 12-month study period. Providers in the clinics were willing to participate because they understood that their clinics served the children believed to be at highest

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8. Clinic providers were justified in claiming cost as an obstacle to screening all children on Medicaid, and, in any case, they had no funding for lead screening for uninsured children. Each of the selected clinics participated in Healthy Options, the Medicaid managed care program in Washington State. Managed care plans that take part in Healthy Options receive a “capitated” fee for providing preventive services for each Medicaid child that they enroll. The managed care plan has the option of paying its participating providers on a capitated or fee-for-service basis. It was widely understood that lead screening was to be left to the discretion of clinic providers, and thus the capitation rate could be seen as covering an occasional lead test deemed “medically necessary,” but it was not expected to cover routine lead screening for all. Thus, the fact that testing would be free was an important incentive for clinic providers to participate in the health department study.

risk for lead exposure in the state, and because neither they nor their patients would incur any cost. From among the group of clinics that were under consideration, the lead program selected the six clinics that were expected to test the most children in the shortest period of time.

Although the lead program staff had anticipated that the portable analyzer’s capacity to provide immediate feedback on a child’s lead level would be attractive, in fact, most clinics did not take advantage of this feature, and no providers asked families to wait in the clinic for immediate results. Instead, blood specimens were collected and held until a group could be analyzed in a single session.

Several clinics are on a waiting list to use the portable analyzers, and the lead program will rotate the instruments among these clinics.

Partnerships and resources

The Washington State Department of Health receives support from the CDC⁹ for its childhood blood lead surveillance activities. Program staff worked with local health departments to identify community clinics. The study required the time of lead program staff, one or two people a few days a month to train and support clinic personnel in using the portable analyzer. The lead program already had five portable analyzers from its previous survey activity and purchased a sixth analyzer (at a cost of approximately \$1,500) in order to add an additional clinic to the screening study in central Washington. The program also paid for test kits, at the rate of \$5 to \$7 per kit.

The possibility for partnerships between the lead program and the clinics serving the higher-risk counties has continued. Several clinics are on a waiting list to use the portable analyzers, and the lead program plans to rotate the instruments among these additional clinics during the remaining months of the study period.

Problems and solutions

The problem of CLIA certification

Problem. The use of the portable analyzer that is currently available is limited to sites with certification under the Clinical Laboratory Improvement Amendments (CLIA). (See the sidebar below on CLIA and the Portable Blood Lead Analyzer.)

Solution. The lead program used the portable analyzers under the auspices of the state public health laboratory, which has CLIA certification. Senior staff of the childhood lead-poisoning prevention program were trained to use the analyzer by staff at the state laboratory. These managers trained lab managers and staff at community clinics to use

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9. The CDC has cooperative agreements with 42 states and 15 locales to fund various aspects of childhood lead poisoning prevention.

CLIA and the Portable Blood Lead Analyzer

What is CLIA?

The Clinical Laboratory Improvement Amendments (CLIA) of 1998 establish minimum quality standards for all laboratories. In accordance with the CLIA program, laboratories are required to comply with specified quality-control regulations that depend on the complexity of the testing performed. (Source: Clinical Laboratory Improvement Amendments General Program Description, US Health Care Financing Administration, US Department of Health and Human Services, updated July 23, 1998; www.hcfa.gov/medicaid/clia/progdesc.htm.)

In the eyes of the CLIA program, how complex is the testing done by the portable blood lead analyzer?

The portable blood lead analyzer used in this case study is categorized in CLIA as “moderately complex.” This designation has the effect of greatly narrowing the number of locations allowed to use the device, as most physicians’ offices and many clinics are not certified to do “moderately complex” testing.

So, who can use the portable analyzer?

The device can only be used by, or under the auspices of, certified laboratories that participate in proficiency testing programs and meet other federal criteria.

Is there a plan for a portable blood lead analyzer that will be easier to use than the existing model and therefore more appealing to programs and clinics?

It is likely that within the next few years, a portable analyzer will be marketed that will be “CLIA-waived,” meaning that it will be easier to use, less subject to user error leading to inaccurate results, and, hence, no longer limited to practitioners who can meet strict criteria.

What effect might widespread use of the portable analyzer have on the collection of screening data?

The lab responsible for overseeing the use of the portable analyzer is also legally responsible for assuring that results obtained are properly reported. If CLIA-waived instruments become available in the future, reliable procedures will need to be established to maintain surveillance of blood lead testing.

the analyzer and to follow the testing protocol and perform quality control. They provided control samples that are analyzed and logged on a regular basis. They participated in the Wisconsin State Lab of Hygiene proficiency testing program for portable lead analyzers.

Discussion. Because the portable analyzer must be used under the auspices of a CLIA-certified laboratory, not all programs or clinics will be able to operate in a manner similar to that of the Washington lead program at the present time.

The problem of potential loss of screening data

Problem. The use of the portable analyzer for screening has the potential to make systematic collection of screening data more difficult. Currently, many state surveillance systems count on collecting reports of all blood lead tests from a limited number of laboratories where blood lead analysis is performed. Use of the portable analyzer presents the possibility that analysis of blood lead specimens will take place at a great many sites in clinics and doctors' offices, with the danger that screening information will be lost and surveillance systems will suffer.

Solution. The lead program requires that the clinics where the portable analyzer is used comply with the state reporting law for all blood lead tests. The lead program provided standard state blood lead reporting forms for each clinic and monitored the number of test kits each clinic received in order to verify the number of reports. The lead program also required clinics to keep log sheets of all tests so that that information could be matched with the number of reports submitted to the state.

Discussion. In the case of Washington State, the lead program was able to maintain control over reporting of blood lead tests because of its close involvement in the project. There are greater challenges to such surveillance in states where portable blood lead analyzers are widely used by CLIA-certified clinics or physicians.

Measuring success

The lead program has maintained a registry of lead screening and cases since 1993, and is able to measure the impact of the screening performed as a result of the portable-analyzer strategy. From March 1, 2000, when the study began, through October 31, 2000, 857 children had been tested, and seven (.08 percent) were found to have elevated blood lead levels ($\geq 10 \mu\text{g}/\text{dL}$). The number of children tested during the study period represents an enormous increase: during all of 1999 the participating clinics had performed a total of only 49 blood lead tests.

Lead program staff are hoping that between 1,500 and 2,000 children will be screened during the study period, and they are optimistic that this goal will be reached. At the end of the study period, the lead program will analyze the data collected and determine whether it can be used as the basis for further screening recommendations.

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THE IMPORTANCE OF EVALUATION

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How North Carolina used a collaborative evaluation project to help guide plans for improving Medicaid screening

North Carolina performed an evaluation of its statewide screening plan to determine the impact of a newly implemented policy on screening for Medicaid beneficiaries and to guide future improvement.

Background

During the past few years, several factors have had a positive impact on lead screening for children in North Carolina. The state has devoted attention and resources to surveillance and screening. Since 1993, the state lead program has maintained a centralized lead surveillance system, with regular dissemination of county-specific reports of screening and identified cases of lead poisoning. Since 1994, the state public health laboratory has provided free blood lead analysis for all children under the age of six.

Underlying these activities have been strong public health policies. Since 1992 the state health department has recommended at least one lead screening before the age of six for all children who receive preventive care at health departments, where most lead screening has historically taken place. It has recommended routine screening for all Medicaid-beneficiary children who receive care from private health care providers. And in 1998, it issued a statewide screening plan, calling for screening for all one- and two-year-old children who receive benefits from the Medicaid, CHIP, or WIC programs. As a result of all these efforts, screening rates have slowly but steadily increased. At present, approximately 20 percent of all children in the state under the age of six are screened for lead poisoning annually. Confronted by mounting evidence of the particular importance of lead screening for low-income children, staff of the lead program, the state Medicaid agency, and the WIC program developed a strategy to improve future screening.

The strategy's aim

The aim of the strategy was to determine the impact of the 1998 statewide plan and its associated promotion campaign on lead screening among Medicaid recipients, and to use the findings to improve future screening policies and programs.

How the strategy took shape

The strategy was predicated on the existence of reliable data on all children who had received blood lead tests in the state. These data are contained in a surveillance database with information dating back to several years before the new screening policy. Central to the strategy was examination of the impact of the 1998 policy on one- and two-year-old Medicaid beneficiaries. Unfortunately, the surveillance database lacked dependable information about the Medicaid status of the children whose records it contained.

Responding to this challenge, the surveillance staff of the lead program met with the managers of the statewide public health data system, a system that includes Medicaid and WIC data. Together, they developed a process for matching information from the lead surveillance database and the Medicaid database. It was a relatively easy additional step to add lead-screening status to the database of children in the WIC program. This enhancement made it possible for WIC clinic staff to determine whether a child's lead screening was up to date and to provide back-up screening for children who needed it, in accordance with the state's 1998 lead screening policy.

Staff of the lead program, the state Medicaid agency, and the WIC program developed a strategy to improve future screening.

The evaluation design called for the following activities:

- Generate a complete count of one- and two-year-old Medicaid-beneficiary children who, according to Medicaid claims records, had at least one preventive health visit during 1998 and 1999.
- Calculate the percentage of those children who had received at least one blood lead test.
- Analyze the data by geography, race, age, and provider type to provide the foundation for improving future lead screening.
- Compare screening rates in this population for the two-year period to demonstrate the impact of the 1998 statewide lead screening plan and promotional campaign.

Partnerships and resources

A close alliance among two agencies and three divisions was developed in order to combine data elements from three databases:

Lead surveillance data, held in the Department of Environment and Natural Resources, is an exhaustive list of names and blood lead levels for all screened children. Additionally, there is some demographic data, which tends to be more complete for children with elevated blood lead levels.

Medicaid data, held by the Division of Medical Assistance, also in the Department of Health and Human Services, contains claims information, including names and demographics of children receiving benefits under the Medicaid program and the services that they received.

WIC certification data, held by the Division of Public Health in the Department of Health and Human Services, contains names and demographics of children who are eligible to receive WIC benefits.

Choosing Subsets of Data from a Larger Universe

In an evaluation of lead screening rates, one of the challenges is selecting children to form the numerator (children actually screened) and the denominator (children who should have been screened), from among all children in a database. The choice of these subsets is determined by the questions to be answered. The North Carolina evaluation team considered several features.

Children in the denominator

Age

The Medicaid screening requirement is for all children at ages 12 and 24 months, and up to 72 months for children with no prior record of screening. It is unlikely that most children will receive a screening test on the exact date of their birth, so it is necessary to decide on an age interval for children be included in the denominator.

One possibility that has been used is to include all children whose age was within six months on either side of the ages at which screening is required. This choice would result in inclusion of all children from six to 30 months of age. The evaluation team in North Carolina felt that it would be wrong to include children younger than nine months. They reasoned that children often receive preventive health services at around six months, but that such young children are almost never screened for lead in North Carolina, nor does the state recommend screening at such a young age. So they selected nine months as their lower age limit.

They expanded the age limit at the other end of the interval to 35 months, reasoning that they would thereby capture screening performed by providers who would consider any two-year-old (even one close to his/her third birthday) as within the age interval for which screening is recommended.

Once the overall universe was defined (children from nine to 35 months of age), the evaluation team could stratify the resulting set of children in several useful ways to determine the effect of age on blood lead levels as well as on the likelihood that a child would be screened.

Eligibility

The question of how to define the set of children who are Medicaid beneficiaries is often complicated by the fact that many children lose their Medicaid eligibility for a period of time during each year, due to fluctuations in family income. In many states it is a thorny problem that is usually solved by developing a set of parameters (for example, include in the denominator all children who were eligible for at least six months of the calendar year) that defines the subset.

A related problem often occurs in places where many children in the Medicaid program are served by managed care plans. Children may switch enrollment among

continued

Choosing Subsets of Data, *continued*

various plans one or more times during the year, making it difficult to examine and compare screening rates among these plans. The customary solution to this problem is similar to the solution to the eligibility problem; that is, develop reasonable parameters to define the group (for example, include in Plan A all children who were constantly enrolled in Plan A during any six-month period).

Opportunity

The staff decided that their central interest was screening rates among those children who actually came to clinics for preventive health services. They wanted to measure providers' performance in screening those children whom they had the opportunity to screen when these children were present for other preventive health services. Therefore, the investigators removed from consideration all children who were eligible for preventive health services under the Medicaid program but who did not receive at least one such service.^a (The removal from consideration of children with no record of preventive services had the additional effect of shrinking the denominator and increasing the calculated screening rate.)

Children in the numerator

Date and definition of blood lead screening test

The evaluation team originally planned to count children in the numerator (children screened) if they had ever been screened. The team decided against this course, however, because they needed annual screening rates in order to measure the improvement from year to year. Thus, in order to count only the subset of test events that met their definition, they had, first, to develop a definition of a "screening test," and then specify age and date intervals as cutoff points.

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a. The issue of why a large number of children on Medicaid do not receive the preventive services to which they are entitled is an extremely important one. The North Carolina evaluation team in this report in no way sought to deny the importance of this problem, although they elected to go around it for the purposes of their evaluation.

It was necessary to formalize detailed data-sharing agreements among the collaborating agencies through approvals by division and agency heads. The most complex aspect of the agreement was the inclusion of the WIC program, which cited strict rules about who could use WIC data. The project received a boost when the state health director, a forceful advocate for childhood lead poisoning prevention, wrote a letter urging that the lead program be allowed access to WIC data.

The State Center for Health Statistics, part of the Department of Health and Human Services, provides data analysis for both Medicaid and WIC and played a central role in the strategy. Staff of this office had previously developed the necessary data-matching strategies and had found that these performed well when used for similar projects. They

provided most of the necessary programming to complete the matches necessary for this project.

The additional resources required for this project were smaller than might be expected, since the State Center for Health Statistics had already developed an effective matching algorithm and executed the necessary programming to bring about the desired data combination. Maintaining the lead surveillance database has required steady resource allocation over a number of years. The extra cost associated with this evaluation project was approximately .25 FTE (full-time equivalent) over approximately one year.

Problems and solutions

The problem of evaluation design

Problem. The North Carolina evaluation team first needed to establish which evaluation questions to ask.

Solution. Looking to the future, the staff of the lead program and the state Medicaid agency anticipated how the results of the evaluation would be used, in order to determine which information would be most significant to collect and examine.

Discussion. The North Carolina evaluation team had the data it needed to determine the impact of a policy on Medicaid beneficiaries. Major decisions had to be made about which subsets of the data would be used, including decisions about which children would be included in both the numerator and the denominator, when lead screening rates were figured. (See the sidebar above on Choosing Subsets of Data from a Larger Universe.)

Measuring success

The table below shows overall lead screening rates and percent changes for different age groups for 1998 and 1999. In addition, the analysis performed as part of the evaluation showed that the percent of children with low-level elevations (10–14 µg/dL) who received

	1998	1999	1998–99, percent change
Percent of children aged 9–17 months who received blood lead screening	40.9	47.8	16.7
Percent of children aged 18–29 months who received blood lead screening	31.1	38.9	25.3
Percent of children aged 9–35 months who received blood lead screening	41.4	49.8	20.2

appropriate follow-up testing nearly doubled, and the number of children identified with blood lead elevations ($\geq 10 \mu\text{g/dL}$) increased for the first time since statewide surveillance efforts began in 1992.

Some consequences of the evaluation

WIC collaboration

On the basis of the findings that half of the Medicaid population that received other preventive services was not receiving lead screening from their routine care provider, the administrators of the WIC program were convinced of the importance of having WIC clinics provide back-up lead screening. To ensure that WIC maintained a back-up role, rather than becoming the main provider of lead screening for WIC recipients, a decision was made to limit the ages at which WIC clinics would perform lead screening to 18 months and 30 months. This schedule had the additional merit of allowing time for the lead program to upload screening data to the WIC data base, so that WIC clinic staff could determine which children had not received a lead test from their routine care providers at the appropriate ages (12 months and 24 months). The impact on Medicaid screening rates of WIC clinic screening has not yet been evaluated, but will be when year 2000 data are available. The ongoing matching of lead screening data and WIC data has been put in place, and such evaluation will therefore be relatively easy to carry out.

Targeting health care providers with poor screening rates

The lead program provided the state Medicaid agency with a list of children who received screening by provider. The state Medicaid agency plans to contact providers under Medicaid contracts that have poor screening rates and target these providers for an in-service education visit and possibly for audit by Medicaid staff in order to boost their participation.

For more information on this strategy and its aftermath, contact:

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THE IMPORTANCE OF SYNERGY

How Wisconsin's lead program and state Medicaid agency joined forces to improve lead screening and follow-up care

The lead program and the EPSDT program collaborated to make partners of health care providers and local health departments in the project of screening and caring for Medicaid beneficiaries.

Background

Wisconsin is a state in which 37 percent of housing stock was built before 1950, placing it well above the national average of 27 percent. In the cities of Milwaukee and Racine, large numbers of poor children live in older, deteriorating housing. In several other smaller cities, children are at risk for lead exposure where there are concentrations of high-risk housing. Both Wisconsin's lead program, located in the Division of

Public Health, and its state Medicaid agency, located in the Division of Health Care Financing, have a strong commitment to lead screening for all young Medicaid beneficiaries. Each division covers a somewhat different domain, and the two have a history of close ties.

Since 1991, the lead program has maintained a complete lead surveillance database, containing records of all children who received blood lead testing in the state, with names, demographics, and test results. This lead registry was greatly enhanced by the passage in 1994 of a state law requiring laboratories and health care providers to report to the state the results of all blood lead tests performed on Wisconsin child residents. (See the sidebar on The History of Wisconsin's Lead Law.) This reporting system does not, however, receive reliable information on whether recorded children are Medicaid beneficiaries. That information is found in a separate database of Medicaid beneficiaries, held by the state Medicaid agency.

The state Medicaid agency has taken important steps to raise the amount of lead screening performed by its participating managed care plans and providers, as part of its EPSDT program, which is known as "HealthCheck." In addition, state Medicaid agency administrators have created a financial impetus for health care providers to meet goals for completed HealthCheck screens. Approximately 50 percent of Medicaid enrollees are in managed care plans, and the rest receive their care from health care providers who have a fee-for-service relationship with the state Medicaid agency. The agency pays managed care plans prospectively with the expectation that 80 percent of eligible Medicaid enrollees will receive a "complete" HealthCheck screen. For a HealthCheck screen to be counted as "complete," there must be evidence of appropriate lead screening. Providers who do not reach the 80 percent goal may incur financial penalties.

The History of Wisconsin's Lead Law

In many states, a cornerstone of efforts to prevent childhood lead poisoning is a state law, with provisions that strengthen various aspects of these efforts. In Wisconsin, such a law was passed in 1994.

Features of the Wisconsin law

- Calls for reporting to the state health department of the results of all blood lead tests performed on children who are residents of the state.
- Authorizes funding for local health departments for lead screening and for follow-up care for children who are identified as having elevated blood lead levels.
- Authorizes increased funding for Medicaid to pay the state's share of Medicaid reimbursement for screening and follow-up care, including care-coordination.

Key factors and milestones in the development and passage of the law

- Following the death of a Wisconsin child from lead poisoning in 1990, there was widespread concern among parents, advocates, providers, and public health and financing professionals about efforts to prevent this disease.
- There was leadership in the Wisconsin legislature from a Milwaukee legislator who had experience as a housing inspector and understood lead-poisoning issues.
- Key advocates, led by the Wisconsin Council on Developmental Disabilities and the March of Dimes, worked with the legislature to develop and pass the bill.
- The presence of a childhood blood lead surveillance system in the health department and a strong commitment to lead screening in the state Medicaid agency made possible the collection and presentation of compelling evidence to bolster the law's passage.
- A study commission was formed to look at the problem and review model laws. The commission met for almost a year and developed a report to the legislature.
- A key component of the report was a map of the state with information on screening penetration and case rate for each county.
- The data showed that case-finding was not limited to Milwaukee and clearly established childhood lead poisoning as a statewide issue, rather than one limited to the city of Milwaukee, thereby greatly enhancing the possibility of passing the law.

The strategy's aim

The focus of a strategy developed by the two agencies was to link lead-screening data with Medicaid data and to use the enhanced database for monitoring and improving lead screening and follow-up care in a high-risk population.

How the strategy took shape

The lead program and the state Medicaid agency have had a collaborative relationship for approximately four years, sharing information and strategies and establishing strong ties with each other and with health care providers. It was through this ad hoc collaboration that the need to share data became apparent.

Data sharing improves the ability of Wisconsin's lead program and the state Medicaid agency to

- monitor lead screening, especially among Medicaid managed care plans
- identify children who lack required screening and focus efforts of health departments and Medicaid providers on screening these individuals
- monitor case-rates in the high-risk Medicaid population
- track follow-up care provided by local health departments
- establish a system for Medicaid reimbursement of follow-up care in local health departments

The lead program and the state Medicaid agency expected that, by combining elements of their databases, they would improve their respective agencies' ability to monitor lead screening and case rates for the Medicaid population and to track follow-up care. Through careful monitoring of lead screening, they would be better able to identify unscreened children and focus screening efforts on those individuals. Also, for screening to be a useful prevention tool, tracking and improving follow-up care for children with elevated blood lead levels are crucial. In Wisconsin, follow-up care is frequently provided by local health departments, and the state Medicaid agency stands ready to reimburse these agencies for services provided to Medicaid beneficiaries. A feature of the combined databases is that it enables the lead program and the state Medicaid agency to monitor follow-up care more closely, and to bolster the security

of a system of follow-up care that is based in local health departments, by ensuring appropriate Medicaid reimbursement.

Another important goal was to use combined elements of the two databases to facilitate providers' access to information on which children had been screened, making it easier for them to join in the effort to identify and focus on unscreened children. Additionally, the state Medicaid agency has encouraged managed care plans to consider lead screening as a subject for quality studies, two of which are required every year for each plan. The managed care plans may choose the subjects for their studies, and several have chosen to examine lead-screening rates. Through a combination of efforts, the screening rate among children on Medicaid has steadily improved, although it remains low.

Partnerships and resources

Both the lead program and the state Medicaid agency have focused on ways to increase screening among high-risk children. Staff of both agencies recognized the importance of sharing information about screening activity between programs and also the necessity of

Details of Data Matching

- The lead program had names and test results for all children in the state who received blood lead testing.
- The state Medicaid agency has data on claims for reimbursement from providers who provide services on a fee-for-service basis.
- The state Medicaid agency also has encounter data, reported by managed care plans for all of their enrollees who are Medicaid beneficiaries.
- On a quarterly basis, the state Medicaid agency gets a tape from the lead program with the names and demographics of children who received blood lead tests, including the results of testing.
- The state Medicaid agency uses the information on blood lead levels to monitor aspects of follow-up care for children with elevated levels. Some follow-up care—for example, repeat blood lead testing—is provided by participating managed care plans and individual health care providers.
- The state Medicaid agency generates lists of all one- and two-year-old children enrolled in each managed care plan and provides these lists to the plans, which, as the agent of the state Medicaid agency, are responsible for ensuring that these children receive blood lead testing.
- Both agencies view the scrutiny of these lists by managed care plans and providers as an excellent opportunity to validate the data in the blood lead surveillance database: that is, to determine whether the data on file agree with the screening that providers report that they have performed.
- The lead program receives an enhanced database from the state Medicaid agency, showing which of the children who received blood lead testing are Medicaid beneficiaries.
- The lead program uses the information on Medicaid status for several purposes, including determination of whether Medicaid was billed for follow-up services provided by local health departments for lead-poisoned children.
- The state Medicaid agency does not provide enrollment data or other data—for example, provider data—to the health department.

sharing data on lead screening with health care providers. The state Medicaid agency, in particular, has a fundamental commitment to a collaborative relationship with managed care plans and providers.

Program staff of both agencies have met often and have established a basis for communication, trust, and cooperation that bore fruit when the programs secured an agreement, signed by the administrators of both agencies, allowing data exchange between the two organizations.

Major resources have been required for the lead program to maintain the lead surveillance database, which has been a critical component for this strategy. The database has required dedicated staff for each year of its existence. Currently, three staff persons work to maintain the statewide database, and there is an identified need for additional personnel to address a backlog of data entry and data analysis requests from local public health agencies. In addition, Milwaukee and Racine both maintain tracking databases that require separate staff for data entry and data management. The data on follow-up care collected in these local databases are sent to the central database and are an important element of the statewide tracking and monitoring system.

require separate staff for data entry and data management. The data on follow-up care collected in these local databases are sent to the central database and are an important element of the statewide tracking and monitoring system.

For more information about the Wisconsin initiatives and their outcomes, contact:

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Problems and solutions

The problem of interaction between different agencies

Problem. In order to share and use data, multiple agencies in Wisconsin had to cooperate with each other.

Solution. The key to solving this problem in Wisconsin was the presence of people in both departments who knew each other and had a long history of meetings, discussion, and mutual trust.

Discussion. Currently, the finalization of a formal agreement between the two agencies is pending. Once that is complete, and each program has had a chance to further examine the Medicaid screening data, a group will be convened to identify key outcomes and to define relevant messages for health care providers and managed-care plan representatives. It is anticipated that the agencies will hold regular joint meetings to review quarterly information, identify gaps, and monitor progress. A recent location change for one of the agencies has resulted in the two agencies' sharing the same building, and is seen as creating the conditions for even stronger ties in the future.

The problem of identifying untested children

Problem. Many Wisconsin health care providers still do not provide routine lead screening to Medicaid recipients, and it is necessary to identify untested children and to focus efforts on providing them with screening.

Solution. Staff of the state Medicaid agency have found it beneficial to work closely with nurse-coordinators from each participating health plan. It is the role of the nurse-coordinator to explain Medicaid policies and to encourage health care providers to perform all

HealthCheck preventive services, as well as to monitor these services. Their efforts may have contributed to a trend of improved screening rates among Medicaid beneficiaries.

Discussion. Staff of both the lead program and the state Medicaid agency acknowledged a need to further encourage health care providers to be more vigorous in their attempts to identify and screen Medicaid beneficiaries, and to understand that a sustained effort is necessary to achieve results among a population of children who continue to be at high risk for lead exposure, even as lead levels continue to decline in the general population.

Measuring success

Based on preliminary information from the matched file, the two divisions worked together to write a budget request to support screening and follow-up care for Medicaid beneficiaries. Exploratory discussions are taking place about expanding the use of Medicaid funds for lead-hazard-reduction activities.

The following table shows an encouraging upward trend in Medicaid screening rates.

Year tested	Medicaid beneficiaries		Not Medicaid beneficiaries	
	Percent of children ages 1–2 years receiving blood lead screening	Percent of children ages 3–5 years receiving blood lead screening	Percent of children ages 1–2 years receiving blood lead screening	Percent of children ages 3–5 years receiving blood lead screening
1995	19.5	15.1	13.4	4.7
1996	23.6	17.3	22.3	5.7
1997	24.4	16.9	26.1	6.0
1998	27.3	16.6	29.6	5.6
1999	28.9	15.7	29.5	5.4

Conclusion

As in many states, Wisconsin is struggling with the difficulty of raising statewide lead screening rates among its Medicaid population. Several promising initiatives are in early stages, and their impact is not yet measurable. As in other states that have spent a decade developing the new tools and relationships necessitated by the shift to Medicaid managed care arrangements, the ground in Wisconsin continues to shift; effective provider incentives and education measures must be continually negotiated and improved.

THE IMPORTANCE OF COMPARING NOTES



How the Rhode Island lead program reaped the benefits of combining data from multiple sources

The Rhode Island Health Department combined data from its pediatric preventive care and lead surveillance databases, and used the results to sharpen surveillance and promote screening among high-risk children who are hardest to reach.

Background

According to the 1990 housing census, 51 percent of Rhode Island's housing stock was built before 1950—a high figure compared with the national average of 27 percent. As in other states, in Rhode Island the prevalence of factors that predict lead exposure varies among census tracts.

Since 1993, Rhode Island law has required annual blood lead screening for all children between 9 and 36 months of age. Children who are found to have blood lead

elevations or who meet certain other criteria must be tested annually until they reach 72 months of age. The lead program, housed in the health department, maintains testing information in a surveillance database. To ensure that blood lead analysis is accurate and that data collection is complete, all blood specimens for lead screening must be submitted for analysis to the health department laboratory or to a laboratory approved by the health department. Data on these analyses are entered electronically into the surveillance database.

Of 33,746 children tested in 1999, 9.5 percent had blood lead levels of ≥ 10 $\mu\text{g}/\text{dL}$, and 1.3 percent had blood lead levels of ≥ 20 $\mu\text{g}/\text{dL}$. The prevalence of blood lead levels of ≥ 10 $\mu\text{g}/\text{dL}$ was highest in Providence (18 percent) and Central Falls (17 percent).

Since the beginning of 1997, the health department has maintained KIDSNET, a shared public health database that enables tracking of preventive health care services for all Rhode Island children. (See the sidebar on The Shared Public Health Database.) The lead surveillance database contains records of children who *have* received blood lead testing; the KIDSNET database contains, in addition to this information, records of children who have *not* received this service. Using KIDSNET, the lead program can send monthly reports to providers, listing children who need to be screened.

The strategy's aim

Working together, staff of the childhood lead poisoning prevention program and KIDSNET decided to compare data in the lead surveillance database to those in KIDSNET and to

The Shared Public Health Database

The idea of a shared public health database has taken root in several states as a way to furnish updated information to providers on children in their care. The KIDSNET database contains a record for every baby born in Rhode Island as of January 1, 1997.^{a,b} Records are updated when a child receives a preventive health service that is tracked in KIDSNET. Efforts are also made to have health care providers enroll in KIDSNET children who move to Rhode Island after birth. By 1999, the cohort of children with records in the KIDSNET database was 0 to 36 months old.

KIDSNET contains data from various sources. In addition to daily download of the results of blood lead testing, the KIDSNET database receives information from an array of programs, including Universal Newborn Screening for Development Risk, Home Visiting, Hearing Assessment, Immunizations, Newborn Metabolic/Hemoglobinopathy, WIC, and Early Intervention. Participating health care providers, who presently serve about half of Rhode Island children, are encouraged to supply information about administered immunizations to the health department, which adds this information to KIDSNET.

KIDSNET provides these data to programs and health care providers to facilitate tracking of missed opportunities, delays, and deficiencies in services for individual children. Using KIDSNET, it is possible for public health officials to identify each child's provider and to notify the provider of the names of children requiring services.

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a. Hall, K., A. Zimmerman, J. Samos, P. Simon, and W. H. Hollinshead, "Coordinating Care for Children's Health: A Public Health Integrated Information Systems Approach." *American Journal of Preventive Medicine*, 1997; 13 (S), 32-36.

b. Matyas, B., A. Zimmerman, P. Simon, and W. H. Hollinshead, "Access to Data in Public Health Informations Systems: A Rational Approach." *American Journal of Preventive Medicine*, 1997; 13 (S), 37-41.

generate reports of unscreened children, by provider. This strategy had three aims:

- To notify providers, using these reports, and to work in partnership to ensure that screening was carried out
- To validate lead surveillance records by comparing them with KIDSNET records of both screened and unscreened children
- To accomplish further validation of the surveillance database by comparing its records of blood lead tests with those in selected providers' offices

How the strategy took shape

The KIDSNET reports were generated, by health care provider, of children 15 months of age and older who were without a record of a lead test. These reports were mailed to the

identified primary health care providers. On a voluntary basis, many providers responded by providing information on children who had received lead screening that had gone unrecorded in the KIDSNET and lead surveillance databases.

Partnerships and resources

Partnership between the lead program and health care providers is central to this strategy. The major resources necessary were those previously expended in the construction and maintenance of the two databases, lead surveillance and KIDSNET. As noted else-

Partnership between the lead program and health care providers is central to this strategy.

where in this report, such tracking systems are labor intensive and relatively costly. In Rhode Island, approximately nine fulltime staff are required to operate KIDSNET, and two fulltime staff maintain and manage the lead surveillance system.

Problems and solutions

The problem of inaccurate data

Problem. A comparative review of multiple sources of records of blood lead tests revealed that numerous blood lead tests that had actually been performed were not recorded in the lead surveillance database. Thus, when the lead program first approached health care providers with lists of children who were believed to be without required lead screening, it met with resistance. Understandably, health care providers were exasperated at receiving inaccurate reports.

Solution. As a result of their initial encounters with cooperating providers, the lead program improved its data validation procedures. Reports are now generated for one health care provider or clinic at a time, and internal data inaccuracies (between KIDSNET and the lead surveillance database) are resolved. The medical director of the lead program then contacts the provider and offers further review of clinical records, in order to more accurately identify unscreened individuals. Upon completion of the clinical record review, the lead program furnishes the provider a one-page report summarizing results, recommending improvements, and describing help available from the health department. Thanks to a strong sense of partnership between health care providers and the lead program, clinical record review has taken place in nine practices in Rhode Island, enabling lead surveillance staff to document tests that were not recorded in the surveillance database. Recognition of important systemic problems has resulted, and processes have been developed to prevent errors from recurring.

Discussion. The lead program identified several factors that contributed to blood lead tests not being recorded in the surveillance database, including electronic transmission failures, lack of reporting or of timely reporting by private laboratories, misspellings of children's names, inaccurate dates of birth, incomplete information, and name changes.

The identification and systemic correction of these problems has made possible a clean, valid surveillance system.

The problem of drawing blood for lead screening at a site removed from the provider's office

Problem. Families whose primary health care providers do not draw blood in their offices, or whose managed care plan requires blood drawing at a specific laboratory, can have lead screening only by making a trip to a laboratory in addition to their clinic visit. A consequence of this added inconvenience is a diminished rate of screening.

Solution. The lead program has brought to the attention of Medicaid managed care plans the importance of providing phlebotomy services in the primary health care setting. One of the major managed care plans is considering changing its policy to create a billing code for providers to use in claiming reimbursement for this service.

Discussion. The problem of remote-site blood drawing has been widely mentioned as a potentially preventable obstacle to lead screening. It is too early to tell whether the measures taken in Rhode Island to bring attention to this problem will result in improvements in managed care plan policies.

The screening rates for 18-month-olds were 59 percent in 1994, 67 percent in 1996, and over 75 percent in 1999.

Measuring success

As of early 2001, lead program staff have conducted reviews of nine pediatric practices. In each practice, they have identified children without proper screening as well as significant data management issues. Importantly, the KIDSNET database has given the lead program the ability to establish a denominator and, as a result, to calculate reliable screening and case rates. According to cohort studies, the screening rates for children who were 18 months old were 59 percent in 1994 and 67 percent in 1996. Using data from lead surveillance and KIDSNET, the lead program estimated this rate for 1999 to be 75 percent. It has since become evident, through the data matching effort and the partnership with providers, that the 1999 rate is, in fact, higher than 75 percent, representing a true increase in the size of the screened population.

This strategy has relevance beyond its use of a shared public health database of the KIDSNET type, which may not currently exist in many areas. It demonstrates the importance—even under optimum circumstances for surveillance, such as those in Rhode Island—of finding opportunities to validate information that is used for decision making. Many such opportunities are afforded by various quality assurance activities, including audits of clinical records and matching and cross-examination of databases of associated

information. For example, state Medicaid agencies are required to report lead screening aggregate figures annually, and in some states they will draw their information from

encounter data reported by health care plans. Health department lead screening data are generally based on laboratory reporting and may differ substantially from physicians' reports. Efforts to cross-check Medicaid and health department figures drawn from different sources may be fruitful in helping both agencies arrive at more accurate data.

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