

Assessing Immunization Performance of Private Practitioners in Maine: Impact of the Assessment, Feedback, Incentives, and Exchange Strategy

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ABSTRACT. *Introduction.* A provider-based vaccination strategy that has strong supportive evidence of efficacy at raising immunization coverage level is known as Assessment, Feedback, Incentives, and Exchange. The Maine Immunization Program, and the Maine Chapter of the American Academy of Pediatrics collaborated on the implementation and evaluation of this strategy among private providers.

Methods. Between November 1994 and June 1996, the Maine Immunization Program conducted baseline immunization assessments of all private practices administering childhood vaccines to children 24 to 35 months of age. Coverage level assessments were conducted using the Clinic Assessment Software Application. Follow-up assessments were among the largest practices, delivering 80% of all vaccines.

Results. Of the 231 practices, 58 were pediatric and 149 were family practices. The median up-to-date vaccination coverages among all providers for 3 doses of diphtheria-tetanus-pertussis vaccine and 2 doses of oral polio vaccine, and 4 doses of diphtheria-tetanus-pertussis vaccine, 3 doses of oral polio vaccine, and 1 dose of measles-mumps-rubella vaccine at age 12 and 24 months were 90% and 78%, respectively, and did not vary by number of providers in a practice or by specialty. Urban practices had higher coverage than rural practices at 12 months (92% vs 88%). The median up-to-date coverage for 4 doses of diphtheria-tetanus-pertussis vaccine, 3 doses of oral polio vaccine, and 1 dose of measles-mumps-rubella vaccine at 24 months of age improved significantly among those practices assessed 1 year later (from 78% at baseline to 87% at the second assessment). On average, the assessments required 2½ person-days of effort.

Conclusions. We document the feasibility and impact of a public/private partnership to improve immunization delivery on a statewide basis.

Implications. Other states should consider using public/private partnerships to conduct private practice assessments. More cost-effective methods of assessing immunization coverage levels in private practices are needed. *Pediatrics* 1999;103:1218-1223; immunizations, assessments, private providers, CASA, health services, performance measurement, managed care.

ABBREVIATIONS. DTP, diphtheria-tetanus-pertussis (vaccine); CDC, Centers for Disease Control and Prevention; MIP, Maine Immunization Program; AAP, American Academy of Pediatrics; AAFP, American Academy of Family Physicians; CASA, Clinic Assessment Software Application; 3:2, 3 diphtheria-tetanus-pertussis vaccine:2 oral polio vaccine; 4:3:1, 4 diphtheria-tetanus-pertussis vaccine:3 oral polio vaccine:1 measles-mumps-rubella vaccine; HEDIS, Healthplan Employer Data and Information Set.

Although the 1996 Childhood Immunization Initiative goals for disease incidence and vaccination coverage levels were met,¹ a significant gap exists between the current coverage levels and the *Healthy People 2000* goals.² For example, the coverage levels of diphtheria-tetanus-pertussis (DTP) and of hepatitis B vaccine are below the objective of 90% for both vaccines. Currently, coverage for the fourth dose of DTP is 81% and for the third dose of hepatitis B is 84%,³ indicating that ~760 000 2-year-old children are incompletely protected against diphtheria, tetanus, and pertussis, and 640 000 2-year-old children are incompletely protected against hepatitis B.

Strong evidence exists demonstrating the effectiveness of measuring the performance of immunization providers to improve the immunization coverage levels of their patients.⁴⁻⁶ Because of this proven effectiveness, the Advisory Committee for Immunization Practices⁷ recommended, and the Centers for Disease Control and Prevention (CDC) required, health departments to assess the coverage levels of children served in their immunization clinics. The Standards for Pediatric Immunization Practices⁸ recommends that providers conduct assessments of their immunization coverage levels on a routine basis.

However, during the 1990s, the delivery of vaccinations to preschool children has been significantly privatized.⁹⁻¹² Health department-operated clinics currently serve only 20% of preschool children,¹² down from ~50% at the start of the decade.¹³ Therefore, assessment of only health department clinics will reach an insufficient number of children to achieve the year 2000 objectives; assessments must also reach children served by private providers if national objectives are to be met.

We report an evaluation of performance measurement with feedback conducted through a public/private partnership of the Maine Immunization Program (MIP) and the Maine chapters of the American Academy of Pediatrics (AAP) and the American

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Academy of Family Physicians (AAFP). The purpose of the intervention was to improve immunization coverage in the state by assessing immunization levels in all Maine immunization provider practices, private and public. The purpose of the evaluation was to determine the feasibility and impact of the assessment intervention.

METHODS

Setting and Study Participants

The intervention was conducted in 1994 through 1996 in Maine, which provides all Advisory Committee for Immunization Practices recommended vaccines free of charge to all immunization providers, public and private.

Maine's population in 1994 was 1 239 448; the annual birth cohort is ~14 000. Ninety percent of the vaccines administered to preschool children in Maine are given by private clinicians; the remaining 10% receive their vaccinations from 3 health department clinics and 30 community health centers (J. Walsh, MIP, personal communication, 1997). Maine is a high-performing state with regard to immunizations. The state ranked number 1 or 2 throughout the time period for the study, according to the CDC's National Immunization Survey.^{1,3,14} Maine's most recent 4 doses of DTP, 3 doses of oral polio vaccine, and 1 dose of measles-mumps-rubella (4:3:1) vaccine coverage level for children 19 through 35 months of age was 87%.³

Unit of analysis was private practice sites receiving vaccine from MIP (*n* = 231 practice sites; 25% pediatricians, 65% family physician, 10% other). To receive vaccine from the state, providers sign an Immunization Provider Vaccine Agreement, which allows MIP staff to make site visits to evaluate vaccine handling and storage, verify record keeping, and conduct immunization coverage assessments.

Intervention

Between November 1994 and June 1996, MIP assessed all private practices providing childhood vaccines. Assessment results on the immunization coverage levels and office practices associated with immunization delivery problems, such as missed opportunities for simultaneous vaccinations and delayed starting of immunizations, were reported to the office staff and clinicians. Between September 1996 and May 1997, follow-up assessments were conducted on 63 of the 231 practices. The practices selected for year 2 assessments were the largest practices, delivering 80% of all vaccines to Maine's preschool children.

Assessments were conducted using procedures outlined in the CDC Clinic Assessment Manual using Clinic Assessment Software Application (CASA).¹⁵ CASA calculated practice immunization coverage levels and immunization practices for each participating site. For practices with 200 or more eligible patients, a systematic random sample of age-appropriate children seen in the practice was selected by state health department assessment staff, and immunization information was abstracted from the medical charts. For practices with fewer than 200 eligible patients, all records of age-appropriate children were abstracted. Eligibility criteria for inclusion of a child in an assessment were: 1) age between 24 and 35 months at time of assessment; 2) visited the practice at least 3 times; and 3) no documentation in the chart of having moved or gone elsewhere before the second birthday.

Once an assessment was completed, results were shared verbally with the providers and office staff. MIP then sent a written report within 3 weeks of the review. A letter discussing ways to improve vaccination practices and coverage levels in their practice accompanied the reports. Practices with coverage levels <85% were visited by a MIP representative to discuss the assessments and diagnostic feedback to help improve immunization service delivery. The names of those practices with 4:3:1 coverage rates of 90% or better were published in the quarterly MIP newsletter, "Immunews," and were officially recognized at an award luncheon sponsored by MIP.

Evaluation

The unit of analysis was private practices and representative samples of their patients aged 24 to 35 months of age. The evaluation was

descriptive and analytic, and included all practice sites eligible for the initial round of assessments. Practices were described in terms of the 1) type of provider (pediatrician, family physician, and other); 2) practice size; 3) practice location (rural versus urban); 4) number of providers in the practice; and 5) resulting immunization coverage levels at 12 and 24 months of age.

For the 24- to 35-month-old children selected for the study, the outcome measures were coverage levels, using the harmonized immunization schedule, at 12 months of age for 3 doses of DTP, 2 doses of oral polio vaccine (3:2), and at 24 months of age for 4:3:1. The analyses measured the change in immunization coverage levels between the first round and the second round of assessments among the sites selected for the second round of assessments. To measure the impact on the up-to-date status of 2 year olds, each practice's 24-month round two coverage was subtracted from its round one coverage; the median change among all practices was determined. Analysis included using Wilcoxon rank sum test to test for within-group differences and Wilcoxon signed rank test to detect differences between groups.

RESULTS

Baseline

All 231 practices had an immunization assessment at baseline and 63 practices had a repeat assessment. All practices were given feedback about their performance. Of the 231 practices that were assessed at baseline, 126 (55%) practices were solo; 159 (69%) practices were rural practices. A total of 9076 patients were assessed; the median number and mean number of charts assessed in each practice were 21 and 39, respectively (Table 1). The average cost of these assessments to MIP was 2½ person-days per assessment.

The median coverage for 3:2 vaccine for all practices for children 12 months of age was 90%; the median coverage for the 4:3:1 for children 24 months of age was 78% (Table 2). Table 2 also shows coverage levels by number of providers within the practice, specialty, geographic location, and specialty by geographic location. Coverage levels at 12 months of age were higher for urban children than rural children, but this difference was not seen at 24 months of age. No relation was seen between immunization coverage and the number of providers in the practice.

Figure 1 displays the percent of all private practices by coverage decile for children at 24 months of age. The median coverage was 78%; the 25th and 75th percentiles of 4:3:1 coverage were 64% and 88%, respectively. Eighty-one percent of practices had coverage levels >60%. Twenty-four percent of all private practices were at or greater than the year 2000 objective of 90% coverage for 4:3:1 series.

TABLE 1. Provider Characteristics

	All	Pediatrics	Family Practice	Other*
Number of practices	231	58	149	24
Median sample size	21	88	13	16
Sample size range	1-222	3-222	1-136	1-41
Number of providers in practice				
1	126	29	81	16
2-3	83	22	54	7
>3	22	7	14	1
Geographic location				
Urban	72	17	46	9
Rural	159	41	103	15

* Other includes nurse practitioner, general practitioner, obstetrics/gynecology, and internal medicine.

TABLE 2. Median Up-to-date Coverage at 12* and 24† Months of Age

	No. Practice	12 Months*		24 Monthst	
		Median Coverage	P Value‡	Median Coverage	P Value‡
Up-to-date	231	90		78	
Number of providers in practice					
1	126	91	.30	78	.86
2-3	83	90		78	
>3	22	86		81	
Specialty					
Pediatrics	58	90	.97	82	.61
Family practice	149	90		76	
Other	24	88		78	
Practice sample size§					
Below median	117	92	.06	77	.68
Above median	114	89		79	
Geographic location					
Urban	72	93	.04	79	.91
Rural	159	88		78	
Specialty by residence type					
Pediatrics:					
Urban	17	93	.15	86	.10
Rural	41	89		81	
Family practice					
Urban	46	93	.07	78	.93
Rural	103	88		75	
Other					
Urban	9	88	.90	64	.34
Rural	15	88		83	

* Up-to-date coverage at 12 months is defined as receiving 3 doses of DTP and 2 doses of polio vaccine.

† Up-to-date coverage at 24 months is defined as receiving 4 doses of DTP, 3 doses of polio vaccine, and 1 dose of MMR.

‡ P values are results from Wilcoxon rank sum test.

§ Median sample size of practices is 21.

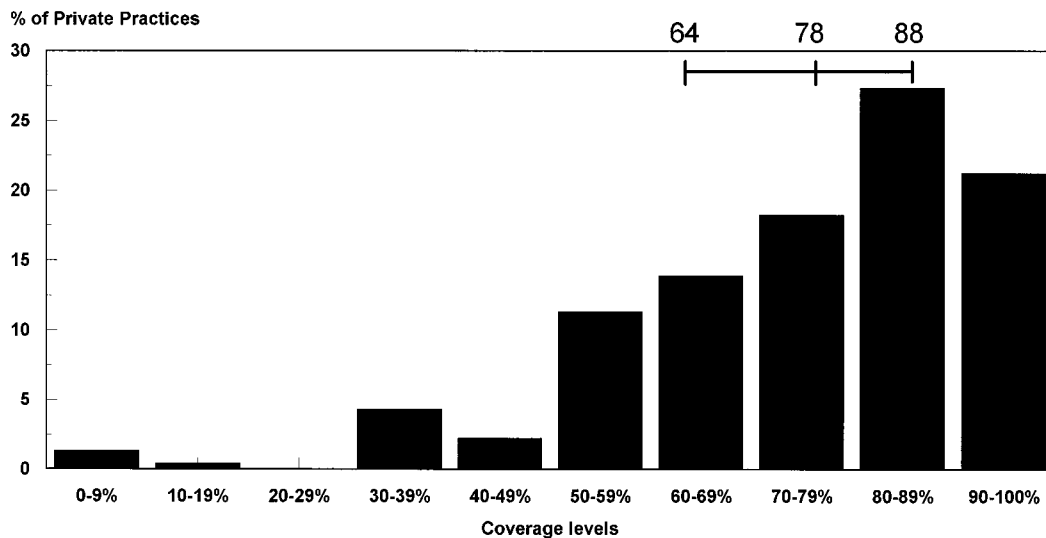


Fig 1. Coverage levels for 4 diphtheria-tetanus-pertussis:3 oral polio vaccine:1 measles-mumps-rubella by 24 months of age ($n = 231$ practices, 9076 children).

Follow-up

For the 63 largest practices, the median 4:3:1 coverage level increased from 78% at baseline to 87% at follow-up ($P < .001$) (Table 3). Significant improvements in coverage levels between baseline and follow-up were observed in all subgroups by specialty, number of physicians per practice, and residence type. Of the 63 large practices, the increase in coverage level was observed for the largest practices (those greater than the median for practice size), as well as the smaller practices (those below the median for practice size).

The percent of practices with coverage level for 4:3:1 >90% improved from 5% at baseline to 36% at follow-up. The percent of practices with coverage level for 4:3:1 <80% decreased from 54% at baseline to 26% at follow-up (Fig 2).

DISCUSSION

The partnership between the MIP and the Maine chapters of the AAP and AAFP demonstrated the feasibility of assessing all immunization practices for preschool children in 1 state. The intervention protocol was conducted in all practices and then repli-

TABLE 3. Median Up-to-date Coverage at 24* Months of Age at Baseline and Follow-up Assessment

	No. Practice	Baseline Median Coverage	Follow-up Median Coverage	P Value†
Up-to-date coverage	63	78	87	<.001
Number of providers				
1	29	76	84	<.001
2-3	24	80	90	.001
>3	10	72	84	.05
Specialty				
Pediatrics	38	81	91	<.001
Family practice	23	74	84	.07
Other‡	2	69	67	¶
Practice sample size§				
Below median	32	75	85	.01
Above median	31	80	90	<.001
Geographic location				
Urban	15	75	92	.01
Rural	48	78	85	<.001
Specialty by geographic location				
Pediatrics				
Urban	9	83	94	.02
Rural	29	81	89	<.001
Family practice				
Urban	5	75	86	.13
Rural	18	73	83	.32

* Up-to-date coverage at 24 months is defined as receiving 4 doses of DTP, 3 doses of polio vaccine, and 1 dose of MMR.

† P values are results from Wilcoxon signed rank test.

‡ Other includes nurse practitioner, general practitioner, obstetrics/gynecology, and internal medicine.

§ Median sample size of practices is 74.

|| Excludes practices classified as Other.

¶ Sample size too small for comparison.

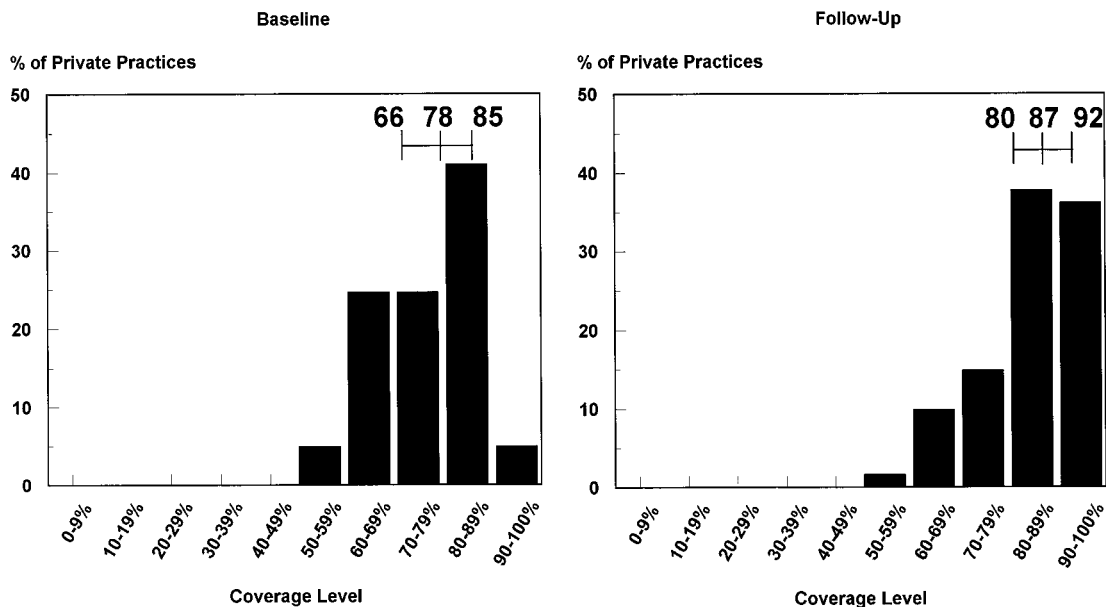


Fig 2. Baseline and follow-up up-to-date coverage for 4 diphtheria-tetanus-pertussis:3 oral polio vaccine:1 measles-mumps-rubella at 24 months of age for 63 of the largest practices.

cated among the practices serving the largest numbers of children, and it included both pediatricians and family physicians. As a result of the intervention, measured immunization coverage levels among the larger practices increased from 78% in 1996 to 87% in 1997.

It is not possible to determine how much of the improvement in coverage was attributable to improvement in the delivery of immunizations and how much was attributable to improved recording. Both are critical in achieving high immunization cov-

erage levels because accurate documentation is a prerequisite for optimal immunization practices. Studies have examined the contribution of record scattering to undervaccination.^{16,17} They demonstrate the importance of accurate records and good communication of immunization histories among providers. The high baseline coverage was reassuring that the practice documentation was quite good, because poor documentation results in underestimation of coverage as measured by an assessment.

Assessment of coverage is a critical first step toward

improving performance. Because most providers overestimate performance, often by >30 percentage points,¹⁸⁻²¹ assessments provide objective evidence to a practice that a problem exists. Without this recognition, a practice would not likely be motivated to improve. The overestimation of performance hinders public health from conducting assessments because providers frequently feel no problem exists, and thus see no need to have their records assessed. For Maine, the method used to overcome reticence to assess coverage came from the leadership of the AAP working with the state health department leadership to promote universal coverage assessments.

The impact of the Maine intervention is consistent with other impact studies of immunization performance measurement. Failure to administer the fourth dose of DTP vaccine during the 12- to 18-month age period was the most common reason for low series coverage at 24 months of age. The effectiveness of assessment with feedback has been demonstrated in a variety of settings, including health department clinics for routine childhood vaccination^{4,22} and private practices of internists for influenza vaccine for adults >65 years of age.^{5,6,23-25} In North Carolina, an intensive academic detailing model was used to improve immunization coverage among private providers in three counties by 6 percentage points. The intervention also resulted in improved lead screening and anemia screening.²⁶

This evaluation advances this line of research because Maine is the first state in the United States to assess the performance of all its childhood immunization providers, both public and private. Currently, all state and urban-area immunization programs that are funded by the CDC are required to assess the performance of health department immunization clinics. The CDC recommends that immunization programs also assess performance of private providers and other immunization providers not under the control of the health department. However, few programs have made significant progress in the assessment of private providers; nationally, <5% of private practices have had assessments (CDC unpublished data available at www.cdc.gov/nip/afix).

With the increasing privatization of preschool immunization delivery, assessment of coverage levels in health department clinics, although important for the population they serve, will cover a smaller proportion of children in the United States. Thus, assessment of private providers will be critical, although more challenging, for several reasons: 1) there are many more private practices than there are health department clinics, and the average cost of 2½ person-days per assessment makes this a labor-intensive intervention. For example, the Vaccines for Children program currently has 33 706 private practices enrolled (October 1997, Vaccines for Children Program Implementation Survey). Thus, the number of assessments will require substantial resources. 2) Because medical homes for primary care deliver many services in addition to vaccinations, the performance of routine immunization delivery may be overwhelmed by other priorities in the practice. Assessments are already being conducted by managed care organiza-

tions and peer-review organizations in many offices. An immunization performance assessment is often viewed as an additional burden. 3) Few states require the assessment of private sector immunization performance. Some states, including Maine, do require performance measurement; however, such an arrangement is unusual. Thus, the vast majority of states will have to rely on a partnership between private providers and immunization programs to accomplish large-scale performance measurement. 4) Although acceptable methods for private provider assessments exist, optimal methods have yet to be developed.²⁷ The CDC's CASA software, which was used for the Maine assessments, was developed initially to assess health department clinics. Because CASA requires a simple random sample of patients in a specified date-of-birth range, the ability to produce a computer listing sample frame is helpful. However, many offices do not have that capability and have to use a hand-search method to identify CASA-eligible subjects.

Immunization performance measurement is also being accomplished for children enrolled in managed care organizations through the National Committee for Quality Assurance's Healthplan Employer Data and Information Set (HEDIS). One intent of HEDIS is to provide purchasers of health care with the ability to compare the performance of different managed care plans. However, for the individual provider, HEDIS is likely to sample only a few of his or her patients, making it impossible for HEDIS to provide any meaningful diagnostic capability for the individual provider to increase his or her immunization coverage levels.

Although assessment of private providers is challenging, the Maine experience demonstrates that it is feasible and effective on a statewide level. Given that Maine's coverage levels were among the highest in the nation, implementation of the Assessment, Feedback, Incentives, and Exchange strategy in states with lower coverages should yield similar or larger increases. Key features of the Maine intervention included close collaboration between the health department and the Maine Chapters of the AAP and AAFP through routine attendance of immunization program staff at AAP meetings, attendance and participation of many private providers in the statewide immunization conferences, membership of AAP and AAFP representatives on the advisory committee of MIP, and regularly scheduled conference calls.

Limitations

The percentage-point increase shown by this intervention may not generalize to other states given that Maine has consistently been a top performing state with regard to preschool immunization coverage levels as reported by the National Immunization Survey. Lower-performing states have more room to improve and may find percentage improvements different from those of Maine. We reported provider-validated immunizations; however, we did not link records across providers. Thus, our results may underestimate the true practice coverage. Maine has also had limited penetration of managed care and thus these results should be interpreted appropriately.

Ideally, the evaluation of assessment as an intervention would have been based on comparisons to a true control group. Because Maine chose to assess all private practices at baseline, this remains as a limitation in interpreting the results of this study.

For the purposes of calculating practice coverage levels, Maine defined an active patient as a child making three or more visits to the practice. This is different from the criterion used by health departments for their clinic assessments, which include any child making one or more visits as an active patient. The decision to use three or more visits was made through discussions of the MIP staff, the local AAP and AAFP, and other providers, and represented a consensus agreeable to all parties. Future assessments will evaluate children who have made at least one visit to the practice. This will allow Maine to track the children who may be at greater risk for underimmunization.

Recommendations

This evaluation supports the recommendation that public health departments collaborate with their provider organizations, such as the AAP and AAFP, to encourage conducting assessments in the private sector as part of the Assessment, Feedback, Incentives, and Exchange implementation plan. The experience of Maine may be used as a model of a successful public/private partnership because it resulted in assessing all private and public provider sites. However, the cost of the assessment is a barrier to the successful implementation of universal assessment of immunization providers, and more cost-effective methods of assessing immunization coverage levels in private practices are needed. Specific questions to address include: 1) the use of smaller sample sizes for assessments; 2) the validity and utility of self-assessments; 3) the use of more convenient sample frames in a practice than simple random samples (eg, sequential patient visits;²⁷) and 4) linkage of the assessment of other clinical preventive services, such as lead and anemia screening, into immunization assessments.

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