

Immunization Strategies for Healthcare Practices and Providers

The Need for Strategies to Increase Immunization Levels

An important component of an immunization provider practice is ensuring that the vaccines reach all children who need them. While attention to appropriate administration of vaccinations is essential, it cannot be assumed that these vaccinations are being given to every eligible child at the recommended age. Immunization levels in the United States are high, but gaps still exist, and providers can do much to maintain or increase immunization rates among patients in their practice. This chapter describes the need for increasing immunization levels and outlines strategies that providers can adopt to increase coverage in their own practice.

Vaccine-preventable disease rates in the United States are at their lowest level ever. In 2003, only 56 cases of measles, 7 cases of rubella, 1 case of diphtheria, 20 cases of tetanus, and no wild-type polio were reported to CDC. Given these immunization successes, one might question the continued interest in strategies to increase immunization levels.

However, although levels of vaccine-preventable diseases are low, this should not breed complacency regarding vaccination. For several reasons—including possible resurgence of disease, introduction of new vaccines, suboptimal immunization levels, cost-effectiveness, and gaps in sustainable immunization efforts—the need to focus on immunization rates remains crucial. The viruses and bacteria that cause vaccine-preventable disease and death still exist and can be passed on to unprotected persons or imported from other countries. Diseases such as measles, mumps, or pertussis can be more severe than often assumed and can result in social and economic as well as physical costs: sick children miss school, parents lose time from work, and illness among healthcare workers can severely disrupt a healthcare system. For many of these diseases, without vaccination, the incidence will rise to prevaccine levels.

Although levels of disease are the ultimate outcome of interest, these are a late indicator of the soundness of the immunization system. Immunization levels are a better indicator for determining if there is a problem with immunization delivery, and this chapter will focus on increasing immunization levels and the strategies healthcare providers can use to do this.

Why Focus on Strategies to Increase Immunization?

- Immunization levels not optimal
- Cost-effectiveness of some strategies uncertain
- Sustainable systems needed

Specific concerns about U.S. immunization levels and areas for further study include the following:

Childhood immunization rates are still suboptimal. In 2004, for example, only 85.5% of children 19 to 35 months of age had received four doses of DTaP vaccine.

For other age groups, immunization rates are considerably lower than those for early childhood. According to Behavior Risk Factor Surveillance System data from 2003, a median of only 70% of persons 65 years of age and older received the influenza vaccine in the past 12 months, and 64.2% had ever received pneumococcal vaccine.

Economic and racial disparities exist. Low-income and minority children and adults are at greater risk for underimmunization. “Pockets of need” exist in our nation’s inner cities.

Uptake is lagging for some antigens. In 2004, for example, the percentage of children who had received varicella vaccine by their second birthday was 87.5%. Rates of influenza immunization are also unacceptably low among healthcare workers, an important target population for vaccination. Typically, fewer than 40% of healthcare workers receive influenza vaccine.

Improvements in adult immunization rates have tapered off. According to data from the National Health Interview Survey, after a consistent increase in rates during the 1980s and early 1990s, improvements in influenza vaccination rates for adults 65 years of age and older have leveled off since 1997.

Cost-effectiveness needs more research. More research is needed regarding which strategies increase immunization levels with the least expenditure so these strategies can be prioritized.

Sustainable systems for vaccinating children, adolescents, and adults must be developed. High immunization rates cannot rest upon one-time or short-term efforts. Greater understanding of strategies to increase immunization levels is necessary in order to create lasting, effective immunization delivery systems.

Many strategies have been used to increase immunizations. Some, such as school entry laws, have effectively increased demand for vaccines, but the effectiveness of other strategies (e.g., advertising) is less well documented. Some proven strategies (e.g., reducing costs, linking immunization to Women Infants and Children (WIC) services, home visiting) are well suited to increasing rates among specific populations, such as persons with low access to immunization services.

One key to a successful strategy to increase immunization is matching the proposed solution to the current problem. At present in the United States, most persons have sufficient interest in and access to health care and are seen, at least periodically, in healthcare systems. Those who remain unvaccinated are so largely because healthcare practices and providers do not always optimally perform the activities associated with delivering vaccines and keeping patients up-to-date with their immunization schedules. Although a combination of strategies—directed at both providers and the public—is necessary for increasing and maintaining high immunization rates, this chapter focuses on immunization strategies for healthcare practices and providers.

The AFIX Approach

The National Immunization Program, through state and other grantees, administers a program designed to move healthcare personnel from a state of unawareness about the problem of low immunization rates in their practice to one in which they are knowledgeable, concerned, motivated to change their immunization practices; and capable of sustaining new behaviors. The acronym used for this approach is **AFIX: Assessment** of the immunization coverage of public and private providers, **Feedback** of diagnostic information to improve service delivery, **Incentives** to motivate providers to change immunization practices or recognition of improved or high performance, and **eXchange** of information among providers. First conceived by the Georgia Division of Public Health, AFIX is now being used nationwide with both public and private immunization providers and is recommended by governmental and nongovernmental vaccine programs and medical professional societies.

Overview

The AFIX process consists of an assessment of an immunization provider's coverage rates by a trained representative from the state or other immunization grantee program, feedback of the results of the assessment to provider staff, incentives to improve deficiencies and raise immunization rates, and exchange of information and ideas among healthcare providers. Some specific characteristics of this approach have made it one of the most effective for achieving high, sustainable vaccine coverage.

First, **AFIX focuses on outcomes**. It starts with an assessment, producing an estimate of immunization coverage levels in a provider's office, and these data help to identify specific actions to take in order to remedy deficiencies. Outcomes are easily measurable. Second, **AFIX focuses on providers**, those who are key to increasing immunization rates. AFIX requires no governmental policy changes, nor does it

AFIX
Assessment
Feedback
Incentives
eXchange

- Special Characteristics of AFIX**
- Focuses on outcomes
 - Focuses on providers
 - Blend of advanced technology and personal interaction

Assessment

- Evaluation of medical records to ascertain the immunization rate for a defined group
- Diagnosis of potential service delivery problems
- Assessment increases awareness

Feedback

- Informing immunization providers about their performance
- Assessment with feedback creates the awareness necessary for behavior change

How to Provide Feedback

- With feeling and precision
- Without judgment
- With confidentiality as appropriate

attempt to persuade clients to be vaccinated, but instead focuses on changing healthcare provider behavior. Third, AFIX, when used successfully, is a unique blend of **advanced technology and personal interaction**. Much of the AFIX process can be done electronically, increasing speed and accuracy of assessment and feedback and streamlining reporting. However, the personal skills of the assessor and that person's ability to establish rapport with and motivate a provider are critical to achieving lasting results.

Assessment

Assessment refers to the **evaluation of medical records** to ascertain the immunization rate for a defined group of patients as well as to provide targeted diagnosis for improvement. This step is essential because several studies have documented that most healthcare providers, while supportive of immunizations, do not have an accurate perception of their own practice's immunization rates. Pediatricians in these studies greatly overestimated the proportion of fully immunized children in their practices. **Assessment increases awareness** of a provider's actual situation and provides a basis for subsequent actions by provider staff.

CDC has developed a software program, CoCASA, that enables assessment to be done electronically, is flexible enough to accommodate whatever assessment parameters are desired, and provides results that can be printed immediately. This program will be described further in the section, "AFIX Tools and Training."

Feedback

Feedback is the process of **informing immunization providers about their performance** in delivering one or more vaccines to a defined client population. The work of assessment is of no use unless the results are fed back to persons who can make a change. Assessment together with feedback **creates the awareness necessary for behavior change**.

Feedback generally consists of the immunization program representative meeting with appropriate provider staff and discussing the results of the assessment in order to determine the next steps to be taken. This may be done at a second visit following the assessment of the provider's records, or it may take place the same day. There are advantages and disadvantages to each approach. If CoCASA has been used, the summary report that is generated can identify specific subsets of patients (e.g., those who have not completed the series because of a missed opportunity for immunization) that, if found in substantial numbers, can provide clues to

which changes in the provider's practice would be most effective. This can save time and make the feedback session more focused.

The personal element of feedback, as mentioned, is also critical to its success. A reviewer who is involved and committed to the AFIX process, who addresses deficiencies **without judgment**, and who respects the **confidentiality of the data** and the efforts of the provider will be likely to gain the trust of providers and motivate them to increase immunization rates in the practice.

Incentives

An incentive is defined as something that **incites one to action or effort**. Incentives are built into the AFIX process, recognizing that immunization providers, like everyone else, will accomplish a desired task more successfully if motivated to do so. The assessment and feedback components are not intended to be done in isolation; providers may have sufficient data about their practice's immunization rates, but they must recognize high immunization coverage as a desirable goal and be motivated to achieve it.

Incentives are extremely variable. No one thing will be effective for every provider, and a single provider may need different types of motivation at different stages of progress. Things like small tokens of appreciation and providing resource materials at meetings have helped providers approach their task positively and create an atmosphere of teamwork, but longer-term goals must be considered as well. Since the effort to raise immunization rates may involve an increase in duties for staff, offering assistance in reviewing records or sending reminder notices might more directly address a provider's needs. Incentives pose a challenge to the creativity of the program representative but also offer the opportunity to try new ideas.

Finally, **incentives are opportunities for partnerships and collaboration.** Professional organizations or businesses have been solicited to publicize the immunization efforts in a newsletter or provide funding for other rewards for provider staff. Many other types of collaboration are possible; these also have the benefit of increasing awareness of immunization among diverse groups.

eXchange of Information

The final AFIX component, eXchange of information, goes hand in hand with incentives. The more information providers have about their own practice's immunization coverage status, how it compares with state norms and with other providers in their community, and what strategies

Incentives

- **Something that incites to action**
- **Vary by provider and stage of progress**
- **Opportunities for partnership and collaboration**

eXchange of Information

- **Allows access to more experience than an individual can accumulate**
- **Motivates improvement**
- **Coordinates resources and efforts**

have been successful with other providers, the more knowledgeable and motivated they will be to increase their immunization rates. It is up to the AFIX representative to provide appropriate statistical and educational information and create forums for exchange of information among providers.

Staff members at all levels can benefit from the exchange of ideas about immunization practices and increasing rates of coverage—what has worked or not worked with another provider, streamlining office procedures, or where to obtain educational or other resources. The forums for such exchanges vary widely from informal meetings on the local level to more structured meetings sponsored by government or professional organizations. Immunization training sessions can be combined with **sharing of ideas** regarding actual situations in which recommendations, such as those from ACIP, are applied.

With the increased use of electronic communication, this method should not be neglected in the information exchange component of AFIX. Although different from face-to-face communication, e-mail exchanges or newsletters sent electronically can be cost-saving and fast means of disseminating information.

VFC-AFIX Initiative

In the last several years, responsibility for immunization has largely shifted from public health departments to private providers, who now vaccinate nearly 80% of children in the United States. Many of these providers participate in the Vaccines for Children (VFC) program, a federal program whereby funding is provided for state and other immunization programs to purchase vaccines and make them available at no cost to children who meet income eligibility requirements. Because immunization program staff make periodic quality assurance site visits to VFC providers, NIP launched an initiative in 2000 to link some AFIX and VFC activities and **incorporate AFIX activities during VFC provider site visits**. VFC program staff are encouraged to promote the AFIX approach and, if possible, to **combine VFC and AFIX site visits**. This **reduces the number of visits** to a single provider and helps avoid duplication of staff time and effort. In addition, it increases the emphasis on overall quality improvement for a provider rather than meeting the requirements of a single program.

VFC serves more than 30,000 private provider sites, and every state participates in the program. VFC provider site visits are conducted to review compliance with VFC eligibility screening requirements and to evaluate vaccine storage and handling procedures. **Linking VFC with AFIX enables AFIX to reach a large number of providers in the private**

VFC/AFIX

- **Incorporate AFIX activities during VFC site visits**
- **Combine VFC/AFIX site visits**
- **Reduces number of visits**
- **Extends reach of AFIX**

sector and to reinforce the goals of both programs. Information about VFC is on the NIP website at <http://www.cdc.gov/nip/vfc/Default.htm>.

AFIX Tools And Training

The National Immunization Program has developed a software program titled **Comprehensive Clinic Assessment Software Application (CoCASA)** to enable electronic entry of AFIX and VFC site visit data. CoCASA, first released in December 2005, is an update of previous versions of CASA and supersedes previous versions. Using CoCASA, a reviewer enters appropriate basic information about an individual provider and conducts an assessment of patient records. The user also has the option to record AFIX visit outcomes and VFC site visit information.

CoCASA can provide **immediate results of the assessment**, supplying the reviewer with the information needed for use in the feedback session and noting areas that need further follow-up. CoCASA saves the reviewer time and provides various analysis options. CoCASA reports provide **estimates of immunization coverage levels** and potential reasons for the coverage level, such as missed opportunities for immunization and patients who did not return to finish the immunization series. The program can generate **reports on specific sets of patients**, such as those mentioned. Data from an immunization registry or patient management system can be imported into CoCASA, and data collected during the visit can be exported for further analysis.

CoCASA is available on the website of the National Immunization Program (<http://www.cdc.gov/nip/casa/>). Comprehensive training modules on AFIX and on how to use CoCASA are built into the CoCASA program. Additional information about AFIX is available on the website of the National Immunization Program (<http://www.cdc.gov/nip/afix/default.htm>).

AFIX Endorsements

AFIX is widely supported as an effective strategy to improve vaccination rates. Many states have shown gradual and consistent improvement in their coverage levels in the public sector, and studies of private pediatricians have also documented substantial improvements in median up-to-date coverage at 24 months. Assessment and feedback of public and private provider sites are recommended by the National Vaccine Advisory Committee (NVAC) in the Standards of Pediatric Immunization Practices as well as by the Advisory Committee on Immunization Practices (ACIP) in a statement endorsing the AFIX process and recommending its use by all public and private providers. *Healthy People 2010* also

Comprehensive Clinic Assessment Software Application (CoCASA)

- VFC and AFIX results
- Immediate assessment results
- Estimate of coverage levels
- Reasons for deficiencies
- Reports on patient subsets

Strategies for High Immunization Levels

- Recordkeeping
- Recommendations and reinforcement
- Reminder and recall to patients
- Reminder and recall to providers
- Reduction of missed opportunities
- Reduction of barriers to immunization

Records

- Must be available at the time of the visit
- Must be easy to read
- Must be accurate
 - reflect current patient population
 - reflect all vaccines given

supports the AFIX concept with a recommendation for increasing the proportion of immunization providers who have measured vaccination levels among children in their practice within the past 2 years.

One of the recently revised Standards for Adult Immunization Practices issued by NVAC calls upon providers of adult immunization to do annual assessments of coverage levels. Although the use of AFIX among providers who serve adults is still in its infancy and is not as widespread as among childhood immunization providers, this strategy can be a powerful tool to improve rates in the adult population.

Other Essential Strategies

Although a substantial portion of this chapter is devoted to AFIX, certain other strategies for improvement of immunization levels deserve emphasis. These are complementary to AFIX; their adoption will support the goals of AFIX, i.e., raising immunization coverage levels, and will facilitate the AFIX process and ensure a favorable outcome of an assessment.

Recordkeeping

Patient records are of vital importance in a medical practice, and maintaining these records, whether paper or electronic, is critical to providing optimal healthcare. Immunization records, specifically, should meet all applicable legal requirements as well as requirements of any specific program, such as VFC, in which the provider participates. These records should be **available for inspection** by an AFIX or VFC representative and should be **easy to interpret** by anyone examining the record.

Immunization records must be **accurate**. The active medical records must reflect which patients are actually in the practice; charts of persons who have moved or are obtaining services elsewhere should be clearly marked accordingly or removed. Records should be kept up-to-date as new immunizations are administered, and all information regarding the vaccine and its administration should be complete.

Because patients often receive vaccines at more than one provider office, communication between sites is necessary for maintaining complete and accurate immunization records. School-based, public health, and community-based immunization sites should communicate with primary care personnel through quick and reliable methods such as, telephone, fax, or e-mail. This will become increasingly important as new vaccines for adolescents are added to the immunization schedule and more alternative sites are available for receiving immunizations.

Immunization Registries

Many recordkeeping tasks, as well as patient reminder/recall activities, can be greatly simplified by participation in a population-based immunization registry, also known as an immunization information system. An immunization registry is a computerized information system that contains information about the immunization status of each child in a given geographic area (e.g., a state). In some areas, an immunization registry is linked to a child's complete medical record. A registry provides a **single data source** for all community immunization providers, enabling access to records of children receiving vaccinations at multiple providers. It **provides a reliable immunization history** for every enrolled child and **can also produce accurate immunization records**, if needed for school or summer camp entry.

Registries can also generate reminder/recall notices (discussed below), relieving provider staff of an additional burden, and can automatically produce reports of immunization coverage in an individual providers' practice, or by the child's age or geographic area. A goal of *Healthy People 2010* is to increase to 95% the proportion of children younger than 6 years of age who participate in fully operational, population-based immunization registries. In 2002, approximately 43% of children in this age-group met this participation goal, and NIP and its partners at the federal, state and local levels are continuing their efforts to improve the registries themselves and to increase participation by immunization providers. Registries are a **key to increasing and maintaining immunization levels** and provide benefits for providers, patients, and state and federal immunization program personnel. More information about immunization registries is available on NIP's website at <http://www.cdc.gov/nip/registry/gen.htm>.

Recommendations to Parents and Reinforcement of the Need to Return

The recommendation of a healthcare provider is a **powerful motivator** for patients to comply with vaccination recommendations. Parents of pediatric patients are likely to follow vaccine recommendation of the child's doctor, and even adults who were initially reluctant were likely to receive an influenza vaccination when the healthcare provider's opinion of the vaccine was positive.

Regardless of their child's true immunization status, many parents believe the child is fully vaccinated. Parents may not have been told or may not have understood that return visits are necessary. It is useful for patients to have the next appointment date in hand at the time they leave the provider's office. An additional reminder strategy is to **link the timing of the return visit to some calendar event**, e.g.,

Immunization Registries

- **Single data source for all providers**
- **Reliable immunization history**
- **Produce records for patient use**
- **Key to increasing immunization levels**

Recommendations and Reinforcement

- **Recommend the vaccine**
 - powerful motivator
 - patients likely to follow recommendation of the provider
- **Reinforce the need to return**
 - verbal
 - written
 - link to calendar event

Reminders and Recall to Patients

- **Reminder**—notification that immunizations are due soon
- **Recall**—notification that immunizations are past due
- **Content of message and technique of delivery vary**
- **Reminders and recall have been found to be effective**

Reminders and Recall to Providers

- **Communication to healthcare providers that an individual client's immunizations are due soon or past due**
- **Examples**
 - computer-generated list
 - stamped note in the chart
 - “Immunization Due” clip on chart

the child's birthday or an upcoming holiday. Even with **written schedules or reminders, a verbal encouragement and reminder can be an incentive** for a patient's completing the immunization series and can ultimately result in higher coverage levels.

Reminder and Recall Messages to Patients

Patient reminders and recall messages are messages to patients or their parents stating that **recommended immunizations are due soon (reminders) or past due (recall messages)**. The messages vary in their level of personalization and specificity, the mode of communication, (e.g., postcard, letter, telephone), and the degree of automation. Both **reminders and recall messages have been found to be effective** in increasing attendance at clinics and improving vaccination rates in various settings.

Cost is sometimes thought to be a barrier to the implementation of a reminder/recall system. However, a range of options is available, from computer-generated telephone calls and letters to a card file box with weekly dividers, and these can be adapted to the needs of the provider. The specific type of system is not directly related to its effectiveness, and the benefits of having any system can extend beyond immunizations to other preventive services and increase the use of other recommended screenings.

Both the Standards for Child and Adolescent Immunization Practices and the Standards for Adult Immunization Practices call upon providers to develop and implement aggressive tracking systems that will both remind parents of upcoming immunizations and recall children who are overdue. ACIP supports the use of reminder/recall systems by all providers. The National Immunization Program provides state and local health departments with ongoing technical support to assist them in implementing reminder and recall systems in public and private provider sites.

Reminder and Recall Messages to Providers

Providers can create reminder and recall systems for themselves as aids for remembering for which **patients routine immunizations are due soon or past due**. Provider reminder/recall is different from “feedback,” in which the provider receives a message about overall immunization levels for a group of clients. Examples of reminder/recall messages are

- A computer-generated list that notifies a provider of the children to be seen that clinic session whose vaccinations are past due.

- A stamp with a message such as “No Pneumococcal Vaccine on Record,” that a receptionist or nurse can put on a the chart of a person over age 65.
- An “Immunization Due” clip that a nurse attaches to the chart of an adolescent who has not had hepatitis B vaccine.

Reminder systems will vary according to the needs of the provider; in addition to raising immunization rates in the practice, they will serve to heighten the awareness of staff members of the continual need to check the immunization status of their patients.

Reduction of Missed Opportunities to Vaccinate

A missed opportunity is a healthcare encounter in which a person is eligible to receive a vaccination but is not vaccinated completely. Missed opportunities occur in all settings in which immunizations are offered, whether routinely or not.

Missed opportunities occur for several reasons. At the provider level, many nurses and physicians avoid simultaneous administration of four or even three injectable vaccines. Frequently stated reasons have included concern about reduced immune response or adverse events, and parental objection. These concerns are not supported by scientific data. Providers also may be unaware that a child is in need of vaccination (especially if the immunization record is not available at the visit) or may follow invalid contraindications (see Chapter 2 for more information).

Some of the reasons for missed opportunities relate to larger systems; e.g., a clinic that has a policy of not vaccinating at any visits except well-child care, or not vaccinating siblings. Other reasons relate to large institutional or bureaucratic regulations, such as state insurance laws that deny reimbursement if a vaccine is given during an acute-care visit. The degree of difficulty in eliminating the missed opportunity may vary directly with the size of the system that has to be changed.

Several studies have shown that eliminating missed opportunities could increase vaccination coverage by up to 20 percent. Strategies designed to prevent missed opportunities have taken many different forms, used alone or in combination. Examples include the following:

- **Standing orders.** These are protocols whereby nonphysician immunization personnel may vaccinate clients without direct physician involvement at the time of the immunization. Standing orders are implemented in settings such as clinics, hospitals, and nursing homes. When used alone or in combination with other interventions, standing orders have had positive effects on immunization rates among adults.

Missed Opportunity

A healthcare encounter in which a person is eligible to receive vaccination but is not vaccinated completely

Reasons for Missed Opportunities

- Lack of simultaneous administration
- Unaware child needs additional vaccines
- Invalid contraindications
- Inappropriate clinic policies
- Reimbursement deficiencies

Strategies for Reducing Missed Opportunities

- Standing orders
- Provider education with feedback
- Provider reminder and recall systems

- **Provider education.** Anyone responsible for administering immunizations should be knowledgeable about principles of vaccination and vaccination scheduling, to the extent required for their position. Providers are largely responsible for educating their patients, so an investment in provider education will result in a higher level of understanding about immunizations among the public in general. Numerous educational materials, in a variety of formats, are available from CDC, the Immunization Action Coalition, and some state health departments, hospitals, or professional organizations. Incorporating some AFIX principles (i.e., assessment, feedback) into a provider education program might have a greater effect on provider behavior than an education effort aimed only at increasing knowledge.
- **Provider reminder and recall systems.** Provider reminder and recall systems are discussed above. These reminder systems, while effective in increasing immunization levels, can also help avoid missed opportunities if they are a component of other practices directed toward this goal. For example, if a reminder system is used consistently and staff members are knowledgeable about vaccination opportunities and valid contraindications, the system can be an additional aid in promoting appropriate immunization practices.

Reduction of Barriers to Immunization Within the Practice

Despite efforts by providers to adhere to appropriate immunization practices, obstacles to patients' being vaccinated may exist within the practice setting, sometimes unknown to the provider. **Barriers to immunization may be physical or psychological.** Physical barriers might be such things as inconvenient clinic hours for working patients or parents, long waits at the clinic, or the distance patients must travel. Providers should be encouraged to determine the needs of their specific patient population and take steps, such as extending clinic hours or providing some immunization clinics, to address obstacles to immunization.

Cost is also a barrier to immunization for many patients. In addition to evaluating their fee schedule for possible adjustments, providers should be knowledgeable about such programs as Vaccines for Children and the State Children's Health Insurance Program and the provisions specific to their state. Enrollment as a VFC provider is recommended for those with eligible children in their practice.

Psychological barriers to health care are often more subtle but may be just as important. Unpleasant experiences (e.g., fear of immunizations, being criticized for previously missed

Reduction to Barriers to Immunization

- **Physical barriers**
 - waiting time
 - distance
- **Psychological barriers**
 - unpleasant experience
 - safety concerns

appointments, or difficulty leaving work for a clinic appointment) may lead clients to postpone receiving needed vaccinations. Concerns about vaccine safety are also preventing some parents from having their children immunized. Overcoming such barriers calls for both knowledge and interpersonal skills on the part of the provider—knowledge of vaccines and updated recommendations and of reliable sources to direct patients to find accurate information, and skills to deal with fears and misconceptions and to provide a supportive and encouraging environment for patients.

Acknowledgments

The editors thank Amy Kirsch and Nancy Fenlon of the National Immunization Program, CDC for their updating and critical review of this chapter.

Selected References

American Academy of Pediatrics, Committee on Community Health Services and Committee on Practice and Ambulatory Medicine. Increasing Immunization Coverage. *Pediatrics* 2003;112:993–996.

CDC. Programmatic strategies to increase vaccination rates—assessment and feedback of provider-based vaccination coverage information. *MMWR* 1996;45:219–220.

CDC. Recommendations of the Advisory Committee on Immunization Practices (ACIP), the American Academy of Pediatrics, and the American Academy of Family Physicians: Use of reminder and recall by vaccination providers to increase vaccination rates. *MMWR* 1998;47:715–717.

Dietz VJ, Baughman AL, Dini EF, Stevenson JM, Pierce BK, Hersey JC. Vaccination practices, policies, and management factors associated with high vaccination coverage levels in Georgia public clinics. *Arch Pediatr Adolesc Med* 2000;154:184–189.

Dini EF, Linkins RW, Sigafos, J. The impact of computer-generated messages on childhood immunization coverage. *Am J Prev Med* 2000;18(2):132–139.

LeBaron CW, Chaney M, Baughman AL, Dini EF, Maes E, Dietz V, et al. Impact of measurement and feedback on vaccination coverage in public clinics, 1988–1994. *JAMA* 1997;277:631–635.

LeBaron CW, Mercer JT, Massoudi MS, Dini EF, Stevenson JM, Fischer WM, et al. Changes in clinic vaccination coverage after institution of measurement and feedback in 4 states and 2 cities. *Arch Pediatr Adolesc Med* 1999;153:879–886.

Lieu T, Black S, Ray P. Computer-generated recall letters for underimmunized children: how cost-effective? *Pediatr Infect Dis J* 1997;16:28–33.

Lieu T, Capra A, Makol J, Black S, Shinefield H. Effectiveness and cost-effectiveness of letters, automated telephone messages, or both for underimmunized children in a health maintenance organization [Abstract]. *Pediatrics* 1998;101:690–691.

Massoudi MS, Walsh J, Stokley S, Rosenthal J, Stevenson J, Miljanovic B, et al. Assessing immunization performance of private practitioners in Maine: impact of the Assessment, Feedback, Incentives, and eXchange (AFIX) strategy. *Pediatrics* 1999;103:1218–1223.

National Vaccine Advisory Committee. Standards for child and adolescent immunization practices. *Pediatrics* 2003;112:958-63.

Poland GA, Shefer AM, McCauley M, et al. Standards for adult immunization practices. *Am J Prev Med* 2003;25:144–150.

Szilagyi PG, Rodewald LE; Humiston SG, et al. Immunization practices of pediatricians and family physicians in the United States. *Pediatrics* 1994;94:517–23. Available at http://www.aap.org/research/periodicsurvey/peds10_94b.htm.

Task Force on Community Preventive Services. *Guide to community preventive services*. Atlanta: Centers for Disease Control and Prevention. Available at <http://www.thecommunityguide.org>.

Yawn BP, Edmonson L, Huber L, Poland GA, Jacobson RM, Jacobsen SJ. The impact of a simulated immunization registry on perceived childhood immunization status. *Am J Managed Care* 1998;4:186–192.