

**Vaccine-Preventable Diseases:
Improving Vaccination Coverage
in Children, Adolescents, and Adults**

**A Report on Recommendations of the
Task Force on Community Preventive Services**

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
Centers for Disease Control and Prevention (CDC)
Atlanta, Georgia 30333



The *MMWR* series of publications is published by the Epidemiology Program Office, Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services, Atlanta, GA 30333.

SUGGESTED CITATION

Centers for Disease Control and Prevention. Vaccine-preventable diseases: improving vaccination coverage in children, adolescents, and adults. A report on recommendations of the Task Force on Community Preventive Services. *MMWR* 1999;48(No. RR-8):[inclusive page numbers].

Centers for Disease Control and Prevention Jeffrey P. Koplan, M.D., M.P.H.
Director

The production of this report as an *MMWR* serial publication was coordinated in
Epidemiology Program Office..... Stephen B. Thacker, M.D., M.Sc.
Director

Office of Scientific and Health Communications John W. Ward, M.D.
Director
Editor, MMWR Series

Recommendations and Reports..... Suzanne M. Hewitt, M.P.A.
Managing Editor

C. Kay Smith-Akin, M.Ed.
Project Editor

Morie M. Higgins
Visual Information Specialist

Use of trade names and commercial sources is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services.

Copies can be purchased from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-9325. Telephone: (202) 512-1800.

Contents

Background	1
Introduction	1
Methods.....	2
Results	6
Use of the Recommendations in Communities and Health-Care Systems	14
Additional Information Regarding the Task Force and the <i>Guide</i>	15
References.....	15

Task Force on Community Preventive Services

CHAIR

Caswell A. Evans, Jr., D.D.S., M.P.H.
National Institute for Dental
and Crainiofacial Research
National Institutes of Health
Bethesda, Maryland

VICE-CHAIR

Jonathan E. Fielding, M.D., M.P.H., M.B.A.
Los Angeles Department
of Health Services
Los Angeles, California

MEMBERS

Ross C. Brownson, Ph.D.
St. Louis University School
of Public Health
St. Louis, Missouri

Patricia A. Buffler, Ph.D., M.P.H.
School of Public Health
University of California, Berkeley

Mary Jane England, M.D.
Washington Business Group on
Health
Washington, D.C.

David W. Fleming, M.D.
Oregon Health Division
Department of Human Resources
Portland, Oregon

Mindy Thompson Fullilove, M.D.
New York State Psychiatric Institute
and Columbia University
New York, New York

Fernando A. Guerra, M.D., M.P.H.
San Antonio Metropolitan Health
District
San Antonio, Texas

Alan R. Hinman, M.D., M.P.H.
Task Force for Child Survival
and Development
Atlanta, Georgia

George J. Isham, M.D.
HealthPartners
Minneapolis, Minnesota

Garland H. Land, M.P.H.
Center for Health Information,
Management, and Epidemiology
Missouri Department of Health
Jefferson City, Missouri

Charles S. Mahan, M.D.
College of Public Health
University of South Florida
Tampa, Florida

Patricia Dolan Mullen, Dr.P.H.
University of Texas-Houston
School of Public Health
Houston, Texas

Susan C. Scrimshaw, Ph.D.
School of Public Health
University of Illinois
Chicago, Illinois

Robert S. Thompson, M.D.
Department of Preventive Care
Group Health Cooperative
of Puget Sound
Seattle, Washington

The following CDC staff members prepared this report:

Peter A. Briss, M.D.
Vilma G. Carande-Kulis, M.S., Ph.D.
*Division of Prevention Research and Analytic Methods
Epidemiology Program Office*

Roger R. Bernier, Ph.D.
Office of the Director
Serigne M. Ndiaye, Ph.D.
Lance E. Rodewald, M.D.
Abigail M. Shefer, M.D.
Hussain R. Yusuf, M.B.B.S., M.P.H.
Immunization Services Division
Raymond A. Strikas, M.D.
*Epidemiology and Surveillance Division
National Immunization Program*

Sheree M. Williams, Ph.D.
*Division of Adult and Community Health
National Center for Chronic Disease Prevention and Health Promotion*

in collaboration with

Alan R. Hinman, M.D., M.P.H.
Task Force on Community Preventive Services

Vaccine-Preventable Diseases: Improving Vaccination Coverage in Children, Adolescents, and Adults

A Report on Recommendations from the Task Force on Community Preventive Services

Summary

The delivery and acceptance of recommended vaccinations is an ongoing challenge for health-care providers and health-care and public health systems, but specific interventions can increase levels of vaccination coverage. The Task Force on Community Preventive Services has conducted systematic reviews of 17 interventions designed to raise vaccination coverage levels in children, adolescents, and adults and made recommendations regarding the use of those interventions. This report provides a summary of the recommendations; informs readers of sources from which they can obtain the full review of the interventions and more detail regarding the application of the interventions at the local level; and informs readers regarding other work of the Task Force.

BACKGROUND

Despite the availability of safe and effective vaccines and substantial progress in reducing vaccine-preventable diseases, the delivery to and acceptance of vaccinations by targeted populations are essential to further reducing and eliminating vaccine-preventable causes of morbidity and mortality in the United States (1). The growing numbers of vaccines and complexity of vaccination schedules make delivering appropriate vaccinations in a timely manner increasingly difficult for health-care providers and health-care and public health systems (2). The recommendations included in this report are intended to guide communities in achieving or maintaining high levels of vaccination coverage and low rates of vaccine-preventable diseases.

INTRODUCTION

The independent, nonfederal Task Force on Community Preventive Services (the Task Force) is developing the *Guide to Community Preventive Services* (the *Guide*) with the support of the U.S. Department of Health and Human Services (DHHS) in collaboration with public and private partners. CDC provides staff support to the Task Force for development of the *Guide*, and CDC staff assisted in preparing this report. In addition, staff from CDC's National Immunization Program provided scientific leadership in conducting the reviews for the chapter "Vaccine-Preventable Diseases: Improving Vaccination Coverage in Children, Adolescents, and Adults." However, the recommendations presented in the chapter and this report were developed by the Task Force and are not necessarily the recommendations of either CDC or DHHS.

The chapter on vaccine-preventable diseases is the first to be completed for the *Guide*. This report summarizes the recommendations from the Task Force, which are included in that chapter. This report also provides an overview of the process used by the Task Force to select and review evidence for the recommendations. A more complete description of the systematic reviews of effectiveness that are the foundation of the recommendations are in press (1). A full report of the recommendations and supporting evidence for the chapter will be published later in the *American Journal of Preventive Medicine*. That report will summarize the systematic reviews of effectiveness, the recommendations, and additional information (e.g., systematic reviews of economic evaluations, a discussion of barriers to implementation, and a summary of remaining research questions). This report and other chapter-related publications will provide guidance from the Task Force to personnel in state and local health departments and managed care organizations, purchasers of health care, those responsible for funding public health programs, and others who have interest in or responsibility for improving vaccination coverage in children, adolescents, and adults.

Methods

The *Guide's* methods for systematic reviews and linking evidence to recommendations will be described in detail elsewhere (1, *American Journal of Preventive Medicine*) but are described briefly in this report. In the *Guide*, evidence is summarized regarding a) the effectiveness of interventions; b) the applicability of effectiveness data (i.e., the extent to which available effectiveness data might apply to other populations and settings); c) other positive or negative effects of the intervention, including positive or negative health and nonhealth outcomes; d) economic consequences; and e) barriers to implementation of interventions (3). For each *Guide* chapter, multidisciplinary chapter development teams conduct reviews by

- developing an approach to organizing, grouping, and selecting the interventions;
- systematically searching for and retrieving evidence;
- assessing the quality of and summarizing the strength of the body of evidence of effectiveness;
- summarizing information regarding other evidence; and
- identifying and summarizing research gaps.

For the chapter on vaccine-preventable diseases, the development team evaluated selected interventions to improve coverage levels for vaccinations universally recommended for certain age groups (Table 1). For example, measles, mumps, and rubella vaccinations are recommended for young children; hepatitis B vaccinations are recommended for adolescents; and annual influenza vaccinations are recommended for adults aged ≥ 65 years. The team focused on interventions that are intended to improve routine delivery of those universally recommended vaccinations. They chose not to address vaccinations with more targeted indications (e.g., vaccinations recommended for persons with specific medical conditions such as asthma or vaccinations for travelers). The major outcomes that were considered included delivery of vaccinations and the occurrence of vaccine-preventable diseases. Interventions

TABLE 1. Universally recommended vaccinations for children, adolescents, and adults

Population	Vaccination	Dosage
All young children	Measles, mumps, and rubella	2 doses
	Diphtheria-tetanus toxoid and pertussis vaccine	5 doses
	Poliomyelitis	4 doses
	<i>Haemophilus influenzae</i> type B	3–4 doses
	Hepatitis B	3 doses
	Rotavirus*	3 doses before first birthday
	Varicella	1 dose
Previously unvaccinated or partially vaccinated adolescents	Hepatitis B	3 doses, total
	Varicella	If no previous history of varicella, 1 dose for children aged <12 years, 2 doses for children aged ≥13 years
	Measles, mumps, and rubella	2 doses, total
	Tetanus-diphtheria toxoid	If not vaccinated during previous 5 years, 1 combined booster during ages 11–16 years
All adults	Tetanus-diphtheria toxoid	1 dose administered every 10 years
All adults aged ≥65 years	Influenza	1 dose administered annually
	Pneumococcal	1 dose

*Because rotavirus vaccine was not universally recommended during the period considered in this review, it is not reflected in these reviews.

reviewed were either single-component (i.e., using only one activity) or multicomponent (i.e., more than one related activity) to achieve desired outcomes.

The interventions included in the review were from a larger list and were prioritized for review by a multidisciplinary team of consultants,* which included some Task Force members. The selected interventions were chosen because they have an important impact or are widely practiced. The review evaluated 17 interventions, which were organized into three categories: a) increasing community demand for vaccinations, b) enhancing access to vaccination services, and c) provider-based interventions. Interventions were grouped together on the basis of their similarity and depth of available literature (i.e., the more literature available, the more subcategories

*Consultants for the chapter on vaccine-preventable diseases included David Atkins, M.D., M.P.H., Agency for Health Care Policy and Research, Rockville, Maryland; Joseph Chin, M.D., M.S., Health Care Financing Administration, Baltimore, Maryland; Caswell A. Evans, D.D.S., M.P.H., National Institutes of Health, Bethesda, Maryland; Theresa W. Gyorkos, Ph.D., Montreal General Hospital and McGill University, Montreal, Quebec, Canada; George J. Isham, M.D., HealthPartners, Minneapolis, Minnesota; Susan M. Lett, M.D., M.P.H., Massachusetts Department of Public Health, Boston, Massachusetts; Rose Marie Matulionis, M.S.P.H., Association of State and Territorial Directors of Health Promotion and Public Health Education, Washington, DC; Lloyd F. Novick, M.D., M.P.H., Onondaga County Health Department, Syracuse, New York; Thomas N. Saari, M.D., University of Wisconsin, Madison, Wisconsin; William Schaffner, II, M.D., Vanderbilt University, Nashville, Tennessee; and Susan C. Scrimshaw, Ph.D., University of Illinois, Chicago, Illinois.

that could be evaluated). Sometimes, the classification or nomenclature was different from that used in the original studies being reviewed. When such a discrepancy occurred, interventions were grouped according to the definitions stated in this report.

Some activities that might improve vaccination coverage were not considered interventions for the purposes of this review. Activities that provide information for public health action (e.g., immunization registries) provide useful information that might incorporate or lead to interventions (e.g., client reminder/recall, provider reminder/recall, and assessment and feedback for vaccination providers). However, registries were considered to be a part of the public health infrastructure rather than interventions. Similarly, improving vaccines (e.g., developing vaccines that are less likely to cause adverse reactions or increasing numbers of antigens contained in a vaccine, thus reducing the number of injections required) can lead to improvements in vaccination coverage. However, improved vaccines are made primarily for other reasons (e.g., harm reduction or to allow the administration of more antigens than would otherwise be feasible) and are, therefore, not considered to be interventions for the purposes of the chapter on vaccine-preventable diseases.

With rare exceptions (e.g., using 1998 papers for home visits and unpublished information regarding WIC* interventions), a study had to meet the following general criteria for inclusion in the reviews of effectiveness:

- be published during 1980–1997;
- address universally recommended childhood, adolescent, or adult vaccinations;
- be a primary study rather than, for example, a guideline or review;
- take place in an industrialized country or countries;
- be written in English;
- meet the chapter development team's definition of one or more included interventions;
- provide information on one or more predefined outcomes of interest; and
- compare a group of persons who had been exposed to the intervention with a group who were not exposed or who were less exposed.

For each intervention reviewed, the team developed an analytic framework indicating possible links between the intervention under study and certain outcomes. The primary outcome of interest for determining effectiveness was a measure of vaccination (e.g., vaccination coverage levels or doses delivered) because the linkage between vaccination and reduction of disease, morbidity, and mortality is strong (4). Current low rates of certain vaccine-preventable diseases make using vaccination levels a more sensitive and feasible-to-measure indicator of intervention impact than using disease rates.

*The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is administered by the U.S. Department of Agriculture.

Each study meeting the inclusion criteria was read by two reviewers who used a standardized abstraction form to record

- information regarding the intervention being studied;
- the context in which the study was done (e.g., population or setting);
- descriptions of the evaluation and results; and
- an assessment of how well the study was executed.

The strength of the body of evidence of effectiveness was characterized as strong, sufficient, or insufficient on the basis of the number of available studies, the suitability of study designs for evaluating effectiveness, the quality of execution of the studies, the consistency of the results, and the effect size. Several studies need to show effects that were generally similar in size and direction for a body of evidence to be considered consistent. In addition, the overall strength of a body of evidence increases as numbers of studies increase, suitability of designs and quality of execution improve, and effect sizes increase.

The *Guide* links evidence to recommendations using an explicit process. In general, strength of evidence of effectiveness corresponds directly to strength of recommendations (e.g., strong evidence of effectiveness corresponds to an intervention being strongly recommended, and sufficient evidence corresponds to an intervention being recommended). Other types of evidence can also affect a recommendation. For example, evidence of important harms might result in an intervention not being recommended even if it is effective. Furthermore, a recommendation might be limited to a specific population (e.g., strongly recommended for adults but insufficient evidence for children) because evidence of effectiveness is applicable to some populations and settings but not others. A determination that evidence is insufficient is important for identifying areas of uncertainty but should not be confused with evidence of ineffectiveness. A determination of insufficient evidence assists in identifying a) areas of uncertainty regarding effectiveness of an intervention and b) specific continuing research needs. In contrast, evidence of ineffectiveness leads to a recommendation that the intervention not be used.

RESULTS

The systematic search by the chapter development team identified 197 studies that met the inclusion criteria (1). Of these, 79 were excluded from further consideration on the basis of limitations in their execution or design and were not considered further (1). Task Force recommendations were based on the remaining 118 qualifying studies (1),* all of which had good or fair execution and the following designs:†

Greatest Suitability for Assessing Effectiveness

- randomized trials, 33 studies;
- nonrandomized trials, 24 studies;
- group randomized trials, 14 studies;
- other designs with concurrent comparison groups, 5 studies; and
- prospective cohort, 3 studies;

Moderate Suitability for Assessing Effectiveness

- time-series, 10 studies; and
- retrospective cohort, 4 studies;

Least Suitability for Assessing Effectiveness

- before/after, 16 studies; and
- cross-sectional, 9 studies.

Considerable variation existed in the numbers of studies available per intervention. For example, client reminder/recall interventions and provider reminder/recall interventions had 42 and 29 qualifying studies, respectively, whereas community education-only programs, school-based vaccination programs, and vaccination interventions in child care centers had one or no qualifying studies for evaluation. This report summarizes the interventions, findings from the reviews, and the Task Force recommendations (Table 2).

*For additional information regarding the methods or results, contact

Peter A. Briss, M.D.
Division of Prevention Research and Analytic Methods
Centers for Disease Control and Prevention
1600 Clifton Rd., N.E., MS D-01
Atlanta, GA 30333
Phone: 404-639-4312
Fax: 404-639-4816
E-mail: pxb5@cdc.gov

†A more detailed description of the methods for classifying study designs in the *Guide* will be published later in the *American Journal of Preventive Medicine*.

TABLE 2. Selected interventions to increase vaccination coverage among children, adolescents, and adults and recommendations from the Task Force on Community Preventive Services regarding the use of these interventions

Intervention	Task Force recommendation for use	Intervention description	Key findings
Increasing community demand for vaccinations			
Client reminder/recall systems	Strongly recommended	Reminders that vaccinations are due (reminders) or late (recall) are provided to target populations. Delivery techniques include telephone calls, letters, or postcards; contents of messages vary. (Interventions that incorporate aspects of client reminder/recall and home visits were classified under home visits.)	Improves vaccination coverage in children and adults in several settings and populations. Effective when applied in individual practice settings, across entire communities, and across several intervention characteristics (e.g., reminder or recall, content, theoretical basis, and method of delivery). Effective whether used alone or as part of a multicomponent intervention.
Multicomponent interventions that include education	Strongly recommended	Target populations receive education regarding vaccinations. Vaccination providers might also receive education. Used with at least one other activity to improve vaccination rates.	Improves vaccination coverage among children and adults in both communitywide and clinic-based settings. Effective in several contexts. (These interventions have incorporated education with other activities, including [from most common to least common among the qualifying studies] client reminders, provider education, expanded hours or access, provider reminders, reducing out-of-pocket costs, client-held vaccination records, WIC interventions, medical and psychosocial assessments, nutrition services, and home visits. Contribution of individual components to overall effectiveness could not be attributed.)
Vaccination requirements for child care, school, and college attendance	Recommended	Laws or policies are enacted or enforced that require vaccinations or other documentation of immunity as a condition of attendance.	Effective in reducing vaccine-preventable disease or improving vaccination coverage in all relevant populations. Differences in effectiveness of state laws based on the law's specific characteristics or its enforcement could not be determined.

TABLE 2. Selected interventions to increase vaccination coverage among children, adolescents, and adults and recommendations from the Task Force on Community Preventive Services regarding the use of these interventions — Continued

Intervention	Task Force recommendation for use	Intervention description	Key findings
Communitywide education only	Insufficient evidence* (Small numbers of qualifying studies and limitations in their designs and executions.)	Provides information to a target population in a geographic area. Can also provide information to vaccination providers. Does not include other features (e.g., reminders), activities, or efforts limited to specific settings.	The only qualifying study evaluated effectiveness in changing vaccination delivery but had limitations in design and conduct and found inconsistent results in different subpopulations. No qualifying studies were identified that evaluated effectiveness in changing knowledge and attitudes regarding vaccinations.
Clinic-based education only	Insufficient evidence* (Small numbers of qualifying studies and limitations in their designs and executions.)	Provides information to persons served in a specific medical or public health clinical setting. Does not include other features (e.g., reminders) or activities provided in other settings (e.g., school or child care centers).	No studies were identified that evaluated strategies other than printed educational materials. The only qualifying study that evaluated effectiveness of printed materials on vaccination coverage found small and nonsignificant effects. The two before/after studies that evaluated the effects of vaccination information statements on client knowledge or attitude towards vaccination documented variable effects.
Client or family incentives	Insufficient evidence* (Small numbers of qualifying studies, variability in interventions evaluated, and variability in size and statistical significance of results.)	Provides financial or other incentives to motivate acceptance of vaccinations. Incentives can involve either rewards or penalties. (Some interventions with aspects of incentives [e.g., WIC [†] programs and vaccination requirements for child care, school, and college attendance] are categorized elsewhere.)	Three qualifying studies were identified, and those studies included four intervention arms. One intervention arm that evaluated use of incentives only found a not statistically significant (6%) net change in coverage. The other three intervention arms evaluated incentives and reminders with and without additional activities; those findings were variable in size and statistical significance.

* A determination that evidence is insufficient should not be confused with evidence of ineffectiveness. A determination of insufficient evidence assists in identifying a) areas of uncertainty regarding effectiveness of an intervention and b) specific continuing research needs. In contrast, evidence of ineffectiveness leads to a recommendation that the intervention not be used.

[†] The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is administered by the U.S. Department of Agriculture.

TABLE 2. Selected interventions to increase vaccination coverage among children, adolescents, and adults and recommendations from the Task Force on Community Preventive Services regarding the use of these interventions — Continued

Intervention	Task Force recommendation for use	Intervention description	Key findings
Client-held medical records	Insufficient evidence* (Small numbers of studies, limitations in study design and conduct, variability in interventions evaluated, and variability in size and statistical significance of reported results.)	Provides to clients or family members medical records that indicate which vaccinations have been received.	Four qualifying studies were identified, one of which evaluated client-held records only and three of which evaluated client-held records used in combination with clinic-based education, client reminders, or multiple strategies. Effectiveness in improving vaccination coverage was variable in size and statistical significance.
Enhancing access to vaccination services			
Reducing out-of-pocket costs	Strongly recommended	Can include providing free vaccinations or administration, providing insurance coverage, or reducing copayments for vaccinations at the point of service.	Improves vaccination coverage in children and adults across several settings and populations. Effective when applied in individual clinical settings, in statewide programs, or in national efforts. Effective whether used alone or as part of a multicomponent intervention.
Expanding access in medical or public health clinical settings	Strongly recommended as part of a multicomponent intervention Insufficient evidence* when used alone (Small numbers of qualifying studies and limitations in their designs and executions.)	One or more of the following: Reduces the distance from the setting to the population. Increases or makes more convenient the hours during which vaccination services are provided. Delivers vaccinations in clinical settings in which they were not provided previously (e.g., inpatient units). Reduces administrative barriers to obtaining vaccination services within clinics (e.g., "drop-in" clinics or an "express lane" vaccination service).	As a part of multicomponent interventions, improves vaccination coverage among children and adults in several contexts. The contribution of individual components to the overall effectiveness of these interventions cannot be attributed. Only two intervention arms evaluated expanded access only; effect sizes were small and statistical significance variable.

* A determination that evidence is insufficient should not be confused with evidence of ineffectiveness. A determination of insufficient evidence assists in identifying a) areas of uncertainty regarding effectiveness of an intervention and b) specific continuing research needs. In contrast, evidence of ineffectiveness leads to a recommendation that the intervention not be used.

TABLE 2. Selected interventions to increase vaccination coverage among children, adolescents, and adults and recommendations from the Task Force on Community Preventive Services regarding the use of these interventions — Continued

Intervention	Task Force recommendation for use	Intervention description	Key findings
Vaccination programs in Women, Infants, and Children (WIC) settings [†]	Recommended	<p>Encourages the vaccination of low-income clients of this nonmedical setting.</p> <p>At a minimum, requires assessment of each child's immunization status and referral of underimmunized children to a health-care provider.</p> <p>Can include education, provision of vaccinations, and incentives to accept vaccinations. (e.g., more frequent WIC* visits for children who are not up-to-date with their vaccinations).</p>	<p>Improves vaccination coverage in children whether used alone or as part of a multicomponent intervention.</p> <p>All qualifying studies evaluated assessing the immunization status of WIC clients and either providing vaccinations on-site or referring clients elsewhere for vaccination.</p> <p>Some interventions also used monthly voucher pick-up or provided free vaccinations. Contributions of individual components to the overall effectiveness could not be determined.</p>
Home visits	Recommended	<p>Provides face-to-face services to clients in their homes.</p> <p>Services can include education, assessment of need for vaccinations, referral for vaccinations, or provision of vaccinations.</p> <p>Can also include telephone or mailed reminders.</p>	<p>Improves vaccination coverage.</p> <p>Most available studies were conducted in socioeconomically disadvantaged populations.</p> <p>When applied only to improve vaccination coverage, home visits can be highly resource-intensive relative to other available options for improving vaccination coverage.</p>
Vaccination programs in schools	Insufficient evidence* (A single qualifying study and limitations in its design and execution.)	<p>Intended to improve delivery of vaccinations to school attendees aged approximately 5–18 years.</p> <p>Usually includes vaccination-related education of students, parents, teachers, and other school staff and either provision of vaccinations or referral for vaccinations.</p> <p>Can also include incentives to participants and methods for acquiring written consent from parents.</p> <p>(Laws requiring vaccination for school entry are evaluated elsewhere.)</p>	<p>Only one qualifying study was identified; it did not provide comparative data regarding vaccination outcomes.</p>

* A determination that evidence is insufficient should not be confused with evidence of ineffectiveness. A determination of insufficient evidence assists in identifying a) areas of uncertainty regarding effectiveness of an intervention and b) specific continuing research needs. In contrast, evidence of ineffectiveness leads to a recommendation that the intervention not be used.

[†] The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is administered by the U.S. Department of Agriculture.

TABLE 2. Selected interventions to increase vaccination coverage among children, adolescents, and adults and recommendations from the Task Force on Community Preventive Services regarding the use of these interventions — Continued

Intervention	Task Force recommendation for use	Intervention description	Key findings
Vaccination programs in child care centers	Insufficient evidence* (No qualifying studies)	Encourages the vaccination of children aged <5 years. Requires assessment of each child's immunization status at entry into child care or at some point during the child's enrollment. Can also involve additional assessments at periodic intervals, education or notification of parents, referral of underimmunized children to a health-care provider, or provision of vaccinations on-site. (Laws requiring vaccination for child care centers are evaluated elsewhere.)	Only one study was identified; it did not qualify for the review.
Provider-based interventions			
Provider reminder/recall	Strongly recommended	Informs those who administer vaccinations that individual clients are due (reminder) or overdue (recall) for specific vaccinations. Techniques by which reminders are delivered — in client charts, by computer, by mail, or other — and content of the reminders vary. (Interventions that incorporate elements of reminders and standing orders are classified as standing orders for the purposes of the chapter on vaccine-preventable diseases.)	Improves vaccination coverage in adults, adolescents, and children whether used alone or as part of a multicomponent intervention. Effective across several intervention characteristics (e.g., computerized or simple reminders, checklists, or flowcharts) and in several settings and populations.

* A determination that evidence is insufficient should not be confused with evidence of ineffectiveness. A determination of insufficient evidence assists in identifying (a) areas of uncertainty regarding effectiveness of an intervention and (b) specific continuing research needs. In contrast, evidence of ineffectiveness leads to a recommendation that the intervention not be used.

TABLE 2. Selected interventions to increase vaccination coverage among children, adolescents, and adults and recommendations from the Task Force on Community Preventive Services regarding the use of these interventions — Continued

Intervention	Task Force recommendation for use	Intervention description	Key findings
Assessment and feedback for vaccination providers	Strongly recommended	<p>Involves retrospectively evaluating the performance of providers in delivering one or more vaccinations to a client population and giving this information to the providers.</p> <p>Can also involve other activities (e.g., incentives or benchmarking: comparing performance to a goal or standard).</p>	<p>Improves vaccination coverage in adults and children whether used alone or as part of a multicomponent intervention.</p> <p>Effective across several settings and populations.</p> <p>Specific characteristics (e.g., content, intensity, use of incentives, or benchmarking) that contribute most to effectiveness cannot be determined from available data; however, a variety of feedback interventions have been consistently effective in several contexts.</p>
Standing Orders	Strongly recommended for adults Insufficient evidence* for children (Small numbers of qualifying studies and limitations in their designs and executions.)	<p>Nonphysician medical personnel prescribe or deliver vaccinations to client populations by protocol without direct physician involvement at the time of the interaction.</p> <p>Settings include clinics, hospitals, and nursing homes.</p> <p>(Dedicated vaccination clinics often operate under standing orders, but standing orders in that context were not considered to be an intervention for the purposes of the chapter on vaccine-preventable diseases.)</p>	<p>Improves vaccination coverage whether used alone or as part of a multicomponent intervention and is effective in such settings as hospitals, clinics, and nursing homes.</p> <p>Insufficient evidence exists to assess the effectiveness of standing orders in improving delivery of vaccinations to children because only one qualifying study was available; that study had limitations in design and conduct and reported effects not substantially different from zero.</p>

* A determination that evidence is insufficient should not be confused with evidence of ineffectiveness. A determination of insufficient evidence assists in identifying (a) areas of uncertainty regarding effectiveness of an intervention and (b) specific continuing research needs. In contrast, evidence of ineffectiveness leads to a recommendation that the intervention not be used.

TABLE 2. Selected interventions to increase vaccination coverage among children, adolescents, and adults and recommendations from the Task Force on Community Preventive Services regarding the use of these interventions — Continued

Intervention	Task Force recommendation for use	Intervention description	Key findings
Provider education only	Insufficient evidence* (Small numbers of qualifying studies, limitations in their design and conduct, and variability in results.)	Provides information to vaccination providers to increase their knowledge or change attitudes. Techniques can include written materials, videos, lectures, continuing medical education programs, and computerized software.	Only four qualifying studies were identified. Two studies of low-intensity interventions evaluated the impact of these interventions regarding vaccination coverage; one documented small and nonsignificant impacts; the other demonstrated that provider education produced smaller impacts than provider reminder/recall or standing orders. Three studies of provider education-only interventions documented variable impacts regarding provider knowledge and attitudes. The best-described and most-intensive intervention produced improvements in provider knowledge and attitudes.

* A determination that evidence is insufficient should not be confused with evidence of ineffectiveness. A determination of insufficient evidence assists in identifying (a) areas of uncertainty regarding effectiveness of an intervention and (b) specific continuing research needs. In contrast, evidence of ineffectiveness leads to a recommendation that the intervention not be used.

USE OF THE RECOMMENDATIONS IN COMMUNITIES AND HEALTH-CARE SYSTEMS

These recommendations and the reviews on which they are based will be useful for choosing interventions, but local contextual information is also important. Local context includes observed problems, community preferences and priorities, and specific interventions that are feasible and appropriate. Choosing interventions that work in general and that are well-matched to local needs and capabilities, then implementing those interventions well, is vital for improving vaccination coverage at the local level.

A starting point for addressing vaccine-preventable disease problems in communities and health-care systems is to assess activities currently being performed, current levels of vaccination coverage, and information regarding vaccine-preventable disease rates. These should be compared with such relevant goals as those in *Healthy People 2000 (5)*, *Healthy People 2010 (U.S. Department of Health and Human Services, Draft for Public Comment, September 1998)*, and additional applicable goals developed locally. In addition to assessing overall progress towards vaccination goals, health planners should also consider whether special attention is warranted for population groups at high risk. In general, the lower the vaccination coverages and the higher the burden of vaccine-preventable diseases in a population or subgroup, the greater the need to improve coverage. For example, all vaccine-preventable diseases except tetanus are primarily spread by person-to-person contact among unvaccinated persons. Low vaccination coverage levels (6,7) and crowding can be particularly common among urban and low-socioeconomic populations. Therefore, improving coverage among persons living in poverty in urban communities should be a top priority.

When improvement in vaccination coverage is needed, the causes of underimmunization should be assessed and interventions chosen that address local problems. The chapter on vaccine-preventable diseases groups interventions into categories to enable users to match interventions to problems. For example,

- **Increasing Community Demand for Vaccinations** — If lack of knowledge among clients regarding need for vaccination contributes to low coverage, a strategy to increase demand can be useful.
- **Enhancing Access to Vaccination Services** — If an undervaccinated population has few or no contacts with the health-care system, an intervention to increase access can be appropriate.
- **Provider-Based Interventions** — In the United States, most persons accept the need for vaccinations and are seen periodically in health-care settings; unfortunately, providers often miss opportunities to vaccinate. Provider-based interventions can help address those missed opportunities.

Once a general strategy for addressing a local problem is selected, the recommendations in the chapter can be used in conjunction with local experience to help select appropriate interventions. Recommendations and effectiveness data can be used to assess the extent to which interventions have been found to consistently improve vaccination coverage. On the basis of those data, the use of strongly recommended and recommended interventions should be increased. Information regarding applica-

bility can be used to assess the extent to which the interventions reviewed might match a particular local situation. Economic information, though limited, can be useful in identifying interventions that meet public health goals more efficiently than other available options for reaching the same goals. Reviews and recommendations provided in the *Guide* need to be considered along with such local information as resource availability, administrative structures, economic, social, and regulatory environment of organizations and practitioners. Guidance for implementation is available elsewhere (8).

ADDITIONAL INFORMATION REGARDING THE TASK FORCE AND THE *GUIDE*

During 1999–2000, *Guide* chapters will be prepared and released as each is completed. Other chapters of the *Guide* will cover such topics as motor vehicle occupant injury, tobacco use, sexual behavior, cancer, sociocultural environment, and oral health. Later, a compilation of the chapters will be published in book form. Additional information regarding the Task Force and the *Guide* is available on the Internet at <<http://web.health.gov/communityguide>>.

References

1. Shefer AM, Briss PA, Rodewald L, et al. Improving immunization coverage rates: an evidence-based review of the literature. *Epidemiol Rev* 1999. (In Press)
2. CDC. Achievements in public health, 1900–1999: impact of vaccines universally recommended for children—United States, 1990–1999. *MMWR* 1999;48:243–8.
3. Pappaioanou M, Evans C. Development of the Guide to Community Preventive Services: a U.S. Public Health Service initiative. *Journal of Public Health Management and Practice* 1998;4(2):48–54.
4. U.S. Preventive Services Task Force. Guide to clinical preventive services. 2nd ed. Alexandria, VA: International Medical Publishing, 1996.
5. Public Health Service. Healthy people 2000: national health promotion and disease prevention objectives. Washington, DC: U.S. Department of Health and Human Services, Public Health Service, 1991; DHHS publication no. (PHS) 91-50212.
6. CDC. National, state, and urban area vaccination coverage levels among children aged 19–35 months—United States, July 1996–June 1997. *MMWR*;47:108–16.
7. CDC. Vaccination coverage by race/ethnicity and poverty level among children aged 19–35 months—United States, 1996. *MMWR* 1997;46:963–8.
8. CDC. Epidemiology and prevention of vaccine-preventable diseases. 5th ed. Atkinson W, Humiston S, Wolfe C, Nelson R, eds. Atlanta, GA: U.S. Department of Health and Human Services, CDC, National Immunization Program, January 1999.

MMWR

The *Morbidity and Mortality Weekly Report (MMWR)* Series is prepared by the Centers for Disease Control and Prevention (CDC) and is available free of charge in electronic format and on a paid subscription basis for paper copy. To receive an electronic copy on Friday of each week, send an e-mail message to listserv@listserv.cdc.gov. The body content should read *SUBscribe mmwr-toc*. Electronic copy also is available from CDC's World-Wide Web server at <http://www.cdc.gov/> or from CDC's file transfer protocol server at <ftp.cdc.gov>. To subscribe for paper copy, contact Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402; telephone (202) 512-1800.

Data in the weekly *MMWR* are provisional, based on weekly reports to CDC by state health departments. The reporting week concludes at close of business on Friday; compiled data on a national basis are officially released to the public on the following Friday. Address inquiries about the *MMWR* Series, including material to be considered for publication, to: Editor, *MMWR* Series, Mailstop C-08, CDC, 1600 Clifton Rd., N.E., Atlanta, GA 30333; telephone (888) 232-3228.

All material in the *MMWR* Series is in the public domain and may be used and reprinted without permission; citation as to source, however, is appreciated.