



MMWRTM

Morbidity and Mortality Weekly Report

Recommendations and Reports

April 1, 2005 / Vol. 54 / No. RR-5

Improving Influenza, Pneumococcal Polysaccharide, and Hepatitis B Vaccination Coverage Among Adults Aged <65 Years at High Risk

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

The *MMWR* series of publications is published by the Coordinating Center for Health Information and Service,* 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. Improving influenza, pneumococcal polysaccharide, and hepatitis B vaccination coverage among adults aged <65 years at high risk: a report on recommendations of the Task Force on Community Preventive Services. *MMWR* 2005;54(No. RR-5):[inclusive page numbers].

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Improving Influenza, Pneumococcal Polysaccharide, and Hepatitis B Vaccination Coverage Among Adults Aged <65 Years at High Risk

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

Prepared by
Bayo C. Willis, MPH¹
Serigne M. Ndiaye, PhD²
David P. Hopkins, MD³
Abigail Shefer, MD¹

¹ Immunization Services Division, National Immunization Program

² Global Aids Program/Office of the Director, National Center for HIV, STD, and TB Prevention

³ Division of Prevention Research and Analytic Methods, Epidemiology Program Office

Summary

The Task Force on Community Preventive Services conducted systematic reviews to evaluate the effectiveness of interventions to improve targeted vaccination coverage (i.e., coverage with vaccines recommended for some but not all persons in an age range on the basis of risk for exposure or disease) among adults aged <65 years at high risk when implemented alone (single-component interventions) and in combination with other interventions (multicomponent interventions). A 1999 report by the Task Force examined the effectiveness of interventions to increase coverage with universally recommended vaccinations (i.e., vaccines recommended for all persons in particular age groups). Three targeted vaccinations recommended for populations at risk are addressed in this review: influenza, pneumococcal polysaccharide, and hepatitis B. The Task Force identified evidence that certain combinations of interventions have improved vaccination coverage. To increase targeted vaccination coverage, the Task Force recommends a combination of interventions that include selected interventions from two or three categories of interventions (i.e., increasing community demand for vaccinations, enhancing access to vaccination services, and provider- or system-based interventions). The Task Force also recommends provider reminders, when implemented alone, to improve targeted vaccination coverage. This report provides additional information about population-based interventions to improve the coverage of influenza, pneumococcal polysaccharide, and hepatitis B vaccines among populations at risk, briefly describes how the reviews were conducted, and provides information that can help in applying the interventions locally.

Background

Influenza, pneumococcal infections, and hepatitis B are vaccine-preventable diseases that cause substantial illness and premature death in the United States (1–3). Rates of morbidity and mortality are higher among adults with certain medical conditions, occupational exposures, or risk behaviors (2,4,5). Efforts to reduce the burden of these diseases depend

on increasing vaccination coverage in the population, especially among adults at high risk. This report provides recommendations from the Task Force on Community Preventive Services (Task Force) for use of population-based interventions to improve the coverage of influenza, pneumococcal polysaccharide, and hepatitis B vaccines among adults aged <65 years at high risk, with occupational exposure, risky behaviors, or medical conditions (targeted vaccinations). Previously, the Task Force evaluated the effectiveness of interventions to increase coverage with universally recommended vaccinations (i.e., those recommended for all persons in particular age groups) (6–8).

Influenza

Influenza causes an estimated 114,000 excess hospitalizations (5) and 36,000 deaths (3) annually in the United States.

The material in this report was prepared by the Epidemiology Program Office, Stephen B. Thacker, MD, Director, Division of Prevention and Research and Analytic Methods, Anne Haddix, PhD, Acting Director.

Corresponding preparer: Serigne M. Ndiaye, PhD, National Center for HIV, STD, and TB Prevention, CDC, 1600 Clifton Road NE, MS E-30, Atlanta, GA, 30333. Telephone: 404-639-8558; Fax: 404-639-6499; e-mail: sndiaye@cdc.gov.

Morbidity and mortality rates are high among adults aged ≥ 65 years and among younger persons who have medical conditions that place them at risk for complications from the disease (e.g., diabetes or lung or heart disease). Influenza vaccination is effective in preventing hospitalization and death among persons with high-risk medical conditions (9). Influenza coverage rates among adults aged < 65 years with one or more risk conditions ranged from 20.4% (aged 18–49 years) to 37.7% (aged 50–64 years) in 1995 (10) and remained low (32%) among adults aged 18–64 years in 2002 (National Health Interview Survey [NHIS], unpublished data, 2002).

Pneumococcal Disease

In the United States, approximately 3,500 persons aged ≤ 65 years die every year as a result of pneumococcal disease (2). Pneumococcal infections cause an estimated 3,000 cases of meningitis, 50,000 cases of bacteremia, and 500,000 cases of pneumonia annually (11). Efficacy rates for the 23-valent vaccine in studies of immunocompetent adults ranged from 65% to 75% in the prevention of pneumococcal bacteremia and meningitis (12,13). Despite the efficacy of the vaccine, vaccination coverage remains low for adults aged 18–64 years with risk conditions. Coverage rates for pneumococcal polysaccharide vaccine among adults aged < 65 years with one or more risk conditions ranged from 11.8% (aged 18–49 years) to 20.1% (aged 50–64 years) in 1995 (10) and remained low (19.1%) among persons aged 18–64 years in 2002 (NHIS, unpublished data, 2002).

Hepatitis B

An estimated 1.0–1.3 million persons in the United States are chronically infected with hepatitis B virus (HBV) (14), of whom approximately 5,000 die of HBV-related cirrhosis or liver cancer each year (15–17). Risk conditions for hepatitis B include occupational exposures and risk behaviors (e.g., injection-drug use and multiple sex partners). Although reported cases of HBV declined 76% during 1987–1998 (18), the annual number of new infections remained substantial with 78,000 cases estimated in 2001 (19). Despite the availability of an effective vaccine, vaccination coverage rates remain low in the majority of targeted populations. In one study, 9% of men who have sex with men (MSM) had both a history and serologic evidence of hepatitis B vaccination in 1998 (20). Among injection-drug users attending a sexually transmitted disease clinic in San Diego during 1998–2001, vaccination coverage for hepatitis B was 6% (21). Among occupationally

exposed workers, vaccination coverage is approximately 75%, and with increasing vaccination coverage, the estimated number of HBV infections among health-care workers in the United States has decreased from $> 10,000$ in 1983 to approximately 400 in 2002 (22,23).

Targeted vaccination coverage rates for influenza, pneumococcal polysaccharide, and hepatitis B vaccines in adult populations at high risk remain low and below the Healthy People 2010 objectives (24). These objectives include increasing both influenza and pneumococcal vaccination coverage among adults at high risk to 60% and increasing hepatitis B vaccine coverage among high-risk groups, including hemodialysis patients (to 90%), MSM (to 60%), and occupationally exposed workers (to 98%).

Introduction

The independent, nonfederal Task Force on Community Preventive Services leads work on the *Guide to Community Preventive Services* (the *Community Guide*), a resource that includes multiple systematic reviews, each focusing on a preventive health topic. The *Community Guide* is being developed with the support of the U.S. Department of Health and Human Services (DHHS) in collaboration with public and private partners. Although CDC provides staff support to the Task Force for development of the *Community Guide*, the recommendations presented in this report were developed by the Task Force and are not necessarily the recommendations of DHHS, CDC, or other participating groups.

This report is one in a series of topics included in the *Community Guide*. It provides an overview of the process used by the Task Force to select and review evidence and summarize its recommendations about interventions to improve targeted vaccination coverage among adults at high risk. A full report on the recommendations, additional evidence (i.e., discussions of applicability; additional benefits; potential harms; existing barriers to implementation; and costs, cost-benefit, and cost-effectiveness [when available] of recommended interventions), and remaining research questions will be published in the *American Journal of Preventive Medicine* in 2005.

Community Guide topics are prepared and released as each is completed. The findings from systematic reviews on improving coverage with universally recommended vaccines, tobacco-use prevention and reduction, reducing motor-vehicle occupant injury, increasing physical activity, diabetes management, oral health, skin cancer prevention, violence prevention, and the effects of the social environment on health have already been

published. A compilation of systematic reviews has been published in book form (*The Guide to Community Preventive Services. What Works to Promote Health?*). Additional information about the Task Force and the *Community Guide* and a list of published articles are available at <http://www.thecommunityguide.org>.

Methods

The methods used by the *Community Guide* for conducting systematic reviews and linking evidence to recommendations have been described elsewhere (25). For each *Community Guide* topic, a multidisciplinary team (the systematic review development team composed of *Community Guide* researchers and methodologists, Task Force members, and other subject matter specialists)* conducts a review consisting of the following steps:

- developing an approach to organizing, grouping, and selecting the interventions;
- systematically searching for and retrieving evidence;
- assessing the quality and summarizing the strength of the body of evidence on effectiveness;
- translating the body of evidence on effectiveness into conclusions;
- assessing evidence about economic efficiency, applicability, other positive and negative effects, and barriers to implementation (if the effectiveness of the intervention has been established); and
- identifying and summarizing research gaps.

The same conceptual approach and model (logic framework) used in the initial systematic reviews of vaccine-preventable diseases for the *Guide to Community Preventive Services* in 2000 (6) was adopted for this review. As in the initial review, the

systematic review development team focused on the following three categories of interventions:

- Interventions to increase community and client demand for vaccines and vaccination services. These efforts provide or disseminate information, advice, or both to clients to increase and improve their efforts to seek appropriate vaccination.
- Interventions to enhance access to vaccination services. These efforts reduce barriers clients might encounter in attempting to receive vaccinations.
- Provider- or system-based interventions. These interventions provide information or deliver timely reminders or periodic feedback to health-care providers with the intent of increasing provider counseling about, and administration of, appropriate vaccinations to clients.

The Task Force previously reviewed the evidence on interventions to improve coverage of universally recommended vaccinations (i.e., vaccines recommended for all persons in particular age groups) in children, adolescents, and adults (6–8). This review is an expansion of the original *Community Guide* review and evaluates the effectiveness of interventions to increase targeted vaccine coverage among populations at high risk. Although barriers to vaccination are similar for universally recommended and targeted vaccinations, the populations are different. This review focused on interventions conducted among adults aged <65 years with medical conditions such as diabetes, human immunodeficiency virus, heart disease, and lung disease; health-care workers at high risk for occupational exposure; and persons with high-risk behaviors for HBV infection (e.g., injection-drug use or multiple sex partners). Because these groups might be harder to reach than those for whom universally recommended vaccinations are appropriate, the Task Force conducted reviews specifically addressing these populations at risk.

The team reviewed the same interventions selected for the initial review of strategies to increase coverage for universally recommended vaccines, adding new studies published during 1997–2001. Studies were eligible for inclusion in the reviews of effectiveness if they 1) were primary investigations of interventions selected for evaluation rather than, for example, guidelines or reviews; 2) were published in English during January 1980–August 2001; 3) compared outcomes among groups of persons exposed to the intervention with outcomes among groups of persons not exposed or less exposed to the intervention (i.e., the study design included a concurrent or before-and-after comparison); 4) were conducted in established market

*The systematic review development team directs the review, in conjunction with a group of consultants. For these reviews, the members of the systematic review development team were David P. Hopkins, MD, Peter A. Briss, MD, Division of Prevention Research and Analytic Methods, Epidemiology Program Office; Serigne M. Ndiaye, PhD, Lance E. Rodewald, MD, Abigail M. Shefer, MD, Bayo Willis, MPH, National Immunization Program, CDC, Atlanta, Georgia; Alan R. Hinman, MD, Task Force for Child Survival and Development, Atlanta, Georgia. Consultants were Bob Gunn, MD, National Center for HIV, STD and TB Prevention, CDC, Atlanta, Georgia; Joseph Chin, MD, Center for Medicare Services, Baltimore, Maryland; Lloyd Novick, MD, Onondaga County Health Department, Syracuse, New York; Rose Marie Matulionis, MSPH, Association of State and Territorial Directors of Health Promotion and Public Health Education, Washington, DC; Susan Lett, MD, Massachusetts Department of Health, Boston; Tracy Lieu, MD, Harvard University, Cambridge, Massachusetts; Theresa W. Gyorkos, PhD, Montreal General Hospital and McGill University, Montreal, Quebec, Canada; Tom Saari, MD, University of Wisconsin, Madison; William Schaffner II, MD, Vanderbilt University, Nashville, Tennessee; Peter Szilagyi, MD, University of Rochester, New York.

economies;[†] 5) measured differences or changes in vaccination coverage; 6) were studies of influenza, pneumococcal polysaccharide, or hepatitis B vaccines; and 7) were studies of populations that either focused on or included persons aged <65 years and at high risk for infection, morbidity, or mortality.

The team used multiple strategies to identify studies of interventions, starting with a search of 12 computerized databases (MEDLINE[®], Embase, Psychlit, Sociological Abstracts, CabHealth, HealthStar, AIDSline, Occupational Safety and Health Database, Educational Resource Information Center [ERIC], PsycINFO[®], Dissertation Abstracts, and Conference Papers Index).[§] Team members also reviewed reference lists of published studies and consulted with specialists in the field to identify relevant studies. Each study was evaluated by two independent reviewers using a standardized abstraction form and was assessed for suitability of the study design and threats to validity (25,26). Studies were characterized as having good, fair, or limited execution on the basis of the number of threats to validity (25). Studies with greatest or moderate design suitability and a good or fair quality of execution were considered qualifying studies and became part of the body of evidence.

Results for each outcome of interest were obtained from each study that met the minimum quality criteria. For this review, assessment of the effectiveness of an intervention was primarily based on the reported measurements of changes in coverage rates for influenza, pneumococcal polysaccharide, or hepatitis B vaccination. In studies with concurrent comparison groups, the overall change in vaccination coverage was calculated by using the difference in vaccine coverage change observed in the intervention and comparison groups. In studies without a concurrent comparison group (e.g., time series evaluations), the absolute percentage change was calcu-

lated from measurements of vaccination coverage in the study population pre- and postintervention.[¶] The median was used to summarize a typical measure of effect across the body of evidence for each outcome of interest; both the median and the range are reported.

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 as defined by the *Community Guide* (25), the consistency of the results, and a determination of median effect size sufficient for the purpose of public health benefit.

The Task Force uses systematic reviews to evaluate the evidence of intervention effectiveness and makes recommendations on the basis of the findings of the reviews (25). The strength of each recommendation is based on the evidence of effectiveness (i.e., an intervention is recommended on the basis of either strong or sufficient evidence of effectiveness) (25). Other types of evidence can also affect a recommendation. For example, harms resulting from an intervention that outweigh benefits might lead to a recommendation that the intervention not be used even if it is effective in improving certain outcomes.

A finding of insufficient evidence to determine effectiveness means that the team was not able to determine whether or not the intervention is effective. This finding is important for identifying areas of uncertainty and continuing research needs. In contrast, sufficient or strong evidence of ineffectiveness would lead to a recommendation against use of the intervention.

In its earlier review of universally recommended vaccines, the Task Force summarized the evidence on effectiveness of interventions implemented in combination within defined

[†] Established Market Economies, as defined by the World Bank, are Andorra, Australia, Austria, Belgium, Bermuda, Canada, Channel Islands, Denmark, Faeroe Islands, Finland, France, Germany, Gibraltar, Greece, Greenland, Holy See, Iceland, Ireland, Isle of Man, Italy, Japan, Liechtenstein, Luxembourg, Monaco, The Netherlands, New Zealand, Norway, Portugal, San Marino, Spain, St. Pierre and Miquelon, Sweden, Switzerland, the United Kingdom, and the United States.

[§] These databases can be accessed as follows: MEDLINE: <http://www.ncbi.nlm.nih.gov/PubMed>; Embase: <http://www.ovid.com/site/catalog/DataBase/903.jsp>; Psychlit: http://www.ovid.com/site/catalog/Catalog_DataBase.jsp; Sociological Abstracts, <http://dialogclassic.com> (requires id/password account), <http://www.csa.com/detailsV5/socioabs.html>; CabHealth: <http://www.datastarweb.com>; HealthStar: <http://www.nlm.nih.gov/services/igm.html>; AIDSline: http://www.ovid.com/site/catalog/Catalog_DataBase.jsp; Occupational Safety and Health Database: <http://www.cdc.gov/niosh/database.html>; Educational Resource Information Center (ERIC): <http://www.askeric.org/Eric/>; PsycINFO: <http://www.dialogic.com> (requires ID/password account), <http://www.apa.org/psycinfo/products/psycinfo.html>; Dissertation Abstracts: http://www.ovid.com/site/catalog/Catalog_DataBase.jsp; Conference Papers Index: <http://www.csa.com/csa/factsheets/cpilong.shtml> (requires subscription).

[¶] In studies with concurrent comparison groups, the overall change in vaccination coverage was calculated by using the difference between the changes in vaccination coverage observed in the intervention and comparison groups. In time-series studies, the absolute percentage point change over time was derived.

In these calculations, I_{post} = last reported coverage in the intervention group after the intervention; I_{pre} = reported coverage in the intervention group immediately before the intervention; C_{post} = last reported coverage in the comparison group after the intervention; and C_{pre} = reported coverage in the comparison group immediately before the intervention.

- For studies with before-and-after measurements and concurrent comparison groups, where baseline = I_{pre}:
(I_{post} – I_{pre}) – (C_{post} – C_{pre})
- For studies with post-only coverage measurements and concurrent comparison groups, where baseline = C_{post}:
I_{post} – C_{post}
- For studies with before-and-after measurements but no concurrent comparison, where baseline = I_{pre}:
I_{post} – I_{pre}

multicomponent categories (e.g., multicomponent interventions that include patient or provider education) (26). The multicomponent body of evidence summarized in the current reviews consisted predominantly of studies evaluating unique, overlapping combinations of interventions. A multicomponent framework was initially developed in these reviews, but the Task Force later determined that a simplified, qualitative, and conceptual categorization of interventions within a “menu” format provides a more accurate and useful assessment of the evidence. Studies with similar but not identical combinations of interventions within or across categories were evaluated together as a body of evidence. Effectiveness was determined for each possible combination of categories. After effective category combinations were identified, specific interventions with sufficient evidence on effectiveness as part of a multicomponent effort were included as category options in the menu (results of this review are presented elsewhere) (27). This approach introduces an additional qualitative method for Task Force recommendations while acknowledging the work of previous investigators who developed and implemented intervention combinations on the basis of a conceptual understanding of vaccination demand and delivery (28).

Results

The team identified 2,461 titles and abstracts, of which 60 met the inclusion criteria. Of these, 25 were excluded on the basis of limitations in their design or execution and were not considered further. The remaining 35 studies were considered qualifying studies and form the basis for the Task Force evaluations reported here. Reviews identified strong evidence of effectiveness in increasing targeted vaccine coverage for provider reminder systems when implemented alone. The evidence was insufficient to determine the effectiveness of all other interventions when implemented alone (single-component interventions). All 11 single-component interventions are described here (Table 1), and a more detailed report will be published elsewhere (27).

The findings of the systematic review of interventions to increase targeted vaccine coverage when implemented in combination (multicomponent) are based on 23 studies (29–51). Overall, the 23 qualifying studies provided 26 study arms evaluating 22 different combinations of interventions. Seven study arms in seven studies evaluated one of three specific intervention combinations: two studies evaluated a combination of client reminders and provider reminders; two used a combination of client education, client reminders, and expanded ac-

cess in a health-care setting; and three used a combination of client education, client reminders, expanded access, and reduced client out-of-pocket costs. The remaining 19 study arms evaluated unique combinations of interventions.

Because the majority of studies evaluated unique combinations of interventions, the team examined the evidence of effectiveness of combinations of interventions within and across three categories of vaccination delivery (i.e., enhancing access to vaccination services, provider- or system-based interventions, and increasing client or community demand) (Table 2).

On the basis of strong evidence of effectiveness, the Task Force recommends the combination of one or more interventions to enhance access to vaccination services (expanded access in health-care settings or reduced client out-of-pocket costs) with at least one provider- or system-based intervention (standing orders, provider reminder systems, or provider assessment and feedback), and/or at least one intervention to increase client or community demand for vaccination (client reminders or client education). The menu format of this recommendation is presented (Table 3). Evidence was insufficient to determine the effectiveness of other combinations across or within categories.

Although incremental improvements in vaccine coverage could not be attributed to the specific components, combined activities improved vaccination coverage. This could reflect any of the following:

- The combined activities reinforce one another (e.g., education alone might not be enough to increase acceptance of vaccinations, but could make clients more receptive to other components).
- Multicomponent interventions are delivered more intensively than single-component interventions.
- More studies have been conducted of multicomponent interventions than single-component.
- Multicomponent interventions might increase the likelihood of a client’s exposure to at least one component.

The results of this review should be applicable in the majority of client and provider populations and the majority of settings where improvements in coverage are needed. Interventions were evaluated among outpatients, inpatients, health-care workers, nurses, and faculty physicians. Evaluated health-care settings included academic programs, outpatient clinics, hospitals, and long-term care facilities. No additional positive or negative effects specific to the combination of interventions were identified in this review, although positive or negative effects of single-component interventions might remain relevant (6). Economic evaluations of the effects of these

TABLE 1. Recommendations from the Task Force on Community Preventive Services on population-based interventions, when implemented alone, to improve targeted vaccination coverage among adults aged <65 years at high risk.

Interventions (number of qualifying studies)	Task Force recommendation	Intervention description	Key findings
Interventions to enhance access to vaccination services			
Expanding access in health-care settings (n = 0)	Insufficient evidence to determine effectiveness*	Expanding access increases the availability of vaccines in medical or public health clinic settings in which vaccinations are offered by 1) reducing the distance between the setting and the population; 2) increasing or changing hours during which vaccination services are provided; 3) delivering vaccinations in clinical settings in which they were previously not provided (e.g., emergency departments, inpatient units, or subspecialty clinics); or 4) reducing administrative barriers to obtaining vaccination services within clinics (e.g., developing a "drop-in" clinic or an "express lane" vaccination service).	Insufficient evidence to determine effectiveness in improving influenza, pneumococcal polysaccharide, or hepatitis B vaccination coverage among adults at high risk because no studies were identified.
Reducing out-of-pocket costs (n = 0)	Insufficient evidence to determine effectiveness*	Health-care system efforts to reduce the out-of-pocket costs to the client for vaccination services include paying for the vaccines or administration, providing insurance coverage, or reducing co-payments for vaccinations at the point of service.	Insufficient evidence to determine effectiveness in improving influenza, pneumococcal polysaccharide, or hepatitis B vaccination coverage among adults at high risk because no qualifying studies were identified.
Provider- or system-based interventions			
Provider reminders (n = 7)	Recommended	Provider reminder interventions are used to inform those who administer vaccinations that individual clients are due for specific vaccinations. Techniques by which reminders are delivered vary, from the use of notations in clients' charts, to attached chart prompt or stickers, to standardized checklists generated by the clinical staff or developed from computer databases and registries. Reminders can be directed to primary health-care providers or to one or more members of the clinic staff.	Provider reminders are recommended by the Task Force on the basis of strong evidence of effectiveness in improving targeted vaccination coverage. The body of evidence identified in the review included two studies of provider reminders focused on influenza vaccination, one study focused on pneumococcal vaccine, and four studies of both influenza and pneumococcal vaccination. The median increase in vaccination coverage was 22 percentage points (range: 8–72).
Assessment and feedback for vaccination providers (n = 1)	Insufficient evidence to determine effectiveness*	Provider assessment and feedback involve retrospectively evaluating the performance of providers in delivering one or more vaccinations to client populations and giving this information to providers. This study evaluated the effect of annual chart reviews and feedback on coverage of influenza and pneumococcal polysaccharide vaccines.	Insufficient evidence to determine effectiveness in improving influenza or pneumococcal polysaccharide vaccination coverage among adults at high risk. Although this study documented a 32 percentage point improvement in coverage for influenza vaccine and an 18 percentage point improvement for pneumococcal polysaccharide vaccine, these findings alone are not sufficient to determine whether the intervention is effective.

TABLE 1. (Continued) Recommendations from the Task Force on Community Preventive Services on population-based interventions, when implemented alone, to improve targeted vaccination coverage among adults aged <65 years at high risk.

Interventions (number of qualifying studies)	Task Force recommendation	Intervention description	Key findings
Provider- or system-based interventions			
Provider education (n = 0)	Insufficient evidence to determine effectiveness*	Provider education involves giving information about vaccinations to providers to increase their knowledge or change their attitudes. Techniques by which information is delivered can include written materials, videos, lectures, continuing medical education programs, or computerized software.	Insufficient evidence to determine effectiveness in improving influenza, pneumococcal polysaccharide, or hepatitis B vaccination coverage among adults at high risk because no studies were identified in the review.
Standing orders (n = 0)	Insufficient evidence to determine effectiveness*	Standing orders involve interventions in which nonphysician personnel (e.g., nurses or pharmacists) prescribe or deliver vaccinations to client populations by protocol without direct physician involvement at the time of interaction.	Insufficient evidence to determine effectiveness in improving influenza, pneumococcal polysaccharide, or hepatitis B vaccination coverage among adults at high risk because no studies were identified in the review.
Interventions to increase community and client demand			
Client reminders (n = 1)	Insufficient evidence to determine effectiveness*	Client reminder interventions involve reminding members of a target population that vaccinations are due. Reminders differ in content and are delivered by various methods (e.g., telephone, letter, or postcard). In the one study, clients received a postcard with a message signed by their providers, reminding them to get a "flu shot".	Insufficient evidence to determine effectiveness in improving influenza vaccination coverage among adults at high risk because only one study was available.
Clinic-based client education (n = 2)	Insufficient evidence to determine effectiveness*	Clinic-based client education interventions provide information to clients served in a specific medical or public health clinic setting. In one study, information or information plus individualized decision analysis were provided to clients to increase coverage with hepatitis B vaccine. In the other study, clients received an educational handout to increase coverage with pneumococcal polysaccharide vaccine.	Insufficient evidence to determine effectiveness in improving influenza, pneumococcal polysaccharide, or hepatitis B vaccination coverage among adults at high risk because of the limited number of studies.
Community-wide education (n = 0)	Insufficient evidence to determine effectiveness*	Community-wide education interventions provide information to the majority of or all of a target population in a geographic area. Educational messages can be delivered by various methods (e.g., radio, newspapers, television, or posters).	Insufficient evidence to determine effectiveness in improving influenza, pneumococcal polysaccharide, or hepatitis B vaccination coverage among adults at high risk because no qualifying studies were identified.
Client or family incentives (n = 1)	Insufficient evidence to determine effectiveness*	Client or family incentives involve motivating clients (or patients) with rewards (e.g., money or discount coupons at retail stores) or the threat of penalties (e.g., being excluded from participating in a program). The study in the review evaluated the effectiveness of a \$10 incentive on increasing receipt of hepatitis B vaccination among injection-drug users.	The study documented a 35 percentage point increase in vaccine coverage. However, this study did not provide sufficient evidence to determine the effectiveness of the intervention.

TABLE 1. (Continued) Recommendations from the Task Force on Community Preventive Services on population-based interventions, when implemented alone, to improve targeted vaccination coverage among adults aged <65 years at high risk.

Interventions (number of qualifying studies)	Task Force recommendation	Intervention description	Key findings
Interventions to increase community and client demand			
Vaccination requirements (n = 0)	Insufficient evidence to determine effectiveness*	Vaccination requirements include laws or policies requiring vaccination or other documentation of immunity as a condition of attendance (e.g., for child care, school, or college), residence (e.g., residential or long-term care facilities), or employment (e.g., health-care worker).	Insufficient evidence to determine effectiveness in improving influenza, pneumococcal polysaccharide, or hepatitis B vaccination coverage among adults at high risk because no qualifying studies were found.

* Insufficient evidence to determine effectiveness means that the Task Force could not determine whether or not the intervention works. A determination of insufficient evidence assists in identifying areas of uncertainty about an intervention's effectiveness and specific continuing research needs.

TABLE 2. Evidence of effectiveness of intervention combinations in increasing coverage of targeted vaccinations in populations at high risk

Combinations across categories of interventions evaluated in the studies qualifying for review			
Interventions to enhance access to vaccination services	Provider- or system-based interventions	Interventions to increase client or community demand	Results from studies qualifying for review
Intervention combinations with sufficient evidence of effectiveness			
X	X	X	Four studies: median change: 22.8 percentage points (range: -5.9–67.0)
X		X	Nine studies: median change: 14 percentage points (range: 3.1–46.0)
X	X		Three studies: 31 percentage points 27 percentage points -0.5 percentage points
Intervention combinations with insufficient evidence to determine effectiveness			
	X	X	Five studies: median change: 3.7 percentage points (range: -2.0–28.9)
X			No studies identified
	X*	X†	One study: 11 percentage points One study: 13.6 percentage points

* One qualifying study evaluated the combination of provider education and provider assessment and feedback.

† One qualifying study evaluated the combination of client education and client reminders.

TABLE 3. Menu format of intervention combinations recommended by the Task Force on Community Preventive Services to increase targeted vaccinations

One or both of these interventions to enhance access to vaccination services:	— Expanded access in health-care settings
	— Reducing client out-of-pocket costs
plus	
One or more of these provider- or system-based interventions:	— Standing orders
	— Provider reminder systems
	— Provider assessment and feedback
and/or	
One or both of these interventions to increase client demand for vaccination services:	— Client reminder systems
	— Client education

combined interventions were identified, but none of them met the quality criteria (52,53). Therefore, the results of these evaluations are not presented.

Barriers to the implementation of single-component interventions are probably relevant to combinations of interventions (6). Additional barriers (e.g., lack of infrastructure) also might be encountered in efforts to combine and coordinate two or more interventions.

In conclusion, on the basis of strong evidence of effectiveness in increasing targeted vaccination coverage among adult populations at high risk, the Task Force recommends the use of provider reminder systems and the use of combinations of interventions that include one or more interventions to enhance access to targeted vaccination services coordinated with one or more provider- or system-based interventions and/or one or more interventions to increase client or community demand for targeted vaccination services. These findings should be applicable to the majority of client populations for which targeted vaccines are indicated and where improvements in coverage are needed and to diverse provider populations and health-care settings.

Using the Recommendations in Communities and Health-Care Settings

Evidence reviews can support, but do not replace, the need to conduct local assessments in the process of program planning. Recommendations from the Task Force can assist program planners in matching effective intervention options to local needs, experience, administrative and social structures and regulations, and resources. In addition to the evidence on effectiveness, evidence on applicability can be used to assess the extent to which the interventions reviewed match a particular local situation. Economic evaluations of the recommended intervention and intervention combinations are limited in both quality and quantity.

The evidence on effectiveness identified in the review is divided among three different vaccines, certain targeted populations, and different community and health-care settings. Despite a limited body of evidence for selected conditions, the Task Force recommendations presented in this report, except as noted in the following, should be broadly applicable. For example, a limited number of studies were identified of population-based interventions to increase vaccination coverage for hepatitis B among health-care workers. Although motivation to be vaccinated might vary with the vaccine (i.e., hepatitis B

protects the health-care worker who is vaccinated, whereas influenza vaccine also protects those patients with whom the health-care worker comes in contact), the Task Force recommendation reflects confidence that effective efforts to increase influenza vaccine coverage among health-care workers can also be applicable to efforts to vaccinate health-care workers against hepatitis B.

Community-based options for interventions to increase vaccination coverage of persons at high risk for HBV are one important area in which substantial gaps remain in the evidence on effectiveness. Substantial differences in the hepatitis B vaccination schedule (a series of three injections), the target populations (persons with high-risk behaviors such as injection-drug use), and the settings for intervention (not primary health-care settings) are unlikely to be overcome through the direct application of health-care system strategies demonstrated to be effective in other targeted vaccination efforts (28). Effective and recommended health-care-based interventions might not be applicable or might require considerable modification to fit community-based programs to increase HBV coverage in populations at high risk. Practitioners should ensure that interventions are selected or modified to address locally relevant barriers to vaccination. Researchers should consider more studies of this problem.

In 2000, the Advisory Committee on Immunization Practices updated their universal recommendations for annual influenza vaccination to include adults aged 50–64 years (54). Program planners dedicated to increasing influenza vaccination coverage within this population should consider recommendations from either or both Task Force reviews applicable. For initial efforts, the recommendations in the original, universal review provide effective and flexible intervention options (6,8). For enhancing initial program efforts, the information on intervention combinations recommended in this targeted review might be helpful.

Certain studies included in these reviews evaluated interventions or combinations of interventions implemented to increase vaccine coverage among all adult patients within a health-care system (including both patients with universal and high-risk indications). To match effective interventions to local needs, program planning should include an assessment of existing disparities, if any, in vaccine coverage among adult patients with universal and targeted indications.

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Task Force on Community Preventive Services*

February 1, 2005

Chair: Jonathan E. Fielding, MD, Los Angeles Department of Health Services, Los Angeles, California.

Members: Noreen Morrison Clark, PhD, University of Michigan School of Public Health, Ann Arbor, Michigan; John Clymer, Partnership for Prevention, Washington, DC; Kay Dickersin, PhD, Center for Clinical Trials and Evidence-based Healthcare, Brown University, Providence, Rhode Island; Alan R. Hinman, MD, Task Force for Child Survival and Development, Atlanta, Georgia; Robert L. Johnson, MD, New Jersey Medical School, Department of Pediatrics, Newark, New Jersey; Garland H. Land, MPH, Center for Health Information Management and Epidemiology, Missouri Department of Health, Jefferson City, Missouri; Patricia A. Nolan, MD, Rhode Island Department of Health, Providence, Rhode Island; Alonzo L. Plough, PhD, Public Health—Seattle and King County, Seattle, Washington; Nicolaas P. Pronk, PhD, HealthPartners Center for Health Promotion, Minneapolis, Minnesota; Dennis L. Richling, MD, Midwest Business Group on Health, Chicago, Illinois; Barbara K. Rimer, DrPH, School of Public Health, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina; Steven M. Teutsch, MD, Merck & Company, Inc., West Point, Pennsylvania.

Consultants: Robert S. Lawrence, MD, Bloomberg School of Public Health, Johns Hopkins University, Baltimore, Maryland; J. Michael McGinnis, MD, Robert Wood Johnson Foundation, Princeton, New Jersey; Lloyd F. Novick, MD, Onondaga County Department of Health, Syracuse, New York.

* Patricia A. Buffer, PhD, University of California, Berkeley; Ross Brownson, PhD, St. Louis University School of Public Health, St. Louis, Missouri; Mary Jane England, MD, Regis College, Weston, Massachusetts; Caswell A. Evans, Jr., DDS, National Oral Health Initiative, Office of the U.S. Surgeon General, Rockville, Maryland; David W. Fleming, MD, CDC, Atlanta, Georgia; Mindy Thompson Fullilove, MD, New York State Psychiatric Institute and Columbia University, New York, New York; Fernando A. Guerra, MD, San Antonio Metropolitan Health District, San Antonio, Texas; George J. Isham, MD, HealthPartners, Minneapolis, Minnesota; Charles S. Mahan, MD, College of Public Health, University of South Florida, Tampa, Florida; Patricia Dolan Mullen, DrPH, University of Texas—Houston School of Public Health, Houston, Texas; Susan C. Scrimshaw, PhD, University of Illinois School of Public Health, Chicago, Illinois; and Robert S. Thompson, MD, Department of Preventive Care, Group Health Cooperative of Puget Sound, Seattle, Washington, also served on the Task Force while the recommendations were being developed.

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