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# Recommendations Regarding Interventions to Improve Vaccination Coverage in Children, Adolescents, and Adults

Task Force on Community Preventive Services

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## Introduction

This report makes recommendations on the use of interventions to increase vaccine coverage levels. The reviews of evidence on which these recommendations are based are provided in the accompanying article (see Briss et al., page 97). The recommendations apply to vaccinations universally recommended for children, adolescents and adults, i.e., measles, mumps and rubella vaccinations for young children; hepatitis B vaccinations for adolescents; and annual influenza vaccinations for adults aged  $\geq 65$ . A complete listing of the types of vaccines for which these recommendations are considered to apply is provided in the accompanying evidence review.

## Interpreting and Using the Recommendations

Using information from the systematic reviews is important for choosing interventions, but considering local context is equally important. Local context includes observed problems, community preferences and priorities and specific interventions that are feasible and appropriate. Choosing strategies that work in general and that are well matched to local needs and capabilities, and then effectively implementing those interventions, is vital to improving vaccination coverage at the local level. This section provides guidance for combin-

ing the information found in these reviews and recommendations (i.e., strategies that work in general) with local contextual information (i.e., ensuring a good match between interventions and local needs and capabilities).

A starting point for addressing vaccine-preventable disease problems in communities is to assess activities currently being performed, current levels of vaccination coverage and information regarding disease rates. These assessments should be compared with such relevant goals as those in *Healthy People 2000/2010*,<sup>1,2</sup> as well as with additional goals developed locally. In addition to assessing overall progress toward 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 spread by person-to-person contact. Urban, low-socioeconomic-status populations are particularly vulnerable when immunization rates are low. Therefore, improving coverage in impoverished urban communities should be a priority.

If improvement in vaccination coverage for a population or subgroup is warranted, causes of underimmunization should be assessed and interventions should be chosen that address local problems. Even generally effective strategies are unlikely to achieve objectives if they are poorly matched to local needs. Interventions are grouped into three general categories. Each category includes several specific interventions. This categorization is intended to facilitate the ability of users to match interventions to problems. For example:

- In the United States, most people accept the need for vaccinations and are seen periodically in health care settings, but unfortunately, providers often miss op-

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portunities to vaccinate. Provider-based interventions are good choices for addressing those missed opportunities.

- Improving recognition, acceptance and use of new vaccines by providers is a challenge that will be confronted increasingly. Provider-based interventions are also good choices for increasing the use of new vaccines.
- If an undervaccinated population had few or no contacts with the health care system, an intervention to increase access might be appropriate.
- If lack of knowledge among clients regarding need for vaccination contributes to low coverage, a strategy to increase demand could be useful.

Once a general strategy for addressing a local problem is selected, the recommendations in this paper and the conclusions in the accompanying evidence review 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. In general, the use of recommended and strongly recommended interventions should be increased. Evidence regarding applicability can be used to assess the extent to which the interventions reviewed might match a particular local situation. At present, available economic information is limited in both quality and quantity. Although limited, it would sometimes 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 here need to be considered along with local information, such as resource availability; administrative structures; and the economic, social and regulatory environment of organizations and practitioners.

Some circumstances could lead to using two or more interventions simultaneously. Most importantly, a single intervention might not address multiple problems contributing to low vaccination rates. For example, if lack of demand for vaccinations among clients and missed opportunities to provide vaccinations by providers were occurring, interventions to address both might be useful. Other circumstances (e.g., particularly low vaccination coverage or high levels of community interest) might also support selection of multicomponent interventions. The accompanying evidence review describes the scientific evidence supporting these recommendations. The available scientific data do not provide clear answers regarding how and when activities should be combined. However, data from the evidence review could be useful in identifying activities that are individually effective and activities that have been previously used together successfully.

## Intervention Recommendations

### Increasing Community Demand for Vaccinations

**Client reminder/recall.** Client reminder/recall interventions involve reminding members of a target population that vaccinations are due (reminders) or late (recall). Reminders differ in content and are delivered by various methods—telephone, letter, postcard or other. Interventions that incorporate aspects of both client reminder/recall and home visits are included under home-visiting interventions.

Client reminder/recall interventions are *strongly recommended* on the basis of strong scientific evidence that they improve vaccination coverage (1) in children and adults; (2) in a range of settings and populations; (3) when applied at different levels of scale from individual practice settings to entire communities; (4) across a range of intervention characteristics (e.g., reminder or recall, content, theoretical basis and method of delivery); and (5) whether used alone or as part of multicomponent intervention.

### Multicomponent interventions that include education.

Multicomponent interventions that include education provide knowledge to target populations, and sometimes to vaccination providers, and use at least one other activity to improve vaccination coverage.

Multicomponent interventions that include education are *strongly recommended* on the basis of strong scientific evidence that they: (1) improve vaccination coverage among children and adults; (2) improve vaccination coverage in community-wide and clinic-based settings; (3) improve vaccination coverage in a range of contexts; and (4) have incorporated education with a variety of other activities. The contribution of individual components to overall effectiveness of these interventions could not be attributed.

### Vaccination requirements for childcare, school and college attendance.

Childcare, school and college requirements are laws or policies requiring vaccinations or other documentation of immunity as a condition of attendance. Vaccination requirements for childcare, school and college attendance are *recommended* on the basis of sufficient scientific evidence that: (1) these requirements are effective in reducing vaccine-preventable disease and/or improving vaccination coverage and (2) they are effective in all relevant populations. Differences in effectiveness of state laws based on a particular law's specific characteristics or its enforcement could not be determined.

### Community-wide education-only interventions.

Community-wide education-only interventions provide information to most or all of a target population in a geographic area. These interventions can also provide information to vaccination providers. Interventions that have additional features (e.g., reminders) are used

in combination with other interventions (e.g., multi-component interventions that include education), or are limited to site-specific efforts in a particular setting (e.g., schools or childcare centers), are included with other interventions.

A review of available scientific evidence found only one qualifying study that assessed the effectiveness of community-wide education-only interventions regarding delivery of vaccinations. That study had limitations in design and conduct and found inconsistent results in different subpopulations. No qualifying studies were identified that evaluated the effectiveness of community-wide education-only interventions regarding knowledge and attitudes. Therefore, available studies provide *insufficient evidence* to assess the effectiveness of community-wide education regarding improving vaccination coverage, knowledge or attitudes.

**Clinic-based education-only interventions.** Clinic-based education-only interventions provide information to groups served in a specific medical or public health clinical setting. Interventions that have additional features (e.g., reminders) are used in combination with other interventions (e.g., multicomponent interventions that include education), or are provided in other settings (e.g., schools or childcare centers), are included elsewhere in this paper.

A review of available scientific evidence found only one qualifying study evaluating the effectiveness of printed educational materials regarding improving vaccination coverage. That study found effects regarding coverage that were neither substantial nor statistically significant. Only two before/after studies were identified that evaluated the effects of vaccination information statements regarding client knowledge or attitude toward vaccination. Those studies demonstrated variable effects regarding knowledge and attitudes. No studies were identified evaluating clinic-based educational strategies other than printed educational materials. Therefore, available studies provide *insufficient evidence* to assess the effectiveness of clinic-based education-only interventions to improve knowledge, attitudes, or vaccination coverage.

**Client or family incentives.** Client incentives involve providing financial or other incentives to motivate persons to accept vaccinations. Incentives can be either rewards or penalties. Some interventions with aspects of incentives (e.g., Women, Infants, and Children (WIC) programs, and childcare, school and college attendance requirements) are included elsewhere in this paper.

A review of available scientific evidence identified three qualifying studies, and those studies included four intervention arms. Only one intervention arm evaluated use of incentives only; it found a 9% change in coverage. The other three intervention arms evaluated incentives and reminders with and without addi-

tional interventions; two of these reported results that were neither significant nor substantially different from no effect. Therefore, on the basis of the (1) small number of available studies; (2) variability in interventions evaluated; and (3) and variability in size of reported results, *insufficient evidence* exists to assess the effectiveness of client incentives in improving vaccination coverage and whether incentives provide a marginal benefit when combined with reminders.

**Client-held medical records.** Client-held medical records that indicate which vaccinations have been received are provided to members of a target population or their families. A review of available scientific evidence identified four qualifying studies of client-held medical records; one evaluated client-held records only and three evaluated client-held records together with clinic-based education, client reminders or multiple strategies. Several of the reported results were neither substantial nor statistically different from zero. Therefore, on the basis of the (1) small number of studies; (2) limitations in study design and conduct; (3) variability in interventions evaluated; and (4) variable size of reported effects, *insufficient evidence* exists to assess the effectiveness of client-held medical records in improving vaccination coverage.

## Enhancing Access to Vaccination Services

**Reducing out-of-pocket costs.** Reducing out-of-pocket costs to families for vaccinations or administration of vaccinations can be implemented by paying for vaccinations or administration, providing insurance coverage or reducing co-payments for vaccinations at the point of service.

Interventions that reduce out-of-pocket costs are *strongly recommended* on the basis that they improve vaccination coverage: (1) in children and adults; (2) in a range of settings and populations; (3) when applied in varying levels of scale from individual clinical settings to statewide programs to national efforts; and (4) whether used alone or as part of a multicomponent intervention.

**Expanding access in health care settings.** Expanding access increases the availability of vaccines in medical or public health clinical settings in which vaccinations are offered by (1) reducing the distance from the setting to 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).

As a part of multicomponent interventions, expanding access is *strongly recommended* on the basis that it improves vaccination coverage among children and

adults and improves vaccination coverage in a range of contexts. The contribution of individual components to the overall effectiveness of these interventions could not be attributed. A review of available scientific evidence found *insufficient evidence* to assess the effectiveness of expanded access only on the basis of: (1) the small number of studies; (2) results that were small and statistically nonsignificant; and (3) limitations in study design and execution.

**Vaccination programs in women, infants and children settings.** Vaccination programs in WIC settings involve efforts to encourage the vaccination of a low-income target population in this nonmedical setting. At a minimum, vaccination-promoting strategies in WIC require assessment of each child's immunization status and referral of underimmunized children to a health care provider. Other services can include education, provision of vaccinations, or incentives to accept vaccinations (e.g., monthly voucher pickup, which requires more frequent WIC visits when children are not up to date).

Women, infants and children interventions are *recommended* on the basis that they improve vaccination coverage in children whether used alone or as part of a multicomponent intervention. All qualifying studies assessed the immunization status of WIC clients and either provided vaccinations on site or referred clients elsewhere for vaccination. Some interventions also used monthly voucher pickup or provided free vaccinations. The contributions of individual components to the overall effectiveness of vaccination interventions in WIC settings could not be determined.

**Home visits.** Home visits to promote vaccinations involves providing face-to-face services to clients in their homes. Services can include education, assessment of need, referral and provision of vaccinations. Home-visiting interventions can also involve telephone or mail reminders.

Home-visiting interventions are *recommended* on the basis that they improve vaccination coverage. Most available studies were conducted in socioeconomically disadvantaged populations. At least when applied only to improve vaccination coverage, home-visiting interventions can be highly resource-intensive relative to other available options for improving vaccination coverage.

**Vaccinations programs in schools.** School-based vaccination interventions are intended to improve delivery of vaccinations to school attendees aged approximately 5–18 years. School-based interventions usually include vaccination-related education of students, parents, teachers and other school staff, in addition to either provision of vaccinations or referral for vaccinations. These interventions can also involve other components (e.g., providing incentives and acquiring written con-

sent from parents or guardians). Vaccination requirements for school attendance are included elsewhere in this paper.

A review of available scientific evidence identified only one qualifying study evaluating the effectiveness of school-based vaccination programs. No comparative studies evaluating the effectiveness of school-based vaccination programs to improve vaccination coverage were identified. Therefore, *insufficient evidence* exists regarding the effectiveness of school-based vaccination programs.

**Vaccination programs in childcare centers.** Interventions in childcare centers involve efforts to encourage vaccination of children aged <5 years. The interventions require assessment of each child's immunization status at: (1) entry into childcare; (2) at some point during the child's enrollment; or (3) at periodic intervals throughout the child's enrollment. Vaccination interventions in childcare centers can also include education or notification of parents, referral of underimmunized children to health care providers and, possibly, provision of vaccinations on site. Vaccination requirements for entry into childcare centers are included elsewhere in this paper.

A review of available scientific evidence found only one study that evaluated the effectiveness of vaccination interventions in childcare settings, and it was not included in the review because of limitations in design and execution. Therefore, available studies provide *insufficient evidence* to assess the effectiveness of vaccination interventions in childcare centers.

## Provider-Based Interventions

**Provider reminder/recall.** Provider reminder/recall interventions inform 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 can vary. Interventions that incorporate elements of both reminders and standing orders are included with standing orders in this paper.

Provider reminders are *strongly recommended* on the basis that they improve vaccination coverage: (1) in adults, adolescents and children; (2) whether used alone or as part of a multicomponent intervention; (3) across a range of intervention characteristics (e.g., computerized or simple reminders, checklists or flow-charts); and (4) in a range of settings and populations.

**Assessment and feedback for vaccination providers.** Provider assessment and feedback involves retrospectively evaluating the performance of providers in delivering one or more vaccinations to a client population and giving this information to providers. Assessment and feedback interventions can also involve other activ-

ities (e.g., incentives or benchmarking, i.e., comparing performance to a goal or standard).

Assessment and feedback are *strongly recommended* on the basis that they improve vaccination coverage: (1) in adults and children; (2) whether used alone or as part of a multicomponent intervention; and (3) across a range of settings and populations. The specific characteristics of assessment and feedback interventions (e.g., content, intensity, use of incentives or benchmarking) that contribute most to effectiveness could not be determined from available data; however, a variety of assessment and feedback interventions have been consistently effective in a wide range of contexts.

**Standing orders.** Standing orders involve interventions in which nonphysician personnel prescribe or deliver vaccinations to client populations by protocol without direct physician involvement at the time of the interaction. Settings in which this occurs include clinics, hospitals and nursing homes. Dedicated vaccination clinics often operate under standing orders, but standing orders were not considered to be an intervention in that context for the purposes of this paper.

Standing orders to vaccinate adults are *strongly recommended* on the basis that they improve vaccination coverage whether used alone or as part of a multicomponent intervention and they are effective in such settings as hospitals, clinics and nursing homes. Given (1) the greater complexity of vaccination protocols in children as compared with that for adults; (2) the identification of only a single qualifying study of standing orders to increase vaccination coverage in children; (3) limitations in that study's design and conduct; and (4) reported effects regarding vaccination coverage that were not substantially different from zero, *insufficient evidence* exists to assess the effectiveness of standing orders to improve vaccination coverage in children.

**Provider education only.** Provider education involves giving information regarding 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 and computerized software. Interventions that have additional features (e.g., provider reminders or assessment and feedback) or that are used in combination with other interventions (e.g., multicomponent interventions that include education) are included elsewhere in this paper.

A review of available scientific evidence found only four qualifying studies of provider education-only interventions. Two studies of low-intensity interventions evaluated the impact of these interventions regarding vaccination coverage. One documented small and non-significant impacts regarding coverage; the other found that provider education produced smaller impacts regarding coverage than provider reminder/recall inter-

ventions or standing orders. Three studies of provider education-only interventions found variable impacts regarding provider knowledge and attitudes. The best described and most intensive intervention produced improvements in provider knowledge and attitudes. Therefore, *insufficient evidence* exists to assess effectiveness of provider education-only because of (1) the small number of studies; (2) the limitations in design and conduct; and (3) the variability in results.

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## References

1. Public Health Service. Healthy people 2000: national health promotion and disease prevention objectives. Washington, DC: U.S. Dept. of Health and Human Services, Public Health Service, 1991 [DHHS Pub No 91-50212, 1991].
2. US Health and Human Services. Healthy People 2010 objectives: draft for public comment. Washington, DC: US Health and Human Services, 1998 [GPO Stock # 017-001-00537; available at <http://www.health.gov/healthypeople>].