How Effectively Can Health Care Settings Beyond the Traditional Medical Home Provide Vaccines to Adolescents?

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ABSTRACT

OBJECTIVES. Our goal was to evaluate the capacity of various health care settings to supplement the activities of the traditional medical home by delivering vaccines to adolescents.

METHODS. A group of experts in the fields of adolescent-immunization delivery and the provision of preventive care in various health care settings summarized the available literature, considered setting-specific factors, and assessed the ability of various health care settings beyond the traditional medical home to conform to the immunization quality standards set by the National Vaccine Advisory Committee, report vaccination information for the quantitative assessment of vaccine-coverage rates, be likely to offer vaccines to adolescents, and be viewed by adolescents as acceptable sites for receiving vaccinations.

RESULTS. Seven candidate settings were evaluated: pharmacies, obstetrics-gynecology practices, sexually transmitted disease clinics, hospital emergency departments, family planning clinics, teen clinics, and local public health department immunization clinics. The panel concluded that all could safely provide vaccines to adolescents but that vaccination efforts at some of the settings could potentially have a markedly greater impact on overall adolescent-immunization rates than could those at other settings. In addition, for adolescent-vaccination services to be practical, candidate settings need to have a clear interest in providing them. Conditional on that, several issues need to be addressed: (1) funding; (2) orienting facilities to provide preventive care services; (3) enhancing access to immunization registries; and (4) clarifying issues related to immunization consent.

CONCLUSIONS. With supporting health policy, health education, and communication, health care settings beyond the traditional medical home have the potential to effectively augment the vaccination efforts of more traditional settings to deliver vaccines to adolescents. These health care settings may be particularly well suited to reach adolescents who lack access to traditional sources of preventive medical care or receive fragmented medical care.

The successful introduction of a new adolescent vaccine (such as the recently recommended meningococcal conjugate, pertussis, and human papillomavirus vaccines\textsuperscript{1–3}), requires careful consideration of a range of issues including, but not limited to, the capacity of health care systems to achieve high coverage levels and adolescent health care utilization patterns. Although many adolescents obtain some medical care from a primary care physician, significant proportions of them, especially in mid- or late-
adolescence, infrequently (or never) seek preventive care services from traditional sources.4–6 Hence, high overall immunization coverage rates can potentially be achieved by complementing the efforts of primary care physicians with efforts to deliver vaccines in other health care settings that adolescents tend to frequent. Efforts to vaccinate adolescents in those settings may be of particular benefit for subpopulations who lack access to a medical home or segment their medical care. However, the ability to implement adolescent-immunization services in these settings has not been studied adequately.

One key to success will be the ability of the medical home and other health care settings to successfully coordinate their efforts. A vaccine such as the human papillomavirus vaccine that prevents sexually transmitted diseases (STDs) is best administered in early to mid-adolescence, before the initiation of sexual activity; hence, that is when administration of this vaccine is recommended. Other vaccines are recommended for early adolescence, in part to promote the use of routine preventive care services.7 Although young adolescents may be more likely to strengthen their relationship with a pediatric or family practice medical home, in part as a result of the new vaccine recommendations, the need to administer several vaccines to adolescents nevertheless represents a major challenge for providers, particularly for multidose vaccines. In addition, older adolescents will need catch-up vaccination, which increases the number of adolescents who must be served in the near term. Thus, to achieve uniformly high adolescent-immunization rates, the combined efforts of the medical home and other health care settings and providers are likely to be necessary.

The Institute of Medicine recognizes that current systems of medical care are not meeting the complex needs of the US adolescent population and has called for the development of innovative programs for the achievement of better health outcomes.8 Can other health care settings plausibly supplement the adolescent-vaccination efforts of the traditional medical home? The National Immunization Program (now a part of the National Center for Immunization and Respiratory Diseases) of the Centers for Disease Control and Prevention (CDC) convened a working group of individuals with expertise in immunization research and adolescent health care to address this question. This report summarizes the group’s findings about what is presently known and what has yet to be determined about the ability of such settings to function as effective providers of vaccines to adolescents.

METHODS

The working group established successive agendas, identified the candidate health care settings to be considered, defined terms, assigned individual scientific review and evaluation tasks, and assessed the results of the reviews over a 4-month period from February through May of 2005. The candidate health care settings were defined as sites that tend to offer services in nontraditional settings or offer limited or episodic health care services, in contrast to the coordinated, comprehensive services offered in the traditional medical home. The settings selected for evaluation were (1) pharmacies, (2) obstetrics-gynecology (Ob-Gyn) practices, (3) STD clinics, (4) hospital emergency departments, (5) family planning clinics, (6) teen clinics, and (7) public health department immunization clinics. School-based and school-linked clinics were not included, because they represented the exclusive focus of a separate working group. In addition, walk-in clinics located inside retail businesses were not addressed, because they are a new phenomenon for which there is insufficient information with which to permit an evaluation of their potential effect on adolescent-immunization efforts.

Key components of this evaluation included comparative assessments of the candidate settings in terms of their:

- capacity to meet the 7 quality standards established by the National Vaccine Advisory Committee (NVAC) to

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>NVAC Quality Standards</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Information and education for vaccine recipients</td>
<td>Culturally and linguistically appropriate information about the risks and benefits of vaccination (including CDC-developed Vaccine Information Statements) must be provided before vaccination</td>
<td></td>
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<tr>
<td>Vaccine storage and handling</td>
<td>Must adhere to vaccine-handling and -storage standards noted in vaccine package inserts</td>
<td></td>
</tr>
<tr>
<td>Prevacination screening</td>
<td>Prevacination screening interviews must include immunization history, existing health conditions, allergies, and history of adverse events</td>
<td></td>
</tr>
<tr>
<td>Contraindications</td>
<td>Must have the ability to assess true vaccine contraindications before vaccination</td>
<td></td>
</tr>
<tr>
<td>Record keeping</td>
<td>A permanent record including the vaccine recipient’s name, age, contact information, preexisting medical conditions, type of vaccine given, dose, site, route of administration, name of vaccine provider, date of vaccination, manufacturer, lot number, and date that next vaccination is due must be recorded; when a vaccine is administered by a health care provider other than the vaccine recipient’s primary care provider, a record of the vaccination should be provided to the primary care provider and the vaccine recipient</td>
<td></td>
</tr>
<tr>
<td>Vaccine administration</td>
<td>Must have the legal authority to provide vaccines and be appropriately trained and licensed in all aspects of vaccine administration</td>
<td></td>
</tr>
<tr>
<td>Adverse events</td>
<td>Must be able to recognize and treat adverse reactions, and the equipment to do so must be on site</td>
<td></td>
</tr>
</tbody>
</table>
ensure the quality of vaccination in these settings (described in detail in Table 1); 

- previous experience with providing adolescent vaccines, alignment of adolescent-vaccination efforts with the primary mission of each setting, resource issues, and likelihood that decision-makers in each setting would elect to have the facility provide some or all of the vaccines to adolescents; 

- overall client mix and the characteristics of adolescents receiving services in each setting, including sociodemographic features, frequency and continuity of contact in these settings, and acceptability and attractiveness of these settings as resources for the receipt of preventive health services; 

- capacity to report or refer clients to a primary care physician, to provide educational materials about the importance of other preventive health care measures, and to recover or sustain the additional costs of adolescent-immunization services; and 

- capacity to report vaccine-related adverse events and contribute data to assist in community assessments of adolescent vaccine-coverage rates.

A subjective matrix that summarizes these key components and provides a structure for comparing the candidate sites was developed and is shown in Table 2.

In many cases, the working group found a dearth of published data concerning the experience of the candidate settings in providing vaccines to adolescents. In those instances, the working group had to depend on as-yet-unpublished data or base its conclusions on information related to the settings’ experiences in providing vaccinations to adult populations. It should be noted that these settings’ experiences with vaccinating adult populations are not always applicable to the adolescent population, particularly with respect to adolescent-specific issues (e.g., securing parental consent for vaccination) that are not faced by facilities when providing vaccinations to adult populations.

A draft of the initial findings was presented in June 2005 at the National Stakeholders’ Meeting: Strengthening the Delivery of New Vaccines for Adolescents, a national conference in Washington, DC, cosponsored by the National Vaccine Program Office and the CDC, during which participants were invited to submit comments. Those comments were evaluated and incorporated as appropriate. The findings presented here summarize what is presently known and not known about the ability and capacity of health care settings beyond the medical home to provide immunizations to adolescents; barriers that might impede efforts to provide immunizations in these settings are also identified.

RESULTS

Pharmacies

Increased recognition of the role of pharmacies in population-based vaccination services is reflected in the Department of Health and Human Services’ 1994 recommendation, made in a meeting with Secretary Sha-

lala, that pharmacists’ competencies include vaccine education and mobilization, vaccine distribution, vaccine access and administration, and participation in vaccine registries and tracking systems. In 1996, the American Pharmacists Association published Pharmacy-Based Immunization Delivery: A National Certificate Program for Pharmacists, which was based on CDC, Advisory Committee on Immunization Practices, and NVAC standards. The program includes practice-management skills and vaccine-administration techniques and teaches pharmacists the functions and responsibilities associated with providing vaccination services.

According to the American Pharmacists Association, the program has been used to train ~25,000 student pharmacists and professionals as of 2006. A study published in 2004 indicated that 77% of pharmacists who completed the certification program directly administered vaccines, of whom 96% administered influenza vaccine, 77% administered pneumococcal vaccine, 55% administered hepatitis vaccines, and 19% administered the combined childhood diphtheria and tetanus toxoids and acellular pertussis vaccine.

Pharmacists’ commitment to providing vaccine services was demonstrated in recent surveys of pharmacists who had completed vaccination training. Respondents reported that they had done so because of their commitment to improving the health of the public rather than for business or financial reasons or for continuing education credit. Various published studies have also shown that most consumers trust pharmacy vaccination services and are attracted to this type of setting because of the convenience that pharmacies offer their customers. These findings are consistent with a recent review that concluded that pharmacist-administered vaccination, particularly for adult patients, has become routinely accepted as an important role of the pharmacist. Nevertheless, to date, there is little experience with administration of vaccines to adolescents in the pharmacy setting.

The number and distribution of pharmacies throughout the nation make them a unique resource. Pharmacies are readily accessible to and frequently visited by adolescents. Many of them have extended hours on evenings and weekends, and they are a particularly important source of health care in rural communities.

At present, 46 states grant pharmacists statutory permission to administer vaccinations; most such efforts in the past have centered on the provision of influenza vaccine. Although a few states have not yet authorized pharmacists to administer vaccines, explicit statements from public health authorities that encourage immunization-trained pharmacists to take proactive roles in immunization delivery would likely prompt these states to support increased pharmacist involvement in this aspect of public health.

Ob-Gyn Practices

Obstetrician-gynecologists have unique opportunities to deliver vaccines to women of all ages. They serve as the first and most frequent point of contact for young women who seek medical consultation for reproductive
| Characteristics of Candidate Settings That May Affect Their Ability to Provide Vaccines to Adolescents |

<table>
<thead>
<tr>
<th>Pharmacies</th>
<th>Ob/Gyn Practices</th>
<th>STD Clinics</th>
<th>Hospital Emergency Departments</th>
<th>Family Planning Clinics</th>
<th>Teen Clinics</th>
<th>Health Department Immunization Clinics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capacity to meet NVIC quality standards</strong></td>
<td>Able to perform</td>
<td>Able to perform</td>
<td>Able to perform</td>
<td>Able to perform</td>
<td>Able to perform</td>
<td>Able to perform</td>
</tr>
<tr>
<td>Provide information and education for vaccine recipients</td>
<td>Able to perform</td>
<td>Able to perform</td>
<td>Able to perform</td>
<td>Able to perform</td>
<td>Able to perform</td>
<td>Able to perform</td>
</tr>
<tr>
<td>Vaccine storage and handling</td>
<td>Able to perform</td>
<td>May have limited access to vaccination records</td>
<td>Able to perform</td>
<td>May have limited access to vaccination records</td>
<td>Able to perform</td>
<td>May have limited access to vaccination records</td>
</tr>
<tr>
<td>Prevaccination screening</td>
<td>Able to perform</td>
<td>May have limited access to vaccination records</td>
<td>Able to perform</td>
<td>May have limited access to vaccination records</td>
<td>Able to perform</td>
<td>May have limited access to vaccination records</td>
</tr>
<tr>
<td>Evaluation of contraindications</td>
<td>Able to perform</td>
<td>Able to perform</td>
<td>Able to perform</td>
<td>Able to perform</td>
<td>Able to perform</td>
<td>Able to perform</td>
</tr>
<tr>
<td>Record keeping</td>
<td>Able to perform</td>
<td>Able to perform</td>
<td>Able to perform</td>
<td>Able to perform</td>
<td>Able to perform</td>
<td>Able to perform</td>
</tr>
<tr>
<td>Recognition and management of adverse events</td>
<td>Able to perform</td>
<td>Able to perform</td>
<td>Able to perform</td>
<td>Able to perform</td>
<td>Able to perform</td>
<td>Able to perform</td>
</tr>
<tr>
<td>Likely interest in providing vaccines to adolescents</td>
<td>High</td>
<td>High for vaccines to prevent STDs</td>
<td>High for vaccines to prevent STDs</td>
<td>May be limited</td>
<td>High for vaccines to prevent STDs</td>
<td>High for all adolescent vaccines</td>
</tr>
<tr>
<td>Orientation toward providing preventive care services</td>
<td>Limited but increasing</td>
<td>Generally not oriented toward providing many preventive care services</td>
<td>Generally not oriented toward providing many preventive care services</td>
<td>May be limited</td>
<td>Generally not oriented toward providing many preventive care services</td>
<td>Yes, but limited to immunizations</td>
</tr>
<tr>
<td>Demographic characteristics</td>
<td>All ages</td>
<td>All ages</td>
<td>All ages</td>
<td>All ages</td>
<td>All ages</td>
<td>All ages</td>
</tr>
<tr>
<td>Age range of clientele</td>
<td>Males and females</td>
<td>Males and females</td>
<td>Males and females</td>
<td>Males and females</td>
<td>Males and females</td>
<td>Males and females</td>
</tr>
<tr>
<td>Gender distribution of clientele</td>
<td>≥ 16 y</td>
<td>≥ 16 y</td>
<td>≥ 16 y</td>
<td>≥ 16 y</td>
<td>≥ 13 y</td>
<td>≥ 13 y</td>
</tr>
<tr>
<td>Logistic characteristics</td>
<td>All ages</td>
<td>Males and females</td>
<td>Primarily symptomatic males</td>
<td>All ages</td>
<td>Females</td>
<td>Males and females</td>
</tr>
<tr>
<td>Approximate number of sites</td>
<td>38,000</td>
<td>32,000</td>
<td>2,900</td>
<td>200</td>
<td>3,150</td>
<td>3,000</td>
</tr>
<tr>
<td>Frequency/continuity of contacts with clients</td>
<td>Moderate to High</td>
<td>Moderate</td>
<td>Limited</td>
<td>Limited</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Case management/tracking capabilities</td>
<td>Not routine</td>
<td>Routine</td>
<td>Routine</td>
<td>Not routine</td>
<td>Routine</td>
<td>Routine</td>
</tr>
<tr>
<td>Perceived acceptability as a vaccination site by adolescents</td>
<td>Unknown</td>
<td>High</td>
<td>High</td>
<td>Unknown</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Link to immunization information system</td>
<td>May be limited</td>
<td>May be limited</td>
<td>May be limited</td>
<td>May be limited</td>
<td>May be limited</td>
<td>May be limited</td>
</tr>
<tr>
<td>Ability to contact the medical home</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Specific vaccination training</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Legal constraints on provision of vaccines in setting</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Parental consent required?</td>
<td>Allowed in all but 4 states; some state-specific limitations exist based on age and antigen</td>
<td>Allowed in all but 4 states; some state-specific limitations exist based on age and antigen</td>
<td>Allowed in all but 4 states; some state-specific limitations exist based on age and antigen</td>
<td>Allowed in all but 4 states; some state-specific limitations exist based on age and antigen</td>
<td>Allowed in all but 4 states; some state-specific limitations exist based on age and antigen</td>
<td>Allowed in all but 4 states; some state-specific limitations exist based on age and antigen</td>
</tr>
<tr>
<td>Ability to be reimbursed by insurers for vaccine purchase and administration and to obtain vaccines from the VFC program</td>
<td>In most states</td>
<td>In most states</td>
<td>In most states</td>
<td>In most states</td>
<td>In most states</td>
<td>In most states</td>
</tr>
<tr>
<td>In most states</td>
<td>Able to bill insurers; are not currently able to be VFC providers in most states</td>
<td>Able to bill insurers; are currently VFC providers</td>
<td>Able to bill insurers; few are currently VFC providers</td>
<td>Able to bill insurers; few are currently VFC providers</td>
<td>Able to bill insurers; few are currently VFC providers</td>
<td>Able to bill insurers and obtain vaccine from the VFC program</td>
</tr>
</tbody>
</table>
health and as primary caregivers for many nonpregnant
women who have little or no other contact with the
health care system.\textsuperscript{20} The vast majority of obstetrician-
gynecologists serve both adolescents and adults.\textsuperscript{20} Al-
though few adolescents under 15 years of age see obstes-
trician-gynecologists,\textsuperscript{3} one third of all medical visits for
women aged 17 to 21 years are to obstetrician-gynecolo-
gists.\textsuperscript{21} Indeed, obstetrician-gynecologists provide
women aged 17 to 21 years are to obstetrician-gyneco-
logists more office-based, general medical examinations to
women aged \( \geq 15 \) years than either family practice or
internal medicine specialists.\textsuperscript{22} Most young women who
see obstetrician-gynecologists are or have been sexually
active.

Nationwide, 64\% of obstetrician-gynecologists have
reported that they work in practices that offer at least 1
vaccine, with rubella (52\%) and influenza (50\%) vac-
cines being the most commonly offered, followed by
hepatitis B vaccine (35\%) and tetanus toxoid-diphtheria
vaccine (32\%).\textsuperscript{20} Yet, fewer than 60\% of obstetrician-
gynecologists report that they routinely obtain patient
vaccination or infection histories. Barriers that have been
commonly noted by obstetrician-gynecologists who do not
vaccinate their patients include the costs associated with vaccination (44\%), the belief that vacci-
nations should be provided by other primary care pro-
viders (41\%), and lack of adequate vaccine-storage and
-handling facilities (32\%).\textsuperscript{20} Nevertheless, studies have shown that most obstetrician-gynecologists feel that the
 provision of vaccines should be within the scope of their
responsible.\textsuperscript{21} As noted previously, human papillo-
mavirus vaccine and vaccines that are currently being
developed to prevent other sexually transmitted infec-
tions primarily target early and middle adolescents be-
fore sexual debut. In contrast, obstetrician-gynecologists
see relatively few women before mid- to late adoles-
cence\textsuperscript{e} and, thus, have relatively few opportunities to
vaccinate women before the initiation of sexual activity.

Studies have demonstrated interesting patterns asso-
ciated with the administration of vaccine in Ob-Gyn
practices. One survey noted a wide range in knowledge
level among obstetrician-gynecologists regarding vac-
cine-preventable diseases, immunization recommenda-
tions, and vaccine safety.\textsuperscript{21} In another recent survey
of obstetrician-gynecologists, provision of vaccines was as-
associated with working in a multispecialty practice and
identifying oneself as a primary care provider.\textsuperscript{20} Almost
all of the respondents indicated a willingness to admin-
ister vaccines to adult women to prevent human papill-
omavirus–associated cervical cancer and infections
cau sed by genital herpes simplex virus (92\% and 91\%,
respectively). Recommendations from the American
College of Obstetricians and Gynecologists (ACOG) were
viewed as the strongest determinant of practice-specific
decisions on the use of newly licensed vaccines. Al-
though vaccination has not traditionally been stressed by
obstetrician-gynecologists,\textsuperscript{20} \( >90\% \) of respondents felt
that the ACOG should make the development of educa-
tional tools related to vaccination of obstetrician-gyne-
cologists’ patients a priority, which suggests a willingness
among obstetrician-gynecologists to integrate immuni-
ization more formally into their routine practice guide-
lines.\textsuperscript{20} Hence, support from the ACOG will be key in
determining whether more obstetrician-gynecologists
adopt immunization services as part of their routine
scope of care and offer vaccinations to adolescents.

STD Clinics

STD clinics serve a high-risk population that tends to be
poor, relatively young, male, and uninsured. Although
most have access to primary care, their clients com-
monly seek STD-clinic services because of the availabil-
ity of walk-in services, low cost of care, privacy or con-
identiality concerns, convenience, or the expertise of
STD-clinic providers in treating sexually transmitted infec-
tions.\textsuperscript{23} In response to recommendations from the
Advisory Committee on Immunization Practices, the In-
stitute of Medicine, and the CDC, many STD clinics have
successfully implemented hepatitis B immunization pro-
grams,\textsuperscript{24–29} which suggests that such clinics may repre-
sent an effective capture point at which some adoles-
cents at high risk might also be able to receive
vaccinations to prevent other sexually transmitted infec-
tions such as human papillomavirus.\textsuperscript{24,30,31} However,
some of the difficulties encountered in efforts to institute
hepatitis B vaccination in STD clinics may also apply to
other vaccination initiatives that may be proposed for
these settings. Studies have found that approximately
half of STD program managers nationally do not view
hepatitis B vaccination as a project responsibility.\textsuperscript{24,29}
Major barriers that have prevented some STD clinics
from instituting hepatitis B vaccination programs in-
clude lack of adequate funding for procurement of vac-
cines and inadequate resources to implement effective
vaccination efforts.\textsuperscript{24} In addition, in typical underfunded
and understaffed STD clinics, prevention strategies that
require personal counseling or injections may be rele-
gated to secondary status.\textsuperscript{32} Other specific issues encoun-
tered with hepatitis B vaccination efforts in STD clinics
include difficulty tracking clients who are highly mobile
and who value anonymity,\textsuperscript{24,32} variable rates of comple-
tion of the immunization series,\textsuperscript{24,32} and relatively low
vaccine acceptance rates.\textsuperscript{32,33}

There are several challenges related to the potential
provision of new vaccines to adolescents through STD
clinics. As the range of vaccines recommended for ado-
lescents increases, it is hard to know whether many STD
clinics will consider providing vaccines to prevent con-
tions other than sexually transmitted infections or
whether they will limit their efforts to vaccines such as
hepatitis B and human papillomavirus vaccines that pre-
vent diseases commonly acquired by sexual contact. The
\( -2\text{-to-1} \) male/female ratio among STD-clinic clients\textsuperscript{23}
limits the number of individuals receiving services at
STD clinics who could directly benefit from the human
papillomavirus vaccine. In addition, although STD clinics
see young adults and some older adolescents,\textsuperscript{23} they are
unlikely to have much contact with the young adoles-
cents who are the primary target group for most adoles-
cent-immunization efforts. Funding sources and vac-
cine-procurement efforts also must be ensured for
vaccination efforts to be successful in STD clinics. Fi-
ally, STD clinics serve a small, defined population,\textsuperscript{23}
which limits the potential impact of vaccination efforts in this setting on overall adolescent-immunization rates. Nevertheless, despite these considerations, STD clinics can play an important role in efforts to vaccinate the particularly high-risk group of adolescents that they serve.44 As such, they should not be overlooked as comprehensive strategies are developed to vaccinate as many adolescents as possible.

Hospital Emergency Departments
In 1995, the American College of Emergency Physicians (ACEP) published a policy statement recognizing that underimmunization of children is a serious problem in the United States and that populations at greatest risk, including the urban poor and racial and ethnic minorities, often use emergency departments as their principal source of primary care.35 A subsequent study has noted that 5% of all adolescents nationally and 7% of non-white adolescents report that emergency departments are their only source of medical care.36 Adolescents are particularly likely to use emergency departments for episodic medical care,37–39 and the vaccine they currently are most likely to receive there is the tetanus-diphtheria toxoid booster.40 For other vaccines, emergency departments usually refer adolescents to primary care providers.

Although the 1995 ACEP policy statement and its 2000 revision encouraged an active role by emergency department personnel in childhood vaccination efforts (including awareness of currently recommended immunization recommendations, screening of immunization status, education of parents, referral of patients with deficient immunizations, and administration of vaccinations in certain circumstances),35,41,42 the ACEP has not published specific policy recommendations concerning the vaccination of adolescents in emergency departments. Furthermore, the potential for large-scale routine provision of adolescent vaccinations in emergency departments has not been systematically evaluated but would most likely not be cost-effective from an institutional perspective. Because emergency departments are generally not reimbursed for the provision of preventive care services, vaccine-purchase costs incurred by emergency departments and administration fees associated with vaccination would not necessarily be reimbursed by all insurers. As a result, emergency departments would have to absorb or shift vaccine costs for some patients. Furthermore, although emergency departments may enroll in the federal Vaccines for Children (VFC) program, administration costs related to providing vaccines in emergency departments are believed to significantly exceed VFC reimbursement levels for vaccine administration.42 In addition, unreimbursed personnel time and decreased operating efficiencies that result from provision of vaccinations would constitute opportunity costs for emergency departments that consider broad vaccination initiatives.

Although emergency departments are able to participate in adolescent-vaccination programs, their core mission of providing acute care is inconsistent with the routine provision of preventive health services. Although some pilot studies have demonstrated the efficacy of vaccinating hard-to-reach populations in emergency departments,43–45 the impact of those efforts has been questioned because of a lack of sustained programmatic success. In addition, a limited ability to ascertain adolescents’ immunization status in the emergency department and a general reluctance of parents to allow their children to be vaccinated during emergency department visits, especially if immunization records are not readily available, continue to be barriers that hinder efforts to provide vaccinations there.46,47 Hence, it is unlikely that the routine administration of vaccines to adolescents in emergency departments will soon become a widespread practice or will have a substantial impact on adolescent-immunization rates. Nevertheless, because emergency departments provide services to large numbers of adolescents who do not routinely receive preventive care elsewhere,48 their potential to contribute to adolescent-vaccination efforts should be explored further. With more widespread access to immunization information systems, adequate reimbursement, and potential support from the ACEP, efforts to provide routine vaccinations to some adolescents during emergency department visits may eventually become more feasible.

Family Planning Clinics
Approximately 3100 Title X and other family planning clinics provide gynecologic care and contraceptive management to US adolescents and adults, often focusing on economically disadvantaged and high-risk populations. They primarily serve young women who seek confidential family planning services.49 Nationally, the population of clients of family planning clinics is 61% non-Hispanic white, 19% black, 14% Hispanic, and 7% Asian or of another race.49 Overall, 30% of all women served at family planning clinics are younger than 20 years. Minority and economically disadvantaged patients are more likely to receive services at family planning clinics that are run by hospitals, public health departments, and community or migrant health centers than at independent or Planned Parenthood facilities.50–53 Many family planning clinics are located in rural communities and serve otherwise hard-to-reach patient populations.

Family planning clinics’ orientation toward serving young, economically disadvantaged women and those who do not have easy access to other sources of care could potentially contribute significantly to vaccination efforts among these populations of adolescents. Moreover, many family planning clinics have successfully implemented previous recommendations to provide hepatitis B vaccinations to their adolescent and high-risk adult clients.54–59 Such efforts are likely to serve as a model for them if they expand their efforts to immunize adolescents and young women by providing other vaccines as well. Furthermore, the human papillomavirus vaccine may be particularly well suited to be provided to women who obtain care in this setting, because it is licensed for administration to women up to age 26 and the timing of vaccination can be coordinated with their regular return visits for Depo-Provera injections or oral contraceptive refills. However, there are some potential
challenges associated with efforts to immunize adolescents in family planning clinics. As is also the case with Ob-Gyn practices, almost all women who receive services at family planning clinics are sexually active, which makes it unlikely that family planning clinics would be able to vaccinate many adolescents before their sexual debut. Patients’ confidentiality concerns may dissuade family planning clinics from notifying their clients’ primary care physicians that they have provided vaccinations. Requirements for parental consent or notification before vaccination may also be a barrier. In addition, family planning clinics may not be inclined to be a setting for the provision of vaccines to prevent conditions other than those that are specifically associated with sexually-transmitted infections. Nevertheless, family planning clinics can certainly contribute to adolescent-immunization efforts, particularly in rural areas and for adolescents who are unlikely to receive preventive health care services elsewhere.

Teen Clinics
Teen clinics are facilities that provide services exclusively to adolescents. They are usually staffed by community health centers, local health departments, hospitals, managed care organizations, or nonprofit agencies. Most teen clinics receive some federal funding. The majority of their vaccine supplies come from the VFC program. Many operate as drop-in clinics that neither require clients to make appointments nor require that they have an established relationship with the facility. A survey in 1 community found that 15% of urban youth received services at a teen clinic, with higher percentages found among older adolescents than younger adolescents. Nationally, the proportion of adolescents who use teen clinics is unknown. However, 24% of US adolescents usually obtain primary care services from some sort of health center or clinic; of these, presumably many are seen in teen clinics.

Teen clinics predominantly serve economically disadvantaged and uninsured teens who choose to receive medical services there because of convenience of scheduling and location, ease of access, low cost, the desirability of receiving services at a facility that is exclusively oriented to teens, or the perceived expertise of clinic staff or who seek assurance of confidentiality (particularly around the onset of sexual activity). Although some adolescents consider a teen clinic to be their medical home, others maintain a medical home elsewhere and only use the teen clinic on an episodic basis.

Almost all teen clinics offer adolescents the hepatitis B vaccine. They are likely to also offer most of the other vaccines that have recently been recommended for adolescents. Although teen clinics have been very successful in their vaccination efforts, they have reported that their most significant difficulties are in (1) getting their patients to complete vaccination series that require multiple injections and (2) frequent unavailability of up-to-date immunization records. These hurdles are not specific to teen clinics and have not prevented many of them from successfully offering vaccinations. Thus, teen clinics are likely to remain important venues for adolescent vaccination as the number of vaccines recommended for adolescents increases.

Public Health Department Immunization Clinics
Vaccination is a shared responsibility between private providers, publicly funded clinics, and public health departments. Currently, health departments continue to play an important role in vaccine-related efforts, particularly as a safety-net provider of immunizations for those who cannot afford the cost of vaccinations or do not have an established medical home. Ninety-eight percent of health departments continue to provide adolescent-vaccination services. In addition, health departments help coordinate efforts to immunize hard-to-reach populations and improve community-wide immunization rates.

Fifty-six percent of public health department immunization clinics use tracking and recall systems, and 38% use vaccination reminder systems. Fifty-five percent have reported using medical charts to store vaccination histories, and 83% store vaccination information in an electronic database. However, only 5% of clinics routinely communicate vaccination activities to primary care providers.

As a result of shifting responsibilities and funding sources, the role of community health department immunization programs has changed from one of the traditional “vaccinator of choice” to that of “safety-net provider.” This role is likely to continue with the advent of new adolescent vaccines.

COMPLIANCE WITH THE NVAC QUALITY STANDARDS
Table 2 describes the ability of candidate health care settings outside the traditional medical home to comply with the 7 NVAC quality standards (which are described in detail in Table 1). Each of the candidate settings evaluated has a basic capacity to meet these standards, although the extent to which they do so varies.

CHALLENGES AND BARRIERS TO PROVIDING VACCINATIONS TO ADOLESCENTS
Table 2 also summarizes how site capacity and other constraints may affect the ability of the various settings to provide vaccinations to adolescents. Of particular importance is that sites have an orientation toward the provision of preventive care services to adolescents and demonstrate a willingness to assume responsibility for providing routine immunizations to adolescents. These 2 crucial attributes will affect the contribution that health care settings outside the traditional medical home can make to adolescent-immunization efforts.

EXPECTED HEALTH OUTCOMES
Additional study will be required to determine how consistently each site is able to meet the 7 NVAC quality standards. It should be noted that sites’ organizational imperatives may not be consistent with, or may even conflict with, core competencies (eg, confidentiality constraints may conflict with data-sharing needs, and an
emphasis on treating acute conditions may conflict with an emphasis on providing preventive care).

Implicit in efforts to offer adolescents a host of new vaccines in a variety of settings is the requirement for information sharing among health care professionals. Electronic immunization-information systems (registries) that are widely accessible are crucial if these efforts are to be successful. At present, ~85% of CDC-funded immunization-information systems include adolescents (D. Bartlett, MPH, personal communication, CDC, April 13, 2006). However, relatively few health care facilities outside the traditional medical home report that they have access to immunization-information systems.62,71 This is especially likely to be the case for those health facilities (eg, Ob-Gyn offices, STD clinics, and family planning clinics) that primarily serve an adult population. Now that data specifications for immunization-information systems have been defined,66 future efforts should focus on enrollment and participation of providers working in health care settings beyond the traditional medical home.

In addition to the provision of vaccine, the capability of health care settings beyond the traditional medical home to collect and report data regarding vaccine-coverage rates and vaccine-related adverse events must be examined. Successful data-collection efforts depend not only on a site’s capability and willingness to collect and report data but also on the ability of the local public health department to collect and analyze them. As has occurred with community-based immunization-information systems, collaboration is facilitated by clearly defined business rules that define what type of data are to be shared, who shares the data and with whom, and the preferred data-exchange format. Each of the candidate sites examined has the capacity to provide data, but not all of them are equally capable of providing the many types of information of interest.

Another variable that must be considered when determining the potential to deliver vaccines at each site is cost. The average unit cost for delivering adolescent vaccinations can be calculated for each specific delivery setting by analyzing standard workflow and using econometric methods. Pharmacies and public health clinics are already engaging in this process. Costs for patients will affect vaccination uptake. Although some sites participate in the VFC program, expanding VFC participation to additional facilities is a crucial component if efforts to vaccinate adolescents are to be successful.

Some have expressed concern that the provision of vaccinations outside the traditional medical home may interfere with the receipt of other preventive health care services that are typically received in traditional primary care settings.67 However, there is limited evidence that adolescents forego preventive health care services provided in primary care settings if they receive vaccinations elsewhere.68 The risks and benefits must be weighed. Data from the 2003 National Survey of Children’s Health indicate that ~60% of adolescents do not receive care from a medical home.69 Thus, it is likely that many of the adolescents who seek services in the settings described in this article cannot identify a primary care provider66 and, thus, would be unlikely to receive vaccinations elsewhere, whereas others who have primary care physicians seek care outside the traditional medical home out of convenience or because they want the assurance of confidentiality.62-65 Minorities, immigrants, and persons who engage in high-risk behaviors are particularly likely to use health care settings outside the traditional medical home68,69,70; these groups would benefit from having vaccination services available in such settings. In addition, many adolescents use more than 1 site of care59; making vaccinations available to these patients at various sites could significantly increase the likelihood that they will be vaccinated. The key to such an approach is ready access to vaccination records through the expansion of immunization-information systems to include all adolescents by increasing the participation of providers outside of the traditional medical home.

Statutory requirements that necessitate parental consent for adolescents’ receipt of preventive care services and immunizations diminish the ability of adolescents to receive vaccines outside of the traditional medical home.70 Adolescents who seek medical care in such settings often are unaccompanied by a parent or guardian. Although states generally allow adolescents to consent to receive confidential reproductive care, few states have statutes that specifically allow adolescents to provide their own consent for routine preventive medical care services or vaccinations.71 Most states’ laws do not explicitly determine if vaccines to prevent sexually transmitted infections fall under parental consent rules or would be exempt from those rules; hence, this remains a gray area. In addition, federal law requires that a parent or legal guardian be provided with an approved vaccine-information statement before vaccines can be given to unemancipated minors. These factors limit the extent to which vaccines can be provided to adolescents who seek confidential medical care and should be addressed if widespread adolescent-vaccination efforts are to succeed.

CONCLUSIONS

Each type of setting evaluated in this article has strengths and weaknesses with regard to its ability to deliver vaccines to adolescents. Some serve hard-to-reach groups of individuals at high risk, whereas others serve those who seek specialized or confidential services. In addition, many adolescents obtain medical care in more than 1 type of setting.58,59 Hence, an approach that provides easy access to immunization records and allows adolescents to be vaccinated in multiple settings would be beneficial if high immunization rates are to be achieved in this population. Because conditions and patterns of health care utilization vary geographically and according to community characteristics, local health authorities should consider the following factors when evaluating how best to provide vaccines to adolescents in their communities:
1. demographic characteristics of the community and local patterns of health care utilization;
2. availability and utilization of health care settings outside of the traditional medical home;
3. ability of vaccination sites to meet NVAC practice standards;
4. volume capacity of each site;
5. extent of participation in immunization-information systems; and
6. whether the provision of immunizations corresponds with the core mission of potential sites.

In most communities, immunization-delivery systems that combine the resources of the traditional medical home and other health care settings are necessary to achieve optimal adolescent-immunization rates. A collaborative approach that enlists public health departments and community providers representing all of these settings would benefit local adolescent-immunization efforts by identifying approaches that would most readily be applicable to specific communities.

Health care settings beyond the traditional medical home have an important role to play in the provision of vaccines to adolescents, especially for those who are unlikely to receive primary care medical services through conventional venues. Although several challenges exist, these health care settings can serve a pivotal and complementary role in ensuring that all adolescents receive recommended vaccinations.

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