

Adolescent Immunizations and Other Clinical Preventive Services: A Needle and a Hook?

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ABSTRACT

Advances in technology have led to development of new vaccines for adolescents, but these vaccines will be added to a crowded schedule of recommended adolescent clinical preventive services. We reviewed adolescent clinical preventive health care guidelines and patterns of adolescent clinical preventive service delivery and assessed how new adolescent vaccines might affect health care visits and the delivery of other clinical preventive services. Our analysis suggests that new adolescent immunization recommendations are likely to improve adolescent health, both as a “needle” and a “hook.” As a needle, the immunization will enhance an adolescent’s health by preventing vaccine-preventable diseases during adolescence and adulthood. It also will likely be a hook to bring adolescents (and their parents) into the clinic for adolescent health care visits, during which other clinical preventive services can be provided. We also speculate that new adolescent immunization recommendations might increase the proportion and quality of other clinical preventive services delivered during health care visits. The factor most likely to diminish the positive influence of immunizations on delivery of other clinical preventive services is the additional visit time required for vaccine counseling and administration. Immunizations may “crowd out” delivery of other clinical preventive services during visits or reduce the quality of the clinical preventive service delivery. Complementary strategies to mitigate these effects might include prioritizing clinical preventive services with a strong evidence base for effectiveness, spreading clinical preventive services out over several visits, and withholding selected clinical preventive services during a visit if the prevention activity is effectively covered at the community level. Studies are needed to evaluate the effect of new immunizations on adolescent preventive health care visits, delivery of clinical preventive services, and health outcomes.

Pediatricians have a unique opportunity to influence adolescents and their families by helping young people build a strong foundation of good health that will continue into their adult lives.

American Academy of Pediatrics (AAP)¹

DELIVERING PREVENTIVE services to US adolescents* is a public health priority.^{2,3} Although most US adolescents are healthy, millions of adolescents initiate behaviors and lifestyles that can adversely affect their immediate and long-term health.⁴ Potentially modifiable adolescent behaviors include failure to use seat belts, unsafe operation of motor vehicles, carrying weapons, using alcohol and other drugs, unprotected sex, inactivity, and overeating. These behaviors are directly linked to injuries and death, as well as to sexually transmitted infections (STIs), unintended

*The definition of “adolescent” differs across studies and organizations; in this report, an adolescent is a person aged 11 to 18 years, unless otherwise specified.

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Key Words

adolescent, immunization, clinical preventive service

Abbreviations

AAP—American Academy of Pediatrics
STI—sexually transmitted infection
CPS—clinical preventive service
MCV4—tetraivalent meningococcal conjugate vaccine
TdaP—tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis
ACIP—Advisory Committee on Immunization Practices
HPV—quadrivalent human papillomavirus
GAPS—Guidelines for Adolescent Preventive Services
HEDIS—Health Plan Employer Data and Information Set
VFC—Vaccines for Children

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TABLE 1 US Guidelines for Adolescent Clinical Preventive Care

Name	Organizational Sponsor	Targeted Age, y	Recommendation for Preventive Care Visits	Web Site
Age charts for periodic health examinations	American Academy of Family Physicians	13–18	Every 1–3 y, tailored to needs of individual, 1 comprehensive PE between 13 and 18 y	www.aafp.org/online/en/home/clinical/exam/agecharts.html
<i>Bright Futures</i>	Maternal and Child Health Bureau (Health Resources and Services Administration) and the AAP	11–21	Annual, with comprehensive PE	www.brightfutures.aap.org
GAPS	American Medical Association	11–21	Annual, with comprehensive PE once during early, middle, and late adolescence	www.ama-assn.org/ama/upload/mm/39/gapsmono.pdf
Recommendations for pediatric preventive health care	AAP	11–21	Annual, with comprehensive PE	http://aappolicy.aappublications.org/cgi/content/full/pediatrics%3b105/3/645
US Preventive Services Task Force ^a	Agency for Healthcare Research and Quality	11–24	Every 1–3 y, tailored to needs of individual, no recommendation for comprehensive PE	www.ahrq.gov/clinic/uspstfix.htm

PE indicates physical examination.

^aIncludes evidence-based recommendations for adolescents as part of their guidelines for CPSs.

pregnancies, and obesity.⁴ They also contribute to chronic diseases in adulthood including cancer, heart disease, diabetes, and infertility. Among adolescents, injuries related to motor vehicle accidents, homicides, and suicides are the leading causes of mortality and account for three fourths of deaths among this group in the United States.^{4,5}

Clinical preventive services (CPSs) are delivered by a health care provider to an asymptomatic individual in a clinical setting.⁶ Immunizations are a highly effective CPS, and the impact of administering vaccines that are universally recommended for children is 1 of the 10 great public health achievements of the 20th century; rates of many vaccine-preventable diseases have been greatly reduced among infants and children.^{7–9} However, infections that are preventable by immunization continue to occur among substantial numbers of adolescents and adults, and these persons may transmit vaccine-preventable diseases to vulnerable populations.^{10–15}

Advances in immunology and biotechnology have led to development of new vaccines, many of which have been or will be targeted to adolescents (see the report by Fishbein et al¹⁶ in this issue). During 2005 and 2006, a new tetravalent meningococcal conjugate vaccine (MCV4) and 2 tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis (Tdap) vaccines were licensed and recommended by the Centers for Disease Control and Prevention Advisory Committee on Immunization Practices (ACIP) for use in adolescents.^{17,18} In 2006, a quadrivalent human papillomavirus (HPV) vaccine to prevent cervical cancer and genital warts was licensed for use in female adolescents and young adults, and ACIP recommendations for it came out in 2007.^{19,20,21} Vaccines to prevent genital herpes and congenital cytomegalovirus infection are being studied in healthy adolescents in US clinical trials.²²

New adolescent immunizations create opportunities to enhance health but also pose challenges. In this article, we review adolescent clinical preventive health care guidelines and patterns of adolescent CPS delivery; evaluate how new adolescent immunizations might affect delivery and effectiveness of other CPSs; and provide

suggested guidance for clinicians and policy makers, including potential areas for future research.

ADOLESCENT PREVENTIVE HEALTH CARE

Clinical Preventive Health Care Guidelines for Adolescents

Providing comprehensive preventive health care, including CPSs, to adolescents to prevent present and future morbidity is an important goal of adolescent provider organizations. Several federal and national medical organizations have created clinical adolescent health care guidelines (Table 1).^{23–27} Recommendations vary regarding the frequency of routine preventive care visits.³ Reflecting the physical and psychological changes that occur during adolescence, both the Guidelines for Adolescent Preventive Services (GAPS) and *Bright Futures* present guidelines for early (11–14 years), middle (15–17 years), and late (18–21 years) adolescence. These guidelines provide a framework for the clinician to deliver comprehensive preventive care to adolescents, but they do not rank the CPSs in order of importance. In addition, no 1 guideline is accepted as a best practice, and although the presence of multiple guidelines offers clinicians choice, it may also generate confusion.

The CPSs recommended in these guidelines can be divided into 5 categories: immunizations, health guidance for adolescents, health guidance for parents, behavioral screening and risk-reduction counseling, and laboratory screening tests^{3,28} (Table 2). In a 1998 review of published adolescent CPS guidelines, Elster³ concluded that the recommendations were generally in agreement, although the formats varied. All guidelines recommend CPSs to prevent or screen for STIs, and all except the US Preventive Services Task Force recommend CPSs directed at the prevention of intentional and unintentional injuries and tobacco use. All organizations support the immunization schedule recommended for adolescents by the ACIP.²⁹

Adolescent Health Care Visits and CPS Delivery

In considering the effect of adolescent immunizations on the delivery of CPSs, it is important to understand cur-

TABLE 2 Selected CPSs Recommended for Adolescents

Immunizations ⁹²
TdaP
MCV4
HPV vaccine
Hepatitis B vaccine (if series not completed)
Measles-mumps-rubella (if series not completed)
Varicella vaccine (if series not completed)
Health guidance for adolescents
Normal development
Sexual health
Nutrition
Physical activity
Injury prevention
Dental health
Skin protection
Self-performed breast or testicular examination
Health guidance for parents
Normal development
Promoting healthy behavior
Screening and risk-reduction counseling
Obesity
Contraception
Tobacco use
Alcohol and substance use
Hypertension
Depression/suicide
Eating disorders
School problems
Abuse
Hearing and vision
Laboratory screening tests ^a
Tuberculosis skin test
Papanicolaou test
Chlamydia test
HIV test
Cholesterol test

Source: Adapted from Elster AB. *Arch Pediatr Adolesc Med.* 1998;152:193–198.

^a Most laboratory screening tests are recommended for certain adolescents after a risk assessment.

rent patterns of adolescent preventive care visits and CPS delivery. Studies have suggested that immunizations and other CPSs are more likely to be administered to adolescents and adults during preventive care visits than during visits for acute illnesses,^{30–33} but acute-care visits also provide an opportunity for CPS delivery.

As reviewed in a report by Szilagyi et al³⁴ in this issue, studies of adolescent health care utilization have shown 3 key findings: most adolescents have a usual source of health care; the type of adolescent health care provider varies according to age, with the highest proportion of pediatrician visits among younger adolescents; and older adolescent boys have lower visit rates than other adolescents.^{33–37}

Estimates of the proportion of adolescents who receive preventive care visits vary widely by study. In nationally representative surveys of adolescents or parents, conducted during the 1990s, most respondents reported having had a preventive health care visit within the past year; rates ranged from 57% of boys in grades 9 to 12 to 89% of girls in grades 5 to 9^{38–41} (Table 3). The highest estimate perhaps reflects the broader definition

TABLE 3 Summary of Studies Assessing the Proportion of Adolescents With at Least One Preventive Health Care Visit During Past Year

Study (Year)	Method	Data Source	Grade/Age of Adolescent	Definition of Preventive Health Care Visit	Proportion of Adolescents With Preventive Health Care Visit During Previous Year
Youth Risk Behavioral Surveillance Survey ³⁹ (1999)	National in-school survey	Adolescent report	Grades 9–12	"Check-up or physical exam . . . when not sick or injured"	60% (girls), 57% (boys)
National Survey of America's Families ⁴¹ (1999)	National random-digit-dial household survey	Parent report	Aged 11–17 y	"Well child-care, such as check-ups"	70% (ages 11–14 y), 66% (ages 15–17 y)
Commonwealth Fund Survey of the Health of Adolescent Girls ³⁸ (1997)	National in-school survey	Adolescent report	Grades 5–12	"Medical check-up or physical examination"	85% (all), 86% (girls), 83% (boys), 89% (grades 5–9), 82% (grades 9–12)
National Longitudinal Survey of Adolescent Health ⁴⁰ (1994 and 1995)	National in-school and in-home survey	Adolescent report	Grades 7–12 (aged 11–21 y)	"Physical examination"	68% (all)
National Committee for Quality Assurance, HEDIS ^{42,33} (2002)	Analysis from state-level summary HEDIS file	Adolescent well-care visits based on provider coding data in administrative databases	Aged 12–21 y	Diagnostic codes for well-care visits	34% (all)

of a preventive health care visit and inclusion of younger adolescents. Three of these surveys only included adolescents who were in school³⁸⁻⁴⁰; youth who were not in school because they dropped out or were absent as a result of chronic illness may be less likely to have preventive health care visits. The rate of preventive health care visits, as determined on the basis of diagnostic and procedure codes in health care databases (eg, *International Classification of Diseases, Ninth Revision*, codes) rather than adolescent or parent reports, was lower.⁴² According to 2002 Health Plan Employer Data and Information Set (HEDIS) data, 34% of US adolescents made 1 or more preventive health care visits during the study year.⁴² The extent to which the difference in rates of preventive health care visits between HEDIS and self-reported adolescent and parent data that reflect undercoding of preventive visits versus adolescent/parent overreporting is not clear.

Despite the observation that adolescents are more likely to receive CPSs during preventive care visits, rather than acute-care visits, national and state-based surveys of adolescents and providers have shown that adolescents frequently do not receive recommended CPSs during either type of visit.^{35,39,43,44} Of the students who reported a preventive visit within the past year in the national 1999 Youth Behavioral Risk Surveillance survey, only 43% of girls and 26% of boys reported discussing STIs, HIV, or pregnancy prevention during that visit.³⁹ Consistent with the Youth Behavioral Risk Surveillance survey data, in a survey of adolescents enrolled in managed care in 3 states, Bethell et al⁴³ noted that the average proportion of those who reported screening and counseling during well and acute-care visits was 50% for weight, diet, and exercise, 36% for sexual activity and STIs, and 18% for other risky behaviors (eg, smoking and alcohol use). Screening and counseling rates were higher among adolescents who reported having had private time with the physician or who were engaging in risky behaviors, compared with those who did not meet privately or engage in risky behaviors.

Providers also report suboptimal rates of CPS delivery during adolescent visits. In 1997, Halpern-Felsher et al⁴⁴ surveyed pediatricians in a California health maintenance organization. These pediatricians reported “usually” providing only 9 (38%) of the 24 recommended services during non-acute-care visits (eg, routine well checks, sports physicals). Fewer than one half of the physicians reported screening or educating all of their adolescent patients for drug and alcohol use, sexual behavior and birth control, peer and family problems, and depression or suicide. Findings from a 1997–2000 combined analysis of National Ambulatory Medical Care Survey and National Hospital Ambulatory Medical Care Surveys data, in which the unit of analysis was office-based or hospital outpatient department visits, showed substantially lower rates of CPS delivery to adolescents than those found in the other surveys described. Physicians and health care staff only reported providing counseling/education during 39% of “general medical/physical examination” adolescent visits.⁴⁵ The counseling/

education rates for exercise (22%) and STI/HIV screening (5%) were ~2 and 7 times lower, respectively, than rates reported in the Bethell et al⁴³ survey of adolescents enrolled in managed care, which suggests that discussions perceived to be counseling/education by adolescents may not be coded as counseling/education CPSs by providers.

Although overall rates of adolescent CPS-delivery are low, data suggest that adolescent immunization-delivery rates may be higher than those of other CPSs.^{30,44,46} Although a minority of pediatricians in the Halpern-Felsher et al study⁴⁴ reported conducting behavior screening for all of their adolescent patients, 76% reported universally assessing their immunization status. Likewise, in another 1997 survey, nearly all pediatricians and family physicians, reported routinely checking immunization status of their adolescent patients (95%) and administering immunizations (94%) if they were eligible during preventive care visits.³⁰ During illness-related visits, rates of assessing immunization status (43%) and administering immunizations if eligible (23%) were substantially lower than well visits but were still higher than rates of providing some of the counseling CPSs during general medical visits.^{30,45} Another survey of pediatricians and family physicians in 1999 showed that providers were more likely to assess immunization status of their younger adolescent patients (11- to 13-year-olds), when indicated, compared with older patients (19- to 21-year-olds); providers reported administering indicated vaccines to 96% and 77% of younger and older adolescents, respectively.⁴⁶

Taken together, these studies of adolescent health care services suggest that most adolescents have annual health care visits. However, most adolescents either have no preventive visits or are seen for a preventive visit but do not receive a comprehensive package of CPSs. Although immunizations may fare better than behavioral CPSs, rates of immunization delivery during acute-care visits and for older adolescents also seem to be suboptimal.

Barriers to Delivery of CPSs During Adolescent Health Care Visits

Physicians and adolescents have reported a wide range of barriers to the delivery of CPSs (Tables 4; see ref 34 for a review of specific barriers for immunizations). Among physicians, lack of adolescent visits is a frequently cited barrier.⁴⁶ However, even when an adolescent presents for a preventive health care visit, several factors impede delivery of CPSs. Lack of patient interest and lack of time are the 2 most frequently cited barriers (43%–57% and 41%–74%, respectively), especially regarding counseling-based interventions.^{30,46,47} During visits, physicians also report lack of interest by the patient/parent, lack of time, inadequate compensation, insufficient insurance coverage for the patient, absence of clear practice guidelines and lack of perceived self-efficacy as common barriers.^{30,46,47,48} As with physicians, adolescents have reported not accessing health care as a primary barrier to receiving CPSs. During health care visits, other barriers include adolescent anxiety and concerns about confi-

TABLE 4 Barriers to CPSs

Physician-reported barriers
Lack of patient interest ^{46,47}
Lack of time ^{46,47}
Insufficient compensation ^{30,42,47}
Absence of clear practice guidelines ⁴⁷
Intrusion into patient's privacy ⁴⁷
Lack of training ⁴⁷
Lack of self-efficacy ⁴⁸
Older age of adolescent ⁴⁶
Confidential services ⁹⁴
Medically emancipated conditions ⁹⁴
Parent- and adolescent-reported barriers
Lack of knowledge about preventive care ⁴⁹
Low levels of perceived susceptibility, severity, response efficacy, and self-efficacy ⁴⁹
Confidential and private care ^{43,49,50}
Underutilization of care (including access to care) ^{45,49}

Barrier is defined as identified by $\geq 16\%$ of physicians (range: 16%–74%).

dentiality, lack of private time with providers, and concern about reporting risky behavior to providers.^{43,49,50}

POTENTIAL IMPACT OF NEW IMMUNIZATION: RECOMMENDATIONS ON ADOLESCENT PREVENTIVE HEALTH CARE

What impact will the introduction of new adolescent immunizations into an already crowded schedule of recommended CPSs have on the delivery of the other adolescent CPSs? To explore this question we considered the potential positive and negative influences of immunization recommendations on adolescent, parent, and clinician behaviors by using a simplified model for delivery of CPSs to adolescents. Our conceptual model has 3 components. The first component is an adolescent preventive or acute health care visit, which provides the opportunity for immunization and other CPSs to be provided. The second component is that the clinician delivers other CPSs during the visit. The third component is that the quality of the CPS delivery is consistent with best effectiveness. Opportunities and challenges are presented separately for each component of our conceptual model.

Adolescent Health Care Visits and Immunizations

Opportunities

Immunization recommendations are likely to increase adolescent health care visit rates for those who targeted for vaccination, which provides an opportunity for the delivery of not only the vaccine but also other recommended CPSs. The routine infant and childhood immunization schedule, for which high coverage has been achieved in the United States, provides an example of this opportunity. There is a strong association between a child receiving immunizations and other childhood preventive services such as lead testing and tuberculosis screening.^{51,52}

Immunizations for adolescents are generally perceived by clinicians and the public as an important preventive measure.^{53,54} Surveys of family physicians and

pediatricians that were conducted before the MCV4⁵⁵ and Tdap⁵⁶ vaccines were recommended by the ACIP suggested that physicians recognize the burden of meningococcal disease and pertussis among adolescents and support routine administration of these vaccines at the 11- to 12-year visit. In a survey of pediatricians about their attitudes toward the HPV vaccine before its licensure, $>95\%$ of respondents reported that they would likely administer HPV vaccine to their adolescent patients if it were recommended by the ACIP or AAP.⁵⁷ Before 2007 national coverage data for these new adolescent vaccines were not available yet. An analysis of the Michigan Childhood Immunization Registry suggested that patterns of MCV4 use in adolescents during 2005 were consistent with ACIP recommendations; however, overall coverage was low.⁵⁸ Although adolescent-vaccination coverage levels are likely to be lower than that achieved for young children, the perception of vaccination as an important preventive service and the actions that clinicians, managed care organization leaders (eg, monitoring HEDIS measures) take to implement an immunization program and achieve high coverage likely will increase health care visits at the ages recommended for adolescent vaccines. For a multidose vaccine such as hepatitis B or HPV, in-office reminders to return for a second or third dose also can increase adolescent visit rates. In a multistate survey, most physicians ($\geq 60\%$) reported scheduling a follow-up vaccination visit when indicated as part of providing preventive care to adolescents.⁴⁶

Federal financing policies and local and state health department immunization programs also are likely to increase visit rates for immunizations and opportunities to deliver other CPSs, particularly among low-income populations. The Vaccines for Children (VFC) program provides recommended vaccines free of charge to participating public and private providers for administration to eligible low-income children and adolescents <19 years of age.⁵⁹ In addition, many states currently have middle and high school vaccination laws for hepatitis B and tetanus and diphtheria toxoids vaccines, and studies have demonstrated that state laws increase coverage levels for mandated vaccines.^{60–62} One study compared rates of preventive visits among adolescents aged 11 to 15 years who were residing in states with and without middle school laws for the hepatitis B vaccine.⁶³ In addition to increasing coverage for hepatitis B vaccine, the presence of a hepatitis B vaccination law was associated with increased likelihood of having a preventive health care visit (77% with a law versus 66% without a law).

Challenges

The potential for adolescent vaccination to increase health care visits and the opportunity to provide other CPSs may not be realized if adolescent vaccines are provided outside the medical home (see ref 34 for discussion of the medical home). In fact, it is possible that vaccination outside the medical home could decrease preventive visits to a provider's office or clinic. School-based vaccination has been proposed as 1 strategy to achieve high coverage levels, particularly for influenza

vaccine (for which delivery is seasonal).⁶⁴ Vaccination-only office visits also have been proposed,⁶⁵ but they might limit opportunities to deliver other CPSs; however, vaccination-only visits might be necessary if reimbursements do not cover follow-up clinical practitioner visits for vaccines that require multiple doses (eg, HPV vaccine).

Clinician Delivery of Other CPSs

Opportunities

In addition to the likely effect of immunizations on increasing delivery of CPSs as a result of an increase in adolescent health care visit rates, the number of other CPSs that are delivered during each of these visits might increase, although fewer data are available to support this hypothesis. Incorporating new adolescent immunizations into practice might increase health care providers' general awareness of CPS guidelines and may lead to implementation of practice systems to monitor vaccination as well as delivery of other services. Studies have suggested that training clinicians about CPSs and providing screening and charting tools increase the delivery of CPSs to adolescents.^{66,67} It is also possible that immunization recommendations may indirectly improve the doctor-patient relationship by increasing the number of encounters between the doctor and the adolescent, facilitating CPS delivery. Better communication between the doctor and adolescent may promote counseling and trust.⁴³

Administering the HPV vaccine may also provide an opportunity to discuss other CPSs related to sexual health. Of pediatricians surveyed, 63% perceived as important the opportunity to discuss sexual health issues as part of HPV vaccination.³⁷ In addition, HPV and future STI vaccines may lead providers to learn more about sexual health topics and improve their confidence in delivery of related CPSs. A provider's perceived self-efficacy to deliver CPSs has been associated with adolescent and physician reports of screening for high-risk behaviors.^{48,68}

Challenges

The amount of time it takes to provide new vaccinations during preventive or acute-care visits may "crowd out" delivery of other CPSs. A time-motion study of well-child visits for children aged <2 years showed that 1.9 minutes of a median 21.4-minute visit (9%) was spent by the physician explaining vaccinations, and 1.6 minutes (7%) was spent by nursing staff administering the vaccines. In comparison, of the total of 16.3 minutes physicians spent with the patient, the median time spent discussing all other health-related issues was 9.5 minutes (58%).⁶⁹ Vaccinations will likely take a similar amount of time from the adolescent preventive visit and may affect the time allowed for other important components of the visit.

Quality of CPS Delivery

Opportunities

In the same way that immunization recommendations might lead to adoption of new CPSs into practice, they have potential to improve the quality and overall effectiveness of CPSs. In particular, the HPV vaccine may influence quality CPSs related to sexual health. For example, as part of learning about the HPV vaccine, clinicians may become aware of new technologies for STI and Papanicolaou testing.^{70,71} Education about CPSs improves adherence to recommendations.⁷² If these immunizations lead to better communication between the adolescent and clinician, the effectiveness of delivery of other CPSs might also improve. Studies among adults have suggested that a patient's trust in his or her physician improves adherence to treatment regimens and recommended health behaviors (eg, smoking cessation).⁷³

Challenges

Although time constraints may reduce delivery of CPSs, having less time available for CPS delivery during the clinical visit also might diminish the quality and effectiveness of these CPSs. For screening/counseling, time-consuming intensive interventions may be more effective than brief interventions.⁶⁸ In addition, lack of time might limit the effectiveness of counseling. Among adolescents surveyed, only 40% indicated that the providers always spent enough time with them.⁴³ Brief screening discussions of sensitive issues can negatively affect the doctor-patient relationship.⁷⁴

DISCUSSION

Adolescent immunization recommendations hold great promise for improving adolescent health, both as a "needle" and a "hook." As a needle, immunizations will enhance an adolescent's health by preventing vaccine-preventable diseases during adolescence and adulthood. Among the adolescent CPSs, immunizations are unique: they are the only CPS that has both a strong evidence base for efficacy and safety and robust funding and infrastructure at federal, state, and local levels to promote delivery, particularly to the most vulnerable adolescents eligible for the VFC program. Funding may not be adequate to permit immunization of adolescents who do not qualify for the VFC program but rely on vaccines financed through federal and state discretionary funding mechanisms, including the Section 317 grant program.⁷⁵ In addition, strong partnerships between clinicians and community public health organizations have been established to promote awareness and education about vaccines.

In addition to preventing vaccine-preventable diseases, adolescent immunizations will likely be a hook to bring adolescents and their parents into the clinic for immunization visits, during which other CPSs can be provided. New immunization recommendations may also increase the number of CPSs provided to adolescents and the quality of CPS delivery. To best take advantage of this opportunity, funding and infrastructure to support systematic improvements in CPS-delivery sys-

tems at the practice level are needed. Systematic improvements might include providing education and resource materials (eg, screening tools, trigger questions) for clinicians and patients, implementing recall-reminder systems, and ensuring confidential visits (ie, time alone with the provider).

Immunizations are most likely to increase visits and delivery of other CPSs among adolescents in age groups that are recommended for vaccination by ACIP²⁹ and partner organizations. Since 1996, the 11- to 12-year early-adolescent visit has been promoted as the adolescent-vaccination platform and an opportunity to provide other CPSs; later visits are used to verify coverage and provide catch-up vaccination if needed.⁷⁶ In response to new adolescent immunization recommendations, the Society for Adolescent Medicine endorsed expansion of the adolescent-vaccination platform to include 3 vaccination visits at ages 11 to 12, 14 to 15, and 17 to 18 years.⁷⁷ Additional new adolescent vaccines are in the pipeline and have the potential to create a "culture" for adolescent immunization that is similar to that for infants and toddlers.⁷⁸

Although increases in adolescent health care visits would provide the opportunity to deliver other CPSs, the time required for immunization counseling and administration might decrease the per-visit time available for their delivery. This effect could lead to the other CPSs not being delivered at all or being delivered suboptimally. Prioritizing and triaging CPSs has been proposed to mitigate this risk. Interest in prioritizing and triaging CPSs is not new, and although none of the clinical preventive health care guidelines for adolescents prioritize CPSs, it is widely acknowledged that not all of these services can be delivered in 1 visit.⁷⁹

Increasing the amount of time allotted for an adolescent visit is 1 strategy that could reduce crowding from adolescent immunizations, but it is unlikely to occur without changes in reimbursement policies. In the absence of these changes, 3 complementary strategies could be considered to help triage and prioritize which CPSs to provide during an adolescent health care visit: prioritizing CPSs with a strong evidence base for effectiveness; spreading the CPSs out over several visits; and not providing selected CPSs during a visit if the prevention activity is effectively provided at the community level.

All organizations consider the strength of evidence to develop guidelines for CPSs, but use of expert opinion varies. Moyer and Butler⁸⁰ reviewed the evidence for effectiveness for behavioral counseling, screening, and prophylaxis CPSs for children and adolescents; immunizations were not assessed. Few CPSs were shown to be effective among adolescents; however, insufficient evidence was available to evaluate many of the CPSs. Effective CPSs included counseling (especially if it was time intensive) to prevent injuries and screening for STIs for sexually active adolescents. A few widely used interventions, such as brief counseling to prevent alcohol abuse, were demonstrated to be ineffective.^{80,81}

Relying on evidence for effectiveness to prioritize interventions has limitations. First, lack of evidence does

not mean lack of effectiveness. For many CPSs, it is not practical to conduct rigorous clinical trials to test an intervention, especially in smaller high-risk groups, but the intervention may be effective. Second, the effectiveness of an intervention needs to be considered together with the prevalence of disease or behavior. For example, if counseling delivered by a primary care provider against smoking resulted in a behavior change for only a small proportion of persons targeted (eg 5%), when delivered broadly to an adolescent population with a 22% prevalence of smoking,⁸² this small change could result in a significant health benefit.

A second triage strategy is to space out the CPSs over several annual visits rather than administer them annually. Many CPSs are currently recommended annually for adolescents without an evidence base for this frequency (by the AAP and GAPS). By contrast, among adults, the frequency of several recommended cancer-prevention services is supported by evidence.⁸³⁻⁸⁵ In October 2007, a revised set of *Bright Futures* Guidelines replaced *earlier Bright Futures*, AAP, and GAPS guidelines for health supervision of adolescents. The harmonized guidelines emphasized CPS prioritization during visits. These guidelines might also enhance adherence to recommendations for CPS delivery.⁸⁶

A third potential triage strategy is not to provide some CPSs during visits if the prevention activity is provided effectively at the community level, particularly if the strength of evidence for effectiveness is high. A variety of preventive services delivered at the community level have been shown to be effective against many of the leading causes of morbidity and mortality in adolescents. These services include interventions that prevent motor vehicle injuries, violence, tobacco use, and STIs and have been recommended by the Community Preventive Services Task Force.⁸⁷⁻⁹² Applying this strategy could mean, for example, that if a community or school had a good injury-prevention program, a clinician might omit or limit discussions about injury during office visits to make more room for other CPSs that can only be provided in the clinical setting (eg, immunizations or STI laboratory screening). For this strategy to work, clinicians would need a high level of awareness of local community health activities.

As the new era of adolescent vaccination begins, addressing research gaps in adolescent health services will help policy makers and clinicians develop, revise, and implement recommendations for adolescent immunizations and other CPSs to improve the health of adolescents. Studies are needed to evaluate whether new immunization recommendations for adolescents are associated with increases in the proportion of adolescents who have preventive health care visits, including differences for VFC and non-VFC-eligible adolescents; increases or decreases in the delivery and effectiveness of adolescent CPSs during visits; changes in the delivery and effectiveness of sexual health CPSs (eg, increased counseling, decreased STI testing); improved or diminished quality of CPS delivery; and improved office-based systems for CPS delivery. Research is also needed to determine if changes in the time allotted to adolescent health

care visits or CPS delivery occurs. Health outcomes among adolescents who receive immunizations and other CPSs during visits should be defined and assessed, and the effects of triaging CPSs on these outcomes should be evaluated. We are potentially at the beginning of a new era, not only of adolescent vaccination but also of improved total health care for adolescents.

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