ADOLESCENT IMMUNIZATION INITIATIVE

Adolescent Immunization Initiative Participants

Litjen (LJ) Tan, MS, PhD[a]
Co-moderator
Chief Strategy Officer
Immunization Action Coalition
Saint Paul, Minnesota

David P. Greenberg, MD
Co-moderator
Associate Vice President
& Regional Medical Head
North America
Sanofi Pasteur
Swiftwater, Pennsylvania

Oliver Brooks, MD, FAAP
Chief, Pediatric and Adolescent Medicine
Medical Director
Watts Healthcare Corporation
Los Angeles, California

Joanna Colbourne, BA
Director, Communications & Public Outreach
National Foundation for Infectious Diseases
Bethesda, Maryland

Amanda Dempsey, MD, PhD, MPH
Associate Professor of Pediatrics
University of Colorado
Denver, Colorado

Claire Hannan, MPH[a]
Executive Director
Association of Immunization Managers
Rockville, Maryland

David Kaplan, MD, MPH[a]
Professor of Pediatrics
Head of Adolescent Medicine
University of Colorado
Denver, Colorado

Daryl Lynch, MD[a]
Director, Division of Adolescent Medicine
Children's Mercy Hospital
Kansas City, Missouri

Gary S. Marshall, MD[a]
Chief, Division of Pediatric Infectious Diseases
University of Louisville School of Medicine
Louisville, Kentucky

(continued)

RATIONALE FOR AN IMMUNIZATION PLATFORM AT 16 YEARS OF AGE

In the summer of 2016, a multidisciplinary group of 17 experts in adolescent health and immunization gathered in Baltimore for a 1-day meeting sponsored by Sanofi Pasteur. The group, called the *Adolescent Immunization Initiative (All)*, was created to focus on immunization of older adolescents, defined here as persons 16 through 18 years of age (consistent with historical child and adolescent immunization schedules from the Advisory Committee on Immunization Practices [ACIP]).

With immunization rates for 16- to 18-year-olds well below national goals, *All's* mission is to increase those rates by collaborating with stakeholders to establish an immunization platform at 16 years of age. Older adolescents have a lower rate of preventive visits than younger adolescents—who have an established immunization platform at 11-12 years of age—and typically come to the office for reasons other than well care, such as sports physicals and completion of college forms. A platform for 16-year-olds could reduce vulnerability to vaccine-preventable diseases in this population and drive overall improvements in preventive care for adolescents, the benefits of which could reach into adulthood.

A second dose of quadrivalent meningococcal conjugate vaccine (MenACWY) at 16 years of age has been recommended by the ACIP, American Academy of Pediatrics (AAP), and American Academy of Family Physicians (AAFP) since the beginning of this decade. Unfortunately, a significant gap exists between this recommendation and actual practice. Other vaccines that should be provided or at least reviewed at age 16 in accordance with the ACIP immunization schedule are also overlooked.

Adolescent Immunization Initiative Participants *(continued)*

Donna Mazyck, MS, RN, CAE
Executive Director
National Association of School Nurses
Silver Spring, Maryland

Amy Middleman, MD, MPH[a,b]
Chief, Section of Adolescent Medicine
University of Oklahoma Health Sciences Center
Oklahoma City, Oklahoma

Donald Middleton, MD[a]
Vice President of Family Practice Education
UPMC St. Margaret
Pittsburgh, Pennsylvania

Carole Moloney, RN, MSN, CPNP
Pediatric Nurse Practitioner
Boston Medical Center
Boston, Massachusetts

Audrey Stevenson, PhD, MPH, MSN, FNP-BC
Division Director of Family Health Services
Salt Lake County Health Department
Salt Lake City, Utah

Tina Tan, MD, FAAP, FIDSA, FPIDS
Professor of Pediatrics
Northwestern University
Feinberg School of Medicine
Chicago, Illinois

James Turner, MD
Former Executive Director
Department of Student Health
University of Virginia
Charlottesville, Virginia

Deborah Wexler, MD
Executive Director
Immunization Action Coalition
Saint Paul, Minnesota

Gregory Zimet, PhD
Professor of Pediatrics and Clinical Psychology
Indiana University School of Medicine
Indianapolis, Indiana

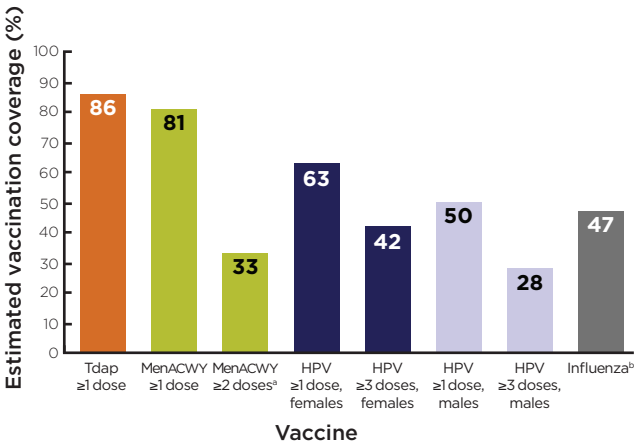
[a] Steering committee member.
[b] Received no reimbursements or remuneration of any kind from Sanofi Pasteur.

These issues resulted in a recent format change to the ACIP schedule to highlight a 16-year-old visit as a chance to review and provide immunizations. However, the change will not achieve its intended effect unless steps are taken to convert that visit into an actual immunization "platform" with its own emphasis—akin to the 11- to 12-year-old immunization/preventive services visit, which has contributed to high immunization rates for tetanus, diphtheria, and acellular pertussis (Tdap) vaccine and the first dose of MenACWY. That same emphasis at 16 years of age would help ensure that the second dose of MenACWY, as well as other vaccines, are assessed and administered as appropriate, and that additional preventive health strategies are delivered.

The concept of an immunization platform at age 16 years has been gaining favor among stakeholders in the health care community. The National Foundation for Infectious Diseases (NFID), for example, issued a call to action to health care professionals (HCPs) in March 2016, challenging them to improve adolescent vaccination rates and recommending, among other measures, establishment of a vaccination platform at age 16 years.[1] The Society for Adolescent Health and Medicine (SAHM) will be issuing a position statement in the spring of 2017 supporting an immunization platform for 16-year-olds.[2]

With the approved format change to the immunization schedule's table—a distinct column for age 16 years (separate from ages 17 and 18 years) with a shaded column heading—the challenge now is to raise awareness about the significance of the change. Making the new column a true platform

2015 Immunization Rates in Adolescents 13-17 Years of Age



[a]Second dose rate based on 17-year-olds; [b]2015-2016 influenza season.

Figure 1: Substantial gaps exist in adolescent vaccination rates.[3,4] *Healthy People 2020* sets a target of 80% coverage among adolescents for 1 dose of Tdap, 1 dose of MenACWY, and 3 doses of human papillomavirus (HPV), and 70% coverage for 1 dose of influenza vaccine. No objective has been established for the second dose of MenACWY.

means engendering an expectation among parents, patients, and HCPs that 16 years is an age when adolescents receive certain vaccines and other preventive health care services.

An immunization platform at 16 years of age has the potential to improve the adolescent health landscape by:

- Creating the expectation that adolescents are *routinely* immunized at this age, consistent with existing recommendations from the ACIP, AAP, and AAFP
- Ensuring that HCPs review MenACWY, meningococcal B (MenB), and (during flu vaccination season) influenza immunization with 16-year-olds, and immunize accordingly, thus increasing unacceptably low vaccination rates and helping protect older adolescents as they enter a key risk period for meningococcal disease
- Providing a chance to catch up on missed immunizations as appropriate for routinely recommended vaccines and to assess for vaccinations based on high-risk conditions
- Increasing preventive care visits
- Improving comprehensive care, including screening and reduction of risk behaviors
- Allowing for immunization before the adolescent becomes ineligible for coverage under the Vaccines for Children (VFC) program
- Empowering adolescents to embrace a greater role in their own lifelong wellness, including adherence to vaccination recommendations

Impetus for Change

Adolescent immunization rates for Tdap vaccine and the first dose of MenACWY surpass *Healthy People 2020* goals. However, rates for the second dose of MenACWY, human papillomavirus (HPV) vaccine series (first dose and the full series), and seasonal influenza vaccine lag well behind (**Figure 1**).[3,4]

The difference in immunization rates between the first and second doses of MenACWY is stark. The rate for the first dose, recommended at 11-12 years of age since 2005, exceeded 50% by the end of 2009 and reached 81% in 2015. In contrast, the rate for completing the second dose among 17-year-olds was only 33% in 2015, despite this dose being recommended at 16 years of age since 2010.[3]

By those estimates, 67% of eligible adolescents are not fully immunized during a period of life that places them at increased risk for meningococcal disease. Approximately 20% of the nearly 2000 deaths from the disease that occurred during 1999-2014 were in the 15- to 24-year-old age group.[5] Case fatality rates are 10% to 15%, and up to 19% of survivors suffer long-term sequelae (eg, limb amputation, hearing loss, cognitive deficits).[6]

> “It’s now been 6 years since the ACIP recommended the second dose of MenACWY, and **the health care community is still struggling to increase the immunization rate for this later adolescent dose**. The low rate translates into millions of teenagers not being optimally protected.”
>
> ***— David Greenberg, MD***

For influenza, some 25% of pediatric deaths in the 2014-2015 and 2015-2016 flu seasons were among adolescents 12-17 years of age.[7] In both seasons, the influenza vaccine immunization rate for 13- to 17-year-olds was just 47%.[4,8]

Half of the 14 million new HPV infections that occur each year in the United States are in the 15- to 24-year-old age group, putting these adolescents and young adults at risk for cervical and other cancers later in life.[9] Yet the rate for initiation of the HPV series is much lower than the vaccination rates for Tdap and the first dose of MenACWY, both also recommended at 11-12 years of age. Rates for completion of the HPV series among both males and females are lower still: 28% and 42%, respectively.[3]

Many providers inappropriately delay recommending HPV vaccine until the adolescent is older than age 11 or 12 years, and some do not recommend it at all. In a 2013 survey, 36% of parents of girls and 58% of parents of boys reported that they had not received a recommendation for HPV vaccine from their child’s clinician.[10]

Why Aren’t Adolescent Immunization Rates Higher?

Parents in general understand the importance of preventive care for their infants and young children but are less aware of the need for such care in adolescents.[11] Parents and adolescents, as well as HCPs, tend to view immunization as less of a priority than seemingly more pressing teenage issues like sex, drugs, drunk driving, and other safety concerns.

In many health care practices, immunizations for older adolescents are not routinized in the way that childhood immunizations are—or the way that vital signs are checked during a well visit. In addition, HCPs may not always fully appreciate the severity of vaccine-preventable diseases and may not be familiar with adolescent immunization recommendations (**Table 1**), which are continually evolving. Even during well visits, opportunities to immunize adolescents are often missed. One study found that 57% of patients due for the first dose of MenACWY did not receive it during a routine preventive visit.[12]

State immunization requirements, which help drive childhood vaccination rates, are comparatively lacking for

adolescents. Most states have school requirements for Tdap vaccine and the first dose of MenACWY, but only 11 states (Arkansas, Illinois, Indiana, Minnesota, Missouri, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, West Virginia) have a requirement specifically for the second dose of MenACWY, and only 3 jurisdictions (Rhode Island, Virginia, District of Columbia) have a requirement for HPV vaccine.[13]

> "We are indoctrinated with the idea of well-care visits for children, but the concept of prevention recedes as they grow older. **During adolescence, the frequency of well visits decreases, overall opportunities to see a physician decline, and the preventive mindset is lost**. HCPs must engage adolescents to recognize the importance of prevention and of owning their own health."
>
> *— LJ Tan, MS, PhD*

A lack of integrated immunization records among HCPs is a barrier to immunizing greater numbers of older adolescents at alternative venues, such as pharmacies, that could supplement primary care settings. In addition, pharmacists' authority to provide a complete vaccine assessment and administer overdue vaccines to adolescents varies by state. Consent requirements and other practical issues (eg, verification that the parent receives the Vaccine Information Statement) can also make it difficult to vaccinate older adolescents who come to a medical office, pharmacy, or other setting unaccompanied by a guardian.

Misperceptions about cost dissuade some families from having their older adolescent immunized. For example, parents who lack health insurance to pay for vaccines are not always aware that the VFC program covers vaccines for qualified patients through 18 years of age.

A 16-year-old immunization platform would increase adolescent vaccination rates by addressing and offsetting the barriers outlined above. The platform would augment existing best practices, such as the use of standing orders and reminder and recall.

A Pathway to Raising Immunization Rates While Promoting Well Care

In 1995, the childhood immunization schedule included ages 11-12 years for the first time.[18] A Centers for Disease Control and Prevention (CDC) notice that year drew attention to a new recommendation that adolescents receive hepatitis B vaccine "as part of a routine adolescent vaccination visit at age 11-12 years."[19] This visit was to ensure that all adolescents not vaccinated previously were caught up on hepatitis B, measles, mumps, and rubella (MMR), and Td (booster) immunizations and, if indicated, varicella. The CDC stated that "Vaccination

Immunization Recommendations for the Healthy Adolescent

Vaccine	11-12 years	13-15 years	16 years	17-18 years
Category A recommendation				
MenACWY	1st dose	Catch-up immunization if not already vaccinated	2nd dose	Catch-up immunization if not already vaccinated
Tdap	1 dose	Catch-up immunization if not already vaccinated	Catch-up immunization if not already vaccinated	Catch-up immunization if not already vaccinated
HPV[a]	2- or 3-dose series	Catch-up immunization if not already vaccinated	Catch-up immunization if not already vaccinated	Catch-up immunization if not already vaccinated
Influenza	Annual (seasonally)	Annual (seasonally)	Annual (seasonally)	Annual (seasonally)
Category B recommendation				
Meningococcal B[b]			Based on individual clinical decision making for patients 16-23 years of age. Preferred age for vaccination is 16-18 years.	

[a] In October 2016, the ACIP approved a 2-dose HPV series for healthy persons who start the series before age 15 years and a 3-dose HPV series for those who start the series at age 15 years and older; 3 doses are still recommended for immunocompromised persons.[14]
[b] A 2-dose MenB series is recommended for healthy adolescents not at increased risk for meningococcal disease.[15]

Table 1: Category A recommendations apply to all persons in an age group—as with the 4 Category A recommendations for adolescents shown here—or in a risk group. Category B recommendations are for use at the clinician's discretion.[16,17]

recommendations are most effective when they become integrated into routine health care. … The establishment of an adolescent vaccination visit provides the opportunity to deliver preventive health-care services to this underserved population."[19]

The vaccination platform at 11-12 years of age—emphasized in a detailed set of ACIP recommendations in 1996[20]—was not fully actualized until about 10 years later, with the addition of MenACWY and HPV vaccines to the schedule and the substitution of Tdap vaccine for Td vaccine. These additions led to an increase in school immunization mandates for MenACWY and Tdap vaccines as well as educational and awareness campaigns in the public and private sectors.

As vaccination visits among 11- and 12-year-olds increased, a concomitant increase occurred in the number of adolescent visits for preventive care. One study showed that during 2003-2010, the annual percentage of adolescents ages 11 through 21 years making at least 1 preventive health care visit grew from 25% to 41%.[21] The magnitude of that increase was greater during 2005-2007 (the years that Tdap, MenACWY, and HPV vaccines were first recommended) compared with the years before and after.

The study authors conclude that between 2003 and 2010, "yearly improvements in preventive care visits by adolescents were substantial. ACIP recommendations may be associated with this improvement. However, ongoing efforts are needed to improve the use and delivery of preventive care services."[21]

Every patient encounter with an adolescent—not just well visits—should be viewed as a potential opportunity to immunize. And, having a second adolescent platform, at 16 years of age, should not detract from the well-established effort to vaccinate 11- and 12-year-olds. The second platform is a chance to reinvigorate interest in the 11- to 12-year visit by refocusing attention on adolescent immunization and health, while creating an expectation among parents, patients, and providers that vaccinations and preventive care will continue in the teenage years. It can also serve as a first step in building an understanding of the importance of immunization across the life span—from childhood, through adolescence, and into adulthood.

The time to establish this platform seems opportune, because a similar confluence of factors exists today as in the mid-2000s—several vaccines recommended at a specific age, and activity by stakeholders to raise awareness of those recommendations.

> "No matter when you're seeing that child, you need to think about immunizations. If we can get great **immunization buy-in at age 16, hopefully that will lead to adults who are well immunized,** because we've taught the adolescent the longitudinal need for immunizations."
>
> *— Carole Moloney, RN, MSN, CPNP*

What an Immunization Platform at Age 16 Would Look Like

Immunizations indicated at the 16-year-old visit include the following:

- Vaccines specifically recommended at 16 years of age: the second dose of MenACWY, and (based on HCP discussion with patient and family) the first dose of MenB
- Influenza vaccine, if the visit is during the vaccination season
- Any vaccines or doses not given previously, including Tdap, HPV, MMR, varicella, hepatitis A (in states with high rates of the infection) and hepatitis B vaccines, as well as vaccines recommended for adolescents with certain high-risk conditions (eg, pneumococcal vaccines for patients with immunosuppression or chronic heart, lung, or liver disease)

Given the relative infrequency of well visits by adolescents, the 16-year-old visit is particularly important because it gives HCPs an opportunity to complete any outstanding immunizations before eligible adolescents age out of VFC coverage at 19 years of age.

An immunization platform at age 16 years is a way to leverage one type of preventive service (immunization) in order to deliver others.[22] Vaccination gives HCPs an "in" to address the range of teen health topics. The 16-year-old visit is a good midpoint for taking stock of how the adolescent is doing emotionally (is there evidence of depression or anxiety?) and behaviorally (is there evidence of alcohol or drug use, and is the teen sexually active?), providing counseling to reduce risk, and performing recommended laboratory testing (eg, HIV testing for those who are sexually active).

The risk behaviors established during adolescence can be lifelong and thus help determine future health outcomes.[23] Data from the 2015 national Youth Risk Behavior Survey underscore the importance of health assessment and guidance for the adolescent patient (eg, among 10th graders, 29% had consumed alcohol and 20% had used marijuana in the 30 days prior to the survey, and 26% had had sexual intercourse in the prior 3 months).[24]

Vaccines in the 16-Year-Old Platform

1. MenACWY
2. MenB (if indicated or based on discussion with patient and family)
3. Seasonal influenza
4. Any recommended vaccines or doses not given previously (eg, Tdap, HPV, MMR, varicella, hepatitis A, hepatitis B vaccines)

The clinician can use the 16-year-old visit to educate and empower adolescents to take control of their health, preparing them for young adulthood. Ownership of one's health includes taking responsibility for receiving vaccines throughout life, and may be facilitated by HCPs discussing methods to contact the adolescent patient about immunizations in the future. For clinical guidance and resources on transition of care from adolescence to adulthood, see https://www.aap.org/en-us/about-the-aap/Committees-Councils-Sections/Council-on-Children-with-Disabilities/Pages/Policy-Resources.aspx.

In Summary

Immunization rates among older adolescents fall well short of desired goals and leave millions of teenagers vulnerable to vaccine-preventable diseases and potentially serious complications as they enter a period of increased risk.

This paper presents the rationale for establishing an immunization platform for 16-year-olds that combines vaccination with preventive services focused on the overall well-being of the older adolescent. Elevating the importance of the 16-year-old visit would make clinicians and families more aware of, and motivated to comply with, preventive health recommendations for adolescents. Ideally, such a visit would stimulate a lifelong preventive care mindset in adolescents, with immunizations providing a solid foundation.

References

1. National Foundation for Infectious Diseases. *Call to Action: Addressing New and Ongoing Adolescent Vaccination Challenges*. March 2016. http://www.adolescentvaccination.org/resources/call-to-action-adolescent-vaccination-challenges.pdf. Accessed January 6, 2017.
2. Society for Adolescent Health and Medicine. [Position statement.] *J Adolesc Health*. 2017, in press.
3. Centers for Disease Control and Prevention (CDC). National, regional, state, and selected local area vaccination coverage among adolescents aged 13-17 years—United States, 2015. *MMWR*. 2016;65(33):850-858.
4. CDC. Flu vaccination coverage, United States, 2015-16 influenza season. http://www.cdc.gov/flu/fluvaxview/coverage-1516estimates.htm. Accessed January 6, 2017.
5. Deaths: final data as reported in National Vital Statistics Reports for 1999 through 2014.
6. CDC. Prevention and control of meningococcal disease: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR*. 2013;62(RR-2):1-28.
7. CDC. Influenza-associated pediatric mortality. http://gis.cdc.gov/GRASP/Fluview/PedFluDeath.html. Accessed January 6, 2017.
8. CDC. Flu vaccination coverage, United States, 2014-15 influenza season. http://www.cdc.gov/flu/fluvaxview/coverage-1415estimates.htm. Accessed January 6, 2017.
9. CDC. Human papillomavirus vaccination: recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR* 2014;63(RR-5):1-30.
10. CDC. Human papillomavirus vaccination coverage among adolescents, 2007–2013, and postlicensure vaccine safety monitoring, 2006–2014—United States. *MMWR*. 2014;63(29); 620-624.
11. Gowda C, Schaffer SE, Dombkowski KJ, Dempsey AF. Understanding attitudes toward adolescent vaccination and the decision-making dynamic among adolescents, parents and providers. *BMC Public Health*. 2012;12:509.
12. Wong CA, Taylor JA, Wright JA, et al. Missed opportunities for adolescent vaccination, 2006-2011. *J Adolesc Health*. 2013;53(4):492-497.
13. Immunization Action Coalition. State mandates on immunization and vaccine-preventable diseases. http://www.immunize.org/laws. Accessed January 6, 2017.
14. CDC. Use of a 2-dose schedule for human papillomavirus vaccination—updated recommendations of the Advisory Committee on Immunization Practices. *MMWR*. 2016;65(49):1405-1408.
15. ACIP. ACIP live meeting archive—October 2016. https://www.cdc.gov/vaccines/acip/meetings/live-mtg-2016-10.html. Accessed January 6, 2017.
16. CDC. Recommended immunization schedule for persons aged 0 through 18 years–United States, 2016. http://www.cdc.gov/vaccines/schedules/downloads/child/0-18yrs-schedule.pdf. Accessed January 6, 2017.
17. CDC. Use of serogroup B meningococcal vaccines in adolescents and young adults: recommendations of the Advisory Committee on Immunization Practices, 2015. *MMWR*. 2015;64(41):1171-1176.
18. CDC. Past immunization schedules. http://www.cdc.gov/vaccines/schedules/past.html. Accessed January 6, 2017.
19. CDC. Update: recommendations to prevent hepatitis B virus transmission—United States. *MMWR*. 1995;44(30):574-575.
20. CDC. Immunization of adolescents: recommendations of the Advisory Committee on Immunization Practices, the American Academy of Pediatrics, the American Academy of Family Physicians, and the American Medical Association. *MMWR*. 1996;45(RR-13):1-16.
21. Tsai Y, Zhou F, Wortley P, et al. Trends and characteristics of preventive care visits among commercially insured adolescents, 2003-2010. *J Pediatr*. 2014;164(3):625-630.
22. Broder KR, Cohn AC, Schwartz B, et al. Working Group on Adolescent Prevention Priorities. Adolescent immunizations and other clinical preventive services: a needle and a hook? *Pediatrics*. 2008;121(suppl 1):S25-S34.
23. CDC. CDC grand rounds: adolescence—preparing for lifelong health and wellness. *MMWR*. 2016;65(30):759-762.
24. Kann L, McManus T, Harris WA, et al. Youth risk behavior surveillance—United States, 2015. *MMWR*. 2016;65(SS-6):1–174.

Brought to you as an educational service by Sanofi Pasteur Inc.

MKT31484-1 2/17