NVAC NATIONAL VACCINE ADVISORY COMMITTEE

February 7–8, 2018, Meeting Minutes

Committee Members in Attendance

Kimberly M. Thompson, Sc.D., Chair
Steve Black, M.D.
Jay C. Butler, M.D., CPE, FAAP, FACP, FIDSA
Melody Anne Butler, B.Sc.N., RN
Timothy Cooke, Ph.D.
David Fleming, M.D., M.P.H.
Leonard Friedland, M.D.
Ann Ginsberg, M.D., Ph.D.
Robert H. Hopkins Jr., M.D., MACP, FAAP
Mary Anne Jackson, M.D., FAAP, FPIDS, FIDSA
Melissa Martinez, M.D., FAAFP
Cody Meissner, M.D., FAAP
Saad Omer, M.B.B.S., M.P.H., Ph.D.
Larry Pickering, M.D., FAAP, FIDSA
Nathaniel Smith, M.D., M.P.H.
Geeta Swamy, M.D., FACOG

NVAC Ex Officio Members

Endale Beyene, M.P.H. (for John Borrazzo, Ph.D.), U.S. Agency for International Development (USAID)
Ruben Donis, D.V.M., Ph.D. (for Rick Bright, Ph.D.), Biomedical Advanced Research and Development Authority (BARDA)
Marion Gruber, Ph.D., Food and Drug Administration (FDA)
Heather Halvorson, M.D., M.P.H., M.S.H.I., LT COL, Department of Defense (DoD)
Mary Beth Hance (for Jeffrey Kelman, M.D., M.M.Sc.), Centers for Medicare and Medicaid Services (CMS)
Troy Knighton, M.Ed., Ed.S., LPC, Department of Veterans Affairs (VA)
Donna Malloy, D.V.M., M.P.H., U.S. Department of Agriculture (USDA)
Valerie Marshall, M.P.H., FDA
Jeffrey McCollum, D.V.M., M.P.H., Indian Health Service (IHS) *(by phone on February 7)*
Nancy Messonnier, M.D., Centers for Disease Control and Prevention (CDC)
Justin A. Mills, M.D., M.P.H., Agency for Healthcare Research and Quality (AHRQ)
Barbara Mulach, Ph.D., National Institutes of Health (NIH) (*by phone on February 8*)
Narayan Nair, M.D., CAPT, Division of Injury Compensation Programs (DICP), Health Resources and Services Administration (HRSA) *(by phone on February 7)*
Judith Steinberg, M.D., M.P.H., Bureau of Primary Health Care (BPHC), HRSA

NVAC Liaison Representatives

James S. Blumenstock, Association of State and Territorial Health Officials (ASTHO) (*day one*)
Michelle Cantu, M.P.H. (for Tiffany Tate, M.H.S.), National Association of County and City Health Officials (NACCHO)
Gina Charos, Public Health Agency of Canada (PHAC)
Rebecca Coyle, M.S.Ed., American Immunization Registry Association (AIRA)
Kathryn M. Edwards, M.D., Vaccines and Related Biological Products Advisory Committee (VRBPAC)
Kristen R. Ehresmann, RN, M.P.H., Association of Immunization Managers (AIM)

Nathalie El Omeiri, Pan American Health Organization (PAHO)
Jean-Venable "Kelly" Goode, Pharm.D., BCPS, FAPhA, FCCP, American Pharmacists Association (APhA)
Kimberly Martin (for James S. Blumenstock), ASTHO (*day two*)
James David Nordin, M.D., M.P.H., America's Health Insurance Plans (AHIP)
José Romero, M.D., FAAP (for Nancy M. Bennett, M.D., M.S.), Advisory Committee on Immunization Practices (ACIP)
Alexandra Stewart, J.D., Advisory Commission on Childhood Vaccines (ACCV) *(by phone on February 7)*

Acting Designated Federal Officer

Angela Shen, Sc.D., M.P.H., CAPT, Senior Advisor, National Vaccine Program Office (NVPO), Department of Health and Human Services (HHS)

Day One—February 7, 2018

Welcome and Call to Order—Angela Shen, Sc.D., M.P.H., CAPT, Senior Advisor, NVPO, HHS

Dr. Shen called the meeting to order at 10:02 a.m.[1] She outlined key parts of the Federal Advisory Committee Act, its conflict-of-interest rules, and standards of ethical conduct for NVAC members. Dr. Shen thanked the NVPO staff for their support in organizing the meeting and called the roll.

Opening Remarks—Donald Wright, M.D., M.P.H., Acting Assistant Secretary for Health (ASH), HHS

Dr. Wright thanked the NVAC members for their willingness to share their expertise, experience, and knowledge in service to the American people. He announced that the Department has a newly appointed Secretary, Alex Azar II. In summarizing the NVAC agenda, Dr. Wright noted the importance of influenza and vaccine innovation to the Department, and he said the Office of the ASH leads a Federal interagency task force on adult immunization. Dr. Wright feels there is tremendous opportunity to boost lackluster uptake of vaccines among adults.

NVAC provides HHS with critical scientific information, expert consultation, and policy analysis that represents perspectives inside and outside government. For that reason, Dr. Wright said, as the acting Assistant Secretary for Health, he has charged NVAC to form a human papillomavirus (HPV) vaccine implementation working group (WG) to recommend ways to strengthen the effectiveness of national, State, and local efforts to improve HPV coverage. He anticipated that this report would be delivered at the June 2018 NVAC meeting.

NVPO Update, Melinda Wharton, M.D., M.P.H., Acting Director, NVPO

Dr. Wharton expressed her appreciation to NVAC voting members, liaisons, and ex officio members for sharing their knowledge, experience, and expertise. Recently, NVPO began a series of regional stakeholder meetings on adult immunization. The first took place in Texas (Region 6) and focused on fostering collaboration across the region, State action plans, and sharing best practices. The next, in March in Region 3, will address expanding effective communication and knowledge sharing.

Chair's Report—Kimberly M. Thompson, Sc.D., NVAC Chair

[1] The meeting was originally scheduled to begin at 9 a.m. but was delayed because of inclement weather.

Dr. Thompson welcomed the meeting participants and thanked the NVPO staff. She gave an overview of the agenda and meeting proceedings. Each day of the meeting offers an opportunity for the public to give comments that will appear in the public record. Written comments can be sent to the NVAC for consideration by e-mail (nvac@hhs.gov). The minutes and presentations of past meetings are available online at http://www.hhs.gov/nvpo/nvac/index.html. The minutes from the June 2017 NVAC meeting were approved unanimously with no changes.

Dr. Thompson thanked Nathaniel Smith, M.D., M.P.H., and Geeta Swamy, M.D., FACOG, for volunteering to co-chair the new HPV Vaccine Implementation WG. NVAC is scheduled to meet next on June 5–6, 2018. A virtual meeting is tentatively scheduled for May 1, 3–5 p.m., to review preliminary WG recommendations.

Update on Implementation of HPV Vaccine Recommendations

Overview: HPV Report Recommendations—Nathaniel Smith, M.D., M.P.H., NVAC Voting Member

Dr. Smith presented NVAC's 2015 recommendations regarding HPV vaccine uptake, which endorsed those of the President's Cancer Panel (published in 2014) and specified several others. He reiterated the charge to NVAC to establish a WG to produce recommendations on improving HPV vaccination coverage rates and introduced the session speakers.

Increasing HPV Vaccine Coverage in the United States—Melinda Wharton, M.D., M.P.H., Director, National Center for Immunization and Respiratory Diseases (NCIRD), CDC

CDC monitors vaccine coverage through the National Immunization Survey (NIS) for teens. Beginning in the mid-2000s, tetanus, diphtheria, and acellular pertussis (Tdap), meningococcal, and HPV vaccines were recommended for children ages 11–12 years. Uptake of Tdap and meningococcal vaccine ramped up quickly, reaching a high level of coverage, but HPV uptake has been slow and has not reached such high levels. Overall coverage for boys and girls is about 60 percent. HPV vaccine coverage rates are higher for adolescent boys and girls in families below the poverty line, who live in urban areas, or who are Black or Hispanic. Between 2013 and 2016, States increased HPV vaccine coverage—on average, nationally, by 5 percent.

CDC activities to improve HPV vaccine coverage include funding the National HPV Vaccination Roundtable, partnering with NACCHO, and various interventions, technical assistance, support, and communications campaigns. In 2014, health care providers began reporting a Healthcare Effectiveness Data and Information Set (HEDIS) measure on HPV vaccination, which is now included in CMS' core set of children's health care quality measures for Medicaid and the Children's Health Insurance Program.

Provider-level interventions are important but difficult to scale up, said Dr. Wharton. To improve HPV vaccine coverage in the United States, ongoing engagement and coalitions at the national, State, and local levels continue to be important. The recently updated HPV HEDIS measure is an opportunity to involve major payers and health systems in State planning and address HPV vaccine coverage with national payers and systems.

Discussion

Saad Omer, M.B.B.S., M.P.H., Ph.D., suggested the new WG seek out evidence on how to communicate effectively with providers, which is currently lacking. David Fleming, M.D., M.P.H., said more understanding is needed of what is not working and what needs to change to increase HPV vaccine uptake. He wondered whether the differences in vaccine coverage by

income, race/ethnicity, and geography reflect differences in provider interpretation of the recommendations. Dr. Wharton said it is possible that distinctions are made in terms of the strength of the recommendations or acceptance of them. Mary Anne Jackson, M.D., FAAP, FPIDS, FIDSA, noted that vaccine hesitancy among medical residents is also an important consideration, and she emphasized the important roles of all members of the medical and office staff in promoting immunization.

Cancer Control Research on the HPV Vaccine: Update from the National Cancer Institute (NCI)—Sarah Kobrin, Ph.D., M.P.H., NCI, NIH

Dr. Kobrin described NCI support of extramural research.

Direct funding of research: In 2016, NCI created a new program to fund efforts to understand how recommendations from providers link to HPV vaccine uptake among adolescents, specifically the role of various concurrent influences on provider behavior. Another effort provides supplements to CDC Prevention Research Centers to develop and test multilevel health communication strategies to promote HPV vaccination in underserved or high-risk populations.

Cancer Centers: In 2015, NCI awarded small supplements to facilitate local scans of barriers and facilitators to HPV vaccination, which spurred broad collaboration among the Cancer Centers and other researchers. As a result, NCI provided additional funding for Cancer Centers to better determine their own catchment areas and to improve care overall to those in their catchment area. The NCI Cancer Centers will share findings around barriers and facilitators to HPV vaccine uptake at a national conference in Salt Lake City, UT, in June 2018.

Surveillance: The Health Information National Trends Survey complements the NIS. In 2017, it found that about 63 percent of respondents had heard of HPV, and, of those, nearly 80 percent understood that HPV can cause cervical cancer. Other survey data may address the relationship of HPV with penile and oral cancer.

Collaboration: NCI takes part in the HPV Roundtable, works with CDC to provide States with technical assistance, and leads the Comprehensive Cancer Control National Partnership (CCCNP).

Discussion

Larry Pickering, M.D., FAAP, FIDSA, asked whether national surveys of adolescents have been conducted to identify trends and whether data exist to support the approach of adolescents providing HPV education to their parents. Dr. Kobrin said some marketing campaigns collect data from adolescents. One national survey tried to collect data from teens and their parents and then corroborate the data with provider records, she added.

Data Suggesting a Single Dose of the HPV Vaccines May Be Sufficient—John Schiller, Ph.D., NCI, NIH

Data suggest a single dose of HPV vaccine may offer sufficient protection against cervical cancer. Globally, vaccinating those currently eligible could avert 19 million cases of cervical cancer and 10 million deaths over the next 65 years. Dr. Schiller indicated that the most important step toward increasing HPV vaccine uptake in low-income countries is to achieve a single-dose regimen. Such a regimen is biologically plausible, and some clinical data demonstrate protection among women who received fewer than the recommended vaccine doses.

Dr. Schiller believes the first dose of HPV vaccine induces a persistent antibody response, while booster shots do not seem to add much benefit. He hypothesized that the HPV vaccine is the first subunit vaccine that looks like a virus to the immune system and thus induces a response similar to that of a live-attenuated vaccine. Also, HPV usually takes hours of exposure to cause infection, so there is an exceptional opportunity for antibodies to interrupt the process.

A single dose of HPV vaccine appears to protect against HPV infection for years, although durability of the immunity remains uncertain, and antibody levels after one dose remain stable (although lower than levels elicited by multiple doses). An NCI-supported, randomized, controlled trial underway in Costa Rica will assess the effects of one versus two doses of two types of HPV vaccine in preventing persistent HPV infection. The results should allow for comparisons with studies in other countries.

Achieving High Adolescent HPV Vaccination Coverage: Denver Health—Anna-Lisa Farmar, M.D., M.P.H., Denver Health

Denver Health sought to increase HPV vaccination rates, recognizing the high rate of missed opportunities. As the CDC data indicate, teens are seeing providers and receiving Tdap and meningococcal vaccines but not HPV vaccine. Dr. Farmar said the key barriers are lack of a strong provider recommendation and lack of support for HPV vaccination among nurses and other medical assistants. Reimbursement is also a concern, and most schools do not require HPV vaccination.

Denver Health focused on ensuring that providers make a strong recommendation for vaccination and on improving the system to minimize missed opportunities. Denver Health is an urban, safety-net provider that serves a significant number of patients who are uninsured or are covered under Medicaid or Colorado's Child Health Plan Plus. Most adolescent vaccines are delivered through Federally-qualified health centers (FQHCs) and school-based clinics. Several steps were taken to promote Tdap, meningococcal, and HPV vaccination in the Denver Health system:

- Standing orders were put in place for immunizations (and an electronic medical record [EMR] system has since been implemented in which the "recommend" function of the vaccine registries acts as a standing order).
- Vaccine status is evaluated via the State registry at every visit.
- If indicated, medical assistants request consent and administer the vaccine.
- Staff use VAX TRAX™ to identify recommended vaccines, contraindications, and refusals and consult the State registry if the child is not found in VAX TRAX™.
- Providers present Tdap, meningococcal, and HPV vaccines together as standard recommendations for adolescent health.

Vaccine information is incorporated into education, including grand rounds, and covers how to talk with vaccine-hesitant parents. Denver Health shares provider-level data on vaccination rates internally, encouraging healthy competition among providers. Other interventions that have contributed to Denver Health's results include school-based vaccine drives, ongoing quality improvement efforts to increase preventive visits, and funding for patient navigators to identify missed opportunities and reach out to families. The EMR system allows Denver Health providers to identify and address previous vaccine declinations.

Rates of all three vaccines rose steadily from 2004 to 2014, although Tdap and meningococcal vaccine coverage rates were higher than HPV vaccine rates. Rates of at least one dose of HPV

vaccine among young women and men were much higher than national averages. The rate of completion (three doses) was 67 percent for young women and 60 percent for young men. Denver Health had higher rates of adolescent vaccine coverage than the State or the nation. Data through January 2018 show a slight decline in HPV vaccine rates, which may indicate that more provider education is needed. Dr. Farmar suggested the Denver Health approach could probably be implemented and achieve high vaccination rates elsewhere.

Discussion

Steve Black, M.D., asked how widely the provider level reports are circulated and whether there was any pushback from providers. Dr. Farmar replied that the provider-level reports were popular and are now used to track preventive visits. She said the ability to step back and get a broader look at one's practice was helpful feedback. Robert H. Hopkins Jr., M.D., MACP, FAAP, said posting the provider-level reports for others (e.g., at the nursing station) encourages accountability and sustainability. Dr. Farmar said the reports are disseminated at provider meetings and posted in a central location along with other metrics. Providers work in dyads with medical assistants, she added, which contributes to accountability.

Dr. Omer asked whether the results have been evaluated using a cost-per-child standard measure, which would help those interested in broad implementation efforts. Dr. Farmar said future analysts could make such assessments.

HPV Vaccination Initiatives at the American Cancer Society (ACS)—Debbie Saslow, Ph.D., ACS (by phone)

The National HPV Vaccination Roundtable, funded by CDC and convened by ACS, is a coalition that aims to prevent cancer through vaccination, primarily in the United States. It brings representatives of cancer-prevention efforts together with those in the immunization field—two groups that historically have had little interaction. The HPV Roundtable has numerous task groups that plan, implement, and evaluate pilot projects. Pilot projects and results are described online.[2] The website also has a resource library of related materials from members and nonmembers. Communication materials are available for anyone to use.

The ACS HPV Vaccinate Adolescents Against Cancers (VACs) initiative engages ACS regional health system staff across the country who serve in hospital systems, FQHCs, and State health systems. Among the resources available through the VACs initiative are a national interactive map describing who is doing what around HPV vaccination, whom to contact, and how; a guide for providers on talking with parents and patients about HPV vaccination; and strategies to increase vaccination. Data gathered from 26 FQHCs showed a 15-percent increase in HPV vaccination rates as a result of the HPV VACs initiative. The use of EMRs and data analysis capacity were key factors in increasing rates. Through a pilot project, ACS determined that regardless of the amount of money provided to a system to improve data capacity, the most effective interventions involved one-on-one coaching to help staff understand how to use their systems to collect data, set goals, and measure changes around vaccination. A primary care intervention also found that education and technical assistance had more impact than expected, even when minimal funding was provided.

A new ACS public health campaign, Mission: HPV Cancer Free, launches in June 2018. It seeks to increase routine HPV vaccination rates among preteens, eliminate gender disparity, and reduce geographical disparities. It will target several audiences, most notably health systems and providers, whose recommendations carry a lot of weight. ACS hopes to normalize vaccination as

[2] http://hpvroundtable.org/

a primary intervention for cancer prevention. No other organization has such strong links to the health workforce and millions of volunteers who can promote its message.

Partner Updates and Activities on Implementation

ANNE EDWARDS, M.D., FAAP, AMERICAN ACADEMY OF PEDIATRICS (AAP)

In 2014, AAP began working with CDC on improving HPV vaccination rates by partnering with State-level organizations. The 59 chapters engaged throughout the United States have all implemented at least one activity through the program and increased their HPV vaccination rates. Projects vary from provider education to tackling missed opportunities at the system level to State-level efforts to address vaccination in communities. AAP created online training and coaching modules that led to a 12-percent increase in the number of patients who completed the HPV vaccine series. A telementoring program is being planned. AAP's Oral Health Section is discussing how to promote HPV vaccination through partnerships. Also, AAP is beginning a randomized, controlled trial in pediatric office settings that addresses barriers to HPV vaccination.

PAMELA ROCKWELL, D.O., AMERICAN ACADEMY OF FAMILY PHYSICIANS (AAFP)

AAFP frequently publishes information on HPV vaccination in its two peer-reviewed journals. It collaborates with national organizations, including the HPV Roundtable, and is represented on Advisory Committee for Immunization Practices (ACIP) WGs. AAFP members at the national and State levels have resolved to increase access to comprehensive reproductive health care for incarcerated women and have proposed a Federally funded adult vaccine program, modeled on the Vaccines for Children (VFC) program. An AAFP vaccine science fellowship aims to increase expertise among family physicians. The Adolescent and Young Adult Consortium brings together AAFP, AAP, the American College of Obstetricians and Gynecologists (ACOG), and others working to improve vaccination rates. AAFP offers education on coding and billing in various formats. For the public, FamilyDoctor.org has information on HPV vaccine for preteen and teen girls and boys.

JENNIE YOOST, M.D., AMERICAN COLLEGE OF OBSTETRICIANS AND GYNECOLOGISTS (ACOG)

Dr. Yoost serves on ACOG's immunization expert WG, which first provided clinical guidance on immunizations in 1994. ACOG's HPV toolkit for providers includes ACOG's Committee Opinion on HPV vaccination, information for patients and providers, coding and billing advice, and a letter template for communicating with patients. The toolkit was distributed to 30,000 practicing ACOG members. Other ACOG documents discuss at-risk populations and barriers to vaccination in the context of health care for incarcerated women, ethical issues, and health risks of noncoital activity. The Immunization for Women website offers numerous resources for providers and patients, such as the Power to Prevent Cancer webinar for providers. Dr. Yoost said billing and coding are a big barrier to administering vaccines for obstetrician-gynecologists, so ACOG offers a coding booklet, web resources, workshops, and other mechanisms. ACOG representatives serve on national and international groups that aim to increase vaccination rates.

CYNTHIA RAND, M.D., M.P.H., ACADEMIC PEDIATRIC ASSOCIATION (APA)

APA has a cooperative agreement with CDC that features a practice-based quality improvement initiative for physicians to reduce HPV transmission rates. Its journal, *American Pediatrics*, will focus on HPV in its March 2018 issue. APA has a speakers' bureau with representatives who provide grand rounds for academic sites. It also edits the three most commonly used curricula for residents to ensure they are up to date on vaccine recommendations.

Over 3 years, APA has worked with 41 residency training programs and 160 community practices to reduce missed vaccination opportunities through monthly education calls with providers that emphasize the importance of communicating about and offering vaccine in the same visit and improving communication during well-child checkups and acute care visits. The most common system-wide changes resulting from this project were:

- identifying a clinical champion who keeps staff updated,
- discussing results of quality improvement measurement at office meetings,
- scheduling patients for vaccination-only visits if needed,
- flagging vaccines due using the EMR or other system, and
- assessing vaccine status at well-child visits.

Dr. Rand suggested that the capacity to administer vaccine at any visit was the most important factor. The project spurred a 30-percent improvement in vaccination rates. It underscored the importance of incorporating all staff, including clerical staff and nurses, in tracking vaccinations and identifying vaccinations due; tracking vaccinations due in a visible way, such as a whiteboard; and taking advantage of untapped resources, such as nurse visits.

MARGARET FARRELL, M.P.H., RD, NCI, ON BEHALF OF THE COMPREHENSIVE CANCER CONTROL NATIONAL PARTNERSHIP (CCCNP)

CCCNP is a group of 18 leading cancer organizations that support State and local efforts to implement and evaluate comprehensive cancer control programs. Since CCCNP established HPV vaccine uptake as a priority 3 years ago, it has mapped activities in an attempt to avoid duplicating efforts and to leverage the work of others. For example, instead of presenting webinars on the same topics, members share, promote, and build on other members' webinars. CCCNP works with States that have high mortality rates and low vaccination rates to determine potentially effective interventions. Partners create action plans together, and CCCNP provides opportunities to keep the conversation going over time. The group's third technical assistance workshop takes place this spring.

GRETCHEN FORSELL, M.P.H., RDN, LMNT, NATIONAL AREA HEALTH EDUCATION CENTERS (AHEC) ORGANIZATION

Funded by CDC, the National AHEC Organization provides HPV vaccine information to health care providers through area health education centers (AHECs). It aims to improve the diversity and distribution of health care providers and focuses on rural and underserved populations and areas. The National AHEC Organization encompasses 300 AHECs, covering most States. AHECs bring students training in the health professions to rural areas in the hopes of retaining them when they complete their education. The Organization ensures that trainees in rural areas have the same resources and access to new techniques and education as their urban counterparts.

The Organization provides clinical education on HPV and other topics online through webinars, onsite programs, and telehealth networks, facilitating access to those in rural and underserved communities. It is preparing to publish the results of a special project demonstrating that its provider education influences practice. The Organization boasts strong connections within communities and seeks to expand partnerships through roundtables and other collaborations. A modification enacted this year by HRSA will enable AHECs to support more professionals in training rotations in rural communities. The Organization has trained more than 32,000 health professionals and more than 5,000 students.

AMY MIDDLEMAN, M.D., M.P.H., M.S.ED., FSAHM, SOCIETY FOR ADOLESCENT HEALTH AND MEDICINE (SAHM)

SAHM seeks simple recommendations that can be harmonized with other recommendations to increase coverage rates among young people. It published a paper describing an immunization platform for 16-year-olds. It is part of the Unity Project, a public-private consortium that created the Thrive mobile application to help parents coordinate care for their adolescents. It also participates in the Adolescent Immunization Initiative, a national multidisciplinary effort that is publishing white papers on increasing adolescent vaccination. SAHM collaborates with the HPV Roundtable and others to raise immunization rates among adolescents. With the Immunization Action Coalition, SAHM created handouts on how to start conversations between providers and young patients.

SAHM is working with a funder to promote vaccination through its regional chapters. Regional outreach is critical, said Dr. Middleman. Anecdotal information suggests that primary care providers are misinformed about adolescent vaccines. SAHM supports a WG on provider education and seeks strategies that help providers communicate better.

RUTH LIPMAN, PH.D., AMERICAN DENTAL ASSOCIATION (ADA)

Oral cancer is important to ADA's 165,000 member dentists. ADA updated its guidelines on assessing malignant lesions, noting that the manual examination is a good time to explain that HPV vaccination can prevent oral cancer. The message is not inflammatory, falls within the dentist's scope of practice, and has potential for good uptake. An ADA webinar on HPV vaccination introduced 2 years ago has been very popular. ADA is working with the M.D. Anderson Cancer Center. The last ADA annual meeting included a 1-day symposium on oral cancer, and the importance of HPV vaccination to prevent oral cancer is being discussed. Dr. Lipman said there is good evidence that members are interested in promoting HPV vaccination.

FRANCES KIM, D.D.S., M.P.H., DR.P.H., AMERICAN ASSOCIATION OF PUBLIC HEALTH DENTISTRY (AAPHD)

AAPHD's members include nurses, school-based providers, and researchers, among others. It joined the HPV Roundtable 1 year ago and is actively participating, for example, in the development of provider guidelines for oral health. AAPHD is working with the AAP Oral Health Section on ways to engage oral health providers in discussion about vaccines. Given the potential for preventing oral cancer, dental providers are natural allies. AAPHD is seeking ways to engage various stakeholders in oral health and public health to start the discussion. AAPHD's Council of Practice is interested in an interdisciplinary approach to improving oral health, including through HPV vaccination.

Discussion

Leonard Friedland, M.D., encouraged the panelists to reach out to industry, which is providing education on HPV vaccination. He said there are more opportunities for partnerships to advance the agenda.

Dr. Fleming said the HPV recommendations from a few years ago may need to be updated given what is now known about how the vaccine works. He asked for input on what should be done differently for HPV vaccine compared with other vaccines. Dr. Fleming asked why children of color and those living in poverty have higher HPV vaccine coverage rates than others. It would be helpful to understand if the difference links to, for example, risk, discrimination, system issues, provider judgment, parental perspectives, or community norms. Once understood, the discrepancies can be addressed with interventions.

Dr. Rand noted that academic sites are doing better than community sites, and she thinks the discrepancies represent a reinforcement of patterns. That is, physicians become wary when patients protest, and if parents raise concerns that result in a lengthy discussion, the physician may be less likely to bring the topic up again at the next visit. In community health settings, where rates are low, it is possible to have an impact if physicians are trained to make a strong recommendation about vaccines.

Ms. Forsell said rural populations tend to be White. In the West, for example, large populations of patients have very limited access to clinics or health care providers. In some cases, the racial discrepancy may reflect the areas served.

Dr. Pickering suggested two reasons why indigent patients are more likely to get the HPV vaccine: public health providers are actively involved in vaccinations, and VFC covers these patients free of charge. About 40–50 percent of children get vaccinated through VFC. Dr. Wharton believed the figure was even higher in younger children. James David Nordin, M.D., M.P.H., said sees more vaccine hesitancy among White parents than among parents of color.

Melody Anne Butler, B.Sc.N., RN, asked how more nurses can be involved in HPV vaccine education. Dr. Edwards said AAP advocates a team approach in which nurses are key. Dr. Rockwell agreed, noting that in family medicine, nurses and even office clerks are part of the discussion in some practices. Dr. Smith said nurses administer the vaccines, talk to patients, and influence community attitudes.

Nancy Messonnier, M.D. praised the multidisciplinary collaboration at the national and local level. She emphasized that NVAC needs to know all that has been tried so far but has not quite achieved the desired results. The discrepancies in coverage by race/ethnicity is a complicated issue with many contributing factors, she noted. Today's presentations described just a small part of the many actions underway. Dr. Messonnier wondered whether NVAC has the capacity to quickly understand all the pieces of the puzzle so that it can determine what is not yet being done. The question NVAC needs to address, she said, is whether some key piece is missing.

Dr. Rockwell agreed, noting that academics and institutions fail by not keeping up with society (e.g., recognizing the amount of misinformation online that patients consume). More efforts are needed to disseminate accurate information in more easily digestible ways. Dr. Messonnier said CDC has a huge social media platform, but the most influential resource remains a provider's recommendation, and providers may not be communicating as expected about vaccines.

Dr. Middleman emphasized that because of its relationship with sex, the HPV vaccine is talked about differently than other vaccines. Children will be at risk if providers and parents cannot talk comfortably about sex and risk. Dr. Hopkins agreed that providers want information and tips for talking about the HPV vaccine without talking about sex, because it keeps the cancer prevention message from getting through. He also emphasized the importance of educating the next generation of providers in medicine, nursing, dentistry, and other health fields so that they all receive the same information.

Dr. Jackson raised the issue of increasing uptake by offering HPV vaccine beginning at age 9 years. Because ACIP recommends vaccination beginning at ages 11–12 years old, Dr. Wharton said offering it earlier than the ACIP recommendation is outside the scope of the NVAC WG's charge.

Dr. Omer called for high-quality evidence for each intervention implemented, specifically the public health resources involved at every level. He encouraged all stakeholders to figure out what is working and at what cost, so that the NVAC WG can focus its deliberations accordingly.

José Romero, M.D., FAAP, said it is important to stress to practitioners not to separate HPV vaccine from Tdap and meningococcal vaccines and to present it as a cancer prevention vaccine. Those two messages will help move HPV vaccination forward. Kristen R. Ehresmann, RN, M.P.H., agreed that focusing on cancer prevention can decrease the challenges of talking about sex. It is important for the immunization field to partner with cancer prevention groups that give credibility to the anti-cancer message, she added.

Vaccine Innovation: Updates

Incentivizing the Development of Vaccines to Combat Antibiotic Resistance—Timothy Cooke, Ph.D., NVAC Voting Member

Dr. Cooke and several other NVAC members served on the Incentives for Vaccine Development WG of the Presidential Advisory Council on Combating Antibiotic-Resistant Bacteria during development of the September 2017 report, Recommendations for Incentivizing the Development of Vaccines, Diagnostics, and Therapeutics to Combat Antibiotic Resistance. The top recommendations for human health vaccine development were increasing funding for vaccine development; optimizing interactions among product sponsors, regulators, and policy-making groups; and incentivizing increased uptake; and, for animal health, supporting basic research. Vaccine-related recommendations are aimed at various stakeholders and categorized as follows:

Economic

- Quantify the value of vaccines in reducing antibiotic overuse and resistance.
- Continue to support and expand financial incentives for developing vaccines.

Research and development (R&D)

- Expand surveillance to identify where vaccination could reduce or prevent antibiotic use.
- Incentivize development of vaccines targeting antimicrobial resistance.

Regulatory

- Promote early interaction between sponsors and regulators.
- Facilitate communication among sponsors, regulators, and government agencies around target product profiles.

Behavioral

- Develop behavioral interventions to increase vaccine uptake, including economic incentives such as insurance coverage without copayments or coinsurance.
- Increase education about the role of vaccines in antibiotic stewardship.

Zika Vaccines in Development—Robert Johnson, Ph.D., BARDA

Since Zika virus emerged as a concern in February 2016, many vaccine products have made it into the pipeline, but most are in preclinical stages. Two DNA vaccines are in clinical trials and moving forward. A live-attenuated, dual vaccine for dengue and Zika viruses developed by NIH's National Institute of Allergy and Infectious Diseases (NIAID) is expected to move into clinical trials soon. One vaccine candidate using synthetic messenger RNA appears promising, and efforts are underway to identify the best candidate to advance to trials, said Dr. Johnson.

NIAID and the Walter Reed Army Institute of Research are studying the safety and immunogenicity of inactivated Zika vaccine. One company with support from BARDA is pursuing an inactivated Zika vaccine. Results from early testing are promising enough that the company is continuing development. Another company is moving forward with an inactivated Zika vaccine based on the company's successful chikungunya vaccine.

Dr. Johnson outlined key challenges and questions:

- What if disease incidence does not allow for evaluation of vaccine efficacy?
- Will immunological responses prevent congenital infections?
- How will funding gaps be filled to support licensure?
- Will the commercial market sustain a Zika vaccine?

Discussion

Dr. Omer asked about plans to include pregnant women in the clinical trials for the Zika vaccines. Because vaccines are only in the earliest phases of clinical studies, pregnant women have not yet been included in any trials, Dr. Johnson noted, but there is discussion about the importance of including pregnant women in studies given the role of maternal transmission. Particularly regarding the financial and commercial barriers to vaccine development, Dr. Johnson hoped that NVAC could provide suggestions on novel approaches to vaccine development that anticipate the next emerging infectious diseases. He said there is much interest in how government can be better prepared to respond more quickly, with a lot of focus on developing a vaccine platform or suite of platforms that can deliver any antigen and can be produced and disseminated quickly. Good candidates are in the works, said Dr. Johnson, but manufacturing vaccine candidates and disseminating the vaccines remain challenging.

Vaccine Innovation: Vaccine Adjuvants

Next Generation Influenza Vaccine Development—Robert Johnson, Ph.D., BARDA

BARDA focuses on developing pandemic influenza vaccines and related development of the next generation of influenza vaccine. At present, a number of next-generation influenza vaccine candidates are in preclinical and early clinical testing. Such products fall into two categories: improved strain-specific vaccines that achieve better efficacy (e.g., through a new route of delivery) and broadly protective vaccines, or "universal" vaccines, that protect against a number of strains.

The qualities that make for an improved strain-specific vaccine could be faster production time, allowing authorities more time to determine the target strain; easier administration, which could improve uptake; better efficacy; and longer durability. A broadly protective vaccine should be multi seasonal, target multiple subtypes and groups, provide long-lasting protection, or have some combination of these qualities.

Challenges include navigating regulatory pathways, identifying new correlates of protection and endpoints, designing appropriate clinical trials, tracking novel antigens and adjuvants, accounting for age dependence and preexisting immunity, funding development, and ensuring sustainability and commercial viability. Dr. Johnson described some candidates moving through the pipeline, such as a room-temperature-stable, orally administered vaccine and two universal influenza vaccines in clinical trials.

Discussion

Dr. Johnson said BARDA has ongoing discussions about the target product profiles for the next generation of influenza vaccines. Currently, seasonal influenza is the benchmark against which improvements are measured. Dr. Johnson said that it is important to weigh production costs against product efficacy. He envisioned that a universal influenza vaccine would not require annual dissemination (but could potentially require booster doses).

Dr. Messonnier said there is a lot of input and oversight on influenza vaccine development from interagency and intergovernmental efforts, as well as outside partnerships. She recognized the need for more financial incentives for vaccine development, especially when dealing with emerging infections in the absence of a commercial market. With influenza, the current financial pull mechanism is to demonstrate superiority (according to FDA or ACIP criteria) and gain preference that drives the market. Dr. Messonnier said the current influenza season has increased the commitment by CDC, FDA, NIH, and BARDA to develop better solutions and find incremental improvements that can help in the interim.

NIAID Universal Influenza Vaccine Portfolio—Teresa Hauguel, Ph.D., NIAID, NIH

NIAID's Division of Microbiology and Infectious Disease supports studies to improve vaccine efficacy and production, assay development to measure safety and efficacy, reagent production for community use, outreach, and partnerships to advance the science. Dr. Hauguel described some projects in the universal influenza vaccine portfolio, which spans basic, translational, and clinical research. NIAID offers preclinical services to help investigators move products through the pipeline and to facilitate manufacturing.

Intramurally, NIAID is developing a universal influenza vaccine platform that is in preclinical testing, a human influenza challenge model that can be used to identify promising candidates in early Phase II studies, reagents and assays, and animal models. NIAID's Vaccine Research Center takes multiple approaches to influenza vaccine, with the ultimate goal of improving the magnitude or quality of response, extending durability, and protecting against future seasonal and pandemic strains.

In June 2017, NIAID convened a universal influenza vaccine conference and published the proceedings. Participants reached consensus that a successful universal influenza vaccine would be defined as one that:

- provides protection against at least 75 percent of symptomatic influenza infection;
- protects against all influenza A viruses, with influenza B being a secondary target;
- protects for at least 1 year; and
- is suitable for all age groups.

On the basis of the conference findings, NIAID is creating a strategic plan for universal influenza vaccine research.

Discussion

Several NVAC members asked questions about NIAID's definition of a successful universal influenza vaccine. Dr. Hauguel explained that the definition establishes a floor in terms of the duration of protection (at least 1 year) and a high bar for efficacy. Other parameters, such as the number of doses required or the delivery platform, are open for exploration. Dr. Hauguel indicated the need for more funding and said that NIAID hopes the strategic plan will lay out the goals and priorities for future investments.

Dr. Thompson emphasized the need to explain and communicate the value proposition of a universal vaccine. Influenza vaccine may be an attractive area for innovation because there is already a market for the product. The nasal influenza vaccine demonstrated the demand for alternative delivery systems. Regarding cost and global access, Dr. Cooke pointed out that Gavi, the Vaccine Alliance, facilitates advance purchasing commitments that bring costs down. Dr. Fleming hoped that global access and related tiered pricing questions would be taken into account during the development process.

Dr. Omer expressed dismay that, despite the well-received recommendations put forth by NVAC's Maternal Immunization Working Group, none of the Federal presenters described explicit plans to study vaccines in relation to pregnancy. Dr. Messonnier expressed confidence that BARDA has clinical plans for testing Zika virus vaccine in women of reproductive age.

Dr. Messonnier praised NIH for its efforts around influenza vaccine. However, she remains concerned about less-visible conditions for which new or better vaccines would have significant impact, such as group B streptococcus, respiratory syncytial virus, and pertussis.

Gina Charos pointed out that, in Canada, there are questions about whether existing products are being used optimally. Lack of uptake of superior products is related to higher cost but also to a lack of information among decision-makers about factors justifying the higher cost.

Overview of Progress and Landscapes in Adjuvants—Karin Bok, M.S., Ph.D., NVPO

Adjuvants may be molecules, compounds, or macromolecular complexes that boost the potency, quality, or longevity of specific immune responses, Dr. Bok explained. They can make vaccines more cost-effective or the antigen more potent. Dr. Bok gave a brief history of the discovery of adjuvants in the late 1890s and their use in vaccines since the 1930s, as well as an overview of adjuvants currently being studied or in use.

Three adjuvanted vaccines were licensed in 2017: FLUAD, a trivalent influenza vaccine with adjuvant MF59; HEPLISAV B, a hepatitis B vaccine with a CpG ODN adjuvant; and Shingrix, a herpes zoster vaccine with adjuvant AS01B. Dr. Bok concluded that adjuvants played a significant role in vaccines approved last year.

The NIAID Vaccine Adjuvant Program: A Pipeline of Novel Compounds to Safely Enhance Vaccine Efficacy—Wolfgang Leitner, M.Sc., Ph.D., NIAID, NIH

Many adjuvants are in development, but more are needed to improve immune response—specifically, to provide protection rapidly, especially during outbreaks. Duration of response is also a concern (as noted with pertussis vaccine). As with vaccines, the ideal adjuvant should be made from materials that are accessible and affordable, the manufacturing process should be manageable and timely, and the product should be stable with a long shelf-life.

In terms of activity, Dr. Leitner said adjuvants are sought that can enhance immunogenicity, target specific pathogens, minimize side effects, and decrease the amount of antigen required or otherwise minimize doses needed. Adjuvants can be formulated to support different vaccine delivery technologies (e.g., mucosal or transdermal). NIAID's goal is to provide a toolbox that helps investigators feed a continuous pipeline of novel compounds, increases understanding of how adjuvants work, and supports early-stage development of novel adjuvanted vaccines.

Dr. Leitner described *in silico* prescreening methodology that allows researchers to virtually test hundreds of thousands of compounds to find those with potential interactions with immune

receptors. He pointed to an adjuvanted vaccine in clinical trials that has had no adverse effects and allows for significant antigen dose sparing. The adjuvant also improves the affinity of the antibodies produced by the antigen. An experimental universal influenza vaccine that combines two adjuvants appears to generate a higher-quality response and better vaccine efficacy. Other new trends in adjuvant research are the use of checkpoint inhibitors to further enhance immune response and the development of vaccines for allergies and autoimmune diseases.

Dr. Leitner emphasized that the public health benefits of adjuvants are clear. Adjuvanted vaccines may require fewer doses, increasing compliance, and generate stronger, longer-lasting protection. More investment is needed to continue and expand adjuvant research.

Precision Vaccines: Using Adjuvants to Bring Precision Medicine to Vaccinology—Ofer Levy, M.D., Ph.D., Boston Children's Hospital

Dr. Levy reviewed evidence about how the effects of vaccines can vary depending on the recipient's age, health, or even location; the timing of administration, including vaccine-vaccine interaction; and the formulation. Morbidity and mortality from infectious diseases tend to have a bigger impact on the very young and the elderly. For newborns and the very young, the promise of adjuvants—more rapid protection, fewer shots, and fewer doses—is particularly appealing.

Precision medicine involves tailoring treatment to the patient or, in the case of vaccines, to subpopulations. The Precision Vaccine Program at Boston Children's Hospital is developing an in vitro system that models age-specific immune responses, with particular focus on early life. Dr. Levy described his laboratory's efforts to identify age-specific patterns of immune response to adjuvants. The findings can also be used to look at vaccine-vaccine interactions and how they change depending on age.

The Precision Vaccine Program also sought to create a microphysiologic system to model human vaccine responses that would eliminate some of the risks of vaccine development. Investigators created a three-dimensional microphysiologic construct that incorporates human cells and allows researchers to see how vaccine migrates through the body. Using this model, investigators identified an effective agonist and modified it to perform better, creating an adjuvant that accelerates antibody production when combined with pneumococcal conjugate vaccine. Primate studies have shown the approach provides early protection and supports the concept that immunization of newborn babies is possible and potentially life-saving.

With NIAID support, the program is modeling in vitro the response of human leukocytes to 200,000 small molecules to find those that activate immune responses at various life stages. To better understand how adjuvants work, several academic centers formed the Expanded Program on Immunization Consortium. Dr. Levy and his colleagues are also part of the Human Immunology Project Consortium and are taking a systems biology approach to evaluating the effects of newborn hepatitis B vaccination.

Vaccine Adjuvants—Leonard Friedland, M.D., FAAP, GSK Vaccines, NVAC Voting Member

Dr. Friedland outlined the challenges to developing new vaccines and various novel approaches, including use of novel adjuvants. He emphasized the role of adjuvants in minimizing adverse reactions to highly immunogenic vaccines. Adjuvants work by stimulating innate immunity. It is expected that using adjuvanted vaccines will provide earlier protection and a stronger, and longer-term response. Categories of adjuvants include mineral salts that have long been in use,

emulsions, and particulate formulations. Dr. Friedland summarized the robust pipeline of adjuvants in use and in development.

In licensed products, adjuvants have been shown to improve efficacy of the antigen in some cases and to increase the quantity and quality of cell response in others. Adjuvants have demonstrated benefits across the age spectrum and are being used in vaccines for special populations, such as immunocompromised people and people living with HIV.

Vaccines are carefully controlled and evaluated by regulatory authorities, and safety is paramount. A robust safety monitoring system is designed to rapidly identify rare or serious adverse events associated with vaccination. Adjuvanted vaccines tend to cause more reactions, especially at the injection site, than vaccines without adjuvant, but the symptoms are usually mild to moderate and do not last long. It is important that vaccine recipients be counseled about potential reactions and the positive benefit-to-safety ratio of adjuvanted vaccines.

No single adjuvant will be effective for all vaccines. Investigators select adjuvants for R&D on the basis of unmet medical need, then determine compatibility with the target antigen along with other factors, including the capacity to manufacture the adjuvant safely, effectively, and in sufficient quantity. They also consider whether tools are available to assess and validate the adjuvant's effect. By understanding an adjuvant's molecular signature, investigators can apply adjuvants to models and eventually to animal and then human studies. Dr. Friedland suggested that NVAC highlight the importance of novel adjuvants in vaccine research and their potential role in vaccine confidence.

Discussion

Discussion ensued about the safety of using multiple adjuvanted vaccines in a given individual. Dr. Levy pointed out that vaccine-vaccine interaction could be antagonistic, synergetic, or absent and may vary depending on different parameters; the potential for interactions should be incorporated into trial design. He and Dr. Friedland both said much more study is needed to assess potential interactions.

Kathryn M. Edwards, M.D., asked how industry will share data collected through adjuvant research while maintaining patient confidentiality. Dr. Friedland said industry consortiums and other mechanisms are working to ensure that anonymized patient-level data are available for research. Dr. Levy stressed the importance of maximizing the output from costly, sophisticated studies to enable secondary analysis. Along these same lines, Dr. Leitner said NIAID establishes contracts with academic institutions to facilitate sharing of new adjuvants.

Cody Meissner, M.D., FAAP, wondered what issues are of particular concern with adjuvants. Dr. Levy said the field is so complicated that it is difficult to anticipate all the potential risks. However, he pointed out that research is slow and deliberate. More sophisticated models along with tools to limit adjuvants to defined targets should improve knowledge about safety. Dr. Friedland added that the field is constantly applying new knowledge and evolving.

In response to Dr. Pickering, Dr. Friedland said that professional societies and authoritative bodies are responsible for recommending how vaccines are used in clinical practice. He also said it is important to let patients know about potential reactions and side effects.

Given that vaccines affect people differently, Dr. Romero stressed that underrepresented minorities must be included in research, and Dr. Friedland agreed. Dr. Leitner said better in vitro models will help predict efficacy and eventually allow for vaccines targeted to different

populations. Dr. Levy added that benchmarking should look at the effectiveness of vaccines in inducing desired responses, the potency, and the consistency of effect across study participants.

Dr. Thompson observed the need for more discussion about communicating the safety of adjuvanted vaccines. While there is much uncertainty, there is also excitement about the potential of adjuvants, and more research is clearly needed. Dr. Thompson noted that while the public health benefits may be clear to the stakeholders in the room, the value proposition may not be as clear, especially to those outside the vaccine enterprise.

Public Comment

No public comments were offered.

Wrap Up and Adjournment—Kimberly M. Thompson, Sc.D., NVAC Chair

The meeting concluded for the day at 5:39 p.m.

Day Two—February 8, 2018

Welcome—Kimberly M. Thompson, Sc.D., NVAC Chair

Dr. Thompson opened the meeting at 9 a.m. and welcomed the participants. Dr. Shen called the roll. Dr. Thompson invited NVAC members to submit ideas on topics they would like to hear more about from the liaison and ex officio members during their updates.

NVAC Liaison and Ex Officio Updates

Agency Highlight: 2017–2018 Influenza Season Update—Lynette Brammer, M.P.H., NCIRD, CDC (by phone)

Ms. Brammer summarized surveillance data for the week ending January 27, 2018, or week 4. The percentage of clinical laboratory samples that were positive for influenza decreased slightly from the peak in week 2. However, while influenza type A is declining, type B is rising. Samples from public health laboratories indicate that 84 percent of the influenza type A viruses are H3N2. Ms. Brammer said that three genetic groups of H3N2 virus are circulating in the United States; antigenically, 98.8 percent of all the H3N2 viruses are similar to the cell-grown vaccine component Hong Kong 4801.

In week 4, influenza-like illness accounted for 7.1 percent of outpatient health care visits, the highest rate since the 2009 H1N1 pandemic, which peaked at 7.7 percent. Also, 42 States, New York City, and Washington, DC, had high levels of influenza-like illness, which is another record high. In weeks 1–3 of 2018, for the first time ever, 49 States reported widespread influenza; in week 4, the number dropped to 48.

According to FluSurvNet, in week 4, there were 51.4 influenza-associated hospitalizations per 100,000 population—the highest since the 2009 pandemic. The numbers were highest among people age 65 years and older (226.8 per 100,000 population), and the rates for adults under 65 years are higher than in previous years. Data from the National Center for Health Statistics' Mortality Surveillance System show that influenza-associated mortality rates were 9.7 percent in week 4, considerably higher than the epidemic threshold for that week of 7.2 percent. In week 4, there were 53 pediatric deaths associated with various influenza viruses, not just H3N2. The overall severity will be calculated at the end of the season, but Ms. Brammer anticipated that hospitalizations and deaths could exceed those of the 2014–2015 season, which was the most severe H3N2 season in recent years.

Discussion

Ms. Charos said that Canadian data indicated a vaccine effectiveness rate of 17 percent for H3N2 and 55 percent for influenza type B. The low vaccine effectiveness rate creates a challenge to vaccine messaging. It was noted that the vaccine effectiveness in the United States does not appear to be as high as a 98-percent antigenic match rate would suggest. Dr. Messonnier said some of the media interpretations of the data are imprecise.

Dr. Jackson raised concerns that messages about low vaccine effectiveness for H3N2 are overshadowing the effectiveness against H1N1 and influenza type B, which are causing pediatric deaths. She also noted that her area is seeing neurological manifestations of influenza as well as gastrointestinal bleeding in children, which has not been seen for many years. Ms. Brammer said CDC messaging always emphasizes that vaccination is important and effective, even if the vaccine is not perfectly protective; data suggest that it protects against death, hospitalization, and severe illness, especially in high-risk groups. She added that CDC relies on stakeholders to amplify its messages.

Ms. Brammer said that influenza B has been seen among pediatric populations, but H3N2 remains the predominant virus among all age groups. Nathalie El Omeiri said that end-of-season data from Latin America, where H3N4 was predominant, showed a low vaccine effectiveness rate of 18 percent.

Ex Officio Member Updates

AHRQ—JUSTIN A. MILLS, M.D., M.P.H.

AHRQ has established a grant award, Synchronized Immunization Notifications, to look at effective immunization reminders and immunization information systems (IIS), especially for patients with chronic and medical conditions. AHRQ also supports the Mentored Clinical Scientist Development Awards, which recently awarded a 5-year grant to a University of Washington researcher who will focus on increasing influenza vaccine uptake. Investigators funded by AHRQ published "Effects of phone and text message reminders on completion of human papillomavirus vaccination series" in the *Journal of Adolescent Health* in 2017.

BARDA—RUBEN DONIS, D.V.M., PH.D.

The influenza strain H7N9 is now deemed to be the highest primary threat for pandemic influenza. The highest number of cases ever recorded occurred last winter, and the viruses were antigenically different from those seen in previous waves. Therefore, the World Health Organization (WHO) recommended the vaccine include two different strains. To meet the fundamental requirement of having 40 million doses of prepandemic vaccine in the Strategic National Stockpile, BARDA has issued task orders for production of the new strains. Three contracts were awarded for stockpiling bulk antigen H7N9 Hong Kong strain. BARDA has also issued a task order to produce the recombinant Flublok vaccine. That vaccine has entered clinical studies, and results on the performance of that vaccine with adjuvants are anticipated later this year.

CDC—NANCY MESSONNIER, M.D.

CDC has spent most of the year enhancing surveillance so that regions can detect H7N9 cases and working closely with partners to improve capacity for influenza response. The fifth wave of H7N9 (avian) influenza is occurring in China, and the risk does not seem to be as high as initially expected, with only a limited number of cases reported this year. The Chinese government has been promoting a vaccine for H7N9, which may account for the low number of cases.

This year is the 100-year anniversary of the 1918 pandemic, and CDC and others have a series of commemorative events planned. For example, the Smithsonian has an upcoming exhibit on epidemics. CDC and Emory University's Rollins School of Public Health will host a 1-day symposium on the 1918 pandemic to talk about the progress made and the work left to do.

Some years ago, ACIP recommended Tdap for pregnant women despite the absence of data on clinical effectiveness. Recent data show that 78 percent of cases of pertussis are preventable with a third-trimester vaccination. The vaccine also shows about 90-percent efficacy against serious cases that would require hospitalization. CDC hopes these data further motivate pregnant women to get vaccinated.

In Bangladesh, 3,700 cases of diphtheria have been reported in refugee camps, where there was severe undervaccination. WHO, the country's ministry of health, and partner organizations are working together and may finally have the infection under control. The situation highlights the global shortage of diphtheria antitoxin. The United States has a small supply, but a number of manufacturers have stopped producing it. Diphtheria cases will occur as long as there are pockets of undervaccinated people. WHO's Strategic Advisory Group of Experts on immunization will look at the global need for diphtheria antitoxin and how to motivate industry manufacturers to produce it.

CMS—MARY BETH HANCE

In late 2017, CMS released the findings from the 2016 core set of Children and Adults Health Quality Measures. The children's core set included immunization measures for children under age 2, which is the same as the HEDIS measure, plus an adolescent immunization measure and HPV vaccine for females. State reporting on these measures is voluntary, and 41 States reported on the childhood immunization measure, with a median of 69 percent of children immunized by age 2. In addition, 43 States reported on the adolescent measure, with a median of 70 percent of adolescents receiving both Tdap and meningococcal vaccines by age 13. For HPV, 41 States reported; 21 percent of girls received three doses by age 13. The 2018 core set includes the new combined adolescent measure for HPV vaccine. CMS has an influenza vaccine quality measure for adults, but only 18 States have reported on the measure (below the threshold of 25), so CMS has not publicly released those results. These data and the core sets for 2018 are available on the Medicaid Quality of Care section of Medicaid.gov.

DOD—HEATHER HALVORSON, M.D., M.P.H., M.S.H.I., LT COL

DoD provides adenovirus vaccine for people ages 17 through 50. Historically, it has only used this vaccine for enlisted troops, but late in 2017, increased risk was seen in other populations, so DoD implemented an adenovirus vaccine program at an officer candidate school. The first class was vaccinated in January of 2018, and surveillance is ongoing.

DoD uses the temperature-sensitive medical product program to track vaccines that may have gone out of the temperature requirements. Those vaccines are labeled and set aside; information about them is reviewed to determine whether DoD can return them to use. The program has been highly successful. DoD is evaluating which data it can collect and report to better understand what vaccines are lost, the etiology of losses, and how to intervene to improve the quality of cold-chain management. DoD will use the data to identify where it can intervene—for example, in events such as power outages.

FDA—VALERIE MARSHALL, M.P.H.

In October 2017, FDA approved hepatitis B vaccine, recombinant, adjuvanted, manufactured by Dynavax Technologies for prevention of infection caused by all known subtypes of hepatitis B virus in adults age 18 years and older. That same month, FDA approved herpes zoster vaccine, recombinant, adjuvanted, also known as Shingrix, manufactured by GlaxoSmithKline, for prevention of herpes zoster in adults 50 years and older. Also in October, FDA approved a supplement to the biologic license application for influenza quadrivalent to extend the indication to use in those age 5 and older. The vaccine was previously approved for administration for those age 18 and older.

HRSA-BPHC—JUDITH STEINBERG, M.D., M.P.H.

HRSA's BPHC health centers provide data annually on 16 quality measures, including a composite measure of childhood immunizations for children under age 2. HRSA has been revising its measures to align with CMS' electronic clinical quality measures. It had used a composite measure for childhood immunizations for children under 3 years; in 2016, the measure was applied only to those under 2 years, and two vaccines were added. In 2013, 2014, and 2015, the centers had a rate of complete immunizations for children under 3 years at around 77 percent; with the change in definition in 2016, it dropped to about 43 percent. BPHC also funds entities that provide technical assistance and training, some specifically around immunizations and also for information technology to track immunizations.

HRSA-DICP—NARAYAN NAIR, M.D., CAPT

The National Vaccine Injury and Compensation program has continued to see an increase in the number of claims filed. In fiscal year (FY) 2017, 1,243 claims were filed—the highest number of claims filed in the program's history. Over $250 million was awarded to petitioners in FY 2017, plus nearly $30 million in attorneys' fees. (Attorneys' fees apply to compensated and dismissed cases and include interim fees and costs.) From the beginning of FY 2018, which started October 1, through November 28, 2017, the program awarded $31 million in compensation to petitioners and $5.7 million in attorneys' fees.

Dr. Pickering asked about the top three conditions for which the program is seeing increasing claims. Dr. Nair said that, in general, the program is seeing increasing claims from adults for shoulder injuries related to vaccine administration and Guillain-Barre syndrome as well as other demyelinating disease claims. The increase in claims is driven almost exclusively by adults, predominately adults receiving influenza vaccines.

IHS—JEFFREY MCCOLLUM, D.V.M., M.P.H.

Two health care facilities funded by IHS received HPV Vaccine Is Cancer Prevention Champion Awards. The Tribally-run Wind River service unit, which is part of the IHS Billings (Northwestern Plains) area, received the HHS Region 8 HPV Vaccine Champion Award, and the Chinle service unit, part of the IHS Navajo area, received the HHS Region 9 HPV Vaccine Champion Award.

Regarding influenza, IHS conducts weekly surveillance for influenza-like illness and influenza vaccine coverage. As of February 3, IHS had administered 20,000 doses of influenza vaccine to patients seen at IHS, Tribally managed, or urban Indian health facilities. Influenza vaccine coverage among children 6 months to 17 years was approximately 34.4 percent. Coverage for adults 18 and older was 32.9 percent.

An IHS survey is assessing the role pharmacists play in the provision of adult and adolescent immunizations and the implementation of standards for adult immunizations practices at IHS

pharmacies. This information will be used to identify best practices and strategies to increase pharmacy-based immunization activities within IHS facilities.

IHS participated in the HHS Region 6 National Adult Immunization Plan Stakeholder Engagement Meeting in January. IHS gave presentations on its efforts to implement NVAC and CDC standards for adult immunizations practice in IHS Tribal and urban Indian health facilities and also on current initiatives to improve access to immunizations in American Indian and Alaska native communities.

NIH—BARBARA MULACH, PH.D.

NIH's *All of Us* program seeks to gather data from one million or more people living in the United States to accelerate research and improve health. Formerly known as the Precision Medicine Initiative, the program is trying to look at individual differences in lifestyle, environment, and biology. NIH is currently asking for ideas about research questions that *All of Us* could help answer. The deadline for submitting ideas is February 23, 2018. More information is available online, where visitors can also see ideas already submitted for discussion. The suggestions will be considered at a research prioritization workshop on March 21–23, 2018.

USAID—ENDALE BEYENE, M.P.H.

USAID facilitates access to vaccines for low- and middle-income countries through its support for Gavi, the Vaccine Alliance. Since 2001, USAID has contributed over $2 billion to Gavi. For FY 2018, USAID has requested $290 million for Gavi. USAID is a member of the Gavi Board and several of its committees. It provides technical assistance to strengthen health and immunization systems.

USAID supports education and technical assistance, such as Gavi's Cold Chain Equipment Optimization Support program, and routine immunization through unilateral and bilateral programs at the country level. It provides technical assistance at the subnational level to address issues of local origin. Finally, USAID backs R&D on vaccines, particularly for malaria and HIV, for low- to middle-income countries and aims to build the capacity of researchers in those countries.

USDA—DONNA MALLOY, D.V.M., M.P.H.

USDA's Animal and Plant Health Inspection Service and CDC have been investigating several CDC-confirmed human infections of *Brucella abortus,* strain RB51. Affected individuals reported consuming raw milk from separate sources in Texas and New Jersey. *Brucella abortus* vaccine, strain RB51, live cultures, is a USDA-licensed vaccine that has been approved for over 20 years in the cooperative State-Federal Brucellosis Eradication Program. It is prepared from naturally occurring mutant strains of the organism. It is controlled and administered only by Federally accredited veterinarians or State-Federal animal health officials to female calves between 4 months and 1 year old. Typical virus shedding lasts approximately 10 days. In this 20-year period, there have been few documented issues with this vaccine. USDA's National Veterinary Services Laboratory is providing diagnostic support for the investigation. USDA's Center for Veterinary Biologics tested *Brucella* RB51 vaccine against the seed stock strain and detected no changes in the vaccine strain. There were no readily apparent changes in the vaccine based on whole-genome sequencing analysis. These are the only known cases so far of *Brucella* infection through raw milk.

VA—TROY KNIGHTON, M.ED., ED.S., LPC

Beginning in September, VA required its health care personnel to participate in the influenza prevention program either by getting vaccinated or by wearing a mask during influenza season. This requirement made a significant impact on the goal of vaccinating 90 percent of health care providers. VA has delivered over 1.65 million influenza vaccines to veterans through its outpatient sites and another 104,000 through its partnership with Walgreens. VA's influenza data parallels CDC's. A comparison of 2017 and 2018 data confirm that this influenza season is very severe. Last year, VA tested just over 26,000 samples, and about 12 percent were positive for influenza. This year, it has tested over 48,000 samples, and over 30 percent have been positive. Last year, almost 4,000 outpatient visits were related to influenza; this year, the number is over 16,000 already. Last year, just over 700 hospitalizations were related to influenza; this year, the figure is approaching 4,000. In the 2016–2017 season, there were 12 influenza-related deaths; there have been 89 so far this year. Influenza has had a significant impact on VA, and it has been a bad influenza season for veterans.

Liaison Member Updates

ACCV—ALEXANDRA STEWART, J.D.

At the 104th quarterly ACCV meeting on December 8, 2017, the Commission reviewed six petitions requesting additions to the Vaccine Injury Table. The first condition related to food allergies. This request was first made in 2015; at that time, the Commission voted unanimously not to add food allergies to the table because there was insufficient evidence proving that vaccines caused food allergies.

Additional petitions requested the addition of autism, asthma, and tics. Another involved three different conditions: pediatric autoimmune and neuropsychiatric syndrome, pediatric infection-triggered autoimmune neuropsychiatric disorder, and pediatric autoimmune neuropsychiatric disorder associated with group A streptococcus. The sixth petition related to experimental autoimmune encephalomyelitis and/or acute demyelinating encephalomyelitis. Medical officers provided the Commission with scientific and medical literature. Following discussions, commissioners all voted to exclude these conditions from the Vaccine Injury Table.

ACIP—JOSÉ ROMERO, M.D., FAAP

At its October 2017 meeting, ACIP approved the 2018 adult and 2018 child and adolescent immunization schedules, which have both been published, and approved a third dose of mumps-containing vaccine for individuals identified by public health officials as being at increased risk for mumps because of an outbreak. Shingrix vaccine was approved for the prevention of herpes zoster in immunocompetent adults age 50 and older and immunocompetent adults who had previously received live zoster vaccine (Zostavax). ACIP also voted in favor of a preference for herpes zoster subunit vaccine over live zoster vaccine.

At the next meeting, February 21–22, 2018, ACIP will vote on the use of HEPLISAV-B in adults, updated hepatitis A postexposure prophylaxis recommendations, and adoption of the Evidence to Recommendations framework. In addition, it will discuss live-attenuated influenza vaccine and influenza, pneumococcal, meningococcal, anthrax, HPV, and Japanese encephalitis viruses.

AHIP—JAMES DAVID NORDIN, M.D., M.P.H.

Dr. Nordin said AHIP had nothing to report.

AIM—KRISTEN R. EHRESMANN, RN, M.P.H.

AIM is working with AIRA, CDC's NCIRD, and the University of Michigan's Child Health Evaluation and Research Department to explore IIS sustainability and enhancement. A report

highlighting successful strategies is expected in the fall of 2018. AIM released an adolescent toolkit in January 2018 that offers activities and strategies to enhance and improve the delivery of vaccinations throughout adolescence, from middle school to college. The toolkit features an adolescent resource guide, program practice interviews, and an adolescent resource library.

AIM continues to hold quarterly HPV call-to-action webinars. In September, South Dakota and Sanford Health shared their joint efforts to raise adolescent HPV vaccination rates through the implementation of evidenced-based interventions. At that webinar, CDC's Adolescent Immunization Communications Team presented resources and messaging strategies related to the 2016 NIS teen data. In December, programs featured in the AIM adolescent research guide shared their successful HPV vaccine initiatives. AIM plans to participate in the HPV Roundtable's upcoming national meeting and continues to participate on the HPV Roundtable State and Local WG.

AIRA—REBECCA COYLE, M.S.ED.

In the fall, AIRA published *Security Guidance*, a companion to its privacy and confidentiality document. It is designed to help guide IIS programs through some of their most common questions and security concerns. AIRA also released a guide to help with understanding the nuances between NIS- and IIS-based coverage assessments and how to communicate those distinctions to leadership, the general public, and the media.

AIRA's measurement and improvement project aims to get all IIS to work towards implementing best practices and standards. AIRA has introduced the term "validation" in place of "certification" to describe the third stage of measurement and improvement. The first round of validation reports will be available in March. The first stage of validation will test transport, which is related to interoperability. Also related to interoperability is a project to identify the best practices for onboarding providers to an IIS. AIRA is looking at systems across the country to glean key best practices and will document its findings.

APHA—JEAN-VENABLE "KELLY" GOODE, PHARM.D., BCPS, FAPHA, FCCP

As of December, more than 320,000 pharmacists across the country are trained and ready to improve access to vaccines and immunization rates. To support that core training, APhA offers several assessments online for pharmacists to test their knowledge and get feedback. The online assessments also help APhA identify knowledge gaps so that it can then provide education, training, and messaging in those areas around influenza and pneumococcal vaccination.

APhA holds post-ACIP meeting webinars for pharmacists. It offers multiple information resources developed in connection with partners, including aging and immunity guides, which educate pharmacists about the patient care process and incorporating immunizations in an effort to globally immunize patients. The BeFLUent project encourages pharmacists to talk with those 65 years and older about influenza prevention. APhA completed a CDC cooperative agreement about immunization neighborhoods and registries, providing several key ideas about the need to enhance pharmacists' education around immunization (e.g., how to access registries and assess immunization). At APhA's annual meeting in March, it will deliver a career achievement award on immunization.

ASTHO—KIMBERLY MARTIN

In a new project, ASTHO is providing direct technical assistance to a few States that are applying for Medicaid match funding to improve their IIS. It will develop some fact sheets with guidance that will help other States. ASTHO's adult immunization guide is now available on its website. It

highlights some of the best practices among States with programs that provide vaccines to uninsured adults. The guide specifically reviews how States locate uninsured populations and how to identify providers that can vaccinate uninsured populations.

The Infectious Disease Policy Committee at ASTHO is made up of about 15 to 20 State health officials and affiliate members and led by Dr. Smith. This Committee has established HPV vaccine as an ASTHO priority for this year. ASTHO hopes to develop a tool to assist State health departments with their HPV vaccination efforts.

NACCHO—MICHELLE CANTU, M.P.H.

NACCHO's model practice program focuses on model and promising practices and recognizes outstanding local health departments and initiatives. The program is peer-reviewed; local health departments deem that these practices are collaborative, innovative, and responsive and exhibit a potential to improve health outcomes. The practices will be recognized at the annual 2018 conference in July in New Orleans. Information about last year's model and promising practices, including six immunization practices, is located on NACCHO's website.

NACCHO's recent policy statement on vaccine supply and distribution urged the development of policies to ensure an uninterrupted supply of vaccines and recognition of the unique role that local health departments play in this endeavor. A second policy statement highlighted the importance of IIS and advocated for timely and bidirectional exchange of data between IIS and electronic health records, as well as dedicated and sustainable financial support for technology updates and technical maintenance necessary to continue local participation in IIS.

NACCHO's CDC-funded HPV vaccination project ended last year, but NACCHO remains committed to ensuring access to resources and to working with the national partners funded by the CDC Cooperative. NACCHO updated its Guide to HPV Resources for Local Health Departments,[3] which is available online. It is a compendium of best practices, resources, and tools created by the HPV vaccine project demonstration sites.

NACCHO continues to regularly convene an immunization WG made up of local health officials, programmatic local health department staff, and immunization coalition members. This WG, along with CDC and AIM, administered an assessment of the functions of immunization programs at the local level, with questions focused on priorities, challenges, billing, IIS and registries, and partnerships. Preliminary data show that about 50 percent of respondents are rural or serve rural populations. It is hoped that additional data will identify some of the priorities and the challenges facing these communities. A report will be released in March of 2018.

PHAC—GINA CHAROS

Canada's next Canada Immunization Conference takes place December 4–6 in Ottawa. It is the country's largest national accredited professional education event for immunization. This year's conference will commemorate the 100-year anniversary of the Spanish influenza epidemic. Canada will also host the next annual meeting of the Global National Immunization Technical Advisory Group (NITAG) Network, a WHO initiative to bring together NITAGs, such as America's ACIP, as a community of practice. It takes place December 6–7 in Ottawa.

Updated national vaccination coverage goals and disease reduction targets were recently approved by all Federal, provincial, and territorial governments, and they align with WHO goals and targets. They include all childhood vaccines covered under public immunization programs as

[3] http://essentialelements.naccho.org/archives/7751

well as publicly funded adolescent and adult vaccines. PHAC will track progress against these goals at the national level through its National Immunization Coverage Surveys for children, adults, and influenza. The children's National Immunization Coverage Survey was modified in 2017 to strengthen the section on knowledge, attitudes, and beliefs and better assess undervaccination. The updated survey will enable better reporting of vaccine coverage among indigenous populations.

PHAC's Immunization Partnership Fund is a 5-year funding program aimed at increasing the capacity of others to support vaccine acceptance and uptake. To date, it has funded five provincial government projects and seven nongovernmental organization projects in areas such as reminder recall systems, training for hospital maternity ward staff, tools and training for health care providers, and online resources. Over the past 3 years, the program has provided a dedicated pool of funding for Canada's three northern territories, which have unique vaccination needs and capacity issues, and supported provincial and territorial governments in starting new initiatives or scaling up promising existing ones.

Influenza activity in Canada remains at peak levels, but there are signs that activity is starting to slow down in parts of the country, so it may have peaked. In week four, January 21–27, most detections continued to be influenza A, H3N2. However, influenza B activity started early and in greater proportion than what is typically seen at the front end of the season. To date, about 40 percent of total detections were influenza B, but parts of the country very early on in the season were seeing more than 50 percent of cases as influenza B. Canada has seen very little H1N1 (about 2 percent of detections).

PAHO—NATHALIE EL OMEIRI

PAHO recently celebrated the 40th anniversary of its Expanded Program on Immunization. It held its 24th regional Technical Advisory Group on Vaccine-Preventable Diseases meeting on immunization in Panama in July 2017. Dr. Messonnier was welcomed as one of the group's newest members. Recommendations were made on various topics, including polio and yellow fever, sustainability of the elimination of measles and rubella, and progress toward the goals of the Regional Immunization Action Plan. The meeting report is posted on PAHO's website.

PAHO remains concerned about polio containment and is providing technical assistance to priority countries with either low vaccination coverage or those affected by outbreaks, such as Haiti, which has ongoing diphtheria outbreaks, and Venezuela, which has both measles and diphtheria outbreaks. PAHO also continues to support Brazil in its response to yellow fever outbreaks that have resurged in the past months. It has assisted Brazil in adopting and implementing national yellow fever vaccination guidelines in metropolitan areas that had no vaccine recommendations prior to the outbreak in 2017.

Also, PAHO held a series of regional meetings and training workshops on HPV vaccine, including communication and response to crises. It continues to collaborate on maternal immunization with Emory University and with CDC to leverage influenza surveillance and vaccination data to inform vaccination programs in Latin America and the Caribbean. Finally, PAHO continues to work closely with the United States and Canada on the implementation of vaccination week of the Americas, April 11–28, 2018.

VRBPAC—KATHRYN M. EDWARDS, M.D.

Since the last NVAC meeting, VRBPAC has met four times. It approved adjuvanted hepatitis B vaccine on July 28. On September 13, it recommended the use of zoster vaccine recombinant, adjuvanted. On October 4, VRBPAC met to advise on strain selection for the Southern

Hemisphere influenza season. On November 4, VRBPAC was asked to make recommendations on the clinical development plan for Pfizer's investigational *Staphylococcus aureus* vaccine intended for presurgical prophylaxis in elective orthopedic populations. VRBPAC reviewed whether the efficacy and safety of the product in spinal fusion surgery could be generalized to other elective orthopedic surgical procedures. The majority of the committee members considered it scientifically valid to generalize the safety and efficacy data to other elective orthopedic procedures if the clinical study was successful.

National Adult and Influenza Immunization Summit (NAIIS) and National Immunization Conference

NAIIS Working Group Updates, 2018 NAIIS, and National Immunization Conference—Litjen Tan, M.S., Ph.D., Immunization Action Coalition

The National Adult and Influenza Immunization Summit is a partnership between the Immunization Action Coalition, CDC, and NVPO. An in-person Summit meeting takes place annually, but the bulk of the effort occurs through WGs made up of volunteers who work year-round. Currently, the Summit has 800 participants representing more than 140 stakeholders, including manufacturers, Federal agencies, professional medical and nursing organizations, public health organizations, hospitals, pharmacies, community providers, businesses, insurers, consumers, and advocacy groups, among others.

The Summit convenes stakeholders across the field who identify specific actions to improve vaccine awareness and uptake. It offers a forum for discussing problems openly, which was extremely important in addressing vaccine supply and distribution issues. The Summit relies on the following strategies:

- Communication—for example, amplifying CDC's message about the benefits of influenza vaccine and addressing concerns in real time
- Community and commitment—that is, fostering partnerships and encouraging stakeholders to take ownership of issues
- Coordination to identify shared principles and goals
- Competition in the form of recognition awards to motivate stakeholders and showcase best practices

The Summit WGs drill down to define and address the nature of a problem and its root causes. For example, claims denial and adequacy of payment are significant barriers to adult immunization, so the Summit created a billing and coding guide for providers[4]. The upcoming Summit meeting, May 17–18, 2018, will primarily focus on implementation challenges in health care systems. A number of Summit products on adult immunization are available on its website[5].

The Summit's Influenza WG created a checklist of best practices for vaccination clinics in satellite or temporary offsite locations and will host a fall meeting on improving education and immunization among health care workers at long-term care facilities. The Quality Measures WG is advancing prenatal and adult composite quality measures and promoting vaccination for patients with end-stage renal disease (ESRD) and corresponding quality measurement. The group also spurred NVPO and CMS to collaborate on Medicare claims analysis of vaccine coverage. The Access and Provider WG developed guidance on immunization and quality payment in public health programs as well as educational resources on adult immunization. It is planning

[4] https://www.izsummitpartners.org/naiis-workgroups/access-provider-workgroup/coding-and-billing/
[5] https://www.izsummitpartners.org/

meetings to develop implementation tools and updating messaging around the benefits to providers of using IIS.

Discussion

Dr. Thompson asked that Summit members consider collecting data about the cost of interventions as part of their evaluations. Such data will improve the evidence base and illuminate the value of immunization. Dr. Tan replied that the Access and Provider WG is seeking such data as a foundation for developing two business cases for adult immunization (one for clinicians, one for health care systems). The Summit is encouraging members to publish cost data to elucidate the return on investment for adult immunization. Dr. Shen pointed out that it may be appropriate to develop several business cases, including one that targets providers who are unlikely to vaccinate and instead refer patients to other providers. Dr. Tan added that the Summit may be able to link providers of vaccines with others, whether through pharmacies, community clinics, or others.

Dr. Thompson asked about the status of expanding immunization registries to include adults. Dr. Wharton said the issue is beyond the Summit's scope. Decisions are made at the State level and take into account State resources and priorities. Ms. Coyle added that AIRA is working through the Summit to provide basic education about IIS and registries. In this context, adults are a very different population from children, and so a well-thought-out approach is needed. The Summit is working on this dimension of education on immunization registries.

Disparities in Adult Immunizations

Racial and Ethnic Disparities in Adult Immunization—Ram Koppaka, M.D., Ph.D., NCIRD, CDC

Dr. Koppaka summarized data from the National Health Interview Survey indicating that for most recommended vaccines, uptake is either flat or increasing in small but statistically significant numbers.

Racial and ethnic disparities in vaccination persist, with the lowest coverage among Blacks and Hispanics, and, in some cases, Asians, when compared with Whites. In many cases, the degree of disparity is large and contributes to low overall coverage rates. Analysis of influenza vaccination rates among older Americans since 2008–2009 show the same degree of disparity persisting across various populations over time, despite fairly steady increases among most. Dr. Koppaka stressed the limitations of the survey data (e.g., the survey had a low response rate and relies on self-report of vaccination). No single factor explains all of the disparities, but some factors thought to contribute are as follows:

- Access to care, including insurance coverage
- Likelihood that providers recommend vaccination
- Quality of care received
- Attitudes toward vaccination and preventive care
- Concerns about vaccination, including vaccine safety
- Propensity to seek and accept vaccination

To reduce disparities among adults, Dr. Koppaka suggested supporting partnerships, such as those forged through the NAIIS, and more effective surveillance to inform interventions. Interventions should focus on evidence-based strategies, such as reminder-recall systems, standing orders, adult vaccination standards, regular assessment of vaccine coverage (at the

practice level), improved provider and patient awareness, and messaging targeted groups affected by disparities.

Understanding Dynamics Underlying Racial Disparities in Influenza Vaccination—Sandra Crouse Quinn, Ph.D., University of Maryland

Focusing on influenza vaccination, Dr. Quinn pointed out that disparities are of particular concern because of the disproportionate burden of chronic disease (e.g., diabetes, heart disease, asthma) on minority populations. In addition, evidence from the 2009 H1N1 pandemic indicate that racial and ethnic minorities have greater difficulty achieving social distancing (e.g., using sick leave, working from home, avoiding public transportation), which increases the risk of infection and spread of disease overall.

Through focus groups, interviews, and an online national survey, Dr. Crouse and colleagues found that Blacks are more likely to perceive a risk of vaccine side effects than Whites and more likely to perceive that risk as very serious. Many people lack understanding of the vaccine development and production process (e.g., annual strain selection and manufacturing). All of those studied trust doctors and CDC most and FDA and drug companies least, but Blacks expressed less trust in each of these entities than Whites. Dr. Crouse said higher trust leads to higher vaccine uptake. Racial bias and differential treatment also play an important role in uptake.

The survey asked about racial awareness, experiences with racial discrimination in health care, and vaccine confidence. Those who perceived that they were treated fairly were more likely to have higher levels of trust and higher vaccine uptake. Being conscious of race during a health care encounter was associated with lower trust, higher perception of the risk of vaccine side effects, less knowledge, greater use of "natural" approaches, belief in conspiracies (around influenza vaccination), and greater vaccine hesitancy. The survey also found that the effect of peer support for or against vaccination was particularly strong for Blacks. Also among Blacks, the presence or absence of a perceived moral obligation to get vaccinated was a powerful predictor of uptake. Knowledge about vaccines and recommendations was also associated with uptake.

To overcome barriers and decrease disparities, Dr. Crouse said public health agencies can boost communication to increase understanding about influenza and vaccines, including how vaccines are produced and approved. Communication should address the risk of side effects from vaccination. In minority communities, partnerships are needed that can work toward changing social norms in favor of vaccination by focusing on protecting the broader community, particularly vulnerable family members. Efforts should be made to encourage family discussion about vaccination; Dr. Crouse suggested that family reunions are an opportunity to spread the message about vaccination.

Dr. Crouse acknowledged that medical schools and other organizations are working to improve understanding about racial bias and eliminate it. Interventions should ensure that minority patients receive a recommendation and a concurrent offer of vaccination. Health care providers' vaccine uptake and their influence on patients is another important factor to explore. Dr. Crouse called for more research to evaluate multilevel immunization interventions.

CMS Quality Innovation Network–Quality Improvement Organizations (QIN–QIOs) Improving Medicare Beneficiary Immunizations Among Disparate Populations—Shiree M. Southerland, Ph.D., R.N., B.S.N., CMS (by phone)

The CMS Quality Strategy Goals identify elimination of racial and ethnic disparities as a core foundational principle. Around the country, through QIOs grouped into QINs, 37 States with low

immunization rates among disparate populations have funding specifically aimed at improving adult immunization rates and increasing assessment, documentation, and reporting via IIS. Goals of this task are aligned with Healthy People 2020 goals; they include reducing disparities among racial and ethnic minorities and expanding pneumonia immunization to one million previously unvaccinated Medicare beneficiaries. As of July 2017, the providers recruited to take part in the task have a combined reach of nearly 4.7 million Medicare beneficiaries.

Dr. Southerland presented early data from nearly 1,200 home health agencies involved in the task. She noted that CMS will be able to link immunizations to specific provider identification numbers to determine the impact of QIN and QIO efforts. Data so far show that providers are assessing, offering, and documenting pneumonia and influenza vaccinations. Home health agencies increased influenza vaccination of Whites and non-Whites by 7 percent and 10 percent, respectively, and pneumonia vaccination by about 10 percent and 8 percent, respectively. They are reducing disparities in vaccination, closing the gap between Whites and non-Whites by about 3 percent for influenza and almost 2 percent for pneumonia.

Reporting remains challenging. QIOs are working with providers to migrate electronic health record data into State registries. So far, 41 percent of providers involved in the task report to their State's IIS. Almost 60 percent report having systems in place for assessment and documentation. Dr. Southerland said CMS collaborates with pharmacies, educating their technicians and promoting the benefits of exchanging data with clinical providers; with local immunization coalitions and ESRD networks; and with patients by providing information in various vehicles.

Discussion

Dr. Thompson asked whether there are other indicators or confounding factors that interact with race/ethnicity that are not being addressed. Dr. Quinn said race is often identified as a demographic factor but not recognized as a social factor. Her research seeks to consider the experiences that racial and ethnic minorities face and to analyze data more deeply the heterogeneity within racial and ethnic groups.

Melissa Martinez, M.D., FAAFP, suggested the biggest driver of disparity may be economic disadvantages and limited access given the high cost of some vaccines. Cost should be considered in the context of vaccine innovation. Companies need financial incentives for innovation, but expensive new vaccines could increase disparities.

Dr. Fleming said the proposed solutions look like the same steps that have been recommended for the past 20 years and that have not worked. He asked presenters to prioritize the most important interventions. Dr. Wharton acknowledged that disparities have been an intractable problem. She said the evidence shows that providers are the most important part of the equation. Public health authorities are working with communities through local pharmacies and other venues to reach those who do not see providers routinely, but disparities will persist until cultural competence and access are addressed, Dr. Wharton noted.

Dr. Southerland added that integrating immunization into the provision of routine health care, especially in the context of chronic disease management, is important. Dr. Quinn noted that with community pharmacies offering vaccines, access is not the problem—rather, it is individuals' willingness to get vaccinated in those settings. She recommended focusing on providers, specifically aiming to address implicit bias, improve communication about vaccination (especially addressing patients' concerns), and increase providers' recommendations and offers of vaccination. She said health departments should seek help from local organizations to change community norms around vaccination.

Dr. Hopkins felt that education of physicians and other allied personnel is effective, but more work is needed to educate nurses, medical assistants, office staff, and others. He added that vaccination is not always readily available locally; therefore, it is important that providers recommend and offer vaccination when they see patients. Dr. Hopkins supported community engagement and collaboration to improve vaccination and preventive care.

Dr. Omer pointed to the success of the VFC program as a system-wide approach to eliminate disparities in vaccination among children. He advocated for bold thinking at the systems level to address racial and ethnic disparities in adult vaccine coverage.

Dr. Omer observed that education is not always effective in improving vaccination rates. Promoting the community benefits of vaccination sometimes backfires in a highly individualistic society. Dr. Omer recommended that interventions be tested before they are widely disseminated.

Dr. Cooke asked whether there is an opportunity to assess how cost affects uptake of vaccines covered under Medicare, particularly with the introduction of two new herpes zoster vaccines for older adults. Dr. Friedland responded that data show vaccination increases when copays are lower under Medicare Part D. Such coverage requires an administrative change, not a legislative one. Dr. Shen said CMS has proposed such coverage guidance for Part D plans. However, she noted, Part B does not have any cost-sharing for vaccines, yet uptake is not where it should be. Dr. Hopkins stressed that recent endorsement of minimal benefit plans that do not cover any preventive care poses a huge risk to the population, potentially increasing costs and decreasing availability of vaccines to subscribers in those plans.

Public Comment

Phyllis Arthur of the Biotechnology Innovation Organization (BIO) hoped that when data on disparities are shared publicly they are described with population percentages and numbers (rather than the percentage difference from Whites noted in Dr. Koppaka's presentation). Doing so is important to ensure that policy-makers understand the impact so advocates can demand the resources. Medicare beneficiaries are a huge and fast-growing group. Saying "2.8 percent" (the highest percentage difference between Blacks and Whites in vaccination rates, as described by Dr. Koppaka) makes the difference sound marginal, but 2.8 percent of Medicare beneficiaries is a lot of people. We need to think about how we convey the impact, Ms. Arthur said.

Ms. Arthur also suggested some research looking at the future. If lower coverage rates for racial and ethnic minorities persist while the number of people entering Medicare increases, the situation will worsen over time. One way to make the case for more resources is to show that more and more people of a certain descent are going to be Medicare beneficiaries, and if disparities persist, fewer people will be vaccinated. There is an opportunity to convey the long-term consequences of disparities in infectious diseases, but that opportunity may be missed if the focus is on the percentages instead of the real.

Regarding class and socioeconomic issues, Ms. Arthur said some of the factors revealed in the research among Blacks relate to class distinctions. There is a difference between class problems and race problems, she concluded.

Sarah Kobrin, Ph.D., M.P.H., of NCI said the same questions about racial and ethnic disparities were raised in the discussion about HPV vaccine uptake. She said the purpose of the HPV vaccine is not to distribute doses but to reduce cervical and other HPV-related cancer risks. If there is a difference in vaccine uptake that moves the needle toward reducing the disparity—

which is to say that the populations who are less likely to have access to cancer screening are more likely to be vaccinated—then vaccination will have a positive public health impact. While she hoped everyone who is eligible would get the HPV vaccine as recommended, she said she was not overly upset about the differences in uptake if they lead to a reduction in cervical cancer risk.

Closing Remarks and Adjournment—Kimberly M. Thompson, Sc.D., NVAC Chair

Dr. Thompson thanked the NVPO staff and all those who contribute to NVAC and the vaccine enterprise. She adjourned the meeting at 12:22 p.m.