IMMUNIZATIONS NEWSLETTER

PROVIDING GSA MEMBERS WITH UPDATES ON ADULT IMMUNIZATIONS

APRIL 2017

Developed by The Gerontological Society of America

FEATURES

News

• Immunizations should “remain a cornerstone of prevention and insurance coverage” in the United States, Adult Vaccine Access Coalition co-chair Laura Hanen wrote in an editorial published in The Hill, a policy and politics news outlet in the nation’s capital. After noting the serious diseases eliminated or controlled by vaccines, Hanen wrote, “As Congress considers changes to the healthcare system, policymakers, providers, and patients must work together to ensure that improving access to and utilization of adult immunizations is a top priority. Let’s do everything we can to relegate all vaccine-preventable diseases to the history books.” GSA is a member of the Coalition.

• Supporting the data from long-term care facilities summarized in last month’s newsletter (see third Breaking News item in the March 2017 issue), a recently published study shows that the high-dose influenza vaccine appeared to be more effective at preventing postinfluenza deaths among older adults than the standard-dose vaccine during a more severe influenza season (J Infect Dis. 2017; jiw641. doi: 10.1093/infdis/jiw641). Specifically, the study found that during the 2012–13 season, when the A/H3N2 strain was common, people who received a high-dose influenza vaccine were 36% less likely to die in the 30 days following hospitalization or an emergency department visit that included an influenza diagnosis compared with those who received a standard-dose vaccine.

• Exceptional individuals and organizations are at the heart of optimizing the vaccine and immunization enterprise. Recognize and celebrate their achievements by nominating them for the National Vaccine Program Office UpShot Awards—a distinguished award honoring excellence in leadership, collaboration, innovation, practice, and research that advances the National Vaccine Plan! Nominations are due April 26. Learn more: http://bit.ly/2nIuRBC.
Resources

• Potential activities for implementing the National Adult Immunization Plan are provided for each of eight implementation priorities in a new document on the National Vaccine Program Office website. The activities provided in *National Adult Immunization Plan: A Path to Implementation* are organized under the plan’s four key goals and are appropriate for both federal and nonfederal advocates of adult vaccines.

• Every Child By Two has released its *2017 State of the ImmUnion Report*, which highlights the successes of vaccines, their economic and societal savings, challenges facing the public health system, and key areas of focus needed to achieve optimal protection of Americans.

Poll

• Take 2-3 minutes to answer a poll about adult vaccines and the diseases they prevent. Results will be shown the following month.

• This month, rate your knowledge of shingles.

Communications

While normative decision theory has the ideal decision maker as a perfectly rational human being who weighs options and chooses the one that is a perfect combination of probability and benefit, the available evidence shows that humans are not rational decision makers. Instead of spending unlimited time and energy examining the thousands of decisions made each day, we rely on heuristics—mental shortcuts that simplify and help us make challenging decisions quickly. Heuristics usually lead to satisfactory outcomes; however, they can also cause predictable systematic errors known as cognitive biases. Both health care providers and patients are subject to cognitive bias; in order to successfully convince a patient to vaccinate, the patient’s biases must be effectively addressed.

For example, many adults have trouble understanding probabilities or risk. It may be expressed as, “That 1 in a million risk would be me; I won’t get the flu shot.” Or, “36,000 deaths from influenza doesn’t sound that high—I don’t need the flu shot.” This cognitive style is known as innumeracy and can lead to the availability heuristic, where we estimate the frequency or likelihood of an event based on how easily the event comes to mind. The situation can best be approached by focusing on nonmathematical information that is accurate and relevant, but also emotive and tells a story. To read more about this bias and a case study of how to approach it, access GSA’s recent publication, *Communicating With Older Adults: Recognizing Hidden Traps in Health Care Decision Making*. 
VACCINOLOGY 3.0: IMMUNIZATIONS IN AN ERA OF PRECISION MEDICINE

In a world with billions of people and trillions upon trillions of bacteria (and that’s not counting the viruses), why would a single amount of vaccine in a specified dosing regimen be right for everyone? Exactly — it’s not. That’s why researchers are looking at ways of using the now-available sources of data-rich information about individuals and pathogens to come up with personalized vaccines that are designed to compensate for natural biologic variation. By creating new vaccine paradigms, innovations in vaccine technology could someday achieve the goal of inducing protective immune responses in 100% of people with minimal adverse vaccine effects.

At the February 7–8 meeting of the National Vaccine Advisory Committee (NVAC) in Washington, DC, Gregory A. Poland, MD, of the Mayo Clinic, and other speakers addressed “the case for personalized vaccinology in the 21st century,” dubbing this approach Vaccinology 3.0.

In the days of Jenner and those who followed in his footsteps, vaccine development was simple: isolate, inactivate/attenuate, and inject. This Vaccinology 1.0 approach—largely empirical—worked fine over many years and for several diseases, Poland said, including smallpox, rabies, diphtheria, and tetanus.

As recombinant genetic research provided new tools in the last quarter of the 20th century, Vaccinology 2.0 was characterized by use of subunit vaccines and other techniques for increasing vaccine effectiveness and eliminating adverse effects. Newer adjuvants were discovered, but they continued to be undirected and the mechanisms by which they work were often unknown. Development of new vaccines focused largely on children, and the one-size-fits-all approach continued with each person getting the same vaccine in the same age-adjusted amount administered the same number of times.

A more personalized approach to vaccine medicine is being developed, Poland said. Vaccinology 3.0 combines the system biology approaches feasible because of the Human Genome Project and other big-data sources. The outline of a new paradigm is taking shape: discover, validate, characterize, and apply. Advanced adjuvants and antigen packaging using nanoparticles can be combined with new vaccines developed for specific subgroups, Poland told NVAC attendees. These can account for the nonrandom interactions of “host genes, epigenetic phenomena, metagenomics, and the microbiome, gene dominance, complementarity, epistasis, coinfections, and other factors occurring within the system as a whole.”
The result is “vaccinomics,” Poland explained. It integrates “a systems biology approach with the immune response network theory, immunogenomics, immune profiling, and functional studies in order to understand and predict vaccine-induced immune responses, and uses this information to engineer vaccine candidates and to drive individualized vaccinology.” In other words, Vaccinology 3.0 is analyzing immune profiles, “omics” data, and clinical phenotypes using computational models to find the molecular signatures that can predict how a given host and pathogen will interact. Designer vaccines are still on the horizon, but products such as high-dose influenza vaccine will likely reach market with indications for patients in certain age groups or with specific characteristics.

**BEHAVIORAL/SOCIAL SCIENCES**

Will all of this really happen? That’s one of the “usual objections” to new ideas and innovative approaches, Poland said, all of which are easily countered:

**Are you really going to develop a unique vaccine for everyone?**
No, vaccines would be tailored for subgroups based on age, gender, genetic profile, and immune status/disease (although cancer vaccines are developed specifically for one person).

**This will be too expensive!**
Not when many new vaccines are expensive and some people respond to the first dose but others don’t respond at all.

**Isn’t all of this far in the future?**
No, we’re already doing this with influenza vaccine for different age groups (think high dose or adjuvanted for older adults). People are demanding safer vaccines or ones that are more effective, and costs of genomic profiles are trending downward toward $100 per person.

**This would be too difficult!**
Personalized pharmacotherapy is routine in clinical practice for chemotherapy, antidepressants, antihypertensives, and many other drugs. The approach would just bring vaccines into a new paradigm.

**SOCIAL RESEARCH/POLICY/PRACTICE**

Vaccines are one of the most effective public health measures and are needed “to play a key role in addressing emerging and re-emerging pathogens,” Jonathan Seals, PhD, of the Office of the Assistant Secretary for Preparedness and Response in the U.S. Department of Health and Human Services, said in another presentation during the NVAC meeting. While recognizing that current development and registration processes for vaccines require 10 to 15 years in research and up to $2 billion in up-front costs, Seals emphasized the potential for innovative technologies “to fundamentally change the delivery of vaccines for both public health and commercial vaccines.”
After detailing the innovations in vaccine and immunogen technologies, Seals explained that the federal government and commercial enterprises need to work together to ensure availability of needed vaccines in general practice and during public health emergencies. “Vaccine technology that has remained relatively unchanged for 200 years is beginning to undergo a renaissance that may enable future vaccines to address contemporary threats,” Seals concluded. “Government investment is needed to address public health threats and to overcome inertia of large commercial investment in current technology.”

**SOURCES AND RESOURCES**


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