

MEETING OF THE BOARD OF SCIENTIFIC COUNSELORS, OFFICE OF INFECTIOUS DISEASES

Centers for Disease Control and Prevention
Tom Harkin Global Communications Center
Atlanta, Georgia

May 2–3, 2018

A one-and-a-half day, open public meeting of the Board of Scientific Counselors (BSC), Office of Infectious Diseases (OID), was held on May 2–3, 2018, at the Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia. In addition to Board members and CDC staff, the meeting was attended by representatives of several public health partner organizations ([appendix](#)).

The meeting included

- Updates from OID, the Center for Global Health (CGH), and the National Centers for Immunization and Respiratory Diseases (NCIRD); HIV/AIDS, Viral Hepatitis, STD, and TB Prevention (NCHHSTP); and Emerging and Zoonotic Infectious Diseases (NCEZID)
- Updates from the BSC Infectious Disease Laboratory Working Group (IDLWG) and the new OID–National Center for Environmental Health (NCEH)/Agency for Toxic Substances and Disease Registry (ATSDR) Vector-borne Diseases Workgroup
- Updates on activities to address antimicrobial resistance by Veterinary Services (VS), Animal and Plant Health Inspection Service, U.S. Department of Agriculture (USDA/APHIS) and CDC
- Presentations and discussion about CDC efforts to address the opioid epidemic, train the next generation of public health workers, and advance the CDC High Containment Laboratory Initiative

The meeting also included a conversation with CDC Director Robert Redfield.

Opening Remarks

BSC Chair Ruth Lynfield, State Epidemiologist and Medical Director, Minnesota Department of Health, called the meeting to order and was joined in welcoming participants and facilitating introductions by Sonja Rasmussen, CDC Deputy Director for Infectious Diseases, and Sarah Wiley, the BSC/OID Designated Federal Official.

Ms. Wiley welcomed Dr. Lynfield as the new BSC chair and Dr. Rasmussen as the new CDC Deputy Director for Infectious Diseases. She also welcomed new participants, including

- Kimberly Elmslie, the BSC liaison representative from Public Health Agency of Canada (PHAC)
- Bruce Wagner, alternate ex officio member from USDA/APHIS, and Melinda Wharton, ex officio member from the National Vaccine Program Office (NVPO)
- Two guests whose BSC appointments are in process: Jay Butler, Alaska Department of Health and Social Services, and Kathy Talkington, The Pew Charitable Trusts

OID Update

Sonja Rasmussen, CDC Deputy Director for Infectious Diseases and OID Director, provided the following updates.

CDC Budget

- The CDC fiscal year (FY) 2018 budget (\$8.246 billion) represents a significant increase in funding, as compared with the FY 2017 Enacted Budget. It includes increased support for the High Containment Laboratory (HCL) infrastructure project, opioid overdose prevention, global health security, vector-borne diseases, emerging infectious diseases, and the High Obesity Program.¹
- The FY 2019 President's Budget request
 - Proposes a 19.4% decrease, due in part to retention of programmatic reductions and eliminations proposed in the FY 2018 President's Budget request, including the elimination of the Prevention and Public Health Fund (PHPF)
 - Proposes transferring
 - The Strategic National Stockpile (SNS) to the HHS Assistant Secretary for Preparedness and Response (ASPR), to increase operational efficiencies during emergency responses and streamline medical countermeasure development and procurement
 - The National Institute for Occupational Safety and Health (NIOSH) to the National Institutes of Health (NIH), to consolidate research efforts

International Conference on Emerging Infectious Diseases (ICEID)

- ICEID 2018 will take place on August 26–29 at the Omni Atlanta Hotel at CNN Center.
- Conference topics include emerging vector-borne, zoonotic, foodborne, and waterborne diseases; influenza and other respiratory diseases; and endemic infections such as HIV, STDs, and hepatitis.
- ICEID 2018 will also include presentations on molecular and genomic epidemiology, vaccines, bioinformatics, the microbiome, and infectious diseases linked to the opioid epidemic.
- Neil Ferguson, Imperial College, London, will give a keynote talk on infectious disease modeling.

OID/NCEH Vector-Borne Diseases Work Group

- OID is working with NCEH/ATSDR to establish the new joint Vector-borne Diseases Workgroup (VBD WG) of the BSC/OID and the BSC/NCEH/ATSDR. BSC/OID member James LeDuc, Director of the Galveston National Laboratory, University of Texas Medical Branch in Galveston, will serve as the co-chair, along with a co-chair from the BSC/NCEH/ATSDR.
- Ben Beard, NCEZID Division of Vector-Borne Diseases, will be the co-Designated Federal Official for the VBD WG, along with a counterpart from NCEH/ATSDR. A second BSC member may also join the VBD WG.
- The VBD WG will report back to the BSCs of OID and NCEH/ATSDR on specific questions related to detection, prevention, and control of VBDS. The workgroup will evaluate goals and strategies for
 - Developing and evaluating VBD prevention and control tools

¹ The [High Obesity Program](#) funds land grant colleges and universities that work with cooperative extension and outreach services in states with counties that have more than 40% prevalence of adult obesity.

- Clarifying CDC/ATSDR’s role in monitoring human exposures and adverse health effects associated with use of pesticides
- Establishing a strong public health workforce in vector control
- Improving overall risk communications for VBD
- Enhancing collaborations among public health organizations, academia, and industry aimed at developing and strengthening VBD prevention and control strategies

Discussion

Budget Issues

- The proposed decreases in funding in the FY 2019 President’s Budget request are due in large part to elimination of PHPF and the Public Health and Social Services Emergency Fund (PHSSEF) and because the FY 2019 President’s Budget request carries over reductions proposed in the FY 2018 President’s Budget request that were not enacted.

OID–NCEH/ATSDR Vector-borne Diseases Workgroup

- A timely issue of [CDC Vital Signs entitled *Illnesses on the rise from mosquito, tick, and flea bites*](#) was issued on May 1, 2018.
- The VBD WG will
 - Include 10–12 members: 4 representatives from the BSCs of OID and NCEH/ATSDR, plus 6–8 additional members from academia, industry, and public health organizations. The workgroup will hold its first teleconference call in June and provide its first report to both BSCs by the end of 2018.
 - Guide efforts to rebuild U.S. capacity to address vector-borne diseases, focusing on workforce development, development of vector control tools, and operations research. Over time, the VBD WG may also address global health issues involving mosquito-borne diseases like yellow fever and rodent-borne diseases like Lassa fever. The VBD WG may also review global data on *Aedes aegypti*, the vector of yellow fever, dengue, chikungunya, and Zika.
- BSC members suggested that the VBD WG might consider selecting members who can provide expertise in (1) ID modeling and (2) adverse health effects associated with use of pesticides.
- Other comments:
 - BSC members suggested various members to consider for the workgroup, including representatives from the U.S. Department of Defense (DoD), NIH, and the U.S. Food and Drug Administration (FDA).
 - Dr. Elmslie reported that PHAC has issued [Lyme Disease in Canada—A Federal Framework](#), which includes a [Federal Action Plan](#).
 - Guillermo Ruiz-Palacios, National Institutes of Health and Tertiary Referral Hospitals, noted that the Mexican Ministry of Health tracks the transmission and distribution of Zika, dengue, and chikungunya viruses and collaborates with the National Institute of Allergy and Infectious Diseases (NIAID), NIH, on clinical studies.
 - Dr. Beard reported that the fourth meeting of the [HHS Tick-Borne Disease Working Group](#) (established in 2016) will be held on May 10. Dr. Beard is the CDC liaison to the HHS workgroup, which plans to post a report.

Update on CDC's High Containment Laboratory Continuity Initiative

Michael Shaw, OID Senior Advisor for Laboratory Science, described the origin and outcomes of the CDC HCL Continuity Initiative.

Background

- CDC's current High Containment Laboratory, built in 2005, provides laboratory support during outbreak investigations involving dangerous pathogens for which there is no treatment or vaccine. It is one of two laboratories authorized by WHO to retain stocks of smallpox virus.
- The HCL is approaching the point in its lifecycle when unplanned outages are to be expected. Engineering experts expect stable operation through 2019-20, with the potential for equipment failures becoming increasingly frequent between 2020 and 2025—some of which may require shutdown of operations for varying lengths of time. HCL controls (e.g., air pressurization mechanisms and door locks) are aging, and some replacement parts are no longer available.
- An assessment of alternative replacement strategies identified construction of a new, stand-alone Biosafety Level 4 (BSL-4) facility as the only feasible and effective solution for maintaining continuity of operations. New construction has been the preferred path forward for other aging BSL4 laboratories, including the USAMRIID (U.S. Army Medical Research Institute of Infectious Diseases) BSL-4 Laboratory. One exception is the University of Texas Medical Branch in Galveston, which has decided to maintain two BSL4 laboratories—i.e., to build a second laboratory as a backup while the first one is still in its prime operating years.

Current Status

- In 2018, Congress provided funding for a new HCL on the CDC Roybal Campus. It will include
 - Six levels, totaling 95,000 square feet, with two levels above ground and four levels below. Level 3 will house three BSL-4 suites and Level 5 will house five BSL-3-enhanced suites.
 - State-of-the-art facilities for work with viruses that cause smallpox, Ebola, Marburg, Lassa fever, Crimean-Congo hemorrhagic fever, rabies, influenza, and other diseases
 - State-of-the-art biosafety features, such as pressure cascade zoning, chemical showers, breathing air systems with positive pressure suits, and modern systems for effluent collection and decontamination
 - Three tunnel systems to allow secure transport of materials, laboratory services, and maintenance access
 - Improved lighting that takes into account both energy efficiency and laboratorian comfort
- The project schedule includes
 - Design to be finalized between January 2019 and June 2020
 - Construction to take place from July 2020 to June 2023
 - Commissioning and certification to take place from June 2023 to June 2025
 - Laboratory operations up and running by August 2025

- Upon completion and occupancy of the new facility, CDC plans to renovate the current HCL building as a backup and training facility, resources permitting.

Discussion

- Although all CDC laboratory facilities will eventually need renovation, OIG identified renovation of the HCL as the highest priority. Dr. Shaw reported that the new HCL will
 - Be constructed in a flexible, modular fashion so that new technologies can be incorporated as they become available and only affected modules need be shut down to implement improvements or repairs. With separate modules for Tier 1 and Tier 2 organisms, not all laboratorians will require the same level of clearance. Moreover, when two or more outbreaks occur at the same time, laboratorians will be able to work with the causative organisms in separate modular spaces.
 - Have a dedicated place for evaluating viruses spread via aerosols (e.g., highly pathogenic influenza, MERS-CoV, or the SARS virus)
 - Incorporate structural innovations that physically isolate laboratory activities and prevent release of materials (e.g., seals on doors, air gaps, and better hoses and suits)
- BSC members commented that
 - CDC might consider hosting a group of directors of existing HCL labs to discuss past mistakes and brainstorm about solutions.
 - Advice from engineers is essential. Fixes that save money in the short term may lead to longer term maintenance costs.
 - Knowledge gained in building the HCL may be useful to state laboratories that host BSL-3 facilities.

NCIRD Update

Nancy Messonnier, NCIRD Director, provided the following updates.

Leadership Changes

- Rita Helfand served as acting Deputy Director for the Division of Viral Diseases.
- Cyndy Whitney is retiring as Chief, Respiratory Diseases Branch, Division of Bacterial Diseases.

Advisory Committee on Immunization Practices (ACIP) Update

- In February 2018, ACIP issued a [recommendation](#) that mentions live attenuated influenza vaccine (LAIV4) as an option for influenza immunization for the 2018–19 season. This recommendation takes into account multiple inputs, including the following:
 - The efficacy of inactivated influenza vaccine (IIV) and LAIV varies by season and across formulations, and a possible root cause for the poor effectiveness of the H1N1 component in LAIV has been identified.
 - Although national coverage rates remained relatively stable, reduced vaccine coverage has been reported in some areas with school-based programs that rely on LAIV.

- The data on LAIV are incomplete, and more data are not forthcoming.
- Multiple flu vaccine formulations are available, and LAIV is a licensed product.

FY 2019 President’s Budget Request

- The Prevention and Public Health Fund, which provides 50% of the NCIRD Immunization Program budget, is eliminated in the FY 2019 President’s Budget request, with some funds restored elsewhere in the budget.
- Funding levels for the NCIRD Influenza Program are reduced by about 15% in the budget request, due in part to the elimination of the Public Health and Social Services Emergency Fund. If this reduction is maintained in the final budget, NCIRD plans to implement rigorous priority setting to support its planned expansion of influenza activities.
- NCIRD activities to address vaccine-preventable diseases (VPDs) globally will be supported under the CDC Global Health Security budget line, and some NCIRD activities related to non-VPD diseases will be supported under the CDC Emerging Infections budget line.

2017–18 Influenza Season

- **Disease was widespread and severe.** All 49 states had widespread activity during the same week (the first time this has happened), and the activity continued for 3 consecutive weeks. Outpatient visits for influenza-like illness were the highest recorded since the 2009 pandemic, and hospitalizations were the highest recorded since hospital surveillance for influenza began in 2010. Half of pediatric influenza-associated deaths were in otherwise healthy children; of those, only 25% had been vaccinated.
- **Vaccine effectiveness.** Overall vaccine effectiveness was lower in 2017–18 than in 2015–16 and 2016–17, although the interim vaccine effectiveness measurement for 2017–18 was similar to the measurement in past H3N2 seasons. Antigenic testing indicated limited genetic drift among circulating viruses.
- **Antiviral drug shortages.** CDC activities included tracking supply and demand for antiviral drugs and aggregating the data into a biweekly dashboard; confirming antiviral drug needs with states and hospitals; and working with pharmacies, manufacturers, and distributors to address local shortages.
- **Lessons learned**
 - Flu is unpredictable and can be severe.
 - Increased vaccine uptake and improved effectiveness of existing flu vaccines could further the impact of influenza.
 - More and better vaccine effectiveness data could help better inform flu policy.
 - More and better drug treatments are needed.
 - A severe flu epidemic or pandemic can stretch and overwhelm public health capacity and bring intense media and public interest.
 - A robust public health response and infrastructure, along with frequent, consistent, and accurate communications, are imperative.

Avian Influenza A(H7N9) Virus

- Human infections with avian influenza A(H7N9) virus were first reported in China in March 2013. Since then, China has experienced annual epidemics of sporadic human infections.
- During the fifth epidemic, from October 1, 2016, through September 30, 2017, WHO reported 766 human infections with Asian H7N9 virus—the largest H7N9 epidemic to date.²

Outbreak Assistance (Winter 2017 – Spring 2018)

- **Meningococcal disease.** NCIRD provided consultation, laboratory assistance, and other technical support for responses to meningococcal disease outbreaks at universities in Massachusetts and Oregon (serogroup B); among homeless populations in Massachusetts and Oregon (serogroup C); among men who have sex with men (MSM) in California (serogroup C); and at a halfway house in Georgia (serogroup Y).
- **Diphtheria.** An NCIRD team deployed to Bangladesh in December to provide technical support for the response to an ongoing outbreak of diphtheria.

Legionnaires' Disease

NCIRD activities to address Legionnaires' disease (LD) in the United States include

- Strengthening partnerships to improve prevention, diagnosis, surveillance, and response to LD
- Participating in the *Legionella* 2018 Symposium on May 9–11 and a National Association of County and City Health Officials (NACCHO) webinar on May 30
- Exploring opportunities to partner with the Association of State and Territorial Health Officials (ASTHO) to address LD issues
- Developing LD resources for partners that will be posted on the [Legionella webpage](#).

Medical Laboratory Professionals Week (Lab Week), April 22–28, 2018

Lab Week activities included a seminar on career development, a bake-off competition, Bring Your Family to Work Day, and Lab Olympics.

Upcoming Events

- [1918 Pandemic Flu Symposium](#), on May 7, sponsored by the Rollins School of Public Health, Emory University, and CDC to discuss and debate pandemic preparedness and influenza prevention and control
- [2018 National Immunization Conference](#)—*Immunization: Prevention, Protection and Progress*—on May 15–17
- **National Preparedness Month**, September 2018. Activities include a CDC-wide pandemic flu exercise on September 12–14; a *Flu Vaccination Kick-Off* press conference in Washington, DC, on September 27; and a WHO Consultation and Information Meeting on the Composition of Influenza Virus Vaccines for Use in the 2019 Southern Hemisphere Influenza Season.

² China is currently experiencing its sixth epidemic of [Asian H7N9 human infections](#). Since October 1, 2017, there has been only one reported human infection.

Discussion

Influenza Vaccines

- BSC members stressed the importance of explaining the benefits of influenza immunization to the public.
- Dr. Messonnier noted that
 - An updated vaccine effectiveness estimate for influenza B vaccine will be available soon.
 - Vaccine efficacy estimates differ from country to country, but confidence intervals (which are wide) usually overlap.
 - CDC is conducting serologic studies to evaluate the possibility that influenza vaccine is less effective in cohorts that have had periodic exposures. This might explain the observation that vaccine effectiveness is lower in 9–17-year-olds than in younger children.
- Daniel Jernigan, Director, Influenza Division, NCIRD, said that a comparison of the effectiveness of different types of flu vaccine (e.g., egg-based vs. cellular) requires a larger sample size than is currently available and that it would be especially useful to obtain additional data about vaccine efficacy in high-risk groups.
- Dr. Ruiz-Palacios noted that the sequences of influenza viruses isolated in Mexico are being compared with those isolated in the United States.
- Emily Erbelding, NIAID/NIH, reported that a new flu vaccine developed in Japan, based on the results of NIH-funded research, may be licensed in the United States.

Antivirals

- Until a universal influenza vaccine becomes available, it is important for CDC to consider investments in improved availability of antivirals, in incremental vaccine improvements, and in public health messaging. Dr. Messonnier reported that CDC is
 - Working with ASPR to ensure the availability of oseltamivir during severe flu seasons
 - Prepared to intervene if states request help in addressing shortages, especially among high-risk groups
 - Working with FDA, NIH, the Centers for Medicare and Medicaid Services (CMS), and other partners to expand access to rapid diagnostic tests that can determine whether a patient has influenza and requires antiviral treatment.
 - Strategically timing future U.S. government stockpile purchases of antivirals has also been discussed between the agencies.
- Dr. Erbelding reported that NIAID is supporting research and clinical testing of antivirals, as well as drug treatments that involve small molecules and monoclonals.

Legionnaires' Disease

- Lack of expertise in sampling water for *Legionella* is a challenge at the state and local levels. It was suggested that CDC work with partners who have this expertise (e.g., state-level environmental health groups) to develop tools and online training.

CGH Update

Rebecca Martin, CGH Director, discussed the benefits of U.S. investments in global health and provided updates on recent CGH activities.

Investments in Global Health

- The benefits of global health investments include
 - Promoting national health security by protecting America from disease outbreaks
 - Advancing health system strengthening, which promotes stable societies that provide opportunities for economic growth
 - Identifying and sharing best practices in program implementation, research, and policy development
 - Saving lives and preventing the spread of disease
- CDC's work to advance global health security (GHS) also safeguards American exports and jobs. In 2015, the United States exported over \$308 billion in goods and services to countries that participate in GHS activities. These exports supported over 1.6 million jobs across America.
- A global outbreak can have a catastrophic impact on the U.S. economy, even if the outbreak does not reach the United States. Modeling studies indicate that
 - An outbreak in a single country overseas can put U.S. exports and export-related jobs at risk.
 - When an uncontained outbreak becomes a regional epidemic, potential costs skyrocket and the number of American jobs threatened multiplies.
 - An epidemic impacting a large region (e.g., the continent of Asia) could cost the United States more than \$41 billion and put more than 1.3 million U.S. jobs at risk.
- CDC's global presence includes
 - [Global Disease Detection](#) (GDD) Centers (GDDs; and [Field Epidemiology Training Programs](#) (FETPs)
 - [Global immunization programs](#) to eradicate polio and reduce or eliminate measles and other childhood diseases
 - Global health programs to address influenza, malaria, TB, and HIV/AIDS, and to advance [global health security](#)

CGH Updates

Division of Global Health Protection

- FETP trainings have improved disease reporting in Benin and outbreak investigations in Uganda.
- Testing for Zika has been added to surveillance platforms in multiple countries, and a prospective cohort study of the effects of Zika infection on maternal and child health is underway in Coatepeque, Guatemala.
- An open-source mobile-phone data collection tool is being developed—in partnership with Bloomberg Philanthropies, RTI International, and InSTEDD—as part of the [Data for Health Initiative](#).

- A Global Hearts Technical Package is available to help reduce risk factors for cardiovascular disease. This technical package is part of the WHO Global Hearts Initiative, which is aligned with the U.S. [Million Hearts](#) initiative.
- A research framework is under development to build the GHS evidence base. Components include identifying pathogens, risks and burdens, to define priorities and goals; advancing implementation science to improve program implementation and scalability; and assessing the impact of interventions and demonstrating the value of global health investments.

Division of Global HIV and TB

- Ongoing PEPFAR activities include provision of antiretroviral treatment for men, women, and children; antiretroviral treatment to prevent mother-to-child transmission; voluntary medical male circumcision to prevent HIV transmission; TB screening of HIV-positive persons; and HIV counseling and testing. In 2018 and 2019, PEPFAR plans to triple the number of people living with HIV who receive TB Preventive Therapy. As part of this effort, CDC is providing intensive technical support to 13 priority countries to assist them in providing TB Preventive Therapy to 5.6 million people.
- CDC-supported Population-based HIV Impact Assessments (PHIAs) have been conducted by [ICAP, at the Columbia University Mailman School of Public Health](#), in Malawi, Zimbabwe, Zambia, Swaziland, Lesotho, Uganda, Tanzania, Namibia, Cameroon, Cote d'Ivoire, Ethiopia, Kenya, Haiti, and Rwanda. Additional assessments are planned by other partners in South Africa, Nigeria, and Botswana.
- Current HIV testing strategies approaches are not adequate to achieve the first “90” target of the [90-90-90 project](#)—*By 2020 90% of all people living with HIV will know their HIV status.*³ The way forward (as indicated by multiple implementation studies) is likely to include (1) index testing of partners and family members to identify new cases of infection and (2) HIV self-testing (HIVST) to reach underserved populations.
- A new point-of-care test, the HIV Rapid Recency Assay, can simultaneously verify an HIV diagnosis and determine whether the infection began within the past 6 months.

Division of Parasitic Diseases and Malaria

- CDC provides intensive technical support to ministries of health to combat malaria—which kills 429,000 people each year and costs \$12 billion in Africa alone—and neglected tropical diseases (NTDs)—which affect more than 1 billion people worldwide.
- CDC and partners have developed an improved antigen immunoassay that can detect pictograms of histidine-rich protein-2 (HRP2), a marker of infection with the malaria parasite *Plasmodium falciparum*. This assay can be used for clinical diagnosis and blood testing, as well as for monitoring disease spread during outbreak investigations and malaria elimination projects.

Global Immunization Division

- **Global polio eradication:** Three countries remain with endemic polio cases: Afghanistan, Pakistan, and Nigeria. Recent outbreaks due to vaccine-derived poliovirus type 2 (cVPDV2) have occurred in Syria, where more than 350,000 children were vaccinated, and in the Democratic Republic of the

³ The second “90” target is *By 2020, 90% of all people with diagnosed HIV infection will receive sustained antiretroviral therapy.* The third “90” target is *By 2020, 90% of all people receiving antiretroviral therapy will have viral suppression.*

Congo. About 750,000 children were vaccinated in two affected provinces in the DRC in June, and 10 million more were vaccinated in an expanded response area in October.

- **Measles and rubella**

- The Americas were the first region declared free of endemic measles (2002) and rubella (2015). However, an ongoing epidemic of measles in Venezuela has spread to Brazil, Colombia, and Peru.
- A rapid, low-cost method for detection of measles and rubella has been pilot-tested in the Kakuma refugee camp in Kenya.
- Studies conducted by the Ghana Ministry of Health and CDC found that improved vaccine delivery during the second year of life—including a second dose of measles-containing vaccine (MCV2)—can be achieved through a multi-faceted strategy that includes raising awareness of vaccination schedules, developing catch-up vaccination policies, and tracking children who “drop out.”

- **Meningitis:** A large outbreak of serogroup C meningococcal disease occurred in Nigeria in 2017. The vaccination campaign targeted 2.1 million persons aged 2–29 years.

- **Economic benefits of global immunization***

- The estimated net benefit to the United States of domestic vaccination against polio, measles and rubella is more than \$700 billion.⁴
- The estimated net benefit of the Polio Global Eradication Initiative, worldwide, is \$45–56 billion.⁵
- The potential global savings *per year* from measles and rubella eradication would be \$59 billion.⁶

Dr. Martin provided these questions for discussion:

- What are the big scientific questions in our global health work that you think CDC should be addressing?
- What additional models should we consider to showcase the return on investment from global health work?
- What do you think CDC should do to stay relevant in global health in the future?

*The studies in references 4–6 measure the economic benefits of vaccination as compared with no vaccination; adjusted to 2016 U.S. dollars using a gross domestic product (GDP) deflator (U.S. Bureau of Economic Analysis. [2018] Gross Domestic Product: Implicit Price Deflator [GDPDEF], retrieved from [FRED, Federal Reserve Bank of St. Louis](https://fred.stlouisfed.org/), February 6, 2018.

⁴Thompson KM, Duintjer Tebbens R. (2006) Retrospective cost-effectiveness analyses for polio vaccination in the United States. *Risk Analysis*, 26(6): 1423–40.

⁵Duintjer Tebbens R, et al. (2011) Economic analysis of the global polio eradication initiative. *Vaccine*, 29(2): 334–43. (104 countries)

⁶Thompson KM, Badizadegan ND. (2017) Modeling the transmission of measles and rubella to support global management policy analyses and eradication investment cases, *Risk Analysis*, 37(6): 1109–31. (183 countries/territories)

Discussion

Global Health Priorities

BSC members mentioned some additional areas:

- **Antimicrobial resistance**, which is both a domestic and an international health priority.
- **Supply chain issues** during outbreak responses. The World Bank, WHO, Gavi, and the GHS Private Sector Roundtable (PSRT) are leading efforts to facilitate the movement of medical products (including diagnostic tests) across borders during emergencies. CDC is helping to address these issues by expanding the former Influenza Reagent Resource into an [International Reagent Resource](#).
- **Climate and health**. CGH is working with NCEH (whose focus is primarily domestic) to provide technical assistance on food security issues and other health implications of rising sea levels.

Models and Approaches for Addressing Global Health Issues

- Dr. Elmslie reported that PHAC is also considering new approaches to improve global health outcomes. It is important to maintain connections between disease-specific domestic programs and global health programs; to align national activities with those of WHO; and to use best practices to scale up proven interventions.

Dr. Martin noted that CGH

- Has established technical teams in Atlanta that support field teams overseas and holds annual in-person meetings for field teams and Atlanta-based support teams
- Leverages partnerships with other HHS agencies and U.S. government departments (USAID, DoD, the State Department, and USDA)
- Conducts implementation studies in key populations in different countries
- Dr. Riddle said that DOD is also considering new ways to engage in global health efforts and ensure good returns on investment. He stressed the importance of identifying stakeholders and communicating with them effectively.
- Dr. Martin reported that the global health issues that Americans care most about (according to surveys) are 1) preventing and stopping disease threats and 2) the economic implications of those threats. CGH is working to improve public understanding of the connections between jobs and illness due to infectious diseases. As part of this effort, CGH is translating public health language into economic language to help private sector stakeholders appreciate the importance of efforts to safeguard global health security.

Staying Relevant

BSC members suggested that CDC consider expanding its work in these areas:

- Helping countries incorporate technical innovations and efficiencies into medical and public health practice (e.g., as in transitioning HIV into a manageable chronic disease)
- Providing leadership in efforts to eliminate tuberculosis and address antimicrobial resistance, including drug-resistant tuberculosis
- Addressing global health security issues (e.g., by building delivery platforms for use in disease elimination efforts and in outbreak responses)

- Helping countries address the transition from infectious to chronic diseases, which is a major global health concern in many nations. Dr. Martin noted that the Division of Global Health Protection is establishing partnerships to help address chronic diseases like cardiovascular disease and cervical cancer, as well as such issues as pollution and road safety.

Update on CDC’s Efforts to Address the Opioid Epidemic

Deb Houry, Director, National Center for Injury Prevention and Control (NCIPC), provided an update on CDC’s efforts to address the opioid epidemic.

Background

- More than 350,000 people in the United States have died from overdoses involving opioids—prescription or illicit—over the last 18 years. Factors that led to the opioid epidemic include the following: under-appreciation of the addictive potential of prescription opioids, coupled with aggressive marketing of opioids to clinicians; opening of “pill mills” that profited from over-prescribing of opioids; new drug-trafficking methods that made it easier to buy heroin; and increased availability of fentanyl, a synthetic and short-acting opioid analgesic.
- The opioid epidemic has proceeded in three waves:
 1. **Prescription opioids.** Deaths associated with natural and semi-synthetic prescription opioids—including oxycodone and hydrocodone—increased four-fold between 1999 and 2011; the death rate associated with methadone increased six-fold between 1999 and 2007.
 2. **Heroin.** The heroin-related death rate has increased more than four-fold since 2010, and more than 15,000 Americans died from heroin in 2016. Per milligram, heroin is one-tenth the cost of prescription opioids, and its use is growing at a faster rate than any other illicit drug.
 3. **Fentanyl.** Fentanyl (which is FDA-approved for management of pain associated with advanced cancer) is 50 to 100 times more potent than morphine. Most fentanyl-related overdoses are associated with illicitly manufactured fentanyl laced with heroin, cocaine, meth, and other drugs. A kilogram of illicit fentanyl costs about \$3–5K per kilogram and can net a profit of almost \$2 million. In comparison, one kilogram of heroin costs about \$5–7K per kilogram and nets a profit of about \$80K.

Treatment for Substance Abuse Disorder

- Current efforts to increase the availability of medication-assisted treatment (MAT)—which combines behavioral therapy and medication—include applying the HIV Cascade of Care model to substance use disorder.⁷ The Substance Abuse and Mental Health Services Administration (SAMHSA) and the Health Resources and Services Administration (HRSA) are taking the lead in implementing treatment services for the cascade of care. CDC’s major focus is on preventing people from developing opioid use disorder, as well as identifying at-risk populations and facilitating linkage to care.
- As with the early days of the AIDS pandemic, the treatment gap is very large. Moreover, a very small proportion of people are sustaining recovery long term.

⁷ Williams AR, Nunes E, Olfson M. [To Battle the Opioid Overdose Epidemic, Deploy The “Cascade of Care” Model.](#) Health Affairs Blog. March 17, 2017.

The Opioid Epidemic and Infectious Diseases

- The opioid crisis is associated with
 - A 300% increase in hepatitis C infections among white Americans, with medical admissions for opioid injection increasing by 134% between 2004 and 2014.⁸ The increase among those aged 18–29 is 400%; the increase among those aged 30–39 is 325%.
 - A rise in hospitalizations related to injection drug use that involve serious infections (endocarditis, osteomyelitis, septic arthritis, or epidural abscess).⁹
- An outbreak of 180 cases of HIV/AIDS associated with injection of a prescription opiate occurred in 2015 in Austin, Indiana, a rural town of about 4,200 people.¹⁰ Most cases had co-infections with hepatitis C.
- An Epi-Aid team is investigating a 125% increase in new HIV cases among people who injected drugs in Lawrence and Lowell, Massachusetts, between 2016 and 2017.

CDC Strategy to Prevent Opioid Overdoses and Opioid-Related Harms

CDC's public health strategy to address the opioid epidemic aims to decrease unsafe prescribing, illicit opioid use, and unsafe use of prescription opioids. The goal is to prevent multiple downstream adverse outcomes, including opioid use disorder, deaths from overdoses, non-fatal overdoses, viral hepatitis infections, HIV infections, and neonatal abstinence syndrome. Implementation of the strategy includes the following:

1. Conducting surveillance and research

- Activities include
 - Improving tracking and reporting of overdoses in 32 states and the District of Columbia via the [Enhanced State Opioid Overdose Surveillance](#) (ESOOS) system
 - Soliciting investigator-initiated research to advance prevention of overdoses from prescription and illicit opioids (see the [Grants.Gov website](#))
- Surveillance data has informed three Health Alert Network advisories about illicit fentanyl and a *Vital Signs* issue entitled [Opioid Overdoses Treated in Emergency Departments](#)

2. Building state, local, and tribal capacity for prevention

- Activities include
 - Implementing evidence-based interventions to prevent drug addiction, by
 - Coordinating the [Prescription Drug Overdose: Prevention for States](#) program

⁸ Zibbell JE, Asher AK, Patel RC, Kupronis B, Iqbal K, Ward JW, Holtzman D. Increases in Acute Hepatitis C Virus Infection Related to a Growing Opioid Epidemic and Associated Injection Drug Use, United States, 2004 to 2014. *Am J Public Health*. 2018 Feb;108(2):175–81. doi: 10.2105/AJPH.2017.304132. Epub 2017 Dec 21.

⁹ Ronan MV, Herzig SJ. Hospitalizations Related To Opioid Abuse/Dependence and Associated Serious Infections Increased Sharply, 2002-12. *Health Aff*. 2016 May 1;35(5):832–7.

¹⁰ Peters PJ, Pontones P, Hoover KW, Patel MR, Galang RR, Shields J, Blosser SJ, Spiller MW, Combs B, Switzer WM, Conrad C, Gentry J, Khudyakov Y, Waterhouse D, Owen SM, Chapman E, Roseberry JC, McCants V, Weidle PJ, Broz D, Samandari T, Mermin J, Walthall J, Brooks JT, Duwve JM; Indiana HIV Outbreak Investigation Team. [HIV Infection Linked to Injection Use of Oxycodone in Indiana, 2014–2015](#). *N Engl J Med*. 2016 Jul 21;375(3):229–39.

- Assisting states in developing coordinated opioid-crisis response plans that connect all components of a community’s infrastructure (e.g., health departments, treatment providers, first responders, law enforcement officers, and CBOs)
 - Conducting Epi-Aid investigations (e.g., in Ohio and Massachusetts)
- 3. **Supporting providers, health systems, and payers**
 - Mapping studies indicate that drug-overdose death rates continue to be higher in areas where greater amounts of opioids are prescribed, even though the number of fatal overdoses related to illicit opioids is now greater than the number due to prescription opioids. CDC is promoting the implementation of the [CDC Guideline for Prescribing Opioids for Chronic Pain](#) and training healthcare providers in its use. Forty-six states have implemented *Guideline*-aligned activities, as have 34 state Medicaid programs.
- 4. **Partnering with public safety officials**
 - Activities include providing guidance for first responders and working with the Drug Enforcement Administration to implement the Heroin Response Strategy in [High Intensity Drug Trafficking Areas](#). A study by the Rhode Island Department of Corrections (supported by NIH and CDC) found that the implementation of a comprehensive medication-assisted treatment (MAT) program at 12 community-based Centers of Excellence in MAT was associated with a 60.5% reduction in overdose mortality among recently incarcerated individuals—equivalent to a statewide reduction in overdose deaths of 12.3%.¹¹
 - CDC is providing funding and scientific technical support for 13 projects to identify innovative ways to combat opioid overdoses through community-level interventions, including 3 projects that aim to increase use of MAT among incarcerated persons. The program involves \$2 million awarded through the Office of National Drug Control Policy.
- 5. **Empowering consumers to make safe choices**
 - Activities include
 - Launching the [Rx Awareness](#) campaign to tell the stories of people whose lives have been affected by prescription opioids
 - Raising awareness about the risks of opioids
 - Encouraging discussion about safer and more effective pain management

Discussion

Access to Substance Abuse Treatment

- BSC members commented that
 - It is essential to engage clinicians in facilitating linkage to care and increasing access to MAT.
 - MAT should be taught in medical schools as part of licensure requirements. Any clinician who prescribes opiates should know what to do when a patient becomes addicted.
 - [Online information about MAT](#), including training resources for physicians, is available at the SAMSHA website.

¹¹ Green TC, Clarke J, Brinkley-Rubinstein L, Marshall BDL, Alexander-Scott N, Boss R, Rich JD. Postincarceration Fatal Overdoses After Implementing Medications for Addiction Treatment in a Statewide Correctional System. *JAMA Psychiatry*. 2018 Feb 14.

- Dr. Houry reported that CDC is part of larger government efforts to
 - Increase the availability of naloxone, which cannot be purchased with CDC state grant funds. Steve Redd, Director, CDC Office of Public Health Preparedness and Response (OPHPR), is evaluating ways to make naloxone more readily accessible at the local level.
 - Ensure that MAT and non-pharmaceutical pain treatments are covered by insurance

Research Priorities

- BSC members identified these areas as research priorities:
 - Root factors that predispose a person to addiction, such as childhood trauma, mental illness, and self-medication for mood disorders
 - Economic and social drivers of chronic pain and addiction
 - Implementation research to develop community-based models for delivery of care
 - How to facilitate long-term recovery from addiction. MAT works in the short term, but patients often relapse.
- BSC members suggested that CDC might play an important role in evaluating the effectiveness of short-term and long-term treatment strategies and that CDC’s research partners might include the [Nurse Practitioner Research Agenda Roundtable](#) and the NIH [Clinical and Translational Science Awards](#) (CTSA) Program.
- Dr. Erbeling reported that NIH is supporting research on anti-drug vaccines (e.g., vaccines that block a target drug from entering the brain).

Data Collection

- BSC members commented that
 - The rapid progress on collection of national data on overdoses and opioid use is commendable.
 - CDC might also collect data on local progress in hard-hit areas, on the availability of MAT, and on the effectiveness of interventions in reducing infectious complications.
- Dr. Houry reported that
 - SAMSHA, which is tracking the availability and use of MAT, reports an increase in prescriptions for MAT medications (buprenorphine and naloxone).
 - CDC purchases national data on opioid prescribing from a proprietary database (on a quarterly basis) and issues [U.S. prescribing rate maps](#) on an annual basis.
 - In the future, CDC plans to provide the states with local data on a regular basis or to develop a state dashboard.

The Opioid Epidemic and Infectious Diseases

- Jonathan Mermin, NCHHSTP Director, noted that
 - Increases in hepatitis C infections have been reported by all states that require reporting of hepatitis C virus (HCV) infections, although the magnitude of the increase varies from state to state. Endocarditis infections are also increasing, but more slowly.
 - HIV diagnoses associated with injection drug use leveled off 4–5 years ago, except for the uptick caused by the 2015 outbreak in Austin, Indiana.
 - Unlike HCV and HIV, TB infections have not been associated with the opioid epidemic.

- BSC members commented that
 - The federal government should consider establishing a coordinating office, like the Office of National AIDS Policy, to address the syndemic of opioid addiction and associated infectious diseases.
 - Services provided at STD and HIV clinics should be expanded to include MAT.
 - CDC should continue to focus on populations who are at risk for both opioid use and infection (e.g., incarcerated persons). CDC should also focus on pregnant women whose infants are at risk for congenital HCV infection and neonatal abstinence syndrome.

Third-Wave Response Priorities

Dr. Houry reported that—in addition to preventing overdoses due to illicit fentanyl—third-wave priorities include partnering with law enforcement to publicize the dangers of taking drugs alone and to focus on incarcerated people who relapse after release.

Addressing the Opioid Epidemic in Canada

Dr. Elmslie reported that

- PHAC supports addiction treatment centers, monitors dispensing of opioids by pharmacists, and is working to integrate health services for people with substance abuse disorder with services for people with mental health issues.
- The Canadian PRISM research initiative is studying the behavioral and biological determinants of addiction.

NCHHSTP Update

Jonathan Mermin, NCHHSTP Director, reported on the following.

Staff Changes

- John Ward, who headed the CDC Division of Viral Hepatitis for 13 years, has joined the Task Force for Global Health.
- Paul J. Weidle is the Acting Director of the Division of Viral Hepatitis. He led the field investigation of the 2015 outbreak of HIV/AIDS in Austin, Indiana.

NCHHSTP Updates

- The CDC [Correctional Health website](#) has been updated by the NCHHSTP Office of Health Equity.
- [NCHHSTP Atlas Plus](#) includes new indicators for social determinants of health and HIV.
- NCHHSTP has made awards to the health departments of American Samoa, Northern Mariana Islands, Federated States of Micronesia, Guam, Marshall Islands, and Palau, under the cooperative agreement [Accelerating the Prevention and Control of HIV, Viral Hepatitis, STDs and TB in the U.S.-Affiliated Pacific Islands](#).

Updates from the Division of Tuberculosis Elimination

- [The number of reported TB cases in the United States declined slightly in 2017](#)—providing the lowest case count on record.

- CDC’s World TB Day Activities (on March 24) included releasing new provisional TB data; posting the [TB Chronicles](#) on the history of TB; and celebrating [TB Elimination Champions](#)—people and organizations who work on the front lines to eliminate TB.

Updates from the Division of Viral Hepatitis

- The [2016 viral hepatitis surveillance report](#), published in April 2018, found that the reported number of
 - Hepatitis A cases increased 44%, due to two large outbreaks associated with food products
 - Hepatitis B cases decreased 5% since 2015
 - Hepatitis C cases is up 22% from the previous year
- *Hepatitis A*. Since March 2017, CDC has assisted state health departments with hepatitis A outbreaks in California, Indiana, Kentucky, Michigan, and Utah. The outbreaks (which involved more than 2,100 cases and 49 deaths) spread primarily among homeless persons and persons who use injection and non-injection drugs.
- *Hepatitis B*. ACIP has issued updated [hepatitis B recommendations](#), including recommendations for (1) vaccination within 24 hours of birth, (2) further testing for pregnant women who test positive for HBsAg (which indicates a current infection), and (3) vaccination of people with chronic liver disease.
- *Hepatitis C*. A CDC [study](#) has linked increases in hepatitis C infections to the opioid crisis. [CDC has identified](#) counties in 44 states and Puerto Rico that are experiencing (or at risk for) increases or outbreaks of hepatitis C and/or HIV/AIDS.

Updates from the Division of HIV/AIDS Prevention

- The [estimated incidence of HIV infection in the United States decreased 14.8% between 2008 and 2015](#), with declines among all transmission groups except MSM. The CDC webpage [HIV Treatment as Prevention](#) includes updated information about HIV transmission.
- Funds to promote efficient, coordinated, and data-driven HIV prevention efforts have been awarded under the cooperative agreement [Integrated Human Immunodeficiency Virus \(HIV\) Surveillance and Prevention Programs for Health Departments](#).
- A recent CDC [study](#) found that pre-exposure prophylaxis (PrEP) is not being prescribed for the majority of people who are likely to benefit from its use.
- Activities to address the opioid epidemic include
 - Partnering with the National Governors Association to host a learning lab on March 5–6 focusing on opioid use and infectious disease. Teams from Alabama, Arkansas, Delaware, Michigan, Utah, Virginia, and Washington shared policies and best practices.
 - Issuing [Managing HIV and Hepatitis C Outbreaks Among People Who Inject Drugs: A Guide for State and Local Health Departments](#)

Updates from the Division of STD Prevention

- April 2018 was [STD Awareness Month](#). This year’s theme—*Treat Me Right*—focused on strengthening the patient-provider relationship by
 - Encouraging patients to ask questions, get tested and treated, and take control of their sexual health

- Encouraging providers to build trust with patients, take thorough sexual histories, and reassure patients that their information is confidential
- CDC has released an updated version of [Syphilis: A Provider's Guide to Treatment and Prevention](#).

Update from the Division of Adolescent and School Health

- CDC has announced a new Notice of Funding Opportunity: *Promoting Adolescent Health through School-Based HIV Prevention* for state education agencies, territorial education agencies, local education agencies, and tribal governments.

Dr. Mermin suggested these questions for discussion:

- How can we increase implementation of routine HIV, viral hepatitis, STD, and latent tuberculosis infection (LTBI) screening in correctional settings?
- What are the most effective ways to support overdose prevention while preventing increases in drug use-associated infectious diseases?
- What would be the most effective policy-level changes to increase access to HCV treatment?

Discussion

Correctional Health

- Medical treatment in jails and prisons is usually covered by correctional health budgets rather than by Medicaid, and many localities cannot afford to treat inmates with hepatitis C infections. As a result, some states are facing lawsuits for failing to provide hepatitis C treatment to incarcerated persons.
- BSC members suggested that
 - Correctional facilities might enroll in the HRSA [340B Drug Pricing Program](#), which allows member organizations to purchase drugs at significantly reduced prices.
 - CDC and partners should
 - Build a data-based case for hepatitis C treatment of incarcerated persons, in terms of cost-effectiveness and community health
 - Emphasize the economic benefits of joint treatment of substance abuse disorder and associated cases of HCV or HIV infection

Joint Services for Substance Abuse Disorder and Treatment of Associated Infectious Diseases

- The use of sterile syringes prevents blood-borne transmission of infectious pathogens among injection drug users. Depending on state laws, sterile syringes may be available from a pharmacy or from a syringe services program (SSP). Although some states allow purchase of syringes without a prescription, individual pharmacies may not allow such sales.
- SSPs typically provide treatment services for substance abuse disorder; some pharmacies that sell syringes also provide treatment services. In some states, pharmacies also sell naloxone to treat overdoses.
- Ideally, joint treatment services for substance abuse disorder and associated infectious diseases should be available at SSPs, STD clinics, and other healthcare facilities.

- BSC members suggested that
 - CDC and partners should develop clinical guidelines for joint treatment of substance abuse disorder and associated infectious diseases. Every hospital should be prepared to provide these treatment services.
 - Use of the HIV Cascade of Care model to address associated infectious diseases as part of the opioid crisis can help move things forward. Components may include
 - Working across the federal government to establish a Ryan White–like program to provide easier access to testing and treatment for both disorders
 - Implementing demonstration projects that provide integrated care for people with substance abuse disorder and HCV infection in a cost-effective way
 - “Arming us with data” that documents the medical and human costs when sterile syringes are not available

HCV Testing and Treatment

- BSC members commented that
 - Hepatitis C is a priority for some state and local health departments, due to increased infection rates and deaths. Barriers to treatment include the high cost of drugs and the requirement by some insurance companies that these drugs be administered by specialists.
 - HCV testing for pregnant women is essential, because 5–10% of pregnant women infected with HCV pass the infection to their babies. Some babies are born with both HCV infection and neonatal abstinence disorder.
 - It is essential to fill knowledge gaps about medical management of HCV-infected pregnant women and newborns. HCV drugs have not been tested in infants and may not be safe for treatment of babies.
- The Veterans Administration has tested more than 70% of veterans for hepatitis C and aims to provide curative treatment to all those infected within 2 years.
- The Cherokee Nation is working to eliminate hepatitis C by detecting and treating all cases among its population.

Public Health Communications

- CDC’s [*Treat Me Right*](#) communications campaign for STDs aims to help people advocate for themselves and to increase community engagement
- BSC members commented that, in regard to HIV/AIDS, hepatitis C, TB, and STDs,
 - It is imperative to reach those without access to healthcare and those with co-morbidities.
 - CDC might explore new ways to use public health data to develop more effective messages about disease prevention. A Canadian study found that behavioral influences include data, money, and embarrassment.

Update on CDC's Efforts to Train the Next Generation of Public Health Workers

Pattie Simone, Director, Division of Scientific Education and Professional Development (DSEPD), Center for Surveillance, Epidemiology, and Laboratory Services (CSELS), described ongoing efforts to train the next generation of public health workers by providing

- Internships and fellowships for students at all educational stages: middle school and high school, college and graduate school, and professional school
- [Continuing education opportunities](#) for public health professionals and teachers at middle schools and high schools

DSEPD Programs

- In addition to the [Epidemic Intelligence Service](#) (EIS) and the [Laboratory Leadership Service](#) (LLS), DSEPD coordinates the
 - [Science Ambassador Fellowship](#)
 - [Academic Partnerships to Improve Health](#) (APIH)
 - [Epidemiology Elective Program](#) (EEP)
 - [Public Health Informatics Fellowship Program](#) (PHIFP)
 - [Steven M. Teutsch Prevention Effectiveness \(PE\) Fellowship](#)
 - [Preventive Medicine Residency and Fellowship](#) (PMR/F)
 - [Presidential Management Fellows](#) (PMF) program
- A DSEPD pilot program deployed a multidisciplinary team of fellows from the PHIFP, PE, and PMR/F programs to assist Denver Public Health in addressing the opioid crisis by improving surveillance methods, integrating novel data sources, assessing the cost-effectiveness of opioid treatment programs, and studying prescription behavior.
- Dr. Simone observed that
 - CDC's training opportunities emphasize public service and learning by doing.
 - DSEPD fellows are assigned to state, local, tribal, and territorial public health departments throughout the country, and a majority continue to work in public health, with 58% taking positions at CDC and 14% at state and local health departments.
 - The winner of a CDC-sponsored high school public health competition at the national Science Olympiad tournament became an EIS officer 17 years later.

Epidemic Intelligence Service

- The current EIS class size of 66 is the smallest in more than 20 years. CDC and public health departments have nearly twice as many potential EIS positions as EIS officers. DSEPD has funds for 50 positions and the remaining 16 are sponsored by OPHPR (n=9), USDA (n=1), Kaiser (n=1), Division of HIV/AIDS Prevention (n=2), National Center on Birth Defects and Developmental Disabilities (n=2), and Influenza Division (n=1). In 2005, the class size was 90.
- The proportion of EIS officers who are physicians has declined significantly. Most medical students graduate with significant student loan debt, and fewer of them apply to EIS.

- The number of Epi-Aid investigations has decreased, which may be due in part to greater investigative capacity in some state health departments.

Laboratory Leadership Service

- The Laboratory Leadership Service is a 2-year program for laboratory scientists, modeled on EIS, that aims to integrate safety and quality into laboratory science; provide public health laboratory training through service; promote applied public health laboratory research; and develop future public health laboratory leaders.
- LLS has trained 6–8 fellows per year since it began in 2015. Fellows have been assigned to public health departments in Minnesota, New Hampshire, and New York City, and to four CDC Centers.
- LLS fellows have participated in Epi-Aids, Lab-Aids, and other responses. Examples include the responses to Hurricane Maria and to outbreaks of *Legionella* in New York and Hawaii, *Escherichia coli* 0157 in Connecticut, Ebola in West Africa, and anthrax in Uganda.

Opportunities

DSEPD is currently exploring additional opportunities for

- Including workforce development into planning for all programs and initiatives at CDC
- Collecting data to better characterize need and priorities
- Modernizing skills and enhancing cross-cutting skills
- Ensuring quality supervision and field experiences
- Incorporating data science into practice and training
- Promoting multidisciplinary teams
- Addressing the needs of state and local health departments
- Enhancing physician recruitment to EIS

Discussion

- To enhance EIS recruitment, BSC members suggested
 - Exploring ways to forgive student loans for physicians who join EIS. The CDC Foundation might be a partner in these efforts.
 - Visiting medical schools to inform first- and second-year medical students about EIS
 - Aligning EIS application dates with those of medical internships, and/or providing students accepted to EIS with the option of deferring entrance for a year
 - Recruiting emergency room doctors who are “burned out”
 - Partnering with ASTHO, NACCHO, and schools of public health (including their alumni associations) to spread the word about EIS among graduate students and public health employees
- BSC members commended the DSEPD website, which provides a single source of information on [CDC training opportunities](#), and commented that
 - DSEPD might assist the new OI–NCEH/ATSDR Vector-borne Diseases Workgroup in building a public health workforce with greater expertise in entomology.

- Other fellowships that are advancing public health workforce development include
 - o [The LEAP \(Leadership in Epidemiology, Antimicrobial Stewardship and Public Health\) Fellowship](#) for infectious disease physicians, which is funded by CDC and coordinated by the Infectious Diseases Society of America (IDSA), the Society for Healthcare Epidemiology of America (SHEA), and the Pediatric Infectious Diseases Society (PIDS)
 - o The Council of State and Territorial Epidemiologists (CSTE) [Applied Epidemiology Fellowship](#) for MPH graduates, developed in collaboration with CDC, HRSA, and the Association of Schools and Programs of Public Health (ASPPH)

Advanced Molecular Detection Update and Report from the Infectious Disease Laboratory Working Group

AMD Update

Gregory Armstrong, Director, Office of Advanced Molecular Detection (AMD), provided an overview of the AMD program, which began in FY 2014.

AMD History

- During its first 3 years, AMD focused on building capacity for next-generation sequencing and bioinformatics at CDC and on applying AMD technology to infectious disease priorities, via intramural projects (58 of which have been funded so far). Investments were made in sequencing equipment, high-performance computing capacity, and computer networking capacity, and microbiologists, bioinformaticians, and epidemiologists were engaged in workforce development efforts. The initial set of intramural projects will be completed in FY 2018, and a solicitation for new projects will be issued for FY 2019.
- During its fourth and fifth years, in addition to continuing to adapt the technology to public health, AMD focused on extending sequencing and bioinformatics capacities to state and local public health laboratories and on expanding engagement of epidemiologists.
- The AMD budget remains at \$30M per year.

AMD Highlights

- **Project solicitation and management.** Based on lessons learned from the first 5 years, the upcoming FY2019 solicitation will focus more on project objectives and less on timelines. Ongoing interaction with the AMD office will be encouraged, both during the solicitation and during the project.
- **Access to cloud services at CDC.** Cloud services will be used for AMD data storage (the first priority) and then for computing services. Cloud services currently involve
 - The [Association of Public Health Laboratories \(APHL\) Informatics Messaging Services platform \(AIMS\)](#), which facilitates the [AMD project on influenza virus](#)
 - The Global Health Outbreak and Surveillance Technology (GHOST) system, which facilitates the [AMD project on hepatitis C virus](#)

- **Expansion of AMD capacities at state and local health departments.** All states have at least one sequencer or have one on order, and 51 PulseNet laboratories in 45 states have been certified for next-generation sequencing (NGS). In addition,
 - CDC has established a National TB Molecular Surveillance Center at the Michigan state public health laboratory, and five other states support TB molecular surveillance laboratories.
 - National Influenza Reference Centers in three states use NGS to monitor strains of influenza virus. NGS is also used by
 - Eight states to monitor hepatitis C viruses, using the GHOST system
 - Six states to monitor strains of *Legionella pneumophila*
 - Four states to monitor viruses that cause vaccine-preventable diseases
 - Thirty-one jurisdictions, with 103 users, are using the secure HIV Trace system to [monitor HIV strains](#).
 - Many states also use NGS to monitor bacterial pathogens that cause particular drug-resistant diseases.
- **Workforce development.** Activities supported by the [Epidemiology and Laboratory Capacity for Infectious Diseases \(ELC\) Cooperative Agreement](#) include
 - Establishing regional AMD training networks for microbiologists
 - Developing a Regional Bioinformatics Resource with a full-time bioinformatician assigned to each of the seven PulseNet regions
 - Working with APHL to develop advanced AMD training courses for microbiologists and working with CSTE to develop AMD trainings for epidemiologists
- **Advancements in data science.** Partly with support from the AMD program, NCIRD’s Influenza Division has established a robust infrastructure to integrate and analyze their diverse data ecosystem. The AMD program believes that this type of approach, which makes use of the emerging field of data science, is potentially quite valuable to CDC and to public health in general.

IDLWG Report

Jill Taylor, Director of the Wadsworth Center, New York State Department of Health, and IDLWG co-chair, reported on the April 27 IDLWG meeting, which focused on AMD and the use of culture-independent diagnostic tests (CIDTs).

AMD Review by IDLWG

- AMD progress over the past 5 years (Phase I) represents “a great leap forward.” During Phase I,
 - NGS methods were embedded in CDC infectious disease programs, achieving broad acceptance.
 - Sequencing capability was put in place at all state laboratories.
 - Bioinformatics capability increased within CDC and the states.
- In setting goals for Phase II, IDLWG members recommend
 - Sustaining a major focus on workforce development
 - Developing expertise in data science and making optimal and integrated use of sequence data, health data, economic data, and environmental data

- Anticipating future developments, keeping in mind that technology is driving a sea change in public health laboratory practice
- When setting programmatic priorities, it is recommended that AMD
 - Invest in programs that have the most potential for public health value, while retaining investment in research
 - Build bridges between programs
 - Seek input from academic and industry experts

IDLWG Comments and Questions on AMD

- IDLWG members provided these comments:
 - “We are only scratching the surface of what is possible.”
 - AMD provides an unprecedented opportunity to harmonize approaches to analysis, sharing, and storage of data and to make them interoperable.
 - The AMD program should
 - Start to “lock down and optimize”
 - Recognize the importance of educating and retaining young talent
 - Develop a strategic rather than piecemeal approach that is not pathogen-specific
 - Be more outward-facing, working with industry partners and state and local health departments
 - Define relative roles and responsibilities of CDC and state and local partners and how these may change because of AMD
 - Keep research at the front line
- IDLWG members asked these questions:
 - Should IDLWG
 - Incorporate additional members with expertise in AMD?
 - Assist CDC in developing an action plan that describes the impact of AMD on disease surveillance and public health interventions?
 - What regulations and guidelines are needed to promote sharing of sequence data?
 - What actions should CDC take to promote internal harmonization across programs that use common technologies?

CIDT Issues

- Widespread use of CIDTs is causing the loss of isolates and disrupting current epidemiologic approaches to disease surveillance and investigation of outbreaks. CDC’s 3-step plan for addressing the transition from culture-based tests to CIDTs includes
 1. *Interim strategy:* Use reflex culture to obtain isolates
 2. *Short-term strategy:* Use whole-genome sequencing to develop a sequence-based national surveillance infrastructure
 3. *Long-term strategy:* Use metagenomic (direct-from-specimen) sequencing techniques to characterize pathogens

- IDLWG might act in an advisory capacity to provide
 - Input on “visioning” and forward-thinking
 - Assistance with prioritization as AMD expands to include all pathogens of public health importance
 - Oversight of efforts to apply WGS and/or metagenomics to different types of pathogens

In conclusion, Dr. Taylor noted that public health is experiencing a fundamental revolution in infectious disease surveillance and outbreak investigation. John Besser, Deputy Chief, Enteric Diseases Laboratory Branch, NCEZID Division of Foodborne, Waterborne, and Environmental Diseases, agreed that CIDTs are a transformative and disruptive technology.

Discussion

CIDTs

- One hundred fifty international experts in clinical medicine, public health, and the development and manufacture of diagnostic tests will participate in a meeting on CIDTs on May 8–9, organized by the Pew Research Center. The expected outcome is a White Paper with options for public health issues related to use of CIDTs.
- CDC is continuing to work with
 - The Clinical Laboratory Improvement Advisory Committee (CLIA) to consider regulatory issues related to CIDT use
 - FDA, APHL, and CSTE to develop model language for CIDT product inserts that describe public health needs
 - The states, CLIA, and USDA on state-level reporting rules, which may require reporting about which tests are used. IDLWG might consider adding an ex officio member from USDA.
- BSC members suggested that CDC and FDA consider whether results from CIDTs might be configured to send infectious disease reports to public health departments automatically.

Data Science: Data-Sharing, Data Privacy, and Workforce Issues

- CDC and PulseNet data-sharing policies are evolving to incorporate new technologies and facilitate timely dissemination of sequence data. Data on *Vibrio cholerae* or poliovirus, for example, are rapidly uploaded to a public database (in advance of publication) to allow immediate access by academic and industrial researchers.
- CDC partners in the development of policies on data-sharing and data privacy include NIH, the Defense Advanced Research Projects Agency (DARPA), the [Chan Zuckerberg Biohub](#), the Gates Foundation, private companies, and universities.
- NIH has developed an initiative called [Big Data to Knowledge](#) to improve use of large data sets.
- Although it is generally difficult for government agencies to compete with industry for data scientists, mathematicians who come to CDC on fellowships may remain at CDC because the work is interesting and “the questions are infinite” (e.g., how to integrate public health data with environmental data).

Issues Raised by the Transition to Molecular Testing

Concerns include

- Decreased ability to detect new forms of drug-resistance when diagnostic tests probe for a limited number of already-known resistance genes. Increased use of WGS may address this concern.
- Decreased ability to detect resistance mechanisms that might involve more than one gene
- Loss of expertise in microbiology (“losing the feel for the organism”)
- Difficulty in interpreting the clinical and/or public health significance of diagnostic results data detected by extremely sensitive molecular tests
- In terms of research, science should always lead technology, so that important scientific questions (rather than technologically feasible ones) are investigated.

Public Comments

The phone lines were opened for public comments at the end of the day on May 2, but no one spoke.

Conversation with Robert Redfield, CDC Director

CDC Director Robert Redfield discussed his priorities for CDC and his goal of further engaging clinicians in “the public health team.” His infectious disease priorities include

- **The opioid crisis**—“the crisis of our time.” Dr. Redfield noted parallels to the public health response to the HIV/AIDS crisis in the 1980s, in terms of mobilization challenges, the complexity of the response, and the need to combat stigma. He spoke of stigma as “the enemy of public health” and said that addiction, like HIV infection, is a medical condition, not a moral failing. CDC’s contributions to the government-wide response effort include surveillance of opioid use and overdoses, provision of health education on the risks of opioid use, and promotion of evidence-based interventions to reduce transmission of HIV and hepatitis C virus among drug users.
- **Global health security**, with a focus on pandemic influenza and antimicrobial resistance
- **Disease elimination**, with a focus on
 - Ending the AIDS epidemic in the United States
 - Ending hepatitis C infection and associated liver disease in the United States
 - Ending polio worldwide

Discussion

STDs

Dr. Redfield stressed the importance of integrating STD prevention and treatment into general medical care to improve coverage and reduce stigma. He noted that

- Any American woman with cervical cancer represents a failure.
- Religious communities should be engaged in efforts to ensure universal vaccination against HPV.
- In the future, nurse practitioners and other primary care clinicians may be trained to treat hepatitis C.

Opioid Crisis

CDC continues to use surveillance data to identify evidence-based interventions and substance-abuse treatment strategies that work over the long-term. Dr. Redfield commented that

- Addiction medicine (like STD care) should be better integrated into primary care, with treatment provided at general healthcare sites rather than primarily at specialized mental health or substance abuse clinics.
- In the future, a better understanding of upstream risk factors for opioid use (e.g., childhood trauma and self-medication of mood disorders) will help identify ways to intervene earlier in life to prevent drug addiction.

Vector-Borne Diseases

Dr. Redfield commended the establishment of the OI–NCEH/ATSDR Vector-borne Disease Workgroup. He mentioned the potential benefits of using traditional vector control methods until improved prevention tools (e.g., vaccines and prophylactic treatments) become available.

North American Health Collaboration

Dr. Redfield stressed CDC’s commitment to long-term collaboration with Mexico and Canada to strengthen infectious disease prevention and control in North America, with special emphasis on joint efforts to address pandemic preparedness and vector-borne diseases.

Data Science and Public Health

Dr. Redfield suggested that CDC might play a role in helping members of the public understand how health data are used for public health purposes and how appropriate use of data can help solve health problems.

NCEZID Update

Rima Khabbaz, NCEZID Director, provided the following updates.

Outbreak Responses

- **Listeria in South Africa.** The world’s largest known outbreak of listeriosis began last year in South Africa, causing about 1,000 illnesses and more than 180 deaths. The outbreak was linked to polony, a type of deli meat. CDC has provided epidemiologic and laboratory assistance since November, working with USDA and FDA.
- **Lassa fever in Nigeria.** Lassa fever is endemic in Nigeria, with a hyperendemic period during the dry season (from January to March). This year 1,865 cases were reported, and the case-fatality rate for hospitalized cases is 24.3%. Nearly all cases involved infection by rodents, although human-to-human transmission can occur.
- **Yellow fever in South America.** Since January 2016, Brazil, Bolivia, Colombia, Ecuador, French Guiana, Peru, and Suriname have reported cases of yellow fever. Brazil has had the most cases, with 1,098 confirmed cases between July 2017 and March 2018. Brazil began reactive and preemptive vaccination campaigns in January. Due to shortages of the Sanofi vaccine, Brazil is using fractional doses. CDC is drafting a pre-emergency use authorization (EUA) for the Stamaril vaccine, which is manufactured in France.

- **Multistate outbreaks of foodborne disease in the United States**

- CDC is working with federal partners to investigate a multistate outbreak of *Salmonella* linked to kratom, a plant consumed for its stimulant effects. More than 130 people from 38 states have been infected, with 40% requiring hospitalization.
- An outbreak of *Salmonella* linked to chicken salad appears to be over. CDC and USDA investigated the outbreak, which infected 265 people in 8 states, with 94 hospitalizations and 1 death.
- An outbreak of Shiga toxin-producing *E. coli* O157:H7 (STEC) was linked to romaine lettuce from the Yuma growing region of Arizona. No common grower, supplier, distributor, or brand was identified. As of April 27, 98 people had been infected in 22 states, and 46 people had been hospitalized, including 10 with hemolytic uremic syndrome. CDC is continuing to work with FDA on this investigation.

Food Safety

CDC and public health laboratory partners have transitioned from pulsed-field gel electrophoresis (PFGE) testing to [WGS for *Listeria* surveillance](#) in 51 public health laboratories in 46 states, starting with a pilot program that began in 2013. By the end of 2018, all 50 states will use WGS to detect *Listeria* as well as other common foodborne bacteria, such as *Campylobacter*, *Salmonella*, STEC, and *Shigella*.

Advanced Molecular Detection

The AMD program is now in its fifth year and has funded over 50 projects. Achievements include

- Transition of PulseNet from PFGE to WGS
- Implementation of the Sequence First Initiative for influenza virus characterization
- Transition of TB characterization methodology from spoligotyping and analysis of mycobacterial interspersed repetitive units (MIRUs) to WGS
- Use of the GHOST system to [investigate outbreaks of hepatitis C](#)
- Use of the secure HIV-TRACE system to [identify molecular clusters of HIV that may be due to recent and rapid HIV transmission](#)

In 2017, AMD methods confirmed the source of a [multistate outbreak of *Campylobacter*](#) linked to puppies in a pet store. Investigators also identified multiple antimicrobial resistance genes and mutations in bacteria linked to the outbreak.

Antibiotic Resistance

Updates include the following:

- The [April 2018 issue of *Vital Signs*](#) highlights CDC's AR Containment Strategy to slow the spread of unusual or novel antibiotic-resistant genes and germs
- The Antibiotic Resistance Laboratory Network has expanded laboratory testing in all 50 states, 5 cities, and Puerto Rico. In 2017, nationwide testing identified 221 instances of "unusual" resistance.
- An International Environmental AMR Forum was co-hosted by the U.K. Science and Innovation Network on April 4–5, 2018, in Vancouver to discuss the impact of antimicrobial resistance in the environment on human health.

Vector-Borne Diseases

The [May 2018 issue of Vital Signs](#) highlights the increase in vector-borne illnesses since 2014. Many state and local public health agencies are not fully prepared to test for, track, prevent, and control the spread of these diseases. CDC efforts include funding states and territories to build capacity, working with partners to detect and respond to these diseases, supporting five regional centers of excellence, developing and improving laboratory tests, and [educating the public about how to protect themselves](#).

Fiscal Year 2018 Budget Update

- On March 23, the President signed a \$1.3 trillion spending bill to fund the government through the end of FY 2018. A total of \$614.572 million was appropriated for NCEZID, representing an increase of \$29.650 million over FY 2017. The increases included
 - *\$12-million increase for vector-borne diseases* that will support up to nine states at the greatest risk for vector-borne disease outbreaks. The goal is to build a sustained foundation to address the persistent threat of mosquito-borne and tick-borne diseases.
 - *\$8.5-million increase for emerging infectious diseases* that will enhance CDC’s support of states in preparing for and responding to emerging and zoonotic health threats
- In addition, CDC received \$480 million for construction of a new High Containment Laboratory.

Hurricane Responses

The response to Hurricanes Harvey, Irma, and Maria by the CDC Emergency Operations Center (EOC) included an Epi-Aid investigation into possible invasive mold infections in Texas and provision of safe-water expertise in the U.S. Virgin Islands. Ongoing response efforts in Puerto Rico include assisting the Puerto Rico Department of Health in restoring epidemiology and laboratory capabilities and assessing reports of leptospirosis. The NCEZID Dengue Branch in San Juan has also required assistance to get back online and maintain its work on mosquito surveillance, vector control, and laboratory testing.

Upcoming Events

- The second meeting of the HHS Tick-Borne Disease Working Group will take place on May 15–16. The CDC representative is Ben Beard, NCEIZID Division of Vector-Borne Diseases.
- The May 2018 meeting of the Presidential Advisory Council on Combatting Antibiotic-Resistant Bacteria (PACCARB) will focus on antibiotic stewardship for animal and plant health.
- The official opening of the Smithsonian “Outbreak!” Exhibit will take place on May 18.
- The International Conference on Emerging Infectious Diseases will take place in Atlanta on August 26–29. A preconference session on AMD is also scheduled.

Discussion

Lassa Fever Outbreak in Nigeria

- Ecologists are helping to investigate the cause of the Lassa fever outbreak in Nigeria, which is thought to involve spillover from infected rodents.
- WHO may host a consultation about the best use of ribavirin in treating Lassa fever.

Environmental Issues

- The impact of antibiotics in wastewater was discussed at the International Environmental AMR Forum in Vancouver. The public health implications of antibiotics in wastewater are as yet unclear.
- A possible cause of the STEC outbreak in Arizona associated with romaine lettuce—which involved produce from several farms—might be contaminated irrigation water from a local river. If this hypothesis is correct, other types of produce besides romaine lettuce may be affected. However, no such finding has been reported so far.

Other Topics and Comments

- When large or multiple outbreaks occur, it is important to understand their consequences—in terms of disease burden and societal costs—and to use that information to inform public health policies, increase our focus on prevention, and demonstrate return on public health investments. Each outbreak response provides an opportunity to learn why outbreaks occur and how to prevent them.
- [Emerging Infections Programs](#) (EIP) facilitate collaboration with state and local health departments and other partners to answer important public health questions. Current areas of concern include prevention of MRSA and of infections associated with the opioid crisis (e.g., hepatitis C, HIV/AIDS, and endocarditis).
- An “emergency fund” for public health emergencies that was proposed in previous years is not included.

Update on CDC’s Activities to Reduce Antimicrobial Resistance

The five areas where CDC is working on antibiotic resistance include

- **Healthcare:** Improving antibiotic use and infection prevention and using innovative and proven practices to control the spread of drug-resistant pathogens
- **Food:** Rapidly identifying drug-resistant foodborne bacteria to stop outbreaks and improve prevention
- **Community:** Detecting, preventing, tracking, and treating drug-resistant pathogens in the community
- **Global:** Improving international collaboration and capacities for surveillance, infection control, prevention, stewardship, and public health research
- **The Environment:** Exploring unanswered questions about the relationship between antimicrobial resistance and humans, animals, and the environment (e.g., surface water and soil)

Michael Craig, Senior Advisor for Antibiotic Resistance, provided an overview of CDC’s work to

- **Detect and contain** drug-resistant pathogens, through improvements in laboratory science and diagnostics and in epidemiology, surveillance, and response
- **Prevent** drug-resistant infections, by providing data and guidance and through improved antibiotic use
- **Innovate** to better address antimicrobial resistance, by identifying insights for medical practice and for research and development

Mr. Craig provided updates on

- **The CDC Containment Strategy**, which involves working with healthcare facilities and health departments to ensure rapid detection of AR threats in healthcare facilities, followed by
 - Infection control assessments led by the health department
 - Colonization screenings in healthcare facilities, when needed
 - Coordination between healthcare facilities to prevent the spread of AR between facilities
 - Continued vigilance until spread is controlled

The Containment Strategy—which represents an aggressive approach for stopping the spread of “unusual” AR threats as soon as they are detected—is described in the April 2018 issue of [Vital Signs: Containing Unusual Resistance](#).

- **The Antibiotic Resistance (AR) Laboratory Network**, which is a key element in implementing the CDC Containment Strategy, which requires early and accurate detection of new threats. The AR Laboratory Network has expanded AR testing in all 50 states, 5 cities, and Puerto Rico. During the first 9 months of laboratory testing facilitated by the AR Laboratory Network, findings included the following:
 - More than 220 instances of “unusual” resistance were detected in new and known threats, such as CRE and *Candida auris*.
 - 11% of screening tests identified people with no symptoms who were infected with hard-to-treat germs.
 - 1 in 4 germs was a producer of carbapenemase.
- **An International Environmental AMR Forum**, which was co-hosted in Vancouver by the U.K. Science and Innovation Network, in collaboration with the Wellcome Trust, on April 45, to discuss the impact of antibiotic-resistant bacteria and antibiotics in the environment on human health. Topics included contamination from human and animal sewage, antimicrobial manufacturing, and antimicrobial use as pesticides. A scientific report and an executive summary of the meeting are under development.
- **A new Broad Agency Announcement (BAA)**, which was issued in March 2018 to explore gaps in knowledge about antibiotic resistance and to pilot innovative solutions in the healthcare, veterinary, and agriculture industries. In 2017 CDC awarded \$9 million under a BAA that supported 25 projects conducted through contracts with educational institutions, nonprofit organizations, state and local government, and private industry for research and development. FY 2017 projects included designing a new coating material for medical devices (e.g., catheters) that protects the devices from contamination (e.g., by drug-resistant germs); enhanced surveillance for sources of *mcr-1* associated with recent U.S. cases of returned international travelers; *Candida auris* decolonization and source control; and evaluation of colonization or infection risk from exposure to environmental sources of AR pathogens.
- **The 2018 United Nations General Assembly**, where CDC plans to launch a year-long campaign to call global stakeholders to action on AMR and to solicit commitments to accelerate combatting antibiotic resistance locally and globally. During a side event, CDC and partners will identify challenges, progress made to date, and work to be done.

In conclusion, Mr. Craig referred the BSC members to the [CDC webpage](#) with information on To Combat AR and Protect the U.S., CDC is Working in Your State and Community.

Discussion

CDC Containment Strategy

- Although states differ in their capacities to implement the CDC Containment Strategy, Mr. Craig reported that the additional laboratory capacity provided by the AR Laboratory Network has had a significant national impact, in terms of improved screening and detection. Ongoing challenges include
 - Obtaining drug-resistant isolates from clinical laboratories. Some states have a great system for this; for others it is more challenging.
 - Implementing the strategy within healthcare facilities, nationwide, and monitoring its effectiveness in reducing drug-resistant disease in the community

Broad Agency Announcements

Advantages of BAAs include opportunities to work with a wide pool of potential partners, a more flexible and collaborative process, and the ability to make awards more quickly. BSC members commented that

- CDC might consider extending the time for some solicitations, because 3 weeks' lead time may not be sufficient for university applicants or for responses involving interdisciplinary teams.
- University partners can help identify global topics and areas where interdisciplinary engagement would be most beneficial.

Environmental AR Issues

BSC members commented that

- Little is known about the impact of rising temperatures on human or animal sewage, in terms of its effect on the growth and spread of pathogens (including drug-resistant pathogens).
- The Environmental Protection Agency (EPA) is considering collaborative efforts to investigate the impact of pharmaceutical drugs, including antibiotics, in the environment.

Appropriate Prescribing and Use of Antibiotics

CDC continues to work with healthcare providers to improve prescription practices. Mr. Craig reported that

- CMS is encouraging insurance companies to provide physicians in their networks with data and tools to improve prescribing practices.
- Experience indicates that health education alone is likely the least impactful approach to behavior change.

Other Issues and Comments

- Each of the five AR categories (healthcare, food, community, global, and the environment) may be viewed from a One Health perspective.
- The CDC report [*Antibiotic Resistance Threats in the United States, 2013*](#) will be updated on a regular basis, with the first new version planned for 2019.

- The Biomedical Advanced Research and Development Authority (BARDA) is working with diagnostic manufacturers to overcome barriers to development of new AR diagnostics. The Infectious Diseases Society of America (IDSA) has highlighted the need for U.S. government investment in this area and encouraged conversations about potential costs and returns on investment.

Update on Antimicrobial Resistance Activities of Veterinary Services, USDA/APHIS

Bruce Wagner, Director, Center for Epidemiology and Animal Health, USDA/APHIS/VS, reported on USDA activities to implement the goals of

- The [National Action Plan for Combating Antibiotic-Resistant Bacteria](#), including
 - **Goal 1:** Stewardship activities
 - **Goal 2:** Surveillance activities, including routine testing of diagnostic isolates, collection of drug use and resistance data on farms, and coordinated investigations
 - **Goal 5:** Efforts to promote international collaboration and build capacity
- The USDA [Antimicrobial Resistance Action Plan](#), which
 - Describes ongoing USDA activities related to antibiotic use and antimicrobial resistance
 - Proposes initiatives to monitor antibiotic use and resistance on farms; monitor clinical isolates; improve antibiotic stewardship through monitoring and education; build international cooperation and coordination, and conduct epidemiologic investigations

Dr. Wagner provided updates on

- **APHIS Veterinary Service's initiatives on AR**, which are conducted by
 - The [National Animal Health Monitoring System](#) (NAHMS), which monitors about 70% of the U.S. farm animal population and more than 70% of animal operations. Between 2008 and 2017, NAHMS collected health data on cows, goats, catfish, sheep, swine, poultry, horses, and ranched bison and deer. NAHMS studies conducted in 2017 included
 - [Antimicrobial Use on U.S. Feedlots](#)
 - The [Beef Cow-Calf 2017 Study](#), which describes antimicrobial stewardship practices and evaluates the prevalence and AR patterns of foodborne pathogens that infect these animals
 - The [National Animal Health Laboratory Network](#) (NAHLN), which provides animal health diagnostic testing, methods for research and development, and expertise for education and extension services for detecting biological threats to the nation's animal agriculture. Nineteen NAHLN laboratories are participating in Year 1 of a pilot project whose objectives include tracking antimicrobial resistance data at the national level, providing AR information to the veterinary diagnostic community, and monitoring drug resistance in
 - *E. coli* in cattle, swine, poultry, horses, dogs, and cats
 - *Salmonella enterica* in cattle, swine, poultry, horses, dogs, and cats
 - *Mannheimia haemolytica* in cattle
 - *Staphylococcus intermedius* group (*S. intermedius*, *S. pseudintermedius*, and *S. delphini*) in dogs and cats

- The [USDA/APHIS National Veterinary Accreditation Program \(NVAP\)](#), which has developed new AR modules, including Module 23, Use of Antibiotics in Animals (2012,) and Module 29, Veterinary Feed Directive (2017).
- **International cooperation and coordination to address AR.** The VS Chief Veterinary Officer serves as a U.S. delegate to the World Organization for Animal Health (OIE). Duties include addressing antimicrobial resistance and harmonization of U.S. trade activities with the OIE Terrestrial Code. VS also participates in the Transatlantic Taskforce on Antimicrobial Resistance, and APHIS provides the USDA representative to the Global Health Security Agenda.
- **An outbreak of *Salmonella* Heidelberg in dairy calves**
 - NAHMS issued a [report](#) on the implications of *Salmonella* Heidelberg for the U.S. dairy industry, following a multidrug-resistant outbreak in Wisconsin in dairy calves.
 - The outbreak strain was different from those identified in swine and poultry, and it was subsequently isolated from 56 people in about 15 states.
 - A case-control study conducted by the Wisconsin Veterinary Diagnostic Laboratory found that calves that were transported longer distances (e.g., from dealers, auctions, or markets) had greater risk of infection. As a result, VS has new guidance for cleaning and disinfecting calf housing and transport facilities.

Discussion

- BSC members commented that
 - Dr. Wagner’s presentation underscores the need for a One Health approach to address AR issues.
 - The data from the NAHLN pilot project on veterinary antimicrobial resistance may be useful to public health researchers, especially if WGS data on animal isolates is available for comparison with WGS data on human isolates. Dr. Wagner reported that VS is seeking a voluntary solution for sharing WGS data on farm animals and is planning to post the data by region and species.
 - In considering the implications of the *S. Heidelberg* outbreak, it would be useful to know if there were differences in the use of antibiotics in the affected and non-affected herds and whether standard practices are used to pre-medicate calves before travel.
- In regard to ongoing activities, Dr. Wagner reported that
 - ARS and the Center for Veterinary Biologics are considering alternative ways to reduce veterinary antimicrobial resistance, including animal vaccines and changes in prescription practices that promote better use of antibiotics.
 - VS is working with the University of Minnesota to monitor drug-resistant pathogens in poultry, using data from farms and industry partners.
 - VS plans to conduct a voluntary survey of farmers and veterinarians to assess compliance with FDA guidance on use of antibiotics in farm animals that aims to limit veterinary use of antimicrobial drugs with importance to human medicine.
 - Research priorities include evaluation of risk factors for contamination of animal feed or fertilizer with drug-resistant pathogens and for infection of animals with drug-resistant pathogens on the farm and during transport.

Public Comments

The phone lines were opened for public comments at the end of the meeting, but no one spoke.

Upcoming BSC/OID Meeting

The next in-person BSC meeting will take place on December 5–6, 2018.

APPENDIX: Meeting Participants

BSC Members

Nancy Bennett	Tim Jones	Jill Taylor
Kristy Bradley	Salmaan Keshavjee	Bruce Wagner <i>(representing USDA)</i>
Sheldon Campbell	Jim Le Duc	Judy Wasserheit
Barbara Cole <i>(by phone)</i>	Mike Loeffelholz	Melinda Wharton
Jeff Duchin	Ruth Lynfield	Debbie Yokoe
Kim Elmslie	Andy Pavia	
Emily Erbeling	Susan Philip	
Mary Hayden	Mark Riddle	
Denise Hinton	Lee Riley	
<i>(representing FDA)</i>	Guillermo Ruiz-Palacios	

Partners and Public Visitors

Meredith Allen <i>(Association of State and Territorial Health Officials)</i>	Peter Kyriacopoulos <i>(Association of Public Health Laboratories)</i>
Jay Butler <i>(Alaska Department of Health and Social Services)</i>	Walt Orenstein <i>(National Foundation for Infectious Diseases)</i>
David Harvey <i>(National Coalition of STD Directors)</i>	Dhara Shaw <i>(Council of State and Territorial Epidemiologists)</i>
Lilly Kan <i>(National Association of County and City Health Officials)</i>	Kathy Talkington <i>(The Pew Charitable Trusts)</i>

CDC Staff

Noah Aleshire	Tom Gomez	Jim Nowicki
Greg Armstrong	Dec Houry	Angela Oliver
Nathelia (Tiki) Barnes	Rima Khabbaz	Sapana Parikh
Elise Beltrami	Dawn King	Antonio Perkins
John Besser	Seth Kroop	Eric Pevzner
Gail Bolan	Alexandra Levitt	Sam Posner
Chris Braden	Rebecca Martin	Sonja Rasmussen
Evelyn Cater	Tonya Martin	Amanda Raziano
Michael Craig	Jonathan Mermin	Robert Redfield
Inger Damon	Nancy Messonnier	Raul Romaguera
Kim Distel	Steve Monroe	Michael Shaw
Peter Drotman	Robin Moseley	Pattie Simone
Brian Edlin	Atis Muehlenbachs	Sharon Slocumb

