MEETING OF THE BOARD OF SCIENTIFIC COUNSELORS
DEPUTY DIRECTOR FOR INFECTIOUS DISEASES

Centers for Disease Control and Prevention
Virtual Meeting
December 9, 2020

A half-day, open public virtual meeting of the Board of Scientific Counselors (BSC), Deputy Director for Infectious Diseases (DDID), Centers for Disease Control and Prevention (CDC), was held on December 9, 2020. In addition to board members and CDC staff, representatives of several public health partner organizations and other members of the public attended the meeting (appendix). No votes were taken.

The agenda included

- An update from Jay Butler, CDC Deputy Director for Infectious Diseases
- An update and a discussion on the COVID-19 pandemic
- An update from the Food Safety Modernization Act Surveillance Working Group (FSMA SWG)
- An update on CDC's global health work
  - Ebola response
  - Global update
- An update on social determinants of health (SDOH)

Opening Remarks

BSC, DDID 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 Dr. Butler and Hilary Eiring, the new Designated Federal Officer (DFO) for the board. Dr. Lynfield thanked Sarah Wiley, outgoing DFO, for her many years of service and hard work.

Dr. Lynfield identified the following changes to the BSC, DDID:

- Member Susan Sharp has rotated off the board and will be replaced by Ilhem Messaoudi.
- Ex officio Tammy Beckham (National Vaccine Program Office) has rotated off the BSC.
- Appointments are pending of ex officios from the U.S. Department of Health and Human Services (HHS) Office of the Assistant Secretary for Health and Office of the Assistant Secretary for Preparedness and Response.

No significant conflicts of interest were identified during the roll call.

Update from the Deputy Director for Infectious Diseases

Dr. Butler provided updates from the three infectious disease national centers and on a variety of topics. He recognized that items that would have been in the headlines in a normal year have often gone unnoticed in 2020 due to the COVID-19 pandemic. He thanked everyone for taking time to participate in

the meeting, noting that there was 100% attendance of the special government employee members of the BSC, DDID (and nearly 100% attendance of the board overall) and emphasizing that it has never been more important for CDC to have the input of external advisors.

Leadership Updates

- **CDC Office of the Director**
  - Kyle McGowan, former Chief of Staff, and Amanda Campbell, former Deputy Chief of Staff, left CDC in August, and Nina Witkofsky became the Acting Chief of Staff for the agency.
  - Kate Galatas became the Acting Associate Director for Communication.
  - Robert Redfield, CDC Director, will depart in January 2021; gratitude was expressed for his service during an extremely challenging time.
  - Rochelle Walensky has been appointed to become the CDC Director when the new administration begins in January 2021.
- **Community of Practice**
  - Stephen Redd retired this year and Nate Smith became the new Deputy Director for Public Health Service and Implementation Science.
  - Chesley Richards retired as the Deputy Director for Public Health Science and Surveillance after 3 decades of service at CDC, Ileana Arias is serving as the Acting Deputy Director in that role, and Brian Moyer became the Director the National Center for Health Statistics (NCHS).
  - Celeste Philip is now the Deputy Director for Non-Infectious Diseases, and Karen Remley became the Director of the National Center on Birth Defects and Developmental Disabilities.
- **DDID**
  - Evelyn Cater is serving as the Acting Senior Advisor for Management and Operations.
  - Katie Fullerton is serving on detail to DDID as the Acting Senior Advisor for Surveillance and Data Modernization.
  - Matthew Biggerstaff, Rachel Slayton, and Michael Johansson are serving on detail to DDID as the CDC Liaisons to the Infectious Disease Modeling and Analytics Initiative and have done significant modeling work in a variety of areas related to COVID-19.
  - Kudos to Emily Mosites, Senior Advisor for Health and Homelessness, who received the U.S. Interagency Council on Homelessness Extra Mile Award for her work in emergency management and the homeless community response to COVID-19.
- **National Center for Emerging and Zoonotic Infectious Diseases (NCEZID)**
  - Darin Carroll is the new Director of the Division of Scientific Resources, the primary laboratory support infrastructure for CDC, among other scientific functions.
- **National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention (NCHHSTP)**
  - Eugene McCray retired as the Director of the Division of HIV/AIDS Prevention (DHAP) in September; Demetre Daskalakis will begin as the new DHAP director on December 21.
  - Deron Burton is the new Deputy Director of NCHHSTP.
- **National Center for Immunization and Respiratory Diseases (NCIRD)**
  - Sam Posner has stepped in as the Acting Director of NCIRD while Director Nancy Messonnier is serving as the Vaccine Task Force Lead in the COVID-19 response.

- Amanda Cohn is serving in the role of the Chief Medical Officer for Vaccine Policy, Preparedness, and Global Health and is very involved in the COVID-19 response.
- Kimberly Fox has taken on the role of the Director of the Division of Bacterial Diseases.
- Stephanie Bialek has accepted the role of the Director of the Division of Viral Diseases.

President's Budget Request

The fiscal year (FY) 2021 President's budget request for CDC is $7.009 billion, which is about $700 million below the FY 2020 budget, and includes

- *Ending the HIV Epidemic* – $371 million
- Global Health Security – $175 million
- Influenza Planning and Response – $216 million
- Public Health Data Modernization – $30 million
- Addressing the Rising Threat of Vector-Borne and Tickborne Diseases – $66 million
- Infectious Diseases and Opioids – $58 million

COVID-19 supplemental funding includes

- Coronavirus Preparedness and Response Supplemental Appropriations Act – $950 million
- Coronavirus Aid, Relief, and Economic Security Act (CARES) – $1.5 billion
- Paycheck Protection Program and Health Care Enhancement Act – $10.3 billion, which was allocated almost entirely to the states and territories through the Epidemiology and Laboratory Capacity (ELC) Grant Program

Homelessness and Health Update

Homelessness and health is a new and important area of work for CDC. To address this area, CDC has a workgroup (WG) comprising a membership of more than 250 people representing every center and almost every division. One of the activities of this WG has included the development of a model for public health approaches to homelessness. The model addresses what can be done to help improve the health of people who are currently experiencing homelessness and ultimately address ending homelessness, with a focus on healthcare, disease prevention, homeless support, and homelessness prevention.

NCEZID Updates

- **Publication in September 2020 of** *A National Public Health Framework for the Prevention and Control of Vector-Borne Diseases in Humans***.** Finalizing this national framework has been one of NCEZID's major activities over the last year. This was a joint effort among CDC, five federal departments, and the Environmental Protection Agency. The framework details disease priorities to address vector-borne diseases and lays the foundation for developing national strategies to detect, prevent, and respond to these threats.
- **Update on vector-borne diseases**
  - A total of 530 cases of West Nile virus (WNV) from the United States were reported to CDC as of November 24, 2020. A total of 126 cases of WNV presumptive viremia have been reported among blood donors. Because states have been under significant strain with the COVID-19

pandemic, the Arboviral Diseases Branch offered to perform diagnostic and surveillance testing at CDC. The agency performed over 2,400 tests from over 1,000 patients and tested over 7,000 mosquito pools and over 700 chicken samples to assess spread of these infections. Without this commitment in 2020, a significant amount of arboviral disease transmission may have gone unrecognized.

- Dengue virus cases are on the rise in many countries, including in the United States. Local transmission of dengue virus serogroup 1 has occurred in Puerto Rico, with more than 500 cases, as well as 69 locally acquired cases reported in Florida. The pandemic has probably affected some of the reporting of WNV and dengue outbreaks, so CDC continues to assess this impact.
- On August 10, 2020, the Food and Drug Administration (FDA) approved Nootkatone insect repellant, a new method of killing mosquitoes and ticks that was discovered and developed by CDC staff. The active agent comes from Alaska yellow cedar trees, as well as vetiver grass.
- The HHS Tick-borne Disease Working Group has continued to meet and is anticipated to release a second report in early 2021 that will include recommendations focused on tick biology, ecology, and clinical control; clinical manifestations and diagnostics of tickborne disease; causes, pathogenesis, and pathophysiology; and treatment.

- **Publication in October 2020 of the** *National Action Plan for Combating Antibiotic-Resistant Bacteria, 2020–2025*, the goals of which are as follows:
  - **GOAL 1**: Slow the Emergence of Resistant Bacteria and Prevent the Spread of Resistant Infections
  - **GOAL 2**: Strengthen National One Health Surveillance Efforts to Combat Resistance
  - **GOAL 3**: Advance Development and Use of Rapid and Innovative Diagnostic Tests for Identification and Characterization of Resistant Bacteria
  - **GOAL 4**: Accelerate Basic and Applied Research and Development for New Antibiotics, Other Therapeutics, and Vaccines
  - **GOAL 5**: Improve International Collaboration and Capacities for Antibiotic-Resistance Prevention, Surveillance, Control and Antibiotic Research and Development
- **Bacterial fungal infections in COVID-19–positive patients** is a current topic of interest. While there is no clear evidence that COVID-19 patients are more susceptible to bacterial fungal infections, there have been half a dozen sporadic outbreaks of antibiotic-resistant (AR) infections in COVID units and higher rates of hospital-onset infections. The pathogens identified in the outbreaks have included carbapenem-resistant Enterobacterales (CRE) and carbapenem-resistant *Acinetobacter baumannii* (CRAB). COVID-19 can create a "perfect storm" for AR infections in healthcare settings: increased length of stay, increased number of patients, staffing shortages, sick patients, antibiotic use, and challenges implementing infection prevention and control. Antibiotic use trends in hospitals increased in early 2020 from 2019 levels but declined in subsequent months as collective learning grew and/or treatment options became available while the COVID-19 pandemic continued. A significant decrease from previous years in antibiotic use occurred in outpatient settings and nursing homes. These facts highlight the importance of infection control and antibiotic stewardship, both of which depend on the resiliency of these programs.

NCHHSTP Updates

- **A landmark tuberculosis trial led by CDC that identified a shorter-course treatment regimen** was first presented during the 51st Union World Conference on Lung Health in October 2020. This Phase III open-label clinical trial, known as Study 31/A5349, examined the safety and efficacy of two 4-month treatment regimens with high-dose rifapentine with or without moxifloxacin for the treatment of drug-susceptible pulmonary TB, compared with the currently recommended 6-month regimen composed of rifampicin, isoniazid, pyrazinamide, and ethambutol (2RHZE/4RH). The findings were that regimen 2PHZM/2PHM was found to be non-inferior to a 6-month treatment, while regimen 2PHZE/2PH did not meet non-inferiority criteria. This study will inform future treatment in the United States. CDC and the National Institutes of Health (NIH) will continue to work with TB control programs and clinicians to improve available treatment and prevention programs.
- **HIV outbreaks during the COVID-19 pandemic** have become another area of concern. HIV diagnoses among persons who inject drugs (PWID) increased by 11% nationally from 2016 to 2018, primarily among adults older than 40 and non-Hispanic Whites. Multiple clusters and outbreaks among PWID have been identified. COVID-19 complicates delivery of essential services, including syringe services programs (SSPs) and treatment for opioid use disorder. CDC staff published a manuscript describing lessons learned from six large HIV outbreaks among PWID. Common factors in these outbreaks included homelessness, unstable housing, and previous incarceration. Also noted was that co-infection with hepatitis C virus (HCV) was common.
- **Publication in October 2020 of** *Infectious Diseases and Injection Drug Use: Public Health Burden and Response*. This article appears in a *Journal of Infectious Diseases* supplement, which includes 34 national and global articles, 10 of which are from CDC. Topics include the following: interdisciplinary telehealth model, lessons learned responding to HIV outbreaks, serious mental illness, cost-effectiveness analysis, assessment of county-level vulnerability for opioid overdose, and medication-assisted treatment for opioid use disorder.
- **A new national harm reduction cooperative agreement** was launched in September 2019. The progress in Year 1 has included the following:
  - Harm reduction technical assistance (TA), with response to more than 35 TA requests in less than 6 months and provision of TA to 25 organizations nationwide
  - Enrollment of 288 clients into the patient navigation program within the first 2 quarters
  - For monitoring and evaluation of SSPs nationally, development of a survey instrument and national SSP metrics
  - Implementation of the Injection Drug Use Surveillance Project, including development of a survey instrument and project protocol and selection of three SSPs to collect bio-behavioral survey data
- **The HIV death rate declined** by half in the United States from 2010 to 2017.[1] While there is still a long way to go, progress is being made. Two aspects of the work are to 1) decrease incidence, morbidity, and mortality and 2) decrease the disparities and inequities that are inherent in HIV, viral hepatitis, and STDs. There was a 50% decrease in mortality related to HIV and a reduction in the

[1] Bosh KA, Johnson AS, Hernandez AL, et al. *Vital Signs:* Deaths Among Persons with Diagnosed HIV Infection, United States, 2010–2018. MMWR Morb Mortal Wkly Rep 2020;69:1717–1724.

relative and absolute disparities, particularly between African Americans and White persons with HIV.

- **To accelerate progress in the fight to end the HIV epidemic in the United States,** CDC awarded $109 million to the 48 jurisdictions; Washington, DC; Puerto Rico; and the 7 states with a particular burden of HIV in their rural areas. This funding will support work toward the goal of reducing the number of new HIV transmissions by 90%. The project period for this program is 5 years, which began August 1, 2020. Of the total $109 million award for Year 1, awards ranged from $1.9 million to $10.6 million. For Component A, a total of $106 million was allocated among 32 health departments. For Component B, a total of $3 million was allocated among 7 STD clinics.
- **Publication in July 2020 of** *Viral Hepatitis Surveillance—United States, 2018*. This report documents increasing acute HCV infections among young adults, including reproductive-age persons. It is recognized that chronic hepatitis C is still a problem in older people as well. The number of newly reported chronic infections is now approximately equal among younger and older adults, which is a distinct shift in the epidemiology of chronic hepatitis C.
  - New HCV infections are seen among all races and ethnicities, but there is a particularly large increase among American Indian/Alaska Native and White, non-Hispanic populations.
  - Based on these trends, CDC's viral hepatitis program released a *Vital*signs™ report on April 10, 2020, documenting changes in new HCV infections, highlighting that additional ages are now at risk.
  - Incidence rates are now highest for persons aged 20–39 years, coincident with the opioid crisis and increasing injection drug use.
  - The data support CDC's new screening recommendations that all adults 18 years and older should be tested at least once for hepatitis C and all pregnant women should be tested during every pregnancy.
- **Integrated Viral Hepatitis Surveillance and Prevention Funding for Health Departments (CDC-RFA-PS21-2103)** supports cooperative agreement funding to health departments in the following areas: Component 1: Viral Hepatitis Surveillance and Outbreak Response; Component 2: Elimination Planning and Prevention Services; and Component 3: Special Projects Targeted to the Prevention, Diagnosis, and Treatment Related to Injection Drug Use (optional). Annual total awards will be approximately $21 million, with an anticipated 58 awardees under Components 1 and 2 and up to 10 awardees under Component 3. Applications were due December 1, 2020, and awards are expected to be made in May 2021.

NCIRD Updates

- **COVID-19 interrupted access to routine childhood vaccinations.** Notable declines were observed in pediatric immunization, including vaccine ordering, outpatient visits, and routine childhood vaccination starting in March 2020.[2] As a result, children and communities are at risk for preventable disease and outbreaks.
  - CDC issued Calls to Action to key partners in August and October 2020, with enhanced partner collaboration to address catch-up vaccination for children.

[2] Santoli JM, Lindley MC, DeSilva MB, et al. Effects of the COVID-19 Pandemic on Routine Pediatric Vaccine Ordering and Administration — United States, 2020. MMWR Morb Mortal Wkly Rep 2020;69:591–593.

- While Vaccines for Children (VFC) provider orders have rebounded, there is still a substantial deficit for 2020.
- As of November 29, overall VFC provider orders (other than influenza) were down by more than 9 million doses and MMR/MMRV were down by more than 1.2 million doses. Other data show a larger gap on the public sector side compared with the private sector.
- CDC's Call to Action included reaching out to healthcare systems and healthcare providers to 1) identify families whose children have missed doses and contact them to schedule appointments; 2) prompt clinicians when these children are seen to deliver vaccines that are due or overdue; and 3) let families know what precautions are in place for safe delivery of in-person services.
- Everyone can communicate directly to families about the importance of well-child visits and of catching up on any recommended vaccines that have been missed.

- **COVID-19 has affected adult vaccination in terms of racial and ethnic disparities as well.** Data from the 2017 National Health Interview Survey show disparities in influenza vaccination at baseline, with lower rates among Hispanic and Black adults compared with White adults in all age groups. CDC has been working to address racial and ethnic disparities by
  - Convening virtual listening sessions in July 2020 with external expert participants in health equity and immunization on strategies to reduce disparities in adult immunization
  - Awarding influenza vaccination supplements to 31 grantees of CDC's Racial and Ethnic Approaches to Community Health (REACH) program to support vaccination coverage for priority populations experiencing disparities in vaccination rates
  - Establishing partnerships with traditional and non-traditional partners who act as trusted messengers within communities of color to improve vaccine confidence
  - Leveraging existing CDC mechanisms to expand the reach of influenza and COVID-19 vaccination efforts through community-based organizations and partners
- **Influenza vaccine distribution** is well above last year's level and at least equal to many recent seasons. CDC purchased 2 million additional doses to vaccinate children newly eligible through the VFC program, as well as another 3 million additional doses to enhance influenza vaccination coverage among adults. CDC partnered with the Health Resources and Services Administration to ensure that these doses of late-season influenza vaccine are distributed and administered throughout the influenza season in 1,400 community health centers around the country.

Acute Flaccid Myelitis (AFM) Update

- Janell Routh, AFM Team Lead, provided a brief update on **AFM epidemiology and ongoing activities**.
  - While 2020 was anticipated to be a peak year for AFM based on previous trends in the United States of increases in cases every other year since 2014, no increase in AFM cases has been seen to date in 2020 . There have been 27 confirmed cases in the United States as of November 30. These numbers are much lower than seen in previous outbreak years and are more consistent with non-peak years.
  - COVID-19 prevention measures such as social distancing and wearing of masks may have reduced the circulation of enteroviruses (EVs) this fall and thus AFM.
  - An outbreak is unlikely to be seen in 2020; however, there is concern that an even larger outbreak may occur in 2021 due to the accumulation of susceptible persons.

- CDC continues to focus intently on surveillance for possible cases and remains prepared to respond to an increase, should one occur.

- **The AFM Task Force** continued to meet every 1 to 3 months throughout 2020; the group discussed the following topics:
  - Latest AFM surveillance data
  - Impact of SARS-CoV-2 pandemic on clinical care and AFM research
  - Rehabilitation services and outcomes for AFM patients
  - Criteria for the clinical diagnosis of AFM
  - National Institute of Allergy and Infectious Diseases workshop on AFM, EV-D68, and remaining research questions
  - Revised clinical guidance on the CDC AFM website
  - Modeling EV-D68 circulation and AFM and the potential impact of SARS-CoV-2
- An effort was made by CDC in 2020 to conduct **broad outreach and awareness**, particularly for frontline clinicians, to improve recognition of the signs and symptoms of AFM.
  - Clinician outreach and awareness included a national media campaign, Public Health Grand Rounds, *Vital*signs™ reports, over 10 webinars, publications, and promotion of AFM Awareness Month in July to ready national clinicians for the potential outbreak.
  - Parent engagement included AFM family stories, "Why I Care" videos with members of the CDC AFM team and key clinical partners to show the faces behind the work, and parent listening sessions in July and November.
  - Media efforts included a *Vital*signs™ telebriefing and press release that generated over 1,600 media reports and that reached over 8 million people on Twitter and over 1.4 million on Facebook.
- Despite the lack of cases this year, the **AFM work has continued**. Activities have included
  - Continuing to strengthen case-based and enhanced surveillance for AFM through the New Vaccine Surveillance Network platform, conducting pilot studies to improve timely recognition and case reporting, and supporting state health departments through ELC funding to continue to conduct surveillance for AFM cases even in the pandemic
  - Moving forward with projects to understand AFM pathophysiology, including documenting the clinical spectrum of illness through chart abstractions of confirmed cases; supporting the NIH natural history study; collecting long-term follow-up information on confirmed and probable cases at 2, 6, and 12 months; and following any clinical treatment updates that might occur
  - Continuing to characterize the etiologies causing AFM through enhanced viral surveillance, performing an EV-D68 serosurvey and viral shedding studies, examining enterovirus biology in neuronal and respiratory disease models, and developing immunoassays
- **Testing and diagnostics activities include**
  - Continuing standard laboratory testing for possible AFM cases
  - Sequencing and isolating EV strains
  - Implementing a BioFire analysis on received specimens to have consistent and systematic data across all AFM patients, which will be for research use only
  - Developing new EV antibody tools

- Validating new anti-EV-D68 IgG and IgM ELISAs (enzyme-linked immunosorbent assays) for potential diagnostic testing
- Adapting an EV peptide screen to a Luminex-based platform, which should be more efficient

- **Research and etiology activities include**
  - Working to characterize the differences in the EVs, particularly EV-D68, between historic and contemporary strains
  - Developing EV-D68 infectious clones to share with other laboratories for research purposes
  - Investigating cytokines to develop possible biomarkers for AFM
  - Adapting a serology microneutralization assay for small sample volumes, which is currently being used to conduct a national EV-D68 serosurvey using National Health and Nutrition Examination Survey (NHANES) sera samples from 1999 to 2018, the results of which are anticipated later in 2021
  - Assessing antibody-mediated enhancement *in vitro*

COVID-19 Update

Dr. Butler, DDID, provided a brief update on the COVID-19 response. The epidemic (epi) curve shows that transmission is at the highest that has occurred thus far, and the healthcare system is "groaning" under the burden of the pandemic. Cases have surpassed 67.5 million globally, with more than half a million cases being reported daily. Sadly, more than 282,000 Americans have lost their lives to COVID-19 and deaths continue on an upward trend.

- **CDC's response** as of December 7, 2020, has included the following:
  - 7,893 CDC personnel are supporting the outbreak response.
  - 1,440 CDC deployers have conducted 2,694 deployments to 233 cities across the United States and abroad.
  - 164 COVID-19 studies have been published in the *Morbidity and Mortality Weekly Report* (*MMWR*).
  - 4,113 documents have been developed to provide guidance for government agencies, businesses, and the public.
  - 199 million+ COVID-19 tests have been conducted by public and private laboratories in the United States.
  - 37.4 million+ is the number of times people have used CDC's online Coronavirus Self-Checker.
  - 627,000+ calls and emails have been made/sent to CDC-INFO (CDC's contact center).
  - 2 billion+ is the number of times people have looked for information on CDC websites.
  - 2.7 billion+ social media impressions have been made on 7,937 CDC response-related posts.
  - 41,000+ inquiries from doctors, nurses, or other clinical staff and health departments have been received by CDC.
- **More than 2,000 reports and recommendations** have been placed on the CDC website, some of the most recent of which include
  - Implementing Mitigation Strategies in Early Care and Education Settings for Prevention of SARS-CoV-2 Transmission — Eight States, September–October 2020

- Summary of Guidance for Public Health Strategies to Address High Levels of Community Transmission of SARS-CoV-2 and Related Deaths, December 2020
- The Advisory Committee on Immunization Practices' Interim Recommendation for Allocating Initial Supplies of COVID-19 Vaccine — United States, 2020
- Developing a Framework for Assessing and Managing Individual-Level Risk of Coronavirus Disease 2019 (COVID-19) Exposure in Mobile Populations
- Other guidance for ventilation and for workplaces and businesses

- **The National Wastewater Surveillance System** is a collaboration among CDC, HHS, other agencies throughout the federal government, and universities. Together this year, these groups implemented an evaluation of the usefulness of wastewater surveillance for detecting COVID-19. This effort includes work that has a goal of being able to identify infections that may occur in communities or institutions, specifically long-term care facilities (LTCFs). This tool will be most useful as a sentinel surveillance tool when the disease is fairly rare, and the tool takes advantage of the fact that viral ribonucleic acid (RNA) fragments detectable by polymerase chain reaction (PCR) are shed in the stool.
- **A key role of CDC has been to provide guidance** to be able to prevent COVID-19 with a goal of saving lives and eventually achieving economic recovery, community life, and societal function. This effort has included the evolution of recommendations as more has been learned about COVID-19 (particularly regarding asymptomatic transmission) in terms of wearing masks, maintaining distance, avoiding gatherings, identifying and isolating cases, protecting healthcare workers and high-risk groups, conducting contact tracing and quarantine, postponing travel, handwashing, and vaccinating widely.
- **The overarching objectives for the COVID-19 vaccination program** are to 1) ensure the safety and effectiveness of COVID-19 vaccines; 2) reduce mortality, morbidity, and incidence of COVID-19 disease; 3) help minimize disruption to society and the economy, including maintaining healthcare capacity; and 4) ensure equity in vaccine allocation and distribution.
- **Vaccine implementation involves multiple components**, including prioritization of populations, allocation, distribution, administration, safety, effectiveness, uptake, second dose, communications and guidance, and regulatory considerations. Public health impact relies on rapid, efficient, and high uptake of the complete vaccine series, with a particular focus on those at increased risk for severe COVID-19 illness. CDC has partnered with the U.S. Department of Defense and Operation Warp Speed to distribute vaccines as soon as possible.
- **In terms of the approach that CDC's Advisory Committee on Immunization Practices (ACIP) is using for COVID-19 vaccine allocation**, the recommendations build on the foundation of the work that was done by the National Academies in September 2020 and on the ethical principles of maximizing benefits and minimizing harms, promoting justice, mitigating health inequities, and promoting transparency.
  - Decisions are based on science, the real-world application of implementation, and ethics.
  - Employing this framework, ACIP identified groups for Phase 1a vaccination as healthcare personnel (HCP) and LTCF residents.
  - To date, nearly a quarter of a million COVID-19 cases have occurred among HCP, with more than 850 deaths.

- LTCF modeling demonstrates that more cases and deaths can be averted more efficiently at the facility by vaccinating staff compared with vaccinating residents.[3]
- COVID-19 exposure, inside and outside the healthcare setting, results in absenteeism due to quarantine, infection, and illness. Vaccination has the potential to reduce HCP absenteeism.

- **These are tough decisions, and they must be based on data**. One of the ways that ACIP is wisely prioritizing use of the vaccine is by focusing on LTCF residents, given that more than half of COVID-associated hospitalized patients over 75 years of age are admitted from LTCFs.
- **Additional work has been done in terms of clinical considerations** for Phase 1a populations, such as sub-prioritization if necessary.
- **The COVID-19 vaccine safety strategy** is an important component of establishing confidence and includes the goals to 1) use established systems to implement heightened safety monitoring for COVID-19 vaccines, 2) develop new platforms and leverage other federal data sources to complement existing systems, and 3) communicate clearly on the vaccine safety process and systems now and provide COVID-19 vaccine safety data and monitoring results once available. Some examples include
  - The Vaccine Adverse Event Reporting System (VAERS), which is a passive system that is co-managed by CDC and the FDA
  - CDC's new V-safe smartphone-based monitoring program for COVID-19 vaccine safety, which uses text messaging and web surveys to check in with vaccine recipients after vaccination. Participants can report any side effects or health problems experienced following COVID-19 vaccination, and the program includes active telephone follow-up by CDC for reports of significant health impact.
  - Vaccinate with Confidence, a national strategy to reinforce confidence in COVID-19 vaccines and that has three objectives: 1) regularly share clear and accurate COVID-19 vaccine information and take visible actions to build trust in the vaccine, the vaccinator, and the system; 2) promote confidence among HCP in their decision to get vaccinated and to recommend vaccination to their patients; and 3) engage communities in a sustainable, equitable, and inclusive way using two-way communication to listen, increase collaboration, and build trust in COVID-19 vaccine
  - Vaccine communication toolkits, which will include ready-made materials to inform HCP, patients, and communities about COVID-19 vaccines

Discussion Session A

Homelessness and Health

BSC members inquired as to whether other federal agencies had committed to collaboration with CDC in the homeless health initiative. Dr. Mosites indicated that so far, there have been great informal collaborations and joint COVID-19 deployments with the U.S. Department of Housing and Urban Development and close work with the National Health Care for the Homeless Council, but not quite as close a relationship yet with the Substance Abuse and Mental Health Services Administration.

[3]See: Slayton RB, Modeling Allocation Strategies for the Initial SARS-CoV-2 Vaccine Supply slide set presented at the August 26, 2020, ACIP meeting.

AFM

- There has been an impressive absence, similar to what is being observed with general respiratory virus circulation in primary care.
- It will be interesting to see how the non-COVID experience will change behavior in the coming years.
- It is interesting that rhinovirus is the exception.
- Wisconsin's school-based surveillance is seeing only SARS-CoV-2 and rhinovirus.

COVID-19

- Strong guidance was suggested for healthcare workers to reduce transmission through fomites in their workplaces apart from personal protective equipment, masks, and ventilation control, and other airborne transmissions. For instance, guidance would be beneficial on how to sanitize coats, scrubs, and oneself upon arriving home from work.
- It is very disturbing to see the decrease in routine immunizations due to COVID-19.
    - This decrease is particularly troubling in terms of measles-containing vaccines and polio vaccines. The polio vaccination effort has softened throughout the world, a situation that may be further exacerbated and may result in importation of polio into the United States.
    - If creative solutions are not employed to address this decrease, there are likely to be measles outbreaks in a couple of years or sooner when people begin to gather again.
    - One suggestion would be to think about ways to address the situation, including using the COVID-19 immunization program as an opportunity for outreach.
- Concern was expressed about why the BSC has not met in the last year that the COVID-19 pandemic has been underway. Dr. Butler expressed appreciation for the nearly 100% attendance during this meeting, apologized for not being able to meet in the summer due to a variety of factors, emphasized that this group is going to be critical going forward in terms of providing input, and that he looks forward to more meetings in the future.
- ACIP found the CDC modeling work on allocation to be instrumental in arriving at decisions, particularly with regard to LTCFs, and expressed gratitude for that work.
    - It would be extremely beneficial if CDC would make the modeling results and rationale for the recommendations public, given that the models have not been vetted or peer reviewed. They must be "ready for prime time" in order to base policy on them.
    - Dr. Butler indicated that one of the models on mitigation was put through a peer review process. One area that would be welcomed from the BSC, DDID over the coming year is advice on how to communicate this to health professionals and the public. Modeling sounds like a "black box" to some people.
- School closings and non-pharmaceutical interventions (NPIs) have had a profound effect on influenza and all other respiratory illnesses.
    - Perhaps an evaluation could be done of NPIs to assess antibiotic resistance and intervention for influenza and other classic infectious diseases, particularly now that it is clear that schools can "turn on a dime" to shift from in-person to virtual classes.
    - Perhaps something will be learned about the duration of protection of influenza vaccines.
    - School closures also must be examined carefully in the context of the cost to students' education, food security, and mental well-being.

- Dr. Butler indicated that CDC is very interested in examining the issue of NPIs further, and the issue seems to align with some of the data on hospital infections that came out of Asia with the severe acute respiratory syndrome (SARS) epidemic in 2003. COVID-19 is unusual in terms of community mitigation efforts, which have been very layered and complex in the impact they have had on respiratory illnesses. Pursuing evaluation of this is of high interest and can be added as an agenda item for the next meeting.
- Dan Jernigan—Director of the Influenza Division, NCIRD—added that little influenza was identified in the Southern Hemisphere due to high mitigation efforts that were underway during winter there. Since that time, the U.S. season has been monitored through the usual means. An additional multiplex combination influenza/SARS-CoV-2 assay, which is reagent-sparing, was cleared by the FDA. This approach is anticipated to be an alternative to collecting both influenza and SARS-CoV-2 data with as parsimonious a use of reagents as possible. Public health laboratories are seeing very little influenza circulation in the United States at this point, similar to the 2011–2012 season. In addition, there have been very few hospitalizations due to influenza. It is not clear at this point whether this pattern will continue, or whether the influenza season may be delayed.

- Another major negative corollary of the COVID-19 pandemic has been decreased uptake of platforms that are used for sexually transmitted infection (STI) diagnostic testing, given the impossibility of performing routine screening, let alone diagnostic testing, in many settings.
  - There also are indications that people are not accessing pre-exposure prophylaxis (PrEP) for HIV prevention, and an increase in acute HIV infections is being seen in emergency departments.
  - Dr. Butler acknowledged that the secondary effects of the pandemic will be a crucial part of the "story" in terms of infectious diseases that have not been screened/treated and chronic diseases that have not been optimally managed. Some of the work by NCHS on excess mortality in 2020 highlights that there are deaths that may be driven by COVID-19 but are not identified as such, and also an increase in deaths caused by other conditions.
  - Jono Mermin, NCHHSTP Director, recognized that this is a major issue and that CDC is assessing and documenting some of the changes. For instance, the number of reported cases of STIs decreased by approximately 50% for the first few months of 2020 but have now increased to where they were beforehand. A similar pattern has been true for HIV, for hepatitis C, and somewhat for tuberculosis. The plan is to ascertain what proportion is attributable to reporting, testing, and actual incidence and fundamentally to determine how to address the issue other than just monitoring. The biggest impact appears to be on community-based activities like routine screening. Guidelines have been published to address routine screening and make PrEP easier.
- The BSC observed that the ventilation guidelines mention ultraviolet (UVC) lighting in terms of the airborne threat of COVID-19.
  - This UVC lighting has been in use since 1943 and has been used extensively for TB.
  - Perhaps CDC could create materials pertaining to how to make public spaces safe. Schools, homeless shelters, et cetera where UVC lighting has been utilized have had very low rates of COVID-19.
  - Dr. Butler indicated that UVC lighting and room ventilation are part of a broader discussion of transmission. This would be a great topic for a future meeting.
- Concerns have been raised about the potential for V-safe to be hacked and/or used as an opportunity to enter information that makes the vaccine look worse in terms of adverse events than

it actually is. Dr. Butler indicated that the concern relates to the QR (Quick Response) code, which CDC is engaged in discussions about internally. The system should be able to recognize the same code being entered multiple times.

- COVID-19 testing continues to be fraught with issues, so guidance would be highly welcomed.
  - Testing still seems to be fairly random and done differently in different states and jurisdictions.
  - Supply shortages continue.
  - There are issues with interpretive criteria in terms of cycle threshold (Ct) values. A commentary on this subject is anticipated in *The New York Times*, and already there is pressure to report Ct values, which may or may not mean anything.
  - The message that a negative result does not mean someone is not infected is critical to convey. For instance, people tested negative boarding a cruise ship who then tested positive once they were out to sea.
  - Perhaps there is a role for the BSC's Infectious Disease Laboratory Working Group to convene to address some of these issues with CDC.
  - Dr. Butler noted that much of the testing work has been outside CDC for a number of months. CDC published specific guidelines, and a specific individual from CDC is now dedicated to addressing testing. There is agreement that there needs to be a more strategic approach to utilizing these tools. Another aspect is continuing to recognize the critical role that transmission by people who are asymptomatic or minimally symptomatic may play.

Vector-Borne Diseases

- During the last BSC meeting, there was excitement about the new Regional Centers of Excellence and the goal to expand the program from 5 to 10 centers. The BSC wondered whether that program would continue and would be expanded as hoped. Deb Lubar, Deputy Director for Management and Operations, NCEZID, reported that the five centers were funded through December 2021 with Zika supplemental funding; however, it will not be possible to maintain or expand without sustainable resources past that date.
- With potentially changing priorities in the coming months, perhaps the interface of climate change and infectious disease will receive increased attention.
  - Work has continued to move forward in terms of this interface, albeit rather quietly. For example, a number of staff participated in a National Academies of Sciences, Engineering, and Medicine meeting in November 2019 on microbial threats related to Arctic warming.
  - Perhaps the disbanded Vector-borne Diseases Workgroup members could re-engage individually and help with a coordinated strategy to share successes and endorse expansion.

Brief Report Back from the Food Safety Modernization Act Surveillance Working Group

Ann Garvey—State Public Health Veterinarian and Deputy State Epidemiologist, Iowa Department of Public Health, and FSMA SWG chair—provided a report from the workgroup. When FSMA was signed into law in 2011, it provided the FDA with new enforcement authority and authorized CDC to establish the FSMA SWG. The workgroup is charged with providing advice and recommendations regarding the improvement of foodborne illness surveillance to the HHS Secretary through the BSC, DDID in the areas

of 1) governmental coordination and integration; 2) evaluating and improving surveillance systems; and 3) external stakeholder collaboration and communication.

December 2020 FSMA SWG Meeting

The FSMA SWG met earlier in the week, on December 7–8, during which time they discussed the following topics:

- **The impact that the pandemic is having on foodborne programs** at the state epidemiology and laboratory levels, including the following challenges:
  - Staff reassignments, particularly because many foodborne epidemiologists are highly skilled at interviewing, data analysis, and other key roles needed for the pandemic response
  - Recruitment, given that many agencies in the private and public sectors are all competing for the same workforce
  - Laboratory issues at the state level, given that laboratories are prioritizing COVID-19 to the exclusion of much of the other standard infectious disease work that they do and are having to send that work to regional laboratory networks that often are not able to perform testing on non-COVID infectious diseases
  - Laboratory supply shortages and how these are going to affect testing across all non-COVID infectious diseases going into 2021
  - Surveillance issues in terms of a decrease in specimen submission for foodborne illness whole genome sequencing (WGS) and a decrease in outbreaks detected
- **The FoodNet population survey** is a critical survey that provides region-specific, population-based estimates on exposure to specific foods, other exposures potentially leading to acute diarrheal illnesses, and medical care–seeking behavior.
  - It is used extensively at the local, state, and federal levels during foodborne disease investigations, as well as used in generating disease burden estimates of diarrheal illnesses.
  - A new set of data will be released to partners in the coming weeks, with extensive analytic improvements and technical guidance.
  - A new publicly accessible web portal has been established, which provides online calculations of population survey results and which should be a tremendous asset for all public health sectors.
- **Recurring, emerging, and persistent bacteria strains**
  - These strains can now be identified with more confidence using WGS.
  - The criteria are being refined for establishing which strains are part of the list.
  - CDC is working with partner agencies across disciplines and sectors to implement public health control measures when these strains are causing illnesses and to conduct surveillance for strains that may not be known to circulate in the United States but that are causing severe illness in other parts of the world.
  - Success stories were shared regarding widespread industry adoption of an animal health vaccine for a REP strain that also causes illness in humans.
- ***Cyclospora* cluster surveillance**
  - CDC is continuing to identify the genomic markers and analyze laboratory data in parallel with the epidemiologic data that are being collected in outbreak settings.

- CDC is working with the FDA to share clinical and environmental data to better understand what the genomic markers mean and how they can be applied to the field and be used in cluster identification.

- **The FSMA SWG FY 2020 Annual Report to the HHS Secretary** has been delayed because of the pandemic response and the cancellation of the May 2020 meeting but is expected to be presented during the May 2021 meeting.

Update on CDC's Global Health Work

Ebola Response

Joel Montgomery, Ebola Response Incident Manager and Chief, Viral Special Pathogens Branch, Division of High-Consequence Pathogens and Pathology, NCEZID, provided an update on the successes and challenges involved in the response to the recent outbreaks of Ebola in the Democratic Republic of the Congo (DRC) and the path forward in terms of responding to and preventing Ebola outbreaks in DRC and other countries.

Ebola Refresher

- Ebola is a rare and deadly disease that was first discovered in 1976 near the Ebola River in DRC, with six new species discovered over the years, two of which are not known to cause human virus.
- Each of the species known to cause human illness has slightly different case fatality rates, with *Zaire ebolavirus* as the highest.
- Outbreaks in people have occurred sporadically in Africa over the past several decades, with three outbreaks in DRC since early 2018.
- Ebola is spread through direct contact with
  - Body fluids of someone sick with or who has recently died from Ebola or contact with objects contaminated with infected body fluids
  - Reservoir species (likely bats), infected non-human primates, et cetera

  The semen of a man who recovered from Ebola was also a source of transmission.
- Once spillover events occur to an index case, amplification and transmission in the human population can and often does occur through nosocomial transmission or transmissions within the healthcare system.
- The signs and symptoms generally follow an incubation period that ranges from 2 to 21 days, but on average it is usually between 4 and 10 days.
- The typical signs and symptoms of Ebola disease are fever, headache, fatigue, muscle pain, vomiting, diarrhea, and abdominal pain, with unexplained hemorrhage usually occurring in less than 50% of cases.
- A person infected with Ebola virus is not contagious until symptoms appear, as opposed to other diseases such as COVID-19.
- It is now known that relapse in survivors is possible though rare, with five known cases of relapse.

Recent Ebola Outbreaks in DRC

- There have been 11 Ebola outbreaks in DRC since 1976. Incredibly, 3 of the outbreaks have taken place since early 2018, 2 of which overlapped.
- DRC's 9th outbreak occurred from May to July 2018 in Equateur Province. This outbreak resulted in 54 cases and 33 deaths.
- DRC's 10th outbreak occurred from August 2018 to June 2020 in North Kivu, South Kivu, and Ituri Provinces. The outbreak resulted in 3,470 cases and 2,287 deaths. It was the second largest outbreak in Ebola history, second only to the 2014–2016 West Africa Ebola outbreak that occurred in Guinea, Sierra Leone, and Liberia.
- DRC's 11th Ebola outbreak occurred from June to November 2020 in the Equateur Province and resulted in 130 cases and 55 deaths.

2018 Eastern DRC Outbreak (also referred to as the North Kivu or 10th outbreak)

Overview

- The DRC Ministry of Health confirmed the outbreak in North Kivu Province on August 1, 2018. This was just 1 month after the 9th outbreak was declared as being over in the West of the country.
- CDC then activated its Emergency Operations Center on June 13, 2019.
- Eventually, the World Health Organization (WHO) declared the outbreak a Public Health Emergency of International Concern (PHEIC), on July 17, 2019.
- On June 25, 2020, WHO eventually lifted the PHEIC status and declared the outbreak over.
- More than 220,000 samples were tested, and more than 300,000 individuals were vaccinated.
- Toward the end of the outbreak, the COVID-19 pandemic began to affect response efforts of the 10th outbreak.
- Unfortunately, partners began to reduce their footprints and the increasing travel restrictions began to affect travel and deployments of the partners, including CDC.
- The capacity built from Ebola is now used to respond to the COVID-19 outbreak for contact tracing and follow-up.

Challenges

- Porous internal and external borders combined with high population mobility, along with extensive movement in and out of North Kivu and Ituri Provinces—making it difficult to identify cases, conduct contact tracing, and isolate cases
- Misperceptions that lead to mistrust
- Community reluctance, refusals for engagement, resistance to vaccination activities
- Gaps in infection control practices leading to transmission in healthcare settings
- Unsafe burials that can amplify transmission
- Delayed presentation of patients to Ebola treatment units (ETUs), leading to late administration of treatment and therapeutics
- Security issues, including ongoing violence aimed at Ebola response efforts

Success: Safe/effective vaccine to prevent Ebola Zaire

- This is a live-attenuated recombinant vesicular stomatitis virus (rVSV) vaccine expressing the glycoprotein of Zaire Ebola virus.
- The vaccine was developed by the Public Health Agency of Canada (PHAC), and Merck currently holds the intellectual rights.
- The vaccine is administered as a single dose (2 x 107 pfu/mL), making it ideal for outbreak situations.
- The vaccine must be stored at -60^{0}C or lower.
- The investigational vaccine was administered under an expanded access protocol during the outbreak and was eventually licensed by the FDA on December 19, 2019, for use in recommended U.S. populations.
- Vaccine efficacy has been demonstrated to be as high as 100% in a 2-part, Phase III, open-label cluster randomized controlled ring vaccination conducted in Guinea from 2014–2016.
- The safety of the vaccine also has been shown to be quite good, with only some temporary arthritis or arthralgia and/or fever in some recipients.
- In terms of the epi curve, the exponential growth that was characteristic of the West African outbreak was not seen in the North Kivu outbreak, likely because more than 300,000 individuals were vaccinated during the outbreak. This strongly suggests that vaccination for Ebola during outbreaks does work in tandem with the "tried and true" methods of case identification, contact tracing, and patient isolation.

Success: Treatments/therapeutics

- In addition to the vaccine, at least two therapeutics have shown very good efficacy during the DRC outbreak.
- The PALM (Pamoja Tulinde Maisha, "Together Save Lives") trial was initiated in November 2018.
- This randomized, multi-center clinical trial in DRC had four arms applying four different therapeutics: Remdesivir (Gilead Sciences), ZMapp (Mapp Biopharmaceutical), mAb114 (Ridgeback Biotherapeutics), and REGN-EB3 (Regeneron Pharmaceuticals).
- mAB-114 and REGN-EB3 demonstrated good efficacy, so the trial was halted.
- REGN-EB3 was approved by the FDA on October 14, 2020.

2020 Equateur Outbreak (also referred to as the 11th outbreak)

Overview

- The 2020 Equateur outbreak was announced on June 1, 2020, just as the outbreak in the East was anticipating its end.
- The first cases in the 11th outbreak were confirmed in the provincial capital of Mbandaka, in the same province as the 9th outbreak in early 2018.
- The 11th outbreak occurred primarily in a rural, quite remote setting that consists primarily of remote rainforest villages. However, Mbandaka has significant river connections to the city of Kinshasa and neighboring countries, including the Republic of the Congo. Individual suspect cases moved across the river on numerous occasions, which was quite concerning because the capabilities in the Republic of the Congo are far less than in DRC.
- Transportation within Equateur is primarily via river and helicopter, and occasionally roads during a dry or not-so-wet season.

- The sequencing of the samples, though still preliminary, suggests that cases were linked to both a new spillover event and the 2018 Equateur outbreak.
- The linkage to the 2018 outbreak is believed to have occurred through a relapse case, though investigations are still underway to identify survivors from the 9th outbreak who may have been the source for the new outbreak.
- There appear to have been two introductions, one from a suspected reservoir species and another from the relapse case from 2018. However, the vast majority of cases from the 11th outbreak were due to a new reservoir species spillover.
- This outbreak does demonstrate that survivors potentially can serve as a source of a new introduction into the human population, which was not realized before the 10th and 11th outbreaks in DRC.
- This 11th outbreak was declared over on November 18, 2020, with 130 cases (119 confirmed, 11 probable, 55 deaths, 75 survivors).
- There is an active survivor program now in the West and East to follow survivors for viral shedding, antibody duration, potential for relapse, and well-being.

Challenges

- In this case, there was poor vaccination coverage most certainly due to the remoteness of the location. Nevertheless, more than 43,000 people were vaccinated.
- Only 32 cases (42% of cases in ETUs) were provided with therapeutics, which also was likely due to the remoteness of the location. Because of the remoteness, the Institutional Review Board for the therapeutics research protocol utilized mobile teams to deliver the therapeutics.
- Contact tracing efforts were limited, so there were numerous new cases with no known epidemiologic link.
- The likely reason for the limited contact tracing efforts is the remoteness and significant issues with workforce development in that region.
- Again, COVID-19 affected response resources and activities due to travel restrictions and quarantine regulations. Despite these challenges, CDC began deploying teams to Mbandaka and Ingende in late August 2020.

Success: Laboratory

- A major success in the response is that CDC deployed almost 4,000 pounds of equipment and supplies to establish a mobile laboratory in Ingende. This was one of the first times in quite some time that CDC deployed a mobile laboratory to DRC, in collaboration with the Ministry of Health.
- The laboratory was staffed by CDC and the Institut National pour la Recherche Biomédicale (INRB).
- Tests also were run in this laboratory to monitor the health of patients in the ETUs.
- In total, the mobile laboratory tested more than 1,400 samples for Ebola.

Moving Forward

Overview

- Ebola outbreaks will continue to occur in DRC and likely in West Africa at some point, given that animal reservoirs are present in all these countries.
- Therapeutics and improved care will increase the number of survivors, which increases the chance for new cases due to relapse or sexual transmission. It is known from West Africa that men can shed

infectious virus in their semen for up to 17 months post-recovery and samples can be positive by rRT-PCR (real-time reverse transcription polymerase chain reaction) for up to 3.3 years.

- CDC will continue to work with the DRC Ministry of Health and partners to build capacity to quickly detect and respond to future outbreaks of Ebola.

CDC–DRC capacity-building investments

- The success in Ebola virus outbreaks demonstrates the progressive improvements in building health security capacity in the region, as well as improvements in research and development through the creation of a vaccine, new therapeutics, and new diagnostics.
- In terms of workforce development, CDC established the Field Epidemiology and Laboratory Training Program (FELTP) in Cameroon in 2009 thanks to the Bill & Melinda Gates Foundation. Due to demand for field epidemiology training in DRC, CDC created the DRC FELTP in 2011. These trainees speak French and were crucial to the West Africa and recent DRC Ebola responses. There remains an important role and opportunity for CDC subject matter experts in engagement with and training of staff.
- Regarding epidemiologic surveillance and laboratory testing capacity, the GeneXpert platform was distributed country-wide for TB testing and became the go-to Ebola testing method during the 9th, 10th, and 11th DRC outbreaks.
- Concerning emergency management, the three DRC emergency management specialists trained at CDC as part of the Public Health Emergency Management Fellowship and two of these graduates played key roles in the DRC Incident Management Structure in the North Kivu 10th outbreak and later in the Equateur 11th outbreak.

Center for Global Health (CGH) Update

Overview

Rebecca Martin, CGH Director, focused on three items in her update: 1) impact of COVID-19 on large-scale CDC global programs and innovations that have been implemented to sustain and maintain essential service delivery work; 2) importance of the infrastructures and systems that have been critical in host countries' response efforts to COVID-19; and 3) a high-level overview of CDC's global COVID-19 response and the connection to the priority of future work.

CDC's global health goals are to have impact in health security, health impact, and public health leadership. Building public health infrastructure and strengthening public health systems are crucial to the work that CDC does so that all countries can be prepared to prevent, detect, and respond to health threats. CDC has a presence in more than 50 countries throughout the world and four new additional regional offices.

COVID-19 Impact on Large-Scale CDC Global Programs/Innovations

- Delivery of lifesaving prevention and treatment programs are challenged by COVID-19.
- **In terms of HIV/AIDS**
  - According to the Global Fund Results Report 2020, deaths from HIV/AIDS in sub-Saharan Africa could double in the next 12 months.
  - There have been results to show a 50% decrease in the volume of HIV testing in some countries, which could lead to a rise in new infections if people are unaware of their status and continue to transmit the disease.

- **According to the Stop TB Partnership,** COVID-19 could result in an additional 525,000 TB deaths in 2020 compared with levels in 2018.
  - As of June 2020, approximately 20% of laboratory services for TB were experiencing high levels of disruption due to COVID-19.
  - TB case notifications also have decreased by up to 75% in some countries.
  - Similarities with the initial symptoms of COVID-19 and TB have caused confusion with identification and treatment of TB patients.
  - Molecular diagnostic instruments for TB have been diverted to the COVID-19 response.
- **Regarding malaria**
  - WHO estimates that COVID-19 could result in an additional 382,000 malaria deaths in 2020.
  - In some countries, the mosquito net distribution campaigns have been delayed or paused.
  - Case management for malaria also has been affected by constraints of movement and availability of healthcare workers.
  - Symptoms related to malaria, particularly fever, often are confused with COVID-19 symptoms.
  - People also are not seeking treatment for malaria due to fear of contracting COVID-19.
- **Related to vaccine-preventable diseases (VPDs)**
  - Most annual mass VPD campaigns have been stopped due to COVID-19.
  - For polio, supplemental immunization activities were paused for March–August 2020.
  - It is estimated that more than 80 million children under the age of 1 year have been affected by disruptions in routine immunizations in more than 68 countries, putting them at risk for VPDs.
  - CDC is assessing and modeling the impact of COVID-19 on its work moving forward.
- **With respect to measles**
  - CDC has safely been conducting a measles vaccination campaign in Ethiopia during the COVID-19 pandemic.
  - As of November 2020, only 8 countries have moved forward with their planned campaign, leaving more than 92.2 million people in 29 countries unprotected from measles.
  - In thinking about how to deliver a measles vaccination campaign with innovation, safety, and partnerships, Ethiopia implemented a nationwide measles immunization campaign in 2020.
    - The campaign required additional protective measures and increased resources, so CDC supported it technically and with financial resources.
    - More than 6,300 additional healthcare workers were mobilized to minimize crowding and to increase physical distancing at vaccination posts.
    - Training, masks, and hand sanitizer were provided for health workers and campaign staff.
    - Three additional days had to be added to the campaign to decrease the crowd size.
    - More than 14.5 million children in Ethiopia were vaccinated who otherwise would have remained at risk for measles.
    - Nationwide vaccination coverage was 95%.
    - This campaign in a very large country serves as a litmus test for other countries, especially given that 40 countries have paused their plans for measles campaigns in 2020.

Highlights of CDC's Critical Infrastructure/Systems Efforts in Host Countries' Responses to COVID-19

- **Global health security**
  - Investments in building in-country capacity were used for COVID-19 response.
  - CDC-trained disease detectives were called upon for response activities.
- **HIV/TB**
  - Historical investments provided critical infrastructure for COVID-19 response efforts.
  - Core activities for HIV prevention, testing, and treatment in country programs were maintained and were a focus.
  - To highlight an adaptation for providing antiretroviral treatment to clients, multi-month medication dispensing occurred using differentiated service delivery models such as providing 6 months instead of 1 month of treatment; in Thailand, the post system was used to mail treatment to clients.
- **Malaria**
  - Investments in national Malaria Control Programs supported COVID-19 response.
  - Methods were identified for safely delivering interventions and assisted in developing international guidance for tailoring malaria interventions.
- **Immunization**
  - An existing network of thousands of polio workers was used to support COVID-19 response.
  - Infection prevention and control guidance was developed for vaccinators and help was provided to develop a framework for the resumption of immunization activities.

CDC's Global COVID-19 Response

- The goals of CDC's international COVID-19 response are to 1) inform the response domestically and internationally, 2) protect the health of the populations of partner nations, 3) protect the health of Americans overseas, and 4) reduce the risk of importations to the United States.
- CDC's global COVID-19 response works toward these goals by taking the following actions:
  - Leveraging longstanding relationships and on-the-ground presence to support partner nations immediately
  - Preserving critical public health programs (e.g., polio, measles, malaria, HIV, and TB)
  - Programming new resources and providing technical support (e.g., guidance, training, analyses) related to emergency response, surveillance, strengthening of laboratory capacity, infection prevention and control, mitigation measures, conducting of epidemiologic studies, introduction of mortality surveillance, and technical assistance for readiness to receive vaccines and track adverse events
  - Building on existing, programs, global health security activities, and other surveillance platforms
  - Supporting multilateral organizations (deployments, detailed staff, resources, collaboration)
  - Supporting information sharing with other countries and partners

- With these goals in mind to inform the domestic response and protect Americans, CDC has learned much from studies outside the United States, with two highlighted here:
  - Singapore demonstrated that taking an aggressive approach to contact tracing and widespread testing can position a nation well in a pandemic response.[4]
  - South Korea demonstrated that early development and scale-up of tests and maintaining extensive testing and contact tracing could help a country maintain a low fatality count and low overall case count.
- CDC's Global Rapid Response Teams are composed of CDC public health experts who are ready to deploy on short notice.
  - While this is a global-focused effort, CDC has turned it into a domestic effort to respond to COVID-19 in the United States.
  - Between January and August 2020, there have been 393 total deployments to almost every state, tribal area, and territory to support the domestic response.
- The connection of CDC's global COVID-19 response to the priority of future work focuses on knowing where the agency has been, what its assets are, and how its work has been operationalized.
  - Perhaps one of the most critical lessons CDC has learned out of the COVID-19 pandemic is that the work being done in global health security and building public health capacity and infrastructure was on the right track. There is a lot more to do, but this was very critical in countries' being able to prepare for the pandemic and respond rapidly.
  - Through the FELTP, CDC has worked with more than 90 countries to train more than 18,000 graduates.
    - Many graduates are now in leadership positions in their ministries of health.
    - FELTP trainees and graduates have played a significant role in the response in their countries. For example, 98% of program trainees or graduates have been supporting country-level coordination and 97% have been supporting surveillance response teams and case investigations.
    - It is very clear that the trainees and graduates are on the frontlines in their countries in responding to the pandemic and ensuring that their countries are moving forward in their response measures to stop transmission.
  - National public health institutes (NPHIs) bring together the components of public health infrastructure.
    - Many NPHIs are now taking the lead in their countries and coordinating the preparedness and response activities for COVID-19.
    - One example is in Pakistan, where the NPHI developed the case definition, put out standard operating procedures, prepares health advisories, and leads laboratory testing efforts.
    - This is so important in terms of thinking about homes for the sustainable public health infrastructure that is needed in countries.

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[4] Ng Y, Li Z, Chua YX, et al. Evaluation of the Effectiveness of Surveillance and Containment Measures for the First 100 Patients with COVID-19 in Singapore — January 2–February 29, 2020. MMWR Morb Mortal Wkly Rep 2020;69:307–311.

Discussion Topics for the BSC

- Communicating and sharing information about CDC's global health work
- Documenting the impact of COVID-19 on our essential global health programs
- Planning for CDC's future role in global health

Update on Social Determinants of Health

Leandris Liburd, Director, Office of Minority Health and Health Equity (OMHHE), provided an update on SDOH, including 1) reviewing definitions of health equity, health disparities, health inequities, and SDOH; 2) describing increasing interest in health equity and SDOH in public health policy and practice; and 3) summarizing key considerations for greater attention to addressing the impact of discrimination, including racism, on health disparities and inequities in populations put at high risk for infectious disease.

Definitions

- **Health Equity:** The attainment of the highest level of health for all people. Achieving health equity requires valuing everyone equally with focused and ongoing societal efforts to address avoidable inequalities, historical and contemporary injustices, and the elimination of health and healthcare disparities.[5]
- **Health Disparities:** Differences in health outcomes and their determinants between segments of the population, as defined by social, demographic, environmental, and geographic attributes. These disparities are a particular type of health difference that is closely linked with social, economic, and/or environmental disadvantage. Health disparities adversely affect groups of people who have systematically experienced greater obstacles to health based on their racial or ethnic group; religion; socioeconomic status; gender; age; mental health; cognitive, sensory, or physical disability; sexual orientation or gender identity; geographic location; or other characteristics historically linked to discrimination or exclusion.[6,7]
- **Health Inequities:** Systematic, unfair, and avoidable differences in health outcomes and their determinants between segments of the population, such as by socioeconomic status, demographics, or geography.[8,9]
- **Social Determinants of Health:** Conditions in the environments in which people are born, live, learn, work, play, worship, and age.[10]

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[5] U.S. Department of Health and Human Services, Office of Minority Health. National Partnership for Action to End Health Disparities. The National Plan for Action Draft as of February 17, 2010 [Internet]. Chapter 1: Introduction.
[6] Truman BI, Smith CK, Roy K, et al. Rationale for Regular Reporting on Health Disparities and Inequalities — United States. MMWR Surveill Summ 2011;60(suppl):3–10.
[7] Healthy People 2020 Disparities.
[8] Braveman P. Health Disparities and Health Equity: Concepts and Measurement. Annu Rev Public Health 2006;27:167–194.
[9] Braveman P, Gruskin S. Defining Equity in Health. J Epidemiol Community Health 2003;57:254–258.
[10] Healthy People 2020 Social Determinants of Health.

Increasing Interest in Health Equity and SDOH in Public Health Policy and Practice

- A table from an article by Raphael in 2011[11] begins with mention of the Ottawa Charter for Health Promotion, which was developed in 1986.
  - It was the outcome of a meeting organized by WHO in response to what was then viewed as a new movement in public health known as "health promotion."
  - Since that time, there has been global interest in the intersection between a number of social conditions and factors and health outcomes.
  - The Ottawa Charter lists the following factors that tend toward health promotion: peace, shelter, education, food, income, a stable ecosystem, sustainable resources, social justice, and equity.
  - These conversations have continued since that time.
- In terms of caring about SDOH and why they matter[12]
  - SDOH affect a wide range of health, functioning, and quality-of-life outcomes and exposures to risk and protective factors.
  - SDOH are linked to health disparities.
  - The conditions in the environments surrounding us shape options, opportunities, and resources for health.
  - Addressing SDOH has immense potential to advance health equity because extending access to physically, materially, and psychosocially healthy environments may decrease health gaps between populations.
- Even at the level of HHS, there has been a focus on SDOH beginning with Healthy People 2020.
  - The first SDOH topic area in the 40-year history of Healthy People was launched almost 10 years ago. It has been well-received and leveraged by many entities and has continued into Healthy People 2030.
  - There are five domains of SDOH: Education Access and Quality, Health Care Access and Quality, Neighborhood and Built Environment, Social and Community Context, and Economic Stability. The domains were selected based on the literature and the amount of evidence that supported them as SDOH. Within the domains are 19 priority topics. For instance, the Social and Community Context domain contains topics being followed by Healthy People to track progress over time in the areas of Social Cohesion, Discrimination, Civic Participation, and Incarceration.
- In terms of incorporating SDOH into all aspects of public health work
  - Increasingly, public health departments are grappling with how to address some of these issues, given that many of the issues are outside what is viewed as the traditional purview of public health and medicine, even though the impact of their everyday efforts can be stymied when these factors are not confronted.

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[11] Adapted from: Raphael D. A Discourse Analysis of the Social Determinants of Health. Critical Public Health 2011; 21:221–236.

[12] Healthy People 2020 Social Determinants of Health.

- Public health departments and their partners need to consider how conditions in the places where people live, learn, work, and play affect a wide range of health risks and outcomes.
- Models and frameworks are available to chart a course of action so that public health practitioners can transform and strengthen their capacity to advance health equity.
- One example is incorporating SDOH into the 10 Essential Public Health Services.
    - There was much energy around creating the 10 Essential Public Health Services in the early 1990s in the midst of health reform, and public health wanted to be sure that public health and its value and place in health reform were not lost.
    - This framework serves as a description of the activities that public health systems should undertake in all communities, and they are organized around what are considered to be the core functions, or domains, of public health: Assessment, Policy Development, and Assurance.
    - In January 2020, these standards were revised, refreshed, and updated. Equity is now at the center of the 10 Essential Public Health Services and is intended to focus on equity as essential to public health practice needs now and in the future.
    - The **Assessment** domain focuses on collecting information and monitoring, investigating, and addressing health problems that are affecting the population. Incorporation of SDOH provides an opportunity to identify root causes of a health issue and engagement with others to ascertain what is happening in a community and the needs of that community.
    - The **Policy Development** domain focuses on assessment to develop practices, strategies, and policies in public health and whether to engage in outreach or to develop health improvement plans. Addressing SDOH through policy moves the work farther along to educate and mobilize communities and implement policies and strategies that might improve health over time. There also are opportunities in policy development to use legal or regulatory actions.
    - The **Assurance** domain builds upon the Assessment and Policy Development domains by developing policies and practices to address the evidence identified. Assurance also is about improving on and innovating in what has been done by building, changing, or maintaining what has already been implemented, such as building a strong organizational culture and infrastructure.

Key Considerations for Greater Attention to Addressing the Impact of Discrimination, Including Racism, on Health Disparities and Inequities in the Future

- Root causes from the standpoint of health equity are factors that affect multiple risk factors and disease outcomes over time.[13]
  - Systems and patterns that perpetuate these root causes are often hidden to some but have the ability to "get under the skin" and compromise health outcomes.
  - Racism is a fundamental cause of health disparities affecting racial and ethnic minority groups.
  - Racism and other fundamental causes operate through multiple mechanisms to affect health.
  - Scholars have identified three levels of racism: institutionalized, personally mediated, and internalized.
  - While these different types of racism operate in multiple ways, research on racial discrimination and health has focused primarily on interpersonal discrimination (i.e., psychological well-being).
  - Although it is important to focus on interpersonal racism, the other levels are also critical to better understand how they affect health outcomes.
- By way of example, disparities in influenza vaccinations between non-Hispanic Whites, Blacks, and Hispanics are well-documented.[14]
  - Why these disparities exist is not as well-studied or -documented and much more work is needed in order to drill down, address them, and then increase coverage.
  - It is known that factors such as historical distrust, health insurance, access to care, transportation, childcare, and other social factors impact the ability of these populations to access care.
- Another example is health disparities in HIV/AIDS incidence, prevalence, and deaths that have roots in racism.[15]
  - Racial/ethnic disparities exist in the medical treatment received and in the survival of people living with HIV.
  - Prevalence of HIV infection and the number of HIV-related deaths were greatest among Black individuals and persons living in the South.

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[13] Sources: Ford CL, Griffith DM, Bruce MA, and Gilbert KL. Racism: Science & Tools for the Public Health Professional. APHA Press, 2019; Phelan JC and Link BG. Is Racism a Fundamental Cause of Inequalities in Health? Annu Rev Sociol 2015;41:311–330; Williams DR, Lawrence JA, and Davis BA. Racism and Health: Evidence and Needed Research. Annu Rev Public Health 2019;40:105–125; Williams DR and Mohammed SA. Racism and Health I: Pathways and Scientific Evidence. Am Behav Sci 2013;57:1152–1173.

[14] Grohskopf LA, Liburd LC, and Redfield RR. Addressing Influenza Vaccination Disparities During the COVID-19 Pandemic. JAMA 2020;324:1029–1030.

[15] Sources: Bosh KA, Johnson AS, Hernandez AL, et al. *Vital Signs:* Deaths Among Persons with Diagnosed HIV Infection, United States, 2010–2018. MMWR Morb Mortal Wkly Rep 2020;69:1717–1724; CDC. Diagnoses of HIV Infection in the United States and Dependent Areas, 2018. HIV surveillance report 2018 (updated), Vol. 31; Earnshaw VA, Bogart LM, Dovidio JF, and Williams DR. Stigma and Racial/Ethnic HIV Disparities: Moving Toward Resilience. Am Psychol 2013;68:225–236.

- Higher levels of poverty, unemployment, and uninsured status as well as HIV-related stigma are challenges associated with accessing care that can affect timely diagnosis and access to treatment, thereby contributing to higher rates of HIV-related deaths.

- Moving from individuals to the community context, it is possible to examine how the large social environment is helping to shape or undermine opportunities for good health as described by Ehlinger in 2016.[16]
  - **Communities of opportunity** lead to good health status because they focus on social/economic inclusion, thriving small businesses and entrepreneurs, financial institutions, good transportation options and infrastructure, home ownership, better performing schools, sufficient healthy housing, grocery stores, IT connectivity, strong local governance, and parks and trails.
  - **Low-opportunity communities** include social/economic exclusion, few small businesses, payday lenders, few transportation options, rental housing/foreclosure, poor performing schools, poor and limited housing stock, increased pollution and contaminated drinking water, limited access to healthy foods, limited IT connections, weak local governance, and unsafe/limited parks. These factors contribute to health disparities in diabetes, cancer, asthma, obesity, and/or injury.

Summary

- Health disparities exist across a wide range of health conditions and disproportionately impact communities of color. There are clearly things in place that allow these disparities to persist.
- Systems, infrastructures, policies, procedures, and practices that shape the circumstances of populations in particular places are all social determinants of health.
- The 10 Essential Public Health Services now place equity at the center of core functions of public health (Assessment, Policy Development, and Assurance), which can accelerate achieving health equity.
- Historical patterns of discrimination, including racism, must be addressed to improve the health and health-related opportunities of populations that have experienced being marginalized, stigmatized, and/or excluded.
- Surveillance systems that monitor social factors associated with infectious disease risks and outcomes must be designed, implemented, and evaluated.
- Strategies that address SDOH extend beyond the individual and impact the broader social environment.
- Numerous resources are available to address SDOH through community-wide improvement initiatives and initiatives to advance health equity, such as
  - Social Determinants of Health: Know What Affects Health
  - Healthy People 2020 – Social Determinants of Health Topic Area
  - Healthy People 2030 – Social Determinants of Health Objective
  - CLAS Standards (National Standards for Culturally and Linguistically Appropriate Services in Health and Health Care)

[16] Ed Ehlinger, State Health Commissioner, Minnesota Department of Health. Presentation given at CDC, October 18, 2016.

- *A Practitioner's Guide for Advancing Health Equity: Community Strategies for Preventing Chronic Disease*
- Health Impact in 5 Years (HI-5)

Discussion Session B

Global Health

- It is critical to communicate about the tremendous amount of global work that CDC has done, especially with respect to the impressive and important accomplishments that have been achieved in the midst of the COVID-19 challenges.
- Everyone is extremely worried about the occurrence of very large outbreaks of VPDs, so this work is critical.
- The estimates are sobering with regard to deaths due to HIV/AIDS, TB, and other infectious diseases.
- It is critical to communicate how people should be using strategies such as reduced length of time for treatment and 1-month preventive therapy to meet the goals of reducing TB rates globally.
- Considerable resources are provided to WHO and The Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) to support TB work. However, they have not been promoting the *search, treat, and prevent* approach that CDC advocates in the United States.
- The impact of COVID-19 on the United States and globally is massive, so understanding how to "keep the lights on" to do the important work that must be done in many areas will provide very important lessons.
- The American Academy of Pediatrics and CDC have a Global Immunization Advocacy Grant Program to work with low- and middle-income countries to help strengthen their childhood immunization programs and advocacy. CDC's involvement has made a major difference in the countries where the work has been done through the countries' pediatric societies. Continued collaboration on this effort is encouraged.
- Dr. Martin indicated that the U.S. government has a seat on the GFATM board. GFATM is linking the work on the three diseases with health system and public health system strengthening, so there is an opportunity to strengthen surveillance.

SDOH

- It is striking that it has been 34 years since the Ottawa Charter came out, yet progress has not been fast enough or been adequate. Everyone has been experiencing and seeing how COVID-19 has exacerbated and shown a light on disparities.
- Interest was expressed in examples of states or programs that have incorporated effective policies to reduce disparities. Dr. Liburd shared the following examples:
  - Rhode Island instituted Health Equity Zones some years ago, which is an innovative, collaborative activity across the state. The state health officer was able to launch this activity in part because, as a member of the governor's cabinet, she was able to engage her colleagues who were responsible for other parts of the state government to support this work. While she has not seen the data on the program's impact, CDC sees a clear need to forge some new evaluation methods to be able to capture disparities, reductions in disparities, and ways in

which the social environment has changed in order to be more supportive of the people who tend to be at higher risk.

- Massachusetts, Minnesota, California, and others also have done much cutting-edge work.
- REACH includes 31 programs throughout the country that have been able to "move the needle" and document improvements in reducing health disparities.
- CDC's Behavioral Risk Factor Surveillance System had a Social Context module, and some effort was made early on to incorporate the Social Context module questions into the core questionnaire. Dr. Liburd will find out the status of this effort. Notably, the states are permitted to decide which modules they want to implement.
- CDC has been invited to collaborate with the CDC Foundation and the Robert Wood Johnson Foundation to develop a standard set of social indicators and create a surveillance system to begin monitoring social indicators.
- A surveillance activity was conducted by the National Collaborative for Health Equity, which spent 2 years developing social indicators and used the data to conduct their analyses. CDC scientists helped, but it was conducted only one time. Although published in the literature, the activity has not been promoted in the states.

- CDC seems well-positioned to ensure that health disparities are measurable across localities.
  - COVID-19 demonstrated the impact of sharing health data, geographically linked, by race and ethnicity as a way to empower communities with their own health data to address issues with support from state and local health departments.
  - It was mentioned to consider what can be learned from the challenges in getting demographic data from laboratories and other systems that CDC could guide at a national level.

Public Comments

Phone lines were opened for public comments at 4:49 PM. No comments were made.

Closing Comments

Dr. Lynfield expressed gratitude to Hilary Eiring and Kim Distel and acknowledged the incredible amount of work it takes to orchestrate a BSC meeting, particularly a virtual meeting with its added complexity.

Dr. Butler thanked the BSC members for their engagement and participation. The next International Conference on Emerging Infectious Diseases has been tentatively scheduled for March 2022.

Proposed agenda items for future meetings:

- Impact of community mitigation efforts on respiratory illnesses in general
- Impact of UVC lighting and room ventilation on COVID-19
- Interface of climate change and infectious disease
- An update later in 2021 on COVID-19's impact on CDC's global work

The next BSC meeting is anticipated to be scheduled for summer 2021 and is expected to be virtual. The December 9, 2020, meeting was adjourned at 5:01 PM.

APPENDIX: Meeting Participants*

BSC Members

Chris Archibald *(representing PHAC)*
Hilary Babcock
Joanne Bartkus
Alex Billioux
Debra Birnkrant
Jeff Duchin
Emily Erbelding
Ann Garvey
Jesse Goodman
Tim Jones
Salmaan Keshavjee
David Kim *(representing the Office of the Assistant Secretary for Health, HHS)*
Jim Le Duc
Mike Loeffelholz
Hugo López-Gatell
Ruth Lynfield
Jeanne Marrazzo
Lee Riley
José Romero
Emily Spivak
Brad Stoner
Kathy Talkington
Tina Tan
Jon Temte
Donna Wolk

Partners and Other Public Visitors

Christopher Busky *(Infectious Diseases Society of America)*
Chris Freedman *(Karna)*
Janet Hamilton *(Council of State and Territorial Epidemiologists)*
Christina Hildebrand *(A Voice for Choice)*
Robert Hood-Cree *(Leidos)*
Danielle Hunt *(Abt Associates)*
Peter Kyriacopoulos *(Association of Public Health Laboratories)*
Ericka McGowan *(Association of State and Territorial Health Officials)*
Ilhem Messaoudi *(University of California, Irvine)*
Jim Nowicki *(GDIT)*
Jordan Peart *(Council of State and Territorial Epidemiologists)*
Marcus Plescia *(Association of State and Territorial Health Officials)*
Dhara Shah *(Council of State and Territorial Epidemiologists)*
Susan Sharp *(Copan Diagnostics, Inc.)*
Matt Wallace *(Chickasaw Nation Industries, Inc.)*
Stephanie Wallace *(Cambridge Communications)*
Kelly Wroblewski *(Association of Public Health Laboratories)*

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Timothy McLeod
Felicita Medalla
Jono Mermin
James Miner
Refilwe Moeti
Joel Montgomery
Emily Mosites
Atis Muehlenbachs
Shravanti Muthu
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Steve Oberste
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Christina Still
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Jose Santiago-Velez
Hazel Shah
Zara Shaikh
Don Sharp
Ray Shiraishi
John Sloan
Christina Spiropoulou
Olga Stuchlik
Rob Tauxe
April Taylor
Tejpratap Tiwari
Pei-Chun Tsai
Amra Uzicanin
Jo Valentine
Chris Van Beneden
Tinsley Waters
Tom Watkins
Christopher Watts
J. Todd Weber
Justin Wellins
Scott Wells
David Wentworth
Melinda Wharton
Sarah Wiley
Alison Winstead
Hua Yang
Brian Yoo
Chunxia Zhao

*Additional participants may have included other CDC staff, individuals from Deputy Director for Infectious Diseases partner organizations, and members of the public.

I hereby certify that to the best of my knowledge, the foregoing minutes of the proceedings of the meeting of the Board of Scientific Counselors, Deputy Director for Infectious Diseases, on December 9, 2020, are accurate and complete.

/S/	08/23/21
Ruth Lynfield, M.D. *Chair, BSC, DDID*	Date