

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

Centers for Disease Control and Prevention
Virtual Meeting
January 19-20, 2022

A two-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 January 19-20, 2022. 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:

- Welcoming remarks from Rochelle Walensky, CDC Director
- Update from Jay Butler, CDC Deputy Director for Infectious Diseases
- Overview of the Advisory Committee to the Director (ACD) from John Auerbach, CDC Director of Intergovernmental and Strategic Affairs
- Update on the COVID-19 pandemic from Barbara Mahon, CDC Incident Manager
- Update on CDC's Center for Forecasting and Outbreak Analytics from Caitlin Rivers, Alison Kelly, and Michael Johansson
- Update on CDC's Advanced Molecular Detection from Greg Armstrong, Director of the Office of Advanced Molecular Detection
- Update from the Food Safety Modernization Act Surveillance Working Group (FSMA SWG) from Tim Jones and Amy Garvey
- Update on CDC's Data Modernization Initiative from Dan Jernigan and Katie Fullerton
- Update on CDC's CORE Health Equity Science and Intervention Strategy from Robbie Goldstein and Emily Mosites
- Update on CDC's Workforce Initiative from Pattie Simone

Opening Remarks

BSC/DDID Chair Ruth Lynfield, State Epidemiologist and Medical Director at 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 BSC/DDID Designated Federal Officer (DFO).

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

- Kim Distel will be leaving the board. Laura Hughes Baker is detailed to DDID to assist in the Committee Management Role.
- The terms ended for the following board members since the last meeting: Joanne Bartkus, Jeffrey Duchin, Hilary Babcock, Barbara Cole, Kim Elmslie, José Romero, and Brad Stoner.
- Three members will be rotating off of the board at the end of March 2022: Ruth Lynfield, Tim Jones, and Lee Riley.
- Joining the board are Ilhem Messaoudi (member), Robert Belknap (ACET liaison), Travis Gayles (CHAC liaison), Grace Lee (ACIP liaison), and Howard Njoo (PHAC liaison).

The following conflicts of interest (COIs) were identified during the roll call each day:

- Jesse Goodman serves on the board of US Pharmacopeial Convention (USP), a voluntary non-profit organization that sets standards for medical products. He also serves as Chair of the Science Committee for GSK's board. GSK manufactures vaccines, monoclonal, et cetera.
- Mike Loeffelholz is an employee of Cepheid, which manufactures a variety of diagnostics.
- Lisa Maragakis receives research funding from Clorox.
- Donna Wolk has research contracts with DiaSorin, Qiagen, and ThermoFischer and serves on the Association of Molecular Pathology (AMP) Board of Directors.

CDC Director's Welcome

Dr. Walensky offered her personal thanks to each member of the BSC for the support they provided to the DDID, the 3 infectious disease centers, and all of CDC. The discussion within the BSC demonstrates the vast expertise of the board members in infectious diseases, knowledge translation and organizational learning, and effectiveness to inform the important work of CDC's infectious disease programs. CDC is grateful for the time the members give the agency and their objective and independent input and guidance. January 20, 2022 would mark the first year since Dr. Walensky's arrival at CDC. It has been a long, tough year. She came to CDC recognizing the seriousness of the moment and the heartbreaking toll the COVID-19 pandemic had on Americans in the loss of loved ones and ways of life. She said then that to get to better and healthier days, COVID-19 testing, surveillance, and vaccination must accelerate rapidly.

The longstanding public health challenges of social and racial injustice and inequity also must be confronted. Potentially lost ground also must be made up in areas such as suicide, substance use disorder (SUD) and overdose, and infectious diseases as a global health initiative. Those continue to be priorities to improve public health in this country, which can be achieved by strengthening the public health workforce, preparing for future domestic and global health threats, strengthening the public health laboratory infrastructure, modernizing data systems, and addressing health equity in all that the agency does. COVID-19 exposed all of the weaknesses in the public health infrastructure and stretched that infrastructure to and beyond its limits. This pandemic also laid bare the hard truth about health inequity in this country—that those in marginalized communities have been disproportionately affected by the pandemic. The results of that inequity will have impact for years to come.

With a \$7.4 billion investment from the American Rescue Plan (ARP), there is now an opportunity to build a strong and more resilient public health system for the future and to ensure that the need for health equity informs everything that the CDC does. The COVID-19 pandemic has made clear the need to nurture the next generation of infectious disease epidemiologists, laboratorians, and providers. Investments in this important field are increasing, but there is still much work ahead. Dr. Walensky is committed to keeping science at the core of everything the agency does. CDC has proposed initiatives that will help streamline data modernization and laboratory innovation and advance molecular detection and genomic sequencing and she looks forward to the BSC's feedback on all of these efforts. In the past year, CDC has embarked on an agency-wide strategic process to ensure that health equity is central to the agency's work and that all parts of CDC are advancing these efforts. This work should be "baked into the cake" such that all centers, divisions, and programs within the agency are advancing these efforts. This work will holistically transform the way in which public health is approached within the agency, across the nation, and around the world.

On July 31, 2021, the agency collectively submitted more than 200 health equity science and intervention goals that described how CDC will continue to study the drivers and impact of social determinants on health outcomes, expand the body of evidence on how inequities affect health, and propose and implement solutions. The submissions are impressive and testimony to the agency's ability to weave health equity into every program at CDC and to implement transformative actions that will improve the health of all Americans. Over 200 state and local health departments have joined CDC in this effort to recommend and recommit to the work of addressing structural factors, racism, discrimination, and historical disenfranchisement that deeply impacts the health of communities.

ACD Overview

Mr. Auerbach, ACD Designated Federal Officer (DFO), provided an overview of the re-established ACD. The ACD is one of CDC's 20 Federal Advisory Committee Act (FACA) committees that advise on various areas of specialty. The ACD is unique among these 20 committees in that it directly advises the CDC Director and the HHS Secretary; is not confined to a specific topic or center, institute, or office (COI); and helps to prioritize CDC's activities, improve results, and address disparities. The re-established ACD will hold meetings each year at the CDC in Atlanta, Georgia. Meetings are open to the public and available online via live webcast. Mr. Auerbach identified the ACD membership, reviewed the agenda for the first meeting confirmed for February 1, 2022, and invited BSC/DDID members to attend that meeting via webinar. The next 3 meetings tentatively will be convened in May, August, and November 2022. It is anticipated that the re-established ACD will stand up 3 workgroups (WGs): Healthy Equity WG, Data Modernization Initiative WG, and Laboratory WG. The Terms of Reference have been established for the Health Equity WG, the first to be formed, and are under development for the other two WGs.

CDC Update

Dr. Butler, DDID, expressed gratitude to the BSC for their input and guidance and indicated that his 3 priority areas for the coming year would be laboratory quality improvement, bioinformatics, and health equity. This session included updates on staffing; the President's Budget Request; and activities underway with the National Center for HIV, Viral Hepatitis, STD, and TB Prevention (NCHHSTP); the National Center for Immunization and Respiratory Diseases (NCIRD); and the National Center for Emerging and Zoonotic Infectious Diseases (NCEZID).

Leadership Updates

- **CDC Office of the Director**
 - Sherry Berger is now the Chief of Staff, with Robin Bailey succeeding her as the Chief Operating Officer.
 - Debra Houry, Director of the National Center for Injury Prevention and Control (NCIPC), is serving as Acting Principal Deputy Director following Anne Schuchat's retirement. Chris Jones is serving as the Acting Deputy Director of NCIPC.
 - Abigail Tumpey is Acting Associate Director for Communications.
 - Jim Pirkle, the Director of Laboratories in the National Center for Environmental Health (NCEH), stepped to the role of Acting Associate Director for Laboratory Science and Safety (ADLSS) subsequent to Steve Monroe's retirement.
 - Reginald Mebane is the Director of the new Office of Equal Employment Opportunity (OEEO).
 - Dory Salcido is the Senior Counselor for Strategic Communication.

- **Community of Practice**

- Dan Jernigan has accepted the position of Deputy Director for Public Health Science and Surveillance (DDPHSS) subsequent to Chesley Richards retirement.
- Henry Walke has been named Director of the Center for Preparedness and Response (CPR) and is also serving as the CDC Lead of the Testing and Diagnostics Working Group (TDWG), a critical leadership role that he shares with Joe Hamel from the Office of the Assistant Secretary for Preparedness and Response (ASPR).
- Nathaniel Smith is also serving as the Acting Director of the Center for Global Health (CGH).

- **DDID**

- Katie Fullerton represents DDID in the CDC Data Modernization Initiative. She stepped into the role as Senior Advisor for Surveillance and Data Modernization.
- Evelyn Cater is the Management Official for DDID following the retirement of Doug Brown.
- Clarissa McLean has joined DDID as the new Administrative Officer.
- Kim Distel is departing DDID to move to the Strategic Business Initiative Unit (SBI) within the Office of the Chief Operating Officer where she will continue to provide support to a variety of the FACA advisory committees.
- Laura Hughes-Baker is currently on detail to backfill for Kim Distel to support the BSC and other functions within DDID.
- Matthew Biggerstaff, Rachel Slayton, and Michael Johansson continue their details to DDID to serve as the CDC Liaisons to the Infectious Disease Modeling and Analytics Initiative, continue COVID-19 modeling work, and coordinate with the new Center for Forecasting and Analytics (CFA).
- In terms of Special Populations, Liesl Hagan is currently detailed to DDID from the Division of Viral Hepatitis (DVH) and has been instrumental in leading some of the work related to corrections populations. Ashley Meehan is on a 2-year term to support the activities related to homelessness and health. She also works with the CDC Foundation on projects related to homelessness.

- **NCEZID**

- Margaret “Peggy” Honein stepped in as the Acting Director for the Division of Preparedness and Emerging Infections (DPEI) subsequent to Henry Walke being named Director of the CPR.

- **NCIRD**

- Sam Posner continues to serve in the role of Acting Director of the NCIRD, a role that he has covered for almost a year since Nancy Messonnier’s departure. The selection process for the new Director of NCIRD is almost complete, with an announcement anticipated soon.
- Georgina Peacock will be serving as the Acting Division Director for the Immunization Services Division (ISD) after Melinda Wharton transitioned out of this role into a new role as the Associate Director for Vaccine Policy. In this job, Dr. Wharton will serve as the Executive Secretary of the Advisory Committee on Immunization Practices (ACIP).
- Vivian Dugan is serving as the Acting Director of the Influenza Division following Dan Jernigan’s move to his new role as DDPHSS.

President’s Budget Request

The fiscal year (FY) 2022 President’s budget request for CDC is \$15.4 Billion, which is \$1.68 billion above the FY2021 enacted budget. This includes \$9.5 billion in discretionary budget authority. This is the largest budget authority increase for CDC in nearly 2 decades and includes the priority areas of rebuilding public health infrastructure, creating a public health infrastructure for the 21st Century,

reducing health disparities, public health approaches to prevention of violence, and defeating other diseases and epidemics. This is exclusive of the \$5.1 billion for the Vaccines for Children (VFC) program, which is a slight decrease over FY2021. Highlights include:

- Public Health Infrastructure and Capacity - \$400 million
- Public Health Data Modernization - \$150 million
- Public Health Workforce - \$106 million
- Global Health Protection - \$303.2 million
- Social Determinants of Health - \$153 million
- Ending the HIV Epidemic (EHE) - \$275 million
- Infectious Diseases and the Opioid Epidemic - \$19.5 million
- Climate and Health - \$110 million
- Immunization and Respiratory Diseases - \$713.572 million
- Infectious Disease Rapid Response Reserve Fund - \$35 million
- Quarantine and Migration - \$72.722 million

The COVID-19 supplemental appropriation for FY2022 is allocated largely through the states and includes:

- Coronavirus Preparedness and Response Supplemental Appropriations Act – \$2.2 billion
- Coronavirus Aid, Relief, and Economic Security (CARES) Act – \$4.3 billion CDC, \$12.5 million ATSDR
- Paycheck Protection Program and Health Care Enhancement Act – \$1 billion
- Public Health and Social Services Emergency Fund (PHSSEF) - \$19.1b via Epidemiology and Laboratory Capacity (ELC) for testing and contact tracing
- Coronavirus Response and Relief Supplemental Appropriations Act – \$8.75 billion
- American Rescue Plan Act - \$11.52 billion
- PHSSEF - \$10.0 billion for testing of teachers, staff, and students

NCHHSTP Updates

- **World Aids Day** was December 1, 2021. President Biden expressed a renewed commitment to reenergize and strengthen a whole-of-society response to the HIV epidemic.
- **A new VitalSigns™** report was released on December 1, 2021, that showed that Black and Hispanic/Latino gay and bisexual men were less likely to receive an HIV diagnosis, be virally suppressed, or use pre-exposure prophylaxis (PrEP) to prevent HIV compared to white gay and bisexual men. It is estimated that 83% of Black and 80% of Hispanic/Latino gay and bisexual HIV positive men who have been diagnosed compared to white gay and bisexual men.¹
- **The National HIV/AIDS Strategy (2022-2025)** was released in late 2021, which details a roadmap to ending the epidemic by 2030.²
- **CDC issued 2 new EHE cooperative agreements**, one for \$42 million to 96 community-based organizations (CBOs) across the country and the other for \$119 million to health departments to

¹ Pitasi MA, Beer L, Cha S, et al. Vital Signs: HIV Infection, Diagnosis, Treatment, and Prevention Among Gay, Bisexual, and Other Men Who Have Sex with Men — United States, 2010–2019. MMWR Morb Mortal Wkly Rep 2021;70:1669–1675. DOI: <http://dx.doi.org/10.15585/mmwr.mm7048e1>.

² <https://www.hiv.gov/federal-response/national-hiv-aids-strategy/national-hiv-aids-strategy-2022-2025>

help rebuild and expand HIV prevention and treatment efforts as the US recovers from the COVID-19 pandemic.

- **Viral hepatitis:**

- CDC released data on hepatitis C treatment (2014-2020) showing that the number of people who initiated hepatitis C treatment in the US declined from 2015 to 2020, with COVID-19-related disruptions to hepatitis C testing/treatment being one of the drivers of that.
- In November 2021, ACIP voted unanimously to update the Hepatitis B vaccination recommendation to include vaccination of all adults 19-59 years and adults ≥60 with risk factors, as well as a permissive recommendation that adults ≥60 without known risk factors may receive hepatitis B vaccines. Recent data revealed that universal hepatitis B vaccination would reduce over 20,000 new cases of hepatitis B annually, which are associated with over \$1 billion in hospitalization costs.

- **Sexually transmitted diseases (STDs):**

- To strengthen the Disease Intervention Specialists (DIS) workforce, CDC is investing \$1 billion over a 5-year period to support emerging STD outbreak response needs.
- The new *Sexually Transmitted Infections Treatment Guidelines, 2021* provide evidence-based prevention, diagnostic, and treatment recommendations for *gonorrhea*, *chlamydia*, and *trachomatis*. Metronidazole was added to the recommended treatment regimen for pelvic inflammatory disease (PID). Recommendations were expanded for syphilis testing among pregnant women to address the congenital syphilis epidemic that has occurred over the past decade.³

- **Adolescent and school health:**

- Results from a new study show the positive impact of CDC programs. After 2 years, students were less likely to experience sexual risk behaviors, violence, and substance use. These programs reached nearly 2 million students at a cost of less than \$10 per student.
- CDC's school health infrastructure has been leveraged to support students by allocating additional CARES Act funding to school districts for mental health supports and understanding the impact of COVID-19 on health and well-being with nationally representative student data and surveys.

- **Tuberculosis (TB):**

- There was a decline in reported cases for TB, with a decrease of 19.7% in the annual incidence rate from 2019 to 2020. As of 2020, the rates of TB cases were down to 2.2/100,000. Except for 2015, TB case counts and incidence have declined every year since 1993. The steep decline in 2020 raises concerns about whether there may be underdiagnosis due to the pandemic.⁴
- Work has been done through the Tuberculosis Epidemiologic Studies Consortium II (2011-2021) to develop research sites. There are now 10 contracted research sites across the country.

NCIRD Updates

- **Impact of the COVID-19 pandemic on provider orders through the VFC Program.** It has been well-documented through surveys and data systems that the number of orders declined. This became evident as soon as the pandemic was declared in March 2020. There was some improvement during 2021 and in the early weeks of 2022, the rebound is not sufficient to catch-up all children who likely have missed vaccine doses. Cumulatively across the 2 years, the deficit is 11% or 12.6 million doses

³ <https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf>

⁴ <https://www.cdc.gov/tb/statistics/reports/2020/default.htm>

of vaccine. To address the gaps, CDC has developed information for parents and providers on routine childhood vaccination catch-up.

- **The rapid response that was begun to interrupt measles virus transmission among Afghan evacuees during Operation Allies Welcome (OAW) included:**
 - CDC guidance to implementing partners, the Department of Homeland Security (DHS) and Department of Defense (DoD), to prevent measles transmission given the low level of vaccine coverage in Afghanistan (approximately 60%).
 - After cases were confirmed, a CDC Directive on September 14, 2021, called for mass vaccination against measles, mumps, rubella (MMR) and varicella. Vaccination reached nearly 100% coverage, followed by a 21-day quarantine and a pause on evacuation flights. Vaccines also were provided for polio and COVID-19.
 - This rapid public health response limited measles cases among people who were evacuated to just 47 among over 70,000 Afghan evacuees, without any deaths or community infections.
- **Influenza activity update:**⁵
 - Seasonal influenza activity in the US remains elevated. While the amount of activity varies by region, a slight decrease in activity was observed for the week ending January 8th.
 - A(H3N2) has been the predominant influenza virus detected.
 - To date, 172 million doses of influenza vaccine have been distributed in the US. The manufacturers predict that more than 187 million doses will be available for distribution.
- **Highlighting the incredible work the ACIP has done during the COVID-19 pandemic.** 25 ACIP meetings have been convened over the past year compared to the standard 3 meetings annually. Select 2021 ACIP recommendation highlights include:
 - February: 2-dose [0, 7 days] intramuscular rabies vaccine series in immunocompetent persons ≥18 years of age for whom rabies vaccine pre-exposure prophylaxis (PrEP) is indicated.
 - May: Pfizer-BioNTech COVID-19 vaccine interim recommendation for adolescents.
 - June: 3-doses of Dengvaxia administered 6 months apart at month 0, 6, and 12 in persons 9-16 years of age with a laboratory confirmation of previous dengue infection and living in endemic areas.
 - August: Pfizer-BioNTech COVID-19 vaccine recommended for persons aged ≥16 years.
 - October: Adults 65 years of age or older who have not previously received a pneumococcal conjugate vaccine or whose previous vaccination history is unknown should receive a pneumococcal conjugate vaccine (either PCV20 or PCV15).
 - November: Pfizer-BioNTech COVID-19 pediatric vaccine interim recommendation.
- **NCIRD leadership pushed forward on health equity**, setting specific indicators and goals down to the division level for the coming year.

NCEZID Updates

- **Work on non-COVID-19 outbreaks.** Much work has been done over the past year that were addressed by CDC staff in partnership with state, tribal, and local public health partners. Examples include responses to a multi-state outbreak of *Listeria* linked to queso fresco, an outbreak of West Nile Virus (WNV) in Arizona, a *Mycobacterium tuberculosis* (MTB) associated with contaminated bone allograft material, two potentially dangerous monkeypox outbreaks in travelers in which Tecovirimat (ST-246) for smallpox was used for the first time, and 3 Ebola flareups in Africa.

⁵ FluView data available at: <https://www.cdc.gov/flu/weekly/>

COVID-19 Pandemic Response Update

Barbara Mahon, Incident Manager, provided an update on the COVID-19 pandemic response with a focus on the areas of case surveillance, domestic and global vaccination uptake, the B.1.1.529 “Omicron” variant, and other areas of interest.

- **Regarding case surveillance as of January 17, 2022:**
 - 326,279,424 cases have been confirmed globally of which 19,304,967 cases (6%) occurred in the last 7 days and 5,536,609 cumulative deaths have been reported.⁶
 - Community transmission in the US is currently high in most counties due to the surge caused by B.1.1.529, the Omicron variant.⁷
 - As of January 16-17, 2022, the 7-day average of daily case counts decreased 6.8% compared with the previous week. While the 7-day average of daily new hospitalizations increased 4.2% compared with previous week, it appears to be peaking.
 - As of January 17, 2022, the 7-day average of daily death counts increased 5.0% compared with previous week.
 - Surges, cases, hospitalizations, and deaths have tracked in parallel through most of the pandemic. During the Omicron surge, there has been a marked decoupling of these with cases surging extremely high and hospitalizations and deaths being quite lower.
- **Domestic and global vaccination uptake continues to progress:**
 - CDC recommends that everyone 5 years of age and older be protected from COVID-19 by staying up to date with their vaccines. Booster eligibility has been expanded by ACIP to all persons ≥ 12 years at ≥ 2 months after an initial Janssen vaccine, ≥ 5 months after completion of the primary series of PfizerBioNTech; or ≥ 6 months after completion of the Moderna primary series. An additional dose of Pfizer-BioNTech has been authorized for some immunocompromised children 5-11 years of age.
 - 75.1% of US population has received at least 1 dose, 38.7% of fully vaccinated persons have received an additional dose, and 63.0% of the US population have been fully vaccinated.
 - 50.1% of the total global population has been fully vaccinated, with 59.9% having received at least one dose and a total of 9,675,614,673 doses administered globally.
 - The US is in the process of donating over 1.2 billion COVID-19 vaccines, safely and equitably, to countries most in need. US Government (USG) support for COVID vaccination was recently identified as “Global VAX.” Additional COVID-19 resources are being directed toward global vaccination efforts.
 - CDC is supporting over 70 countries to receive and administer COVID-19 vaccines. There has been remarkable, but uneven, progress with relatively low coverage for low-income countries and in the Africa region.
- **B.1.1.529, Omicron variant:**
 - Accumulating evidence suggests that the Omicron variant is more transmissible but causes less severe disease.
 - Currently authorized vaccines offer less protection against infection from Omicron compared to ancestral strains and previous variants, but still provides benefit. It is important to increase uptake of primary vaccination and boosters in eligible populations to optimize protection.

⁶ WHO Coronavirus (COVID-19) Dashboard

⁷ CDC COVID Data Tracker (County View)

- Susceptibility to monoclonal antibodies appears to be lower for Omicron compared to Delta, but Sotrovimab is likely effective.
- Layered prevention strategies are key for minimizing the impact of the spread of Omicron variant (e.g., vaccination, masking, improved ventilation, wider and more frequent testing, and adherence to quarantine and isolation guidance).
- **Other areas of interest:**
 - Recently updated guidance and recommendations have focused on quarantine and isolation, the definition of “up-to-date” on vaccination, and mask recommendations based on current data.⁸
 - To monitor trends in pediatric populations and support efforts to understand disease severity and related outcomes in children, a response “Tiger Team” has been created to work across task forces and with external partners to rapidly assemble and disseminate information about pediatric disease.
 - Considerable work is underway to increase testing capacity domestically and globally, emphasizing equitable access. The White House launched <https://www.covidtests.gov/> to allow each home in the US to order 4 free at-home rapid tests delivered by the United States Postal Service (USPS).
 - Additional efforts include updating surveillance strategies for the current stage of the pandemic (COVID-Next); evaluating vaccine efficacy (VE) and durability; addressing international issues, especially in terms of supporting vaccine delivery and administration; and eventual transition of emergency response activities to home programs.

Center for Forecasting and Outbreak Analytics

Caitlin Rivers, Associate Director CFA, provided an update on the CFA in terms of the rationale/value for standing up the CFA, principles to guide decisions, CFA functions, and FY 2021 CFA activities and recent contributions of CFA modeling.

- **Rationale/value for standing up the CFA:**
 - Disease outbreaks are becoming more frequent and more disruptive.
 - The nation lacks data, analytical systems to identify and respond quickly and effectively.
 - The US must improve these systems and develop capabilities for producing forecasts and analytics that leaders can use to make timely, informed decisions about how to best prepare for and respond to infectious disease threats.
 - Models and analytics need to be responsive to concerns of underserved communities and address issues of health equity directly.
 - A robust, fast, agile, ready toolbox full of analytical tools is needed for pandemic responses.
 - It is important to understand that at this time, the science is not at a point to be able to understand the specifics about when/where pathogens might emerge.
- **Principles to guide decisions:**
 - Focus on saving lives and protecting people through outbreak data, forecasts, and analytics.
 - Make data, analyses, and scientific methods open to the public in human and machine-readable formats as much as possible.
 - Work with partners, including in the public sector, private sector, academia, and civil society to coordinate efforts and maximize impact.

⁸ <https://www.cdc.gov/coronavirus/2019-ncov/your-health/quarantine-isolation.html>; <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/types-of-masks.html>

- Support efforts to achieve health equity by using data to identify and track health disparities in outbreaks and inform policies to address those disparities.
- **The CFA is organized into 3 major components/functions and goals:**
 - #1: PREDICT: Generate forecasts and analyses to support outbreak preparedness and response efforts; establish and maintain CFA data architecture; and respond to needs of federal, state, tribal, territorial, and local leaders for analytical, forecasting results.
 - #2: INFORM: Communicate next-generation public health data with expert disease modelers, and emergency responders to meet the needs of decision-makers; share timely, actionable information with the federal government, STLT leaders, and the public; and coordinate early warning efforts between CDC subject matter experts and the USG interagency.
 - #3: INNOVATE: Support research and development to improve outbreak forecasts and analyses; collaborate with and support academic, private sector, and interagency partners; and create translational tools, products, enterprise enhancements to make analyses of pandemic data flexible, fast, and scalable for STLT authorities.
- **FY 2021 CFA activities and recent contributions of CFA modeling:**
 - \$26 million in funds were awarded to academic and interagency groups (e.g., Johns Hopkins, University of Utah, Harvard, University at Albany, State University, and Stanford) with goals being to improve forecasting and outbreak analytics for emergency decision-making; and use modeling to inform public health actions with emphasis on equity.
 - Interagency agreements were established with the Department of Energy (DOE) and the National Science Foundation (NSF) with goals to access rapid funding mechanisms to distribute funds to support a public health response; and facilitate access to supercomputing resources.
 - Examples of recent contributions of CFA modeling include providing early warning of the Omicron surge to senior leaders, informing guidance for school test-to-stay programs, estimating the risk of importation of Omicron before it was transmitting within the US and informed the decision to lift travel restrictions that were no longer protecting US, providing some of the first US estimates of Omicron severity, and informing healthcare worker quarantine and isolation guidance.

Public Health Forecasting, Modeling, and Analytics at CDC

Michael Johansson, Biologist and Senior Advisor for Infectious Disease Modeling and Analytics, discussed modeling that has been underway at CDC and some of the efforts that will be built upon as part of CFA and as part of the broader DDID effort.

- **Real-Time epidemic preparedness and response:**
 - There is generally a need to assess risk, prevent, and control problems immediately. However, data upon which evidence is based are often delayed, diverse, and imperfect.
 - Modeling can help synthesize and contextualize data, and communication of results is critical to inform action. One example of many that go on across CDC is the Chikungunya outbreak in 2014.⁹
- **CDC Epidemic Prediction Initiative (2014):**
 - In 2013-2014, CDC had many models that looked good for pathogens on paper and in research papers, but there was no sense of whether these could be applied in real-time and used to help support decision-making. Input was sought from colleagues inside and outside of CDC and settled on some objectives thought to be important to help advance the science of forecasting.

⁹ <https://www.cdc.gov/chikungunya/modeling/index.html>

- The objectives of this initiative are to connect forecasting research to decision-making needs, evaluate forecast skill and facilitate forecasting research, and operationalize forecasting.
- Samples of forecasting projects include influenza (2014–2020, 2022); and vector-borne diseases including dengue (2015), Aedes mosquitoes (2019-2020), and West Nile neuroinvasive disease (2020).
- While there have been many successes, including increasing data availability and real-time forecasting, building systems for forecast and evaluation standardization, and community building (CSTE, academia, industry, and others), there is still room for growth.
- **All of this work has been translated into what has been done for COVID-19 forecasting in the US:**
 - Forecasting has been done to estimate cases, hospitalizations, and deaths at different geographical scales.
 - There has been work with interagency support for decision-making needs such as for the supply chain and deployments of staff across the country and in terms of communication by CDC, partners, and the media to the public.
 - This work has involved coordination with CDC-funded Forecasting Centers of Excellence and the NIH-funded Models of Infectious Disease Agent Study (MIDAS) Coordinating Center (MCC).
 - Over 60 academic, industry, and government teams are participating in this effort that involves producing the forecasts, including the hundreds of thousands of forecasts that are collected and analyzed every week.
- **CDC modeling coordination and collaboration:**
 - In terms of interagency work, CDC collaborates across the USG (ASPR, CMS, NIH, NSF, DHS, DoD, DOE, NOAA, OSTP).
 - Pertaining to academia, CDC cooperative agreements have supported academic modelers since 2014 and supplemented academia for COVID-19. Examples include the National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention Epidemiologic and Economic Modeling Agreement (NEEMA), Modeling Infectious Diseases in Healthcare (MInD-Healthcare), and Influenza Forecasting and Modeling Centers of Excellence.
 - CDC’s State, Territorial, Local, and Tribal (STLT) partners are critical to a lot of this work. For instance, the agency has worked closely with the Council of State and Territorial Epidemiologists (CSTE) Forecasting Workgroup since 2017 to bridge the gap between the people who are using models to make decisions at the local scale and those who are making the decisions.
 - CDC also works globally with many groups who are involved with creating and using models such as WHO, PAHO, ECDC, and the Transatlantic Taskforce for Antimicrobial Resistance (TATFAR).
- **Public Health Analytics & Modeling Fellowship:¹⁰**
 - This new fellowship was set up over the past year and builds upon the existing Prevention Effectiveness Modeling Track.
 - The new fellowship requires a 2-year commitment to a program within CDC and utilizes a learning-through-service model and competency-based curriculum.
 - The inaugural class (2021-2023) began with 20 Fellows, with the second round of fellows to start in the summer.
- **Keys to CDC modeling successes that set the stage for future successes:**

¹⁰ <https://www.cdc.gov/pef/analytics-and-modeling/index.html>

- The number of skilled modelers at CDC and the competency of modeling in others at CDC, such as epidemiologists, are constantly increasing and are an asset to the agency.
- There is interdisciplinary work within CDC in various fields (epidemiology, laboratory, communications, etc.); a variety of pathogens/diseases (influenza, coronaviruses, chronic diseases, etc.); and across programs (zoonotic, respiratory, healthcare, etc.).
- Engagement with partners is important throughout the lifecycle of data, analysis, and policy/communication and across sectors (general public, domestic and global government, academia, and private).

Discussion: January 19, 2022

Re-Established ACD

- BSC questions/observations/suggestions:
 - Consider establishing a formal structure by which the BSC/DDID can communicate with the re-established ACD.
 - The last 24 months have highlighted the critical need for clear communication from CDC across the country, especially to the public. Perhaps the ACD should examine the best approaches for transparent and evidence-based public communication.
 - Rather than just 4 quarterly meetings, it might be more impactful to allow the re-established ACD to have more real-time communication while still in the midst of the COVID-19 pandemic public health emergency.
 - Consider including liaison members from various agencies such as the Canadian National Advisory Committee on Immunization (NACI).
 - Only 45 minutes were devoted to COVID-19 on the BSC/DDID and ACD agendas for COVID-19, which seemed limited.
 - A focus on how the public health system can better succeed now and in the future is a major issue that should be on everyone's agendas, including better incorporation of clinical laboratory and hospital-based communities into the discussions. The time is now to learn from the lessons of the pandemic.
- Mr. Auerbach will relay the BSC's suggestions to the ACD and relevant WGs. He noted that all ACD meetings are public. One challenge of a FACA-chartered committee is the need for time to ensure that arrangements are in place to comply with the various rules/regulations, one of which is requisite posting of a meeting in the *Federal Register* for at least 2 weeks in advance. While the full ACD membership will meet quarterly, the members of the 3 WGs will be meeting in between. Given that these are WGs, they are not required to be open to the public. The ACD potentially could request quick feedback from the WGs on more pressing questions.

CDC Update

- BSC questions/observations/suggestions:
 - It was observed that CDC lost one of its true pioneers with the passing of Sherif Zaki on November 21, 2021. He was generous with his time and advice to junior scientists and was a great inspiration to public health throughout the world. His passion for public health, teaching, mentorship will live on in all he touched. A number of ideas are being considered within CDC and the CDC Foundation to recognize his contributions. Perhaps this can be a future BSC agenda item.

- Much that has been learned from the technology, activities, and measures put into place for COVID-19 can be applied to other respiratory viruses and future situations (e.g., identification of gaps, rapid assessment of vaccines, testing, masking, social distancing, sanitizing, et cetera). This includes exchange of information with global colleagues, such as NACI . There was support for Dr. Butler’s suggestion to assemble experts to explore the approach to respiratory diseases and future pandemic planning more strategically.
- In terms of building infrastructure, it is important not to forget about TB. TB programs have been supportive of the COVID-19 efforts in terms of isolation, quarantine, contact precautions, et cetera. A tremendous CDC-funded piece of work that got overshadowed was the first shorter course effective treatment for active TB—an advance that will not be realized by patients without additional investments.
- With regard to modernization and ways to move public health forward, it would be beneficial to build flexibility into the way CDC funds research.
- It is not clear why more ventilation and germicidal ultraviolet light (UR-GUV) have not been employed in the COVID-19 pandemic response effort. In homeless shelters in Oklahoma City where UR-GUV was used, there was almost no transmission of COVID-19. It is not too late to do this and the cost is reasonable. This could facilitate keeping schools and businesses open and is an effective way to address biosecurity for the future. This is already in the CDC TB guidelines, but perhaps there could be some signaling from CDC about other uses such as with COVID-19.
- Addressing vaccine hesitancy continues to be extremely important. The work that CDC is doing related to vaccine confidence is greatly appreciated. There is a concern that progress has been very slow in children 5 to 11 years of age.

COVID-19 Pandemic Response Update

- BSC questions/observations/suggestions:
 - Looking ahead, transmissibility and duration of transmissibility are important to monitor. While the severity of disease is lower, the total impact on the workforce is tremendous. Risk-based data would be beneficial.
 - The impact of COVID-19 and isolation on mental health are critical to consider.
 - There continues to be a lot of chaos/confusion about testing. Science-based guidance that involves a reasonable approach is needed.
 - There is a major need for data pertaining to children, pregnant women, and immunocompromised populations beyond just the typical case counts, hospitalizations, and deaths to consider longer-term impacts, such as education disruption on children.

CFA / Public Health Forecasting, Modeling, and Analytics at CDC

- BSC questions/observations/suggestions:
 - No one anticipated the incredible shock the COVID-19 pandemic was going to have on the primary care community in terms of visitation in clinics, lack of preventive services, and abandonment of childhood immunization for months. A comprehensive approach to linking a variety of infectious disease modeling to other downstream outcomes will be beneficial with regard to decision-making and policy.
 - Attention to collecting/analyzing data on equity and predicting impacts in specific communities to ensure that data are representative is crucial. The intent for this to be an agency priority, the plan to assign approximately 10 communication experts to STLT, and the recognition of the need to supplement this in times of crisis are appreciated.
 - There continues to be a challenge with risk communication and mitigation strategies to the public. While perception of risk is very different from actual risk, it is difficult to conceptualize this. The use of modeling as a tool to help the public visualize risk/risk mitigation can be compelling for layered interventions in terms of conveying why particular strategies keep children in school, businesses open, etc.
 - Establishment of the Public Health Analytics & Modeling Fellowship program is commendable. Broader modeling training for epidemiologists in health departments and for other public health staff would be beneficial as well, particularly given that many classically trained public health practitioners often do not have this perspective. CFA staff noted that there is now some training on modeling as part of the Epidemic Intelligence Service (EIS), increasingly more modelers are entering EIS, there is a plan for a small Workforce Development Team as part of the CFA, and there is work through academic partners to increase the pipeline/diversity of the pipeline.
 - Continual evaluation of forecasting, modeling, and analytics is laudable.

Update on CDC's Advanced Molecular Detection

Greg Armstrong, Director of the Office of Advanced Molecular Detection (OAMD), described the history of the AMD Program, progress before 2020, limits of progress before 2020, and AMD program during the COVID-19 pandemic.

- **History of the AMD Program:**
 - The AMD Program was established by Congress in FY2014 with \$30 million per year with the impetus being the advent of next generation sequencing and its potential to transform infectious disease public health, and the main objective being to bring pathogen genomics and related technologies into the US public health system.
 - Activities prior to the pandemic included supporting innovation, developing genomics capacity at CDC and in the wider US public health system, developing the workforce, and developing scientific computing capacity.
- **AMD Program progress before 2020 in innovation, capacity, workforce development, and computing:**
 - Within CDC, sequencing was in use in all or nearly all areas of infectious disease, with routine use in several areas such as bacterial foodborne disease (PulseNet), TB, influenza, and others.
 - Within state/local health departments, bioinformaticians used certain tools, such as containerization of applications, and laboratory scientists and epidemiologists applied genomics at the state and local levels.

- There were various academia collaborations through one broad agency announcement (BAA).
- Genomics capacity was in place across all infectious disease laboratories at CDC, with approximately 60 bioinformaticians. All state/local health departments had sequencing capacity and were sequencing PulseNet pathogens, while a limited number of laboratories were sequencing other pathogens. There were seven regional bioinformaticians and some bioinformaticians in state laboratories.
- In terms of workforce development, efforts were underway to standardize microbiologist curriculums in microbial genomics, establish continuing education (CE) for bioinformaticians, and develop in-person training and an online course in genomic epidemiology for epidemiologists.
- The OAMD manages the scientific computing center established at CDC, and movement to cloud services was awaiting authorization.
- **Limits of AMD Program progress before 2020:**
 - Innovation was limited due to a substantial decrease in funding overall, with a smaller portion of the \$30 million, which had implications for the future of the program and limited resources to support extramural innovation.
 - Capacity was limited in that many CDC programs were without sufficient resources to scale-up, few state/local health departments had in-house bioinformatics capacity, and there was limited knowledge among epidemiologists of the utility of pathogen genomics.
 - For workforce development, there was a need to expand online training for all three professions.
 - Pertaining to scientific computing, there was limited national infrastructure (e.g., BioNumerics, AMD Portal), as well as inconsistent access to high-performance computing and cloud services in state health departments.
- **AMD program during the COVID-19 pandemic *before* the American Rescue Plan (ARP):**
 - Before the American Rescue Plan (ARP), some limited progress was made but a lot of the innovation, capacity-building, and workforce development had been put on hold largely because staff were deployed to the pandemic response.
 - Early sequencing of SARS-CoV-2 began with the SARS-CoV-2 Sequencing for Public Health Emergency Response, Epidemiology, and Surveillance (SPHERES) Initiative in May 2020. The SPHERES Initiative has become the convening group that are doing genomic surveillance for SARS-CoV-2 across the US, with ~1,000 participants from ~200 organizations and public health departments, the private sector, academia, and non-governmental organizations (NGOs). These groups engage in biweekly coordination calls to better understand local epidemiology and identify/investigate clusters.
 - The AMD program was able to provide support for sequencing through BAAs using COVID funding, with 7 awards in mid- to late-2020 and another 29 awards in early 2021. These awards were primarily to academic institutions in collaboration with health departments.
 - The National SARS-CoV-2 Strain Surveillance (NS3) program began in late 2020.
 - While it was not possible to move the 2-day course for epidemiologists online, some mid- and junior-level bioinformaticians from CDC were detailed in and tasked to collaborate with health departments to develop a series of short online modules called the “COVID-19 Genomic Epidemiology Toolkit.” This toolkit has been used in South Africa and Ethiopia.
- **AMD program during the COVID-19 pandemic *after* the American Rescue Plan (ARP):**
 - ARP funding appropriated \$1.75 billion for sequencing for which two clear priorities were identified: 1) accelerate sequencing of SARS-CoV-2 in the US; and 2) build US capacity to make use of pathogen genomics more widely. The approximate spend plan according to the White

House Fact Sheet¹¹ included \$1 billion to expand genomic sequencing, \$400 million for innovation, and \$300 for national bioinformatics infrastructure.

- In terms of the sequencing priority, “Strain Surveillance” is managed by the COVID-19 Response/Laboratory Task Force with assistance from OAMD. The components include sequencing through 9 contract laboratories (50%), NS3, state/local health departments (25%), and sequencing in other laboratories (25%).
- Pertaining to the public health genomics capacity priority, a 6-year spending plan was developed for this one-time funding that can be spent over multiple years. Related to this priority:
 - \$240 million was released in May 2021 to cover the first 3 years of capacity-building in state/local health departments, with the additional 3 years planned when new ELC agreements are negotiated in 2024. \$175 million has been released for construction.
 - The national bioinformatics infrastructure is being coordinated with the Data Modernization Initiative (DMI), with involvement of state/local health departments from the outset. Because of the use of open-source technologies, there is an opportunity to involve the wider health system in building this infrastructure.
 - In terms of innovation, CDC is increasing the amount of funding allocation for intramural innovation projects within the agency. Outside of CDC, the hope is to fund 6 Centers of Excellence modeled on the Emerging Infections Program (EIP). The foci of the Centers of Excellence will be translation, education, and response.

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

Tim Jones, FSMA SWG, reminded everyone that the charge of the FSMA SWG is to provide advice and recommendations regarding the improvement of foodborne illness surveillance to the HHS Secretary through the CDC DDID BSC in the areas of governmental coordination and integration, evaluating and improving surveillance systems, and external stakeholder collaboration and communication. Major topics during the January 13 & 18, 2022 FSMA SWG included the impacts of COVID-19 and current status of enteric disease surveillance, CDC modernization and advances in surveillance technology, CDC updates on current issues, and establishing next steps and potential future topics.

- **Impacts of COVID-19 and current status of enteric disease surveillance:**

- There were 26% fewer infections reported with pathogens commonly transmitted through food in 2020 compared with previous 3 years.¹²
- There was some leveling off even before COVID-19, which had to do with the marked increase in availability in culture-independent diagnostic tests (CIDTs).
- Primary issues seen in PulseNet Labs in 2020-2021 included personnel/staffing issues, full suspension of whole genome sequencing (WGS) in 2020 due to the need to share equipment and laboratory space for COVID-19 activities (though most were back to 100% by September 2021), supplies/equipment issues, and various delays.
- There are indicators and conjecture about what led to the 26% decrease in disease incidence in 2020. Some of the decrease was real, such as 73% fewer infections associated with international

¹¹ <https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/16/fact-sheet-biden-administration-announces-1-7-billion-investment-to-fight-covid-19-variants>

¹² Ray LC, Collins JP, Griffin PM, et al. Decreased Incidence of Infections Caused by Pathogens Transmitted Commonly Through Food During the COVID-19 Pandemic — Foodborne Diseases Active Surveillance Network, 10 U.S. Sites, 2017–2020. *MMWR Morb Mortal Wkly Rep* 2021;70:1332–1336. DOI: <http://dx.doi.org/10.15585/mmwr.mm7038a4>

travel due to pandemic shutdowns. There is no evidence that observed decreases were due to laboratory or surveillance artifacts.

- The National Wastewater Surveillance System (NWSS) has received a lot of attention during COVID-19. State/local jurisdictions are using wastewater data to inform response decisions, with 13 jurisdictions submitting 31,730 unique wastewater samples up from 419 as of 1/10/22. The NWSS is a nimble structure that can rapidly adapt to changing public health needs. The NWSS testing panel can be expanded to detect a variety of enteric pathogens and identify high priority pathogens and antimicrobial resistance (AR).
- **Modernization and progress in technology advances in surveillance:**
 - There is a salmonella dashboard on the horizon to make more data publicly available.
 - PulseNet has been a fundamental part of surveillance for foodborne disease. The transitioning of this system to WGS will allow for more granular identification, serotyping, virulence profiling, antimicrobial susceptibility, and subtyping for surveillance and outbreak investigation.
 - PulseNet’s software, BioNumerics, reaches the end of its life in December 2024, so there is a lot of work underway to create a one-stop shop for STLT public health laboratories, develop an open-source modular workflow that can be used for multiple genomic epidemiologic programs in addition to PulseNet, and take advantage of cloud strengths.
 - CIDTs have had a major impact on PulseNet, including key public health areas being placed at risk and the necessity of modifying detection/infection of outbreaks, case-based surveillance, AR monitoring, and screening potential among potentially infected persons to return to childcare, food service, or other sensitive settings.
 - A CIDT Action Plan has been developed that includes short- and long-term goals.
- **CDC updated the FSMA SWG on the following current issues:**
 - Division of Foodborne, Waterborne, and Environmental Diseases (DFWED) future planning
 - Outbreak investigations and reoccurring, persistent, and emerging strains
 - Chicken as the most important source of salmonella
 - Cyclospora surveillance and advances for cluster detection
 - Centers of Excellence throughout the country
- **Potential future topics:**
 - Climate change and enteric disease surveillance (Vibrio and warmer waters)
 - One Health approach to linking clinical/animal/food to identify sources faster
 - Coordinated response to eliminating Reoccurring, Emerging, and Persistent Strains
 - Increasing surveillance in certain months, integrating various surveillance data, considering entire food distribution system
 - SARS COV-2 human disease surveillance approach to other pathogens
 - Health Equity in enteric disease surveillance
 - How CDC can help states and local jurisdictions in terms of home cooked foods/food freedom laws/cottage foods
 - Foodborne surveillance modernization and integration with CDC broader data system modernization efforts
 - SARS COV-2 human disease surveillance approach to other pathogens
 - Networks for state labs to share information for surveillance models, clinical partnerships, capitalizing on existing collaborations and connections
 - Enteric disease diagnoses to leverage innovative technology, integration with EHR systems to increase efficiency and case response rates, data collection and electronic methodology
 - Virulence factors/markers – potential emergence; tracking virulence factor changes as an indicator
 - Non-enteric foodborne disease, drug-resistant genes in food

- **The FSMA SWG FY 2022 Annual Report to the HHS Secretary** is expected to be presented to the BSC during the December 2022 meeting.

Working Group Membership

BSC members interested in serving on one of the BSC Working Groups were invited to send an email expressing their interest to Hilary Eiring at vte0@cdc.gov. The Working Groups include Acute Flaccid Myelitis (AFM), FSMA SWG, Infectious Disease Laboratory Working Group (IDLWG), and Vaccinate With Confidence WG. Brief updates were given about the Working Groups, for which there will be more detailed updates during future meetings.

Data Modernization Initiative

Dan Jernigan, CDC Deputy Director for Public Health Science and Surveillance, and Katie Fullerton, DDID Senior Advisor for Surveillance and Data Modernization, provided updates on CDC's DMI. The "North Star" goal of this initiative is to move from siloed and brittle public health data systems to connected, resilient, adaptable, and sustainable "response-ready" systems that can help solve problems before they happen and reduce the harm caused by the problems that do happen.

- **The problems to be solved:**
 - Disconnected and/or proprietary disease systems driven by disease-specific budget lines hinder the ability to see the complete picture.
 - Most systems at health departments are not flexible, do not use cloud, and are not scalable.
 - The public health workforce needs training to use current technologies more effectively.
 - Providers in healthcare and at health departments are burdened with sending data to many places in many ways.
 - Public health has not been part of the healthcare data ecosystem as federal incentives and regulations helped healthcare systems to be able to easily share data automatically in the electronic health record (EHR).
- **Listening, connecting, and DMI priorities:**
 - CDC has a group who reviews the numerous reports that have been written to glean from their recommendations.
 - The agency also has been talking to various groups to acquire input and is working with a number of them on solutions moving forward.
 - This engagement effort led to the development of the DMI priorities, which are to build the right foundation, accelerate data into action, develop a state-of-the-art workforce, support and extend partnerships, and manage and change governance.
- **Building the right foundation:**
 - The components of this priority include automated real-time data collection, cloud-based services, "North Star" architecture, and reduced silos.
 - Because of COVID-19, it has been possible to obtain electronic case reporting (eCR), electronic laboratory reporting (ELR), vital statistics, immunization data, and other data that CDC has never been able to acquire quickly. For instance, eCR has moved from about 187 total facilities reporting to over 10,000.
 - To process the resulting firehose of data that must be processed and fed down to the states, CDC implemented an Azure cloud platform that allows the agency to store/share those data in a way not previously possible.

- CDC has been working with states and others to develop a “North Star” architecture, which is a collaborative vision to improve STLT access to actionable intelligence in order to scale-up quickly when there is a response.
- In terms of reducing silos, CDC is working with programs to ensure that stand-alone systems are migrated to a common architecture at CDC and STLTs.
- **Accelerating data into action:**
 - The components of this priority include rapid outbreak response, forecasting and outbreak analytics, moving from “my data” to “our data,” and connecting public health and health care.
 - Consideration is being given to how platforms such as Data Collation and Integration for Public Health Event Response (DCIPHER) and NWSS can be made available to other pandemic programs so that they are ready scale-up when there is a problem that requires a national response.
 - CDC is working on a lot of new standards using Fast Healthcare Interoperability Resources (FHIR), which will be a requirement by the federal government through the Centers for Medicare and Medicaid Services (CMS) beginning in 2 years. CDC is making sure that public health needs are being represented in that and that the agency can use this to bring public health into the health care ecosystem.
- **Developing a state-of the-art workforce:**
 - The components of this priority include recruitment, training, forecasting workforce needs, and state and local support.
 - A new Notice of Funding Opportunity (NOFO) will be coming out of the Center for Surveillance, Epidemiology, and Laboratory Services (CELS) that will allocate \$3 billion over three years to provide multiple approaches to help build the STLT workforce to address various needs.
- **Supporting and extending partnerships:**
 - The components of this priority include policies, transparency, data use agreements (DUAs), and collaboration.
 - CDC recognizes that there is a need to address how data are shared and is working with CMS and Office of the National Coordinator for Health Information Technology (ONC) to plan a consortium to work through complex policies that need to be in place to streamline the hundreds of DUAs into just a few.
- **Managing change and governance:**
 - The components of this priority involves strategic and efficient IT, monitoring and evaluation of progress, change management, and innovative procurement methods.
- **Because of DMI, when the next emergency occurs, there will be:**
 - A foundation for data sharing across all levels of public health for coordinated, scalable and timely case investigation, management, and reporting.
 - Shared analysis capabilities for rapid identification of trends within and across jurisdictions, including forecasting and SDOH.
 - A prepared data science workforce
 - Decreased burden on data reporters and public health staff.
- **Specific to supporting data modernization in DDID:**
 - CDC is organizing differently externally and internally in support of the culture change that is needed.
 - Externally, this involves establishing a multi-sector consortium of partners such that CDC has structured and regular engagement with its external partners.
 - There are two new enterprise-wide approaches internally to address data and IT, DMI and IT and Data Governance (ITDG), which work together across the agency in a horizontal fashion to

support programs by providing oversight of the investments being made with DMI funds and more broadly toward data and infrastructure with any type of funds. Communication is bidirectional.

- In terms of moving from strategy to implementation, the *DMI Strategic Implementation Plan* was released in November 2021.¹³ This plan details the goals, objectives, and activities for the five priorities. The cross-cutting drivers of focus for 2022 are core data sources and data to action. The “North Star” is interoperable, shared, modular solutions built on human-centered design practices.
- An example would be the way DMI funding was brought to bear around COVID-19 in a way that allows for program-agnostic expansion so that other diseases can take advantage of this effort.
- DCIPHER was before and is now even more a key element of CDC’s Common Operating Picture (COP), which plays a key role alongside other enterprise tools to support the agency in its responses through data integration in a disease-agnostic way and its design to help CDC with data for action.
- The important component is that the platform on which the COP exists and the open-source approach and documentation that exists within DCIPHER allows for the data flows that have been set up to be shared and connect with the enterprise tools within the agency so that CDC has a more broadly interoperable ecosystem.
- DDID is preparing for what is next and recognizes that a different approach is needed. In particular, a couple of topics to address from an infectious disease standpoint involve rethinking case surveillance and genomic epidemiology. The way to achieve that approach is through connecting conversations, supporting STLT, and balancing enterprise and programmatic needs and funding.

CORE Health Equity Science and Intervention Strategy

Robbie Goldstein, Senior Policy Advisor in the Office of the Associate Director for Policy and Strategy, and Emily Mosites, Senior Advisor on Special Populations in DDID, provided an update on CDC’s agency-wide strategy to integrate health equity into the fabric of all the agency does. This strategy known as CORE (Cultivate, Optimize, Reinforce, Enhance) is an idea about a transformative way to think about health equity at the agency that was initiated by the Office of Science (OS) led by Dr. Becky Bunnell and the Office of Minority Health and Health Equity (OMHHE) led by Dr. Leandris Liburd.

- **CORE crosses four domains of the agency’s work:**
 - Cultivate comprehensive health equity science: CDC will embed health equity principles in the design, implementation, and evaluation of our research, data, and surveillance strategies.
 - Optimize interventions: CDC will use scientific, innovative, and data-driven strategies that address policy and systemic factors that impact health outcomes and address drivers of health disparities.
 - Reinforce and expand robust partnerships: CDC will seek out and strengthen sustainable multi-level, multi-sectoral and community partnerships to advance health equity.
 - Enhance capacity and workforce engagement: CDC will build internal capacity to cultivate a multi-disciplinary workforce and more inclusive climates, policies, and practice for broader public health impact.

¹³ <https://www.cdc.gov/surveillance/pdfs/FINAL-DMI-Implementation-Strategic-Plan-12-22-21.pdf>

- **CORE health equity goals timeline:**
 - CORE was launched in April/May 2021 with a challenge to the agency to identify specific goals for each division that would transform the work of that division and of the various centers, institutes, and offices (CIOs).
 - The identified goals were submitted in August 2021 and feedback was provided. Programs had an opportunity during September 2021 to review the feedback and resubmit their goals and begin their work during October/November 2021.
 - The CORE leadership developed an analysis of all submissions. A total of 159 goals were submitted that included over 400 metrics to evaluate the impact on health equity across 64 divisions and 18 CIOs. Those goals fell into the four major categories of Science (43%), Interventions (17%), Science and Interventions (27%), and Cross-Cutting (13%).
 - Looking at the goals in aggregate across the agency, they fit into seven unique themes: Transform Surveillance Systems, Build Health Equity Data Science Capacity, Build the Evidence Base, Build and Scale Program Interventions, Identify Key Multi-Sector Policy Levers, Cross-Cutting Coordination, and Bolster Workforce Management. Several examples were shared of DDID’s CORE goals during this presentation.
 - In the process of collecting and assembling all of the goals into a comprehensive strategy for health equity science and intervention, it became clear that a tremendous amount of work already was occurring within the agency that focused on health equity and diversity, equity, inclusion, and accessibility (DEIA). In many ways, CORE is holding all of that together by serving as an umbrella to ensure that there is a way to describe and talk through all of the work that is happening.
 - An effort has been made to demonstrate that there are four pillars of CORE (science, interventions, partnerships, and internal capacity and workforce) and that CORE will leverage the agency priorities to drive health equity, coordinate mechanisms to advance CORE implementations, and transform efforts to accelerate innovative change with an emphasis on Dr. Walensky’s declaration in April 2021 that “Racism is a public health threat.” This resulted in over 200 state/local health departments also making this declaration.
 - The biggest challenge with CORE was the aggressive timeline, which was intentional to ensure that the agency was moving forward and taking advantage of this moment to achieve some of these goals as quickly as possible.
 - It was made clear at the beginning of CORE that there was not an expectation for every goal to be a success or for every division to achieve everything they laid out. It is anticipated that some goals may fail or may have to be redirected. The idea was to set up an infrastructure within which people were given permission to fail, learn from mistakes, and develop more transformative goals/outcomes. This helped accelerate the process.
- **DDID’s work on the special populations of people experiencing homelessness or incarceration:**
 - DDID has a small Special Populations Team that covers incarceration and homelessness as cross-cutting issues across the infectious disease centers. The work on homelessness began in Fall 2019 and corrections work began in Fall 2021.
 - Several factors contribute to risks in these populations that differ from the general population, creating a need for population-specific work such as this. For instance, the physical context, access to resources, relationships with service providers, and demographic composition differ in these populations. All of these factors lead to a need for cross-cutting work because there is an increased risk for nearly all infectious diseases for these groups.
 - DDID’s current activities include providing internal and external technical assistance (TA); coordinating with federal, state, and local partners; developing strategies across infectious diseases across these populations; and working on a variety of specific projects.

- One example of a specific project is a one-year pilot of three Public Health and Homeless Centers of Excellence in three cities: San Francisco, Seattle, and Minnesota. The goals of this project include coalition building, strategy development, infectious disease needs prioritization, and development of a best practices toolkit to share with other jurisdictions.
- There is a CDC-wide Homelessness and Public Health Working Group, with about 250 people on the listserv representing nearly all divisions. This group conducts quarterly internal webinars within CDC and facilitates local volunteering coordination for CDC staff. Subgroups arise within this working group on an as-needed basis to accomplish a specific goal, after which they stand down. There are two current subgroups, one that is focused on data collection related to homelessness and the other related to pregnancy and homelessness.
- While some progress has been made in the last two years with the DDID and working group projects, the COVID-19 response has been the center of most of the DDID Special Populations Team's efforts. The team has been involved in 16 on-the-ground deployments, guidance development, partner coordination, and several ongoing projects.
- An example of a corrections project is that CDC funded the National Sheriffs' Association (NSA) to address the lack of a coordinated data system linking correctional facilities and public health. This system is currently being piloted in three parish prisons and three state prisons in Louisiana.
- An example of a project for people experiencing homelessness is a qualitative project to identify communication pathways and styles for people experiencing homeless, which resulted in a communications plan and sample materials for health departments and homeless service providers that are currently undergoing evaluation.
- **Questions for the BSC:**
 - What do you think are the priority public health needs for these populations?
 - How can we ensure we are connected to what is happening the ground?
 - What are the most effective ways to foster further cross-sector collaboration?

Future of the Public Health Workforce

Pattie Simone, Director Division of Scientific Education and Professional Development, provided an update on CDC's workforce initiative.

- **Overview:**
 - The public health workforce is the first line of defense against disease outbreaks and other health threats. Yet, decades of underinvestment have undermined the public health workforce resulting in shrinking numbers in capacity.
 - COVID-19 highlighted the critical role of the public health workforce in responding to emergencies and the consequences of the underinvestment.
 - There are various estimates about the staffing deficit, including a recent Staffing Up report that estimated the need for an additional 80,000 full-time equivalents (FTEs) just to provide minimum public health services in state and local health departments.¹⁴
 - Workforce development involves much more than staffing. It also includes recruitment, hiring systems, fellowships and other pathways, training and upskilling, data to understand what is needed, and diversity.

¹⁴ Staffing Up: Determining Public Health Workforce Levels Needed to Serve the Nation (2021)

- Workforce development has fallen behind across public health. Skills have not kept up with technology, there are not systems and data to assess and monitor what is needed, there are issues with diversity, and hiring barriers exist at all levels. Even with increased funding, substantial barriers remain.
- **The ARP specifically addresses expanding the public health workforce:**
 - The ARP policy¹⁵ announced in January 2021 proposed expanding the public health workforce by 100,000 to address the needs of COVID-19 and build long-term capacity.
 - The legislation¹⁶ passed in March 2021 provided \$7.66 billion to HHS for expanding the public health workforce. Some of these funds have been allotted to CDC.
 - Now at a critical juncture, there is a great opportunity to make important progress in workforce development.
 - While it is not possible to make up for over 20 years of infrastructure erosion overnight, there are crucial issues on which progress must be made.
- **The way forward for state/local public health workforce development is a three-pronged approach: Bridge, Build, and Sustain:**
 - It is first necessary to bridge with innovative interim solutions to address urgent needs. Building on lessons learned from COVID to implement a combination of interim solutions such as through public-private partnerships. While federal solutions will not replace the entire 80,000 plus deficit, they can help in the short-term while more is learned to understand what is needed and identify solutions for the long-term.
 - What is learned must be applied to build a public health workforce with hiring by state and local jurisdictions to reduce the staffing deficit.
 - Longer terms solutions will be needed to sustain the public health workforce, including reliable ongoing federal funding and commitment at the state and local levels. State and local jurisdictions must develop plans to spend the large amounts of federal funding already awarded to address systemic barriers that have led to the current state and develop plans to rebuild and sustain the public health workforce long-term.
 - Examples were shared for each of these prongs.
- **Opportunities in workforce development the new public health workforce (PHWF):**
 - While there is a lot of funding, now it is time to deliver. It is not as simple as having money to hire.
 - It will be necessary to modernize antiquated hiring systems and conduct comprehensive workforce planning; focus on professional development, mentorship, and training for the needed strategic and technical skills; and work with academia to give more students applied learning experiences to better prepare them for jobs in public health and figure out how to get more public health graduates to choose public service and jobs in governmental public health.
 - Through pathways like AmeriCorps, it will be possible to reach a more diverse group of students who previously never considered a career in public health. It is necessary to strengthen recruitment, with a focus on diversity and health equity, and address the important role of student loan repayment and loan forgiveness for public services.
 - There can be a lot of pessimism about whether anything can really be done about hiring systems in government, but opportunities must be provided to hear from jurisdictions that have had some successes and share best practices and lessons learned from others.

¹⁵ ARP Policy <https://www.whitehouse.gov/briefing-room/legislation/2021/01/20/>

¹⁶ ARP Act Legislation <https://www.congress.gov/bill/117th-congress/house-bill/1319>

- As the new PHWF grant is designed, it will be important to incorporate those lessons and gather other input to make the grant successful and contribute to sustainable solutions.
- Input from internal listening sessions with CDC colleagues pertaining to how the PHWF grant can complement existing CDC categorial programs and other emergency funds regarded the following:
 - There is a need to ensure flexibility to account for different jurisdictional needs and capacities and to conduct needs assessments during the initial stages of the grant.
 - Given the large number of other CDC and federal programs, related activities and resources need to be mapped to ensure that the new grant will complement and leverage existing programs.
 - To increase the ability of skilled staff, the grant should support a variety of options for hiring, recruiting, training, and upskilling.
 - CDC must coordinate and collaborate with academia, public health partners, and other federal agencies to improve hiring and recruitment and support future sustainability.
- External listening sessions included representatives from STLT jurisdictions, NGOs, academic partners, national organizations and others. Meetings have been scheduled with other federal partners as well to ensure that investments are complementary to existing workforce programs. With a focus on success and sustainability, the following questions were asked during the external partner listening sessions:
 - How can we make this successful considering challenges from the COVID-19 pandemic?
 - How can organizations support sustained success beyond the funding provided?
 - How can this be structured to complement existing funded efforts and succeed in your organization?
 - What types of systems, facilitators, supports, or services could CDC (or its partners) provide to support your organization?
 - What are the main workforce barriers this can help address?
- While the notes are still being analyzed from the external meetings, many of the same themes were heard as in the internal sessions, such as: there is a need for maximum flexibility to tailor to jurisdictional needs, make sure that the length of the grant is as short as possible since jurisdictions have so much trouble hiring for 2-3 years of funding, try to minimize the administrative burden on jurisdictions, and there is a need for retention strategies and student loan forgiveness.

Discussion: January 20, 2022

Advanced Molecular Detection

- BSC questions/observations/suggestions:
 - The COVID-19 Genomic Epidemiology Toolkit and biweekly SPHERES Initiative coordination calls have been extremely beneficial.
 - Prior to 2020, there was an AMD advisory committee known as the Infectious Disease Laboratory Working Group (IDLWG). Consider revisiting the IDLWG charter to determine whether it might be possible/beneficial to revive this group. Hilary Eiring reported that there is an effort underway to invite people to join the IDLWG.
 - There should be a core sampling strategy for COVID-19, other infectious diseases, foodborne illnesses, et cetera. Greg Armstrong pointed out that almost all of the discussion that has occurred thus far has been about the national-level objectives. If time were not a factor, it would be preferable to fund state health departments rather than contract laboratories to

perform the sequencing. The bigger question pertains to what sequence-based surveillance for respiratory diseases looks like in the long-term. Some work began on this and will be resumed but was temporarily derailed by Delta and then Omicron. While developing a single system has never been viewed as a practical alternative, areas where coordination is needed are being considered (e.g., unified library preparation for bacterial sequencing).

- The advent of rapid sequencing through state laboratories is greatly appreciated, but appropriate education and communication is needed for practicing physicians in hospital or clinic settings who are the source of a lot of the raw material. Many contributors and consumers do not know how to interpret or utilize the information from advanced molecular diagnostics tools. The CFA and OAMD reported that they are contemplating ways to work together and are open to suggestions regarding other collaborations and how to use data/metadata more effectively going forward.

FSMA SWG

- BSC questions/observations/suggestions:
 - The wastewater surveillance work is interesting. One result of COVID-19 is that it has made things that seemed impossible before the pandemic now seems possible, such as the NWSS that has been very useful at the local level.
 - Having some pilot projects on expansion to other enteric pathogens could be beneficial. Rob Tauxe indicated that the focus is on COVID-19 right now, but with an eye toward the future in terms of transition to other problems for which the NWSS may offer useful complementary surveillance. The current focus is on building up the number of wastewater systems around the country, but there is an interest in exploring pilot projects.
 - In terms of equity, perhaps consideration could be given to whether there are opportunities to have emerging infection sentinel surveillance sites in more diverse communities to capture a different picture of the data compared to the more traditional homes/settings for these sites.
 - Wastewater sampling and surveillance seems to work well for a qualitative measure, but not so good for a quantitative measures. It would be beneficial to know more about the state of the science on this. Perhaps there could be a presentation on this during the next BSC meeting. Rob Tauxe pointed out that there are a couple of problems. First, RNA gets pretty chewed up and what is being reconstructed is not going to be the complete sequence from sewage. Second, there are many sources and if several strains are circulating in the community, pieces of them all will be mixed together. There have been some approaches to semi-quantitative work that have been reasonably interesting/successful. The trouble is that apparently, there are system-specific factors of dilution that make it difficult to compare a reading from one system to another.

Data Modernization Initiative

- BSC questions/observations/suggestions:
 - It is important to realize that many stakeholders are not necessarily in control of their IT architecture. Many states have a centralized division of administration. The easiest way to get around 54 architecture solutions is to build a system and give states access versus forcing a design on them.
 - In terms of healthy equity, it is important to seek input from communities in order to build in data visualization and health equity from the outset.
 - It would be great to connect with EHR-based systems (e.g., PEDSnet and PCORnet).

CORE Health Equity Science and Intervention Strategy

- BSC questions/observations/suggestions:
 - The progress and accomplishments achieved internally at CDC for promoting health equity are impressive.
 - The University of Texas provides healthcare to much of the incarcerated population in Texas. One of the tools they use routinely is telemedicine, which has been quite successful and cost-effective. This has been especially true during the COVID-19 pandemic when people cannot be moved easily. If not already incorporated into the special populations work, consideration should be given to opportunities to do so. Reach out to Jim Le Duc for further dialogue on this.
 - Central and rural Pennsylvania use telemedicine as well. They are developing mobile test units in order to provide point-of-care (POC) testing for which rapid results are needed such as STDs. Perhaps a partnership would be beneficial with the POC community for site testing at prisons or mobile ability to go to hotspots, which could be helpful for the homeless and corrections initiatives. This could be particularly valuable in more rural communities.
 - It is important to consider that, especially with rural outreach, mobile care is not necessarily well-received due to incredibly deep stigma related to particular infections.
 - Some of the community engagement activities funded by NIH pertaining to COVID-19, such as the Community Engagement Alliance (CEAL) Against COVID-19 Disparities, have resulted in the ability to perform extensive testing in minority populations in many rural areas. At UAB, this is run through the Minority Health & Health Disparities Research Center. Perhaps there are ways CDC could synergize with/leverage the structures that have tried to reach people at the highest risk for poor outcomes of COVID-19.
 - Self-collection with the ability to drop off samples such that no one knows what the sample is and offering the ability to receive other testing from a mobile influenza testing unit are other examples for reducing stigma.
 - Dr. James O’Connell in Boston has done magnificent work to establish trust in the community and reach the unsheltered with healthcare.

CDC Workforce Initiative

- BSC questions/observations/suggestions:
 - The NIH has a program for loan forgiveness, so this is possible at the federal level. Pattie Simone noted that CDC has this for current staff, but there is not enough in the grant now to cover what is needed. The Health Resources and Services Administration (HRSA) has a program for the state/local level, so perhaps CDC could partner with them if additional funding is received. This is an area for expansion and CDC does review and try to build on the authorities other agencies have.
 - Retention of qualified and motivated public health workers is a major issue in public health, which is likely to require special programs and provisions for public health overall and within federal agencies.
 - Career development opportunities, mentorship, student loan repayment at the state and local level, and ongoing training have been identified as areas of importance.
 - Attention also needs to be paid to bridging between public health and clinical practice. From the public health perspective, there are pharmacists, physicians, nurses, therapists, and scientists who are interested in clinical or laboratory practice and want to retain that, but they also have an interest in public health service. Opportunities should be provided to make it easier for the

individuals to make a connection between clinical practice and being a public health practitioner. Perhaps new models are needed to facilitate this.

- The effort to entice new people to enter public health service is commendable.
- Rural health officers are strained beyond belief and turnover is extremely high among them.
- It is difficult for universities to attract dual degree students anymore for Master of Public Health (MPH) programs, largely because of the associated cost.
- There are great resources in communities among the primary care physician (PCP) workforce. There is a movement within the American Academy of Family Physicians (AAFP) to take into consideration the incredible need for coupling of primary care, mental health, and public health. This is particularly true in areas that are low-resourced. New models must be developed that carry across specialties. There is genuine interest within AAFP in determining how to create a much greater synergy between primary care medicine and public health practice.
- Clinical laboratories are experiencing extreme shortages. Online training mixed with onsite training have been useful in this setting. While some of the allure of fellowships is getting to work at CDC, not everybody is in a position to leave their family to do that. Expansion of this with a mixture of onsite and offsite training might be helpful.
- The Association of Public Health Laboratories (APHL) has received CDC funding to expand their internship and fellowship as well, so a substantial number of fellows should be placed through that program.

Public Comments

Phone lines were opened for public comments on January 19, 2022, at 5:00 PM and January 20, 2022, at 5:10 PM. No comments were made during either public comment session.

Closing Comments

Dr. Butler expressed gratitude to Dr. Lynfield for her leadership of the BSC over the past several years and emphasized how much he would miss her going forward.

Dr. Lynfield stressed what an honor and privilege it had been to serve as the Chair and how special it was to have the opportunity to participate in the discussions of the BSC. She expressed her hope that everyone would stay well and strong, and that they would have an opportunity someday to get together in person.

The January 19-20, 2022, meeting was adjourned at 5:11 PM.

APPENDIX: Meeting Participants*

BSC Members

Bob Belknap	Jim Le Duc	Kathy Talkington
Alex Billioux	Grace Lee	Tina Tan
Debra Birnkrant	Mike Loeffelholz	Jon Temte
Emily Erbeling	Ruth Lynfield	Donna Wolk
Ann Garvey	Lisa Maragakis	
Jesse Goodman	<i>(representing HICPAC)</i>	
Tim Jones	Jeanne Marrazzo	
Salmaan Keshavjee	Ilhem Messaoudi	
David Kim <i>(representing the National Vaccine Program)</i>	Howard Njoo	
	Lee Riley	
	Emily Spivak	

Partners and Other Public Visitors

Sara Black <i>(National Association of County and City Health Officials)</i>	Isabella Izquierdo <i>(Lewis-Burke Associates)</i>
Amelia Blumberg <i>(Council of State and Territorial Epidemiologists)</i>	Peter Kyriacopoulos <i>(Association of Public Health Laboratories)</i>
Rebecca Boyles <i>(RTI International)</i>	Michael Lin <i>(Rush University)</i>
Michael Choy <i>(Boston Consulting Group)</i>	Pia MacDonald <i>(RTI International)</i>
Meredith Lichtenstein Cone <i>(Council of State and Territorial Epidemiologists)</i>	Erica McGowan <i>(Association of State and Territorial Health Officials)</i>
Marla Dalton <i>(National Foundation for Infectious Diseases)</i>	Melissa McPheeters <i>(RTI International)</i>
Annie Fine <i>(Council of State and Territorial Epidemiologists)</i>	Eric Mooring <i>(State of Alaska)</i>
Chris Freedman <i>(Maximus)</i>	Jim Nowicki <i>(Palantir Technologies)</i>
Jack Goodman <i>(Lewis-Burke Associates)</i>	Walt Orenstein <i>(National Foundation for Infectious Diseases)</i>
Janet Hamilton <i>(Council of State and Territorial Epidemiologists)</i>	Samantha Porter <i>(RTI International)</i>
Honorata Hansen <i>(Association of Public Health Laboratories)</i>	Anna Scrimenti <i>(American Society for Microbiology)</i>
Kate Heyer <i>(Association of State and Territorial Health Officials)</i>	Alexander Tin <i>(CBS News)</i>
Karin Hoelzer <i>(Maximus)</i>	Any Walker <i>(Seqirus)</i>
Robert Hood-Cree <i>(General Dynamics Information Technology)</i>	Stephanie Wallace <i>(Cambridge Communications)</i>
Pien Huang <i>(NPR)</i>	Mary Lee Watts <i>(American Society for Microbiology)</i>
	Portia Williams <i>(Big Cities Health Coalition)</i>
	Kelly Wroblewski <i>(Association of Public Health Laboratories)</i>

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Matthew Biggerstaff
Ally Binder
Catherine Bozio
Chris Braden
Allison Brown
Dan Budnitz
Deron Burton
Jay Butler
Rebecca Byram
Abigail Carlson
Shirley Castillo
Evelyn Cater
Salvador Cerriteno
Kelly Charniga
Sneha Cherukuri
Roxana Cintron
Eleanor Click
Marah Condit
Jennifer Cope
Kelsey Coy
Amanda Crouse
Deanna Dennis
Lois Diem
Kim Distel
Peter Drotman
Elinam Dzubey

David Ederer
Hilary Eiring
Elina El-Badry
Siobhan Eze
Anna Fagre
Isaac Fillyaw
Steve Flores
Katie Fullerton
Alexandra Ganim
Andrew Geller
Dylan George
Robbie Goldstein
Rachel Gorwitz
Camden Gowler
Lon Gross
Larisa Gubareva
Christopher Gulvik
Brian Gurbaxani
Melissa Habel
Tei Habenicht
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Senad Handanagic
Jennifer Harcourt
Chelsea Harrington
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Christine Kim
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Bob Kirkcaldy
Lisa Koonin
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Gregory Lanman
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Jessica Leung
Felicia Lewis
Ruoran Li
Art Liang
Brandi Limbago
Michael Lo
Adriana Lopez
Brittany Lue
Duncan MacCannell
Adam MacNeil
Barb Mahon
Daniella Malave
Mariel Marlow
Tonya Martin
Rose Martines
Nina Masters
Melantha Matthews
Susannah McKay
Ashley Meehan
Martin Meltzer
Jono Mermin
Karen Miernyk
Halie Miller
Maureen Miller
Lisa Mills
Kameil Milton-McKee

CDC Staff (cont.)

Chrissy Miner	Bridget Richards	Alex Tocitu
Shunte Moon	Caitlin Rivers	Michael Townsend
Sinead Morris	David Robeck	Angie Trujillo
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Hanako Osuka	Lisa Rotz	William Walker
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Llandess Owens	Scott Sammons	Stephen Waterman
So Park	Don Sharp	Melissa Whaley
Ketan Patel	Karlen Sharpe-Brown	Melinda Wharton
David Philpott	Pattie Simone	Lisa Whittle
Bob Pinner	Brenna Simons-Petrusa	Carrie Whitworth
Emily Pollock	Nishant Singh	Sarah Wiley
Sam Posner	Rachel Slayton	Taitainia Williamson
Ann Powers	Nate Smith	Caryn Womack
Janette Prewett	James Stevens	Brian Yoo
Liz Pusch	Roxana Rodriguez Stewart	Patty Yu
Yunlong Qin	Ying Su	Hui Zeng
Malavika Rajeev	Rob Tauxe	Kun Zhao
Sujan Reddy	Andrea Thames-Allen	Casey Zipfel
Faisal Reza	Natalie Thornburg	

*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 January 19 and 20, 2022, are accurate and complete.



Ruth Lynfield, M.D.

Chair, BSC, DDID

May 9, 2022

Date