PACCARB

Presidential Advisory Council on Combating Antibiotic-Resistant Bacteria

Meeting Summary

22nd Public Meeting of the Presidential Advisory Council on Combating Antibiotic-Resistant Bacteria

January 24–25, 2023

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Welcome, Overview, and Roll Call

Martin Blaser, M.D., Council Chair; Michael D. Apley, D.V.M., Ph.D., DACVCP, Vice Chair; and Jomana F. Musmar, M.S., Ph.D., Designated Federal Official, Advisory Council Committee Manager, Office of the Assistant Secretary for Health (OASH), U.S. Department of Health and Human Services (HHS)

Dr. Blaser opened the meeting at 10 a.m. ET; he and Dr. Apley welcomed the participants. Dr. Musmar described the Council's establishment and charter and summarized the rules governing the Council under the Federal Advisory Committee Act and conflict-of-interest guidelines. She then called the roll. (See the appendix for the list of Council members and staff present.)

Secretary Xavier Becerra tasked the Presidential Advisory Council on Combating Antibiotic-Resistant Bacteria (PACCARB) with providing recommendations on how to strengthen defense against antimicrobial-resistant pathogens by revising current pandemic preparedness and response plans and policies. In response, PACCARB formed the Antimicrobial Resistance (AMR) and Pandemic Preparedness Working Group, which is developing a report and recommendations that will be presented to the full Council for consideration at the March 2023 public PACCARB meeting.

Opening Remarks: Working Group Co-Chairs

Ramanan Laxminarayan, Ph.D., M.P.H., and Joni Scheftel, D.V.M., M.P.H., DACVPM, Co-Chairs, PACCARB AMR and Pandemic Preparedness Working Group

To inform the Working Group's deliberations, PACCARB hosted a workshop in September 2022 organized around a hypothetical large-scale disease outbreak of a novel viral pathogen that causes significant antibiotic-resistant secondary bacterial infections in humans and swine. Dr. Laxminarayan summarized some of the major themes that emerged from that exercise:

- Investment is needed to ensure capacity to sustain routine, daily operations outside of a major emergency.
- Flexibility is key to scaling up during an emergency and requires immediate investment.
- The One Health approach is crucial; close coordination across domains is needed.

At the January 2023 public meeting, PACCARB aimed to identify gaps in current pandemic preparedness policies, specifically focusing on communication and health equity. Dr. Laxminarayan noted that the COVID-19 pandemic demonstrated the importance of trust and cooperation across human, animal, and environmental health.

Patient Story

Tori Kinamon

Ms. Kinamon explained that she acquired methicillin-resistant *Staphylococcus aureus* (MRSA) as a freshman in college, where she was a champion gymnast in excellent physical condition. She suddenly found herself hospitalized, undergoing multiple surgeries, and worried about the

potential amputation of her infected leg. Ms. Kinamon counted herself fortunate to have had access to high-level surgical care as well as effective antibiotics that helped her recover. The infection was both physically and psychologically taxing, she added. Ms. Kinamon pointed out that many lack access to care, which prevents early diagnosis and effective treatment. She shares her story widely to raise awareness that AMR is a threat to everyone.

Ms. Kinamon was inspired to better understand AMR in her role as a medical student. At the Duke University School of Medicine, she took advantage of a curriculum created by four institutions that includes training in microbiology and immunology, with a focus on AMR and antimicrobial stewardship. Now, as she pursues medical research, Ms. Kinamon recognizes the critical importance of uniting efforts to address AMR across institutions such as Duke, the Food and Drug Administration (FDA), and the Antibiotic Resistance Leadership Group.

Discussion

Council members were profoundly impressed by Ms. Kinamon's story. Ms. Kinamon said AMR is not a high priority among medical students, but sharing her experience with classmates and others helps raise awareness of the gravity and extent of the problem. She acknowledged that the medical school curriculum has little emphasis on the One Health approach.

Ms. Kinamon said that including more questions about AMR and antimicrobial stewardship on board examinations would ensure that the topics are part of the curriculum in all medical schools. She also called for more AMR and stewardship research opportunities. Helen W. Boucher, M.D., FIDSA, FACP, hoped that PACCARB's recommendations would elevate the importance of addressing AMR in government and academia, in the same way that climate science is now being integrated into government initiatives and the academic curriculum.

Ms. Kinamon observed that the high cost of medical education leaves many students with substantial debt, which dissuades them from pursuing infectious disease as a specialty. She recommended better promoting the many opportunities to apply infectious disease expertise in the realms of patient care, research, industry, and regulatory science.

Federal Communication With States, Hospitals, and Subject Matter Experts

Communication Within the Agricultural Sector for Antimicrobial Use and Monitoring

Katie Abrams, Ph.D. Colorado State University

Dr. Abrams summarized some findings from research using the U.S. Department of Agriculture's (USDA's) National Animal Health Monitoring System to assess antimicrobial use among swine and cattle. Through in-depth interviews with stakeholders representing industry, cooperative extension programs, agricultural journalism, and national advocacy groups, investigators identified a need to use a wide variety of communication outlets and better search engine optimization to make it easier for people to find reliable information quickly. Findings should be translated into communication packages that include products tailored for targeted audiences, such as public health or agricultural commodity producers. Stakeholders should have options for receiving updated reports on antimicrobial use in the form of push notifications or email newsletters. Materials should be short and use infographics to convey information. When done well, communicating risk visually can prompt behavior change.

Continuous interaction with stakeholders is key. Interviewees suggested that USDA representatives attend industry and trade events to build relationships within the field. Better relationships would improve the likelihood that government research is translated into stakeholders' policies and best practices. Research must reach the information brokers—such as extension specialists and agricultural journalists. Involving stakeholders in the research process increases the likelihood that results will be accepted and disseminated. Researchers should highlight the intent of the research and its potential benefits to stakeholders; researchers should also acknowledge and express gratitude to stakeholders for their role in the work.

Dr. Abrams emphasized that cultivating strong relationships is the foundation to forming strong narratives. For information that is intended to prompt quick action from stakeholders, communication should be designed with usability in mind. More investment in scientific communication research would increase dissemination of findings and enhance biosecurity.

Science Guiding Practice: Role of the Centers for Disease Control and Prevention (CDC)

Arjun Srinivasan, CAPT, U.S. Public Health Service, CDC

CAPT Srinivasan described CDC guidance as suggested practices developed internally by CDC staff based on the best available data to address an issue of concern. Guidelines, on the other hand, are evidence-based practice recommendations based on systematic literature reviews, often crafted by groups of external experts, such as federal advisory committees, working with CDC staff. Guidance may be identified as interim, particularly in the context of an evolving emergency, such as the COVID-19 pandemic, and may be updated rapidly when new information emerges.

The guideline development process can take years. It follows strict protocols for vetting experts and has mechanisms for gathering public input. Guidance allows more flexibility and can suggest best practices based on expert opinion or experience in the field. Guidelines make recommendations based on published evidence of good quality—and avoid making recommendations when evidence does not meet a minimum standard. CDC's Healthcare Infection Control Practices Advisory Committee gives epidemiologists and antimicrobial stewardship experts an opportunity to weigh in on guidance and guidelines. For example, in 2016, the Committee recommended that professional societies developing guidelines on AMR better incorporate the principles of diagnostic testing and treatment.

CDC guidelines are based on careful review of the published evidence, with emphasis on randomized, controlled trials. CAPT Srinivasan pointed out that in the absence of comparative studies, focusing on randomized, controlled trials can imply that all evidence is equal in quality. In the case of antibiotics, for example, no study compares various options, and there is little clear evidence to determine which antibiotic is best for a patient or for society as a whole in a given situation. CAPT Srinivasan noted that it takes years before guidelines are fully implemented in the field. Thinking in advance about implementation and evaluation could speed up that process.

Pandemic Communications: New Hampshire Public Health Perspective

Benjamin P. Chan, M.D., M.P.H., New Hampshire Division of Public Health Services

Dr. Chan noted that successful communication builds trust, and trust leads to successful communication. During the COVID-19 pandemic, all government agencies were challenged with the task of communicating rapidly changing science and had to recognize that the local context influences how science is interpreted and how guidance is implemented.

To develop public health messaging in New Hampshire, Dr. Chan described working backward; instead of focusing on the specific message, the process begins with identifying the target audience, methods for reaching that audience, and mechanisms to gather feedback. The message content and delivery are created with key objectives in mind and anticipate the target audience's range of emotions, fears, concerns, and uncertainty. A messenger—an individual or organization who is trusted, creditable, knowledgeable, and empathetic—is identified. The process of building credibility and trust is a circular one.

In times of crisis, it is important to maintain and leverage available communication channels, which differ across levels of government. Many states have or are developing One Health coalitions that can disseminate federal information down to the local level. Early in the process, federal communication efforts should engage public health authorities, who are likely be on the front lines of an emergency and can advise on how to tailor guidance for local communities to ensure the best possible implementation. Dr. Chan recommended developing systems for evaluation and feedback to assess the reach and impact of guidance.

Antibiotic Resistance and Other Complicated Topics: Gaining the Trust of Your Audience

Russ Daly, D.V.M., M.S., DACVPM, South Dakota State University

Dr. Daly underscored that veterinarians are highly trusted by clients and the general public, and veterinarians from cooperative extension agencies (often associated with land-grant universities) are an important source of unbiased information. He noted that the COVID-19 pandemic revealed how important it is to understand whom people trust for information. Extension veterinarians often have practical experience as well as specialized training, a broad perspective across species and settings, and minimal conflicts of interest, making them a trustworthy resource for veterinarians in private practice. Extension veterinarians routinely translate complex concepts to veterinarians, food animal producers, and the general public. Their wide networks allow them to build relationships and trust among many stakeholders.

Extension veterinarians communicate using all types of media to reach various audiences, from traditional outlets such as newspapers to social media. Extension veterinarians played a key role in explaining FDA's Veterinary Feed Directive to stakeholders when it was enacted. They succeeded because of the trust and relationships built over time through frequent communication about animal health. Dr. Daly said that leveraging connections with veterinarians is an important way to reach livestock producers and owners. Messaging is more effective, clearer, and easier to act on when trust and relationships are in place, he concluded.

Discussion

Dr. Daly acknowledged that the number of extension veterinarians is limited, but other staff within extension agencies are also involved in outreach. Extension agencies are not growing, he noted, so everyone must consider how to better get messages out.

CAPT Srinivasan pointed to the need to rebuild trust not just in government institutions but across society. Transparency is essential. Guidelines should be created by experts who have been vetted, with conflicts of interest addressed, and the processes for development made clear. Michael Craig, M.P.P., added that currently, guidance and guidelines are either insufficient, conflicting, or underused, which he attributed to a lack of resources among professional societies in particular.

Dr. Chan observed that the lack of federal guidance at the outset of the COVID-19 pandemic forced states and localities to create their own, which led to confusion. Eventually, federal guidance improved, becoming more timely and incorporating state and local perspectives. He noted that it takes work to make individual hospital laboratory data, such as antibiotic susceptibility monitoring, available to public health entities, but the process ultimately builds capacity for baseline monitoring and facilitates communication across local, regional, and state groups, which can then assist with disseminating guidance during an emergency.

Dr. Abrams said that every medium has a specific audience. Sophisticated analytic tools are available to understand who uses the medium and how, which can help with targeting communication to specific user groups.

Several presenters agreed that it is challenging to avoid the perception of competing narratives when the science is changing rapidly. Dr. Daly said more transparency about the evidence and process behind creating recommendations could be helpful. CAPT Srinivasan acknowledged that the public health field did a poor job of communicating given the uncertainty around the COVID-19 pandemic; it is important to clarify that recommendations are based on current, limited data. He added that CDC and others could be more open about factors other than scientific evidence that influence guidance, such as the practicality of implementing recommendations. The Centers for Medicare and Medicaid Services (CMS), for example, describes its assessment of public comments and the rationale behind its rulemaking. Dr. Chan reiterated that communication is a two-way street; authorities should discuss the guidance with the target audience and respond to concerns and feedback. Elaine Larson, Ph.D., RN, noted that the Agency for Healthcare Quality and Research used to have a clearinghouse of guidelines that it had vetted to ensure quality; Melissa Miller, M.D., M.S., FCCM, said the clearinghouse was discontinued for budgetary reasons.

Dr. Chan said that the reluctance to make predictions based on current evidence must be balanced with the public's desire for some insight about the future. He proposed that forecasting likely developments—based on experience and current data and acknowledging the possibility that forecasts could be wrong—could help with uptake of guidance. Dr. Abrams added that journalists who specialized in agriculture, for example, have built strong networks and relationships over time that put them in a position to make some predictions. She recognized that revising guidance when new evidence arises can be an opportunity to attack the credibility of those making recommendations. However, Dr. Abrams believed that continuously alerting people about the changing data would help audiences be more flexible in their thinking.

Locke Karriker, D.V.M., M.S., DACVPM, pointed out that the swine industry is prepared to address potentially catastrophic infectious disease but not motivated to take on topics of lesser

proportions. Dr. Abrams noted that building the capacity for communicating about science could help trade organizations, for example, become more comfortable with developing messages around other topics. Dr. Daly added the importance of understanding the motivations of individual producers. Dennis M. Dixon, Ph.D., observed that peoples' willingness and ability to act in their own best interests is complicated.

Stephanie Black, M.D., M.Sc., and Dr. Chan agreed that CDC outreach was pivotal for state and local public health providers disseminating guidance. Data dashboards have been key to engaging stakeholders and informing communication. By working with CDC before new guidance was released, states were better able to explain and distribute the new guidance.

External Communication With the Public

Communication Challenges About AMR and Antimicrobial Stewardship in Animal Agriculture During a Pandemic

Andy J. King, Ph.D., University of Utah

Dr. King offered three reasons why effective communication about AMR and antimicrobial stewardship among agricultural stakeholders is particularly challenging during a pandemic:

- Science communication is challenging in the animal agriculture setting under any circumstances, in part because concerns, interests, and goals vary markedly across stakeholders, which include individual producers and farmers, veterinarians, industry organizations, policymakers, and consumers.
- Communicating during a crisis poses unique challenges. Responding to crisis effectively requires having a plan in place as well as flexibility to respond quickly and transparently and acknowledge uncertainty. Communication must be adapted in response to stakeholder feedback. Efforts must be made to prioritize communication with research and planning.
- Few recommendations exist to guide behavioral and communication strategies for AMR and antimicrobial stewardship in animal agriculture during times of normal operation, let alone during crises. There is little consensus about the desired behavior around AMR. It is difficult to make recommendations that apply broadly across stakeholder groups. Communication must be tailored to the audience and its goals.

Communicating AMR With the Public: Effective Strategies and Considerations During a Pandemic

Katy Capers, M.A., CDC

Ongoing national surveys show that a growing number of people understand that current antibiotic use has an impact on future effectiveness, among other AMR concepts. A small percentage of people believe that people (or animals) develop resistance, rather than the germs evolving to become resistant. Despite positive trends in general awareness, one third of people believe that "antibiotic resistance" is a protective factor (i.e., resisting or reducing bacteria). A significant percentage of people acknowledge saving some of their prescribed antibiotics for future use. Higher levels of education are a significant predictor of understanding AMR. The COVID-19 pandemic has boosted awareness that antibiotics cannot treat viral infections and that vaccines can have an indirect effect on antibiotic use.

Ms. Capers said using engaging messages on social media with good, simple graphics that describe actions to take has worked to increase knowledge. CDC tailors messages for different settings, taking local needs into account. Techniques that have not worked include using stock photos and advertising in paid media. Mistrust in government and in some health care providers limits the effectiveness of messaging. Many individuals do not see AMR as their personal responsibility; rather, they believe scientists, medical researchers, and CDC will address the issue. Some feel that their individual actions will not have enough impact to make a difference.

CDC leverages various communication channels to reach a broad range of audiences, taking a One Health approach that addresses individuals and their communities. Its Be Antibiotics Aware campaign has been redesigned and will relaunch in spring 2023. CDC is testing whether a domestic or global AMR campaign could be effective and whether to emphasize AMR as a personal responsibility or a societal problem. CDC is refreshing its Be Antibiotics Aware materials to address misconceptions, particularly the perception that a new drug or new research will be available to treat antimicrobial infections when existing drugs fail. Ms. Capers noted that CDC is always seeking partners to disseminate its messages more widely.

Communicating AMR: One Health (Small Animal) Perspective

Meghan Davis, D.V.M., Ph.D., M.P.H., Johns Hopkins University

Dr. Davis pointed out that despite the overlap of human, animal, and environmental health that underlies the One Health approach, communications tend to target one aspect, and there is no sense of a shared responsibility to create communications strategies from a One Health lens. An integrated strategy is needed.

Veterinarians remain trusted sources of information among the public. They can be an important part of an integrated communication strategy around AMR, which can serve as a platform for communicating during an emergency.

Subject matter experts should be identified from different levels of government across all the One Health domains, recognizing that some entities, such as environmental health agencies, have limited experience with infectious disease and AMR. Nontraditional partners and other stakeholders should be engaged in communication, and feedback loops should be incorporated. For example, animal control officers and animal shelters were crucial in reaching low-income people with pets early in the COVID-19 pandemic. Dr. Davis emphasized the need to address structural gaps and harmonize communication strategies so that key messages are delivered consistently across various fronts.

Addressing AMR: Health Literacy, Communication, and Decision-Making Considerations

Aisha T. Langford, Ph.D., M.P.H., New York University Langone Health

"Health literacy" is defined by Healthy People 2030 as the ability to find, understand, and use information and services to inform actions related to health; "organizational health literacy" is the ability for organizations to enable individuals to find, understand, and use information and services in an equitable way. Dr. Langford described a method for fostering health literacy among patients by steering them to specific reputable resources for information, such as CDC's Be Antibiotics Aware campaign materials and Medline Plus.

Dr. Langford pointed out that shared decision making is a collaborative process between patients and their providers, often supported by decision aids. (She recommended the Ottawa Hospital Research Institute's searchable library of patient decision aids.)

Awareness of and participation in clinical trials also supports health literacy. The steps from learning about a trial and enrolling are lengthy—and health care providers often lack time to keep abreast of ongoing trials and discuss them with patients. Researchers should involve patients and the public in designing trials to mitigate barriers to participation. All of these steps contribute to reframing patients' choices about their care and diminishing the perception that health care providers who discourage antibiotic use are withholding useful treatments.

Discussion

Some discussion revolved around terminology that can be confusing. Dr. Davis said the term "AMR" is used differently in human health than in environmental health, for example. Consistent definitions and use could lead to more coherent communication strategies. Dr. King noted the difficulty of capturing the many issues related to AMR in varying circumstances under one umbrella.

Via chat, Dr. Davis referenced an article in *Antibiotics* that addresses AMR language across One Health domains. Timothy Jinks, Ph.D., said the Wellcome Trust commissioned work about reframing resistance and wrote a report with recommendations for improving communication. Dr. Davis noted a study challenging the principles of the Wellcome Trust's report. Paul Plummer, D.V.M., Ph.D., DACVIM, DECSRHM, pointed to a paper on the need to understand individual values around antimicrobial use in agriculture.

Dr. Davis said that one way to counter disinformation is to rely on trusted community members to deliver messages. In some cases, it may be necessary to identify messengers who are not associated with a standard authority. Dr. King proposed paying more attention to the large proportion of people who want good information but are confused; it may be a mistake to focus too much on misinformation and disinformation. He added that facts are not enough to change behavior. Further, the general public does not care much about AMR because it does not rate as a primary concern. Mr. Craig agreed, noting the need for more intense research as well as recognition of the pressing issues that may contribute to AMR, such as holding on to antibiotics because health care visits are unaffordable. Dr. Plummer concurred, saying that many factors influence how a message is received.

Dr. Langford said shared decision making can be bolstered by mechanisms that push patient decision aids directly to patients, such as patient portals. Some health systems are integrating educators and decision coaches into the health care team. There are opportunities to cultivate health educators within care settings who can help patients and take some burden off of physicians. Dr. Davis pointed out that shared decision making is common in veterinary practices, and veterinarians are trained to communicate with people about animal health issues, including topics that overlap with human health issues. For the animal agriculture setting, Dr. King reiterated the need for clear recommendations on the behavior changes needed across animal,

human, and environmental health settings, including some sort of index measure that could be used to track progress over time.

Dr. Davis described total worker health, an approach to investing in well-being of individual workers that takes into account that a healthier workplace yields better outcomes. She agreed with Dr. Langford on the need for a more team-based approach that leverages the skills of various members of the health care team without adding more burden to health care providers.

Regarding the selection of the right medium to deliver the message, Dr. Davis noted that alternatives to traditional approaches should be considered. For example, some research suggests that having a physical presence in the community is necessary to deliver a message effectively. Dr. King suggested engaging social media influencers in promoting public health.

Elizabeth Dodds Ashley, Pharm.D., M.H.S., FCCP, BCPS, noted that providers on the front lines with patients—such as physicians, nurses, pharmacists, and therapists—are often left out of communication plans developed by hospitals and subject matter experts. Front-line providers need reliable information quickly. Dr. King said compartmentalization is more prominent in human health than in animal health, which prioritizes systems thinking. Ms. Capers said tying together the various topics that fall under AMR is complex and requires a team approach across One Health domains.

Dr. Langford said time constraints and reimbursement concerns limit health care providers' use of the shared decision-making process and decision support tools. Julia E. Szymczak, Ph.D., said patient demand for unnecessary antibiotics remains a concern; work is underway on time-sensitive techniques to ensure patient satisfaction with physician recommendations.

Presenters identified their top recommendations for improving communication with the public as follows:

- Integrate communication using a One Health perspective, particularly increasing considerations around environmental health.
- Identify trusted sources of information (eg, among clinicians).
- Invest in partnerships and relationships across the board and down to the community level.
- Provide clear recommendations on behavior change that focuses on empowerment.

Public Comment

Tom Heyman of the Sepsis Alliance said medically underserved communities are less likely to be aware of the risks of infection, AMR, and sepsis and much more likely to suffer from them. With a diminishing supply of effective antibiotics and other antimicrobials, more infections progress into sepsis, and sepsis becomes increasingly difficult to treat. More people will die and suffer harmful after-effects. It is critical to improve understanding of AMR as a major public health crisis by focusing on education and communication. A Sepsis Alliance survey of adults in the United States and four other countries found that only 52 percent are aware of the term "antimicrobial resistance." Mr. Heyman called for investment in public education. Sepsis Alliance also found that while 90 percent of infectious disease physicians and pharmacists

consider AMR a major problem, only about a third are familiar with current legislation and policy solutions. Sepsis Alliance believes that public awareness, effective communication, and education efforts can make a difference. It is advancing the creation of a National Sepsis Data Trust to harmonize existing data and help understand the heterogeneity of infections and the body's immune response to these pathogens (visit Sepsisregistry.org). Additionally, Sepsis Alliance is hosting a free, 2-day AMR conference for health care leaders on April 26 and 27, 2023, with a session on CDC's antimicrobial stewardship core measurement program (see AMRconference.org). Sepsis Alliance looks forward to continuing to work with PACCARB and other partners on improving the shared understanding of AMR and building strategic solutions.

Jeanine Thomas of the MRSA Survivors Network observed that the World Health Organization has identified AMR as a major global health concern, but little has been done to change the trajectory. Prevention saves lives, but society has not done everything possible to stop MRSA and other staph infections circulating in health care facilities for decades. Ms. Thomas expressed gratitude to all the health care workers and their families who made huge sacrifices during the COVID-19 pandemic, including the many health care workers who contracted MRSA and other health-care-associated infections (HAIs) while on the job. Health-care-associated MRSA infection rates having increased up to 25 percent since the beginning of the COVID-19 pandemic. Ms. Thomas said many health care facilities stopped screening patients for MRSA, which was a disaster for patients with COVID infections, despite hundreds of peer-reviewed, published studies demonstrating that screening high-risk patients, along with strict hand hygiene, contact precautions, thorough decontamination of surfaces, decolonization and isolation of MRSA-positive patients, and a good antibiotic stewardship program can make a huge difference and save lives. Northern European countries, such as the Netherlands, have used screening to successfully reduce MRSA infections and deaths. The U.S. Department of Veterans Affairs sharply reduced MRSA infections by 80 percent within 7 years in all of their 150 facilities by universally screening patients. Ms. Thomas said patients do not want more noninferior products and therapies to treat pathogens and infections; she hoped companies would continue developing superior products with fewer adverse side effects. The key to reducing MRSA and HAIs is a preventive approach. The MRSA Survivors Network commends the companies and researchers who are developing these products and also the health care facilities who are committed to reducing infections, deaths, and needless pain and suffering.

Kevin Kavanagh of Health Watch USA noted that the CDC reported an increase in antibiotic-resistant infections during the COVID-19 pandemic and an even more concerning increase in resistance in hospital-onset infections. There is concerning evidence that this rise in resistance will be compounded by a lasting immune dysfunction produced by COVID-19, exemplified by the recent surges in hospitalizations from respiratory syncytial virus (RSV) in the United States. Not widely reported by the lay press, the United States, Germany, and Sweden had large RSV surges not only this year but also last year, shedding significant doubt on the "immunity debt" hypothesis. Sweden also had very little masking and few closures during the pandemic. Immune dysfunction for COVID-19 is also supported by clinical studies and abundant laboratory evidence. A non-peer-reviewed study observed an almost 100-percent increase in risk of RSV infections in COVID-19 patients compared with controls. Notably, 9.7 percent of children who did not develop an RSV infection had a documented COVID-19 infection, in contrast to 19.2 percent of children who developed an RSV infection and had a documented COVID-19

infection. Another study found a 34-percent increase in risk of streptococcal tonsillitis in COVID-19 patients compared with controls. The best policy is to prevent patient exposure to drug-resistant pathogens. Screening and surveillance must become a leading strategy upon which others are added. In the case of hospital-onset MRSA infections, private-sector health care in the United States experienced a 17-percent increase above their 2010–2011 baseline rates. The Veterans Health Administration had a uniform strategy of surveillance and contact precautions, which enabled it to maintain more than an 80-percent decrease. It is important to remember that no matter how high a patient's risk, one will only become infected with a drug-resistant pathogen if one is exposed to it.

Mayra Reiter of Farmworker Justice said that since 2016, the U.S. Environmental Protection Agency (EPA) has made several decisions authorizing the use of streptomycin to combat citrus greening in Florida. EPA's 2021 registration decision allows this antibiotic to be used on citrus until 2028, potentially resulting in more than 650,000 pounds being sprayed on citrus trees in Florida and California. Unlike with medical prescription of antibiotics, there has been little communication with affected workers and communities regarding the risks they are exposed to. They also have little power to control these risks. These applications expose farmworkers and communities in citrus fields to unacceptable risks, including allergic reactions and the development of antibiotic-resistant bacteria. Farmworkers are at risk of exposure when they misload and apply antibiotics as well as when they enter sprayed fields or when they are exposed to pesticide drift. EPA has acknowledged the risk of bacterial resistance posed by this practice, but the agency believes that the use of personal protective equipment (PPE) will lessen the risk of farmworker exposure. However, this ignores the fact that farmworkers are not always provided adequate PPE by their employers and frequently lack training in its proper use. Furthermore, reentry intervals that are intended to protect workers are also frequently ignored. The risks of these exposures have not been communicated properly to farmworkers or to communities. As a matter of public health and environmental justice for farmworker communities, these uses should be eliminated, and exposed communities must be informed of the possible exposures, so they can receive appropriate medical care if they experience side effects.

Ted Schroeder, past chair of the Antimicrobials Working Group and former chief executive officer of Nabriva Therapeutics, underscored the dire state of the antimicrobials industry. Nabriva was founded in 2005 with a mission to develop novel antibiotics to treat infectious diseases, particularly those caused by multidrug-resistant organisms. Despite many challenges, the company succeeded in bringing a novel antibiotic to the market in 2019 with a qualified infectious disease product designation. Despite the company's successes on the scientific, technical, and regulatory fronts, the dysfunction of the commercial market proved to be its undoing. Currently, the market is unable to sustain small companies with newly FDA-approved antibiotics, despite the clear life-saving potential of these drugs. In January 2023, Nabriva announced a strategic plan to wind down the company's operations, recognizing the unfortunate impact on its employees, partners across the globe, and, most importantly, the patients who rely on Nabriva's products. In September 2022, PACCARB sent a letter to HHS Secretary Becerra recommending improvements to the antimicrobial commercial ecosystem. On behalf of the many struggling small biotech companies, Mr. Schroeder urged PACCARB to revisit its letter and reiterate its recommendations. He encouraged the Council to consider both

long-term solutions and near-term strategies to preserve stewardship, protect intellectual property, and ensure continued patient access to innovative and safe antimicrobials. Today, the industry is at a critical inflection point. Mr. Schroeder urged the Council to ask HHS to take immediate near-term actions that will preserve the essential capability to develop the medicines of the future while continuing to support safe drug development, appropriate use, and product access.

Council Perspectives

Council members offered their key concerns and takeaways from the day's presentations and discussion, which are summarized here according to broad categories of interest.

Challenges of Addressing AMR

- Tackling AMR means grappling with other, broader problems, such as mistrust of authority; education that focuses narrowly on preparing for examinations; lack of science literacy; public confusion, misinformation, and disinformation; and underappreciated environmental exposures to drugs.
- Behavior change is difficult, but AMR affects everyone. CDC aims to improve its communication but also needs partners across the One Health spectrum and in communities to better understand preferences, demands, and barriers.

Education and Training

- Education remains a key concern, whether for improving health and science literacy or preparing future health care providers to think beyond board examination requirements so they can better care for patients.
- Medical students would benefit from more education on AMR, microbiology, and immunology, but the curriculum is already packed. Interest in pursuing infectious diseases as a specialty is low. PACCARB has discussed integrating AMR education for all health care providers and incorporating it into community outreach.
- Animal and human health care providers should receive training on how to identify reliable sources of information.
- More focus is needed on reaching younger audiences, such as those in primary and secondary schools, who can be advocates for change.

General Communication Challenges

- The issues around effective communication are extremely complex and interconnected.
- Efforts must be made to invest in infrastructure, build relationships, and support the structural drivers that underlie good communication under normal circumstances so that they can be leveraged during times of crisis.
- Challenges remain around ensuring open communication with the general public and even among health care professionals, which should be addressed in PACCARB's recommendations.
- Patient advocates have a role to play in improving communication and should be integrated into strategic communication planning.
- Increasing interaction among providers across One Health domains will build trust.

- Some efforts seek to engage underserved communities to better understand their concerns and their lack of trust in vaccines, for example.
- Determining what the intended audience hears and understands may be more important than the communication itself. More focus is needed on learning what people think.
- Communication should highlight individual empowerment and agency.
- Efforts should be made to build trust with intermediaries—such as extension veterinarians, agriculture educators, and local epidemiologists—who can deliver messages effectively.
- Tailoring communication to the target audience might involve personal engagement and a physical presence in a community.

Developing Guidance and Guidelines

- Clinicians must recognize the value of guidelines for making treatment decisions before they can be expected to adopt new or revised guidance or guidelines during a time of crisis.
- Trainees should understand how guidelines are created and should support their use in practice.
- More consideration is needed about how to create guidelines in a way that facilitates their communication and uptake. For example, standards could be developed to ensure that a range of stakeholders participate in guideline development, such as patients, representatives from all the One Health domains, and providers from other disciplines.

Recess for the Day

Martin Blaser, M.D., Council Chair, and Michael D. Apley, D.V.M., Ph.D., DACVCP, Vice Chair

Dr. Blaser appreciated the interesting and provocative presentations and discussion. The meeting recessed at 3:58 p.m.

Day 2

Welcome and Roll Call

Martin Blaser, M.D., Council Chair; Michael D. Apley, D.V.M., Ph.D., DACVCP, Vice Chair; and Jomana F. Musmar, M.S., Ph.D., Designated Federal Official, Advisory Council Committee Manager, OASH, HHS

Drs. Blaser and Apley welcomed the participants. Dr. Musmar reiterated the rules governing the Council under the Federal Advisory Committee Act and conflict-of-interest guidelines. She then called the roll.

Recap of Day 1 and Overview of Day 2: Working Group Co-Chairs

Ramanan Laxminarayan, Ph.D., M.P.H., and Joni Scheftel, D.V.M., M.P.H., DACVPM, Co-Chairs, PACCARB AMR and Pandemic Preparedness Working Group

Dr. Scheftel summarized some themes from the presentations and discussion on day 1:

- A crisis may be global, but communication must meet individuals where they are.
- Science and facts are not enough to spur action or change behavior; experts in sociology and communication are needed to improve messaging.
- A holistic, One Health approach that takes the needs of all into account, balances risks, and optimizes outcomes is necessary.
- More work is needed to better incorporate the environmental perspective in One Health efforts.

Dr. Laxminarayan added that day 1 underscored the vital role of communication during a pandemic. When the science is evolving quickly, maintaining public trust is critical. He outlined some other key learnings:

- Good communication builds trust, and building trust must take place before a crisis is underway.
- Veterinarians are highly trusted and serve as good models for developing and maintaining relationships.
- Public trust in institutions may be declining, but some sources are still seen as unbiased and trustworthy. Systematic efforts should be made to identify those sources.

Day 2 focused on understanding and addressing disparities. Dr. Laxminarayan noted that vulnerable populations have been ignored in pandemic prevention planning around the world. Authorities must recognize that the burden of AMR is not uniform across all populations.

Vulnerable and Marginalized Populations

Combatting AMR During a Pandemic: The Pediatric Perspective

Latania K. Logan, M.D., M.S.P.H., Emory University

Dr. Logan summarized a host of issues that contribute to vulnerability and marginalization of pediatric populations, explaining how these issues play a role in AMR and further increase vulnerability during a pandemic. Community-acquired and health-care-associated drug-resistant infections are increasing among children, and COVID-19 continues to affect AMR in children and adults.

The impact of social determinants of health on children—such as food and housing insecurity and reduced family income—has been exacerbated by the COVID-19 pandemic. Racial and ethnic disparities in diagnosis and treatment lead to higher morbidity and mortality for patients, especially Black children, who are less likely to be diagnosed with common infections or receive antibiotics than White children. Social determinants of health affect access to care, including vaccines, which can lead to more vaccine-preventable illnesses, which in turn contribute to excess antibiotic use, more secondary bacterial infections, more drug-resistant infections, and more nosocomial infections. Since the COVID-19 pandemic began, uptake of all types of vaccines have declined. Pediatric chronic conditions have worsened during the pandemic and underserved or marginalized communities are disproportionately affected by chronic conditions.

Recent trends that shift resources away from pediatric and maternal childcare have contributed to further disparities. Readiness to provide pediatric emergency and outpatient care varies highly.

The National Pediatric Readiness Project found that hospital emergency departments that score well on assessments of pediatric readiness have substantially lower mortality rates among critically ill children than lower-scoring hospitals. A nationwide shortage of pediatric beds, staff, supplies, and equipment has contributed to increasing secondary bacterial infections and subsequent AMR. Finally, antibiotic development for children is very complicated; harmonizing regulatory approval processes is one step toward prioritizing children and expediting antibiotic development. Dr. Logan called for more investment in children in the context of all of these issues and recommended public–private partnerships as one mechanism to do so.

Lessons for Long-Term Care: What COVID Taught Us

Aval-Na'ree Green, M.D., Baylor Scott and White Health

Among the many lessons learned so far during the COVID-19 pandemic, Dr. Green highlighted the intersection of politics and public health, noting that she and her staff were not initially prepared to navigate the effects of political polarization on making care decisions for patients (e.g., vaccine and treatment refusal). They had to manage the impact of misinformation through education and reassurance while also keeping up with evolving science.

Existing staff shortages in long-term care facilities worsened with the COVID-19 pandemic and contributed to the spread of disease, highlighting the need to better manage infection control in the workplace. Dr. Green's facility negotiated with others to ensure that instead of working in multiple facilities, staff would work regular and overtime hours in one location. Preventing and managing outbreaks requires perpetual vigilance, including staying up to date on data and public health recommendations. Purposeful discussions and advance planning with patients and caregivers helped with decision making when in-person contact and options for care were limited. Dr. Green said that partnering with a local hospital proved to be highly valuable for coordinating care and leveraging resources available in the long-term care facility.

Integrating Immunocompromised Patients Into Pandemic Preparedness

Sankar Swaminathan, M.D., University of Utah

Dr. Swaminathan explained that the proportion of immunocompromised people is growing. The social and economic costs of infectious disease among immunocompromised people are extremely high. Dr. Swaminathan called out shortsighted policies that, for example, cover the high costs of organ transplants but not the cost of routine preventive care afterward that is crucial for transplant recipients. He outlined the many barriers to care and offered several suggestions for addressing the challenges faced by immunocompromised people during an emergency:

- Develop clear, consistent guidance for health care providers and patients about how to use new vaccines and treatments among immunocompromised people.
- Prioritize immunocompromised people in planning to mitigate challenges around access and logistics.
- Create a national mechanism to coordinate the health care response for immunocompromised people.
- Develop a national plan for access to and delivery of vaccines, chemotherapy, prescription drugs, and PPE for immunocompromised people.
- Improve access to diagnostic tests and decentralize testing to avoid logjams and delays.

- Expand and facilitate access to rapid testing to identify drug resistance patterns.
- Invest heavily in rapid development of novel vaccines and therapeutics for influenza for immunocompromised people to prevent severe disease and emergence of drug resistance.
- Expand telehealth and in-home care options to overcome barriers to access for immunocompromised people, and adequately compensate providers for such care.
- Create a national registry of patients who need special care so that they can be located during an emergency.
- Set up a national infectious disease consultation service via telephone, with federal subsidies to ensure staff are in place when needed.

Unique Vulnerabilities of Agricultural and Migrant Workers in the COVID-19 Pandemic

Julia Coburn, M.A., Centro de los Derechos del Migrante (CDM)

Ms. Coburn pointed out that policies and environmental factors put agricultural workers, particularly migrants and immigrants, at increased risk for illness during a pandemic. The use of foreign-born labor has ballooned in the food production industry over the past 10 years, resulting in a workforce more culturally and linguistically diverse than other U.S. industries. CDM aims to improve working conditions through outreach, education, legal support, and advocacy.

Ms. Coburn characterized the animal food production industry as demanding, dirty, and dangerous. The pressure on employees to work quickly to increase production is intense. Some veterinarians at pork facilities report treating up to 400 pigs in an 8-hour day. Workers have reported to CDM that they are incentivized not to wear PPE (e.g., gloves to cover a wound) because it slows them down. Social distancing is often impossible inside of a plant, and poorly-thought-out safety measures can make matters worse. Food processing plants have high rates of accidents and illness. Meatpacking plants, for example, were the source of early COVID-19 outbreaks and were responsible for spreading the virus in their communities. Seasonal and migratory workers often live in employer-provided group housing with inadequate ventilation to prevent spread of disease. Finally, most processing occurs in rural areas, so workers are isolated and lack access to transportation, health care, and legal support.

Immigrant employees may be reluctant to take time off from work when they are ill or injured. Whistleblowers may face retaliation. The threat of deportation can be used to prevent workers from seeking reasonable treatment. Government raids to identify undocumented immigrants often target food processing facilities. Using the National Guard to set up COVID-19 vaccine clinics proved to be a deterrent even for those eligible.

Federal funding has strengthened some meaningful partnerships, but that funding is drying up, and health departments and other government agencies acknowledge that they have insufficient resources to address workforce needs. CDM and similar organizations are making the case that occupational health is public health. Ms. Coburn offered the following recommendations for federal agencies:

- Prioritize participation of immigrant and migrant workers in all levels of designing and implementing policies and interventions.
- Diminish the power of retaliation by strengthening protections for whistleblowers and seeking relief for workers in the food animal production industry in particular. (For

example, the Department of Homeland Security recently published new guidance allowing workers with temporary visas to report workplace violations and receive protection from deportation while the report is investigated.)
- Ensure that federal, state, and local agencies are equipped with adequate language access plans and implementation resources (as required under the Civil Rights Act of 1964).
- Support sustainable, public–private partnerships that include worker groups to close gaps and build trust within communities.
- Expand access to paid sick leave and free and low-cost health care services and treatments, regardless of worker immigration status.

Discussion

Dr. Blaser said the presentations highlighted the need to identify public health champions at the local level and support them in building strong relationships within their communities. Dr. Green agreed, adding that in long-term care, more attention should be paid to recognizing and documenting individuals' capacity to make their own health care decisions, even in the context of cognitive impairment.

Dr. Laxminarayan suggested seeking out assessments like the National Pediatric Readiness Score, which could drive more facilities to focus on preparedness.

Ms. Coburn said CDM advocates for better data about immigrant and migrant population health, which is challenging to gather. CDM also seeks better communication about how infectious diseases in occupational settings spread to communities. Health departments have been unable or unwilling to track or share such data. Ms. Coburn also pointed to the risk of disease transmission between humans and animals; she gave an example in which a processor put productivity before human health when a veterinarian identified a parasite with potential for transmission to humans.

Paula J. Fedorka Cray, Ph.D., noted that some long-term care facilities appear to be relaxing policies intended to prevent the spread of COVID-19. The pandemic persists, and precautions remain necessary. Dr. Green agreed; she hoped policymakers would review existing regulations to distinguish those that can prevent health and mitigate the risk of outbreaks from those that have little impact.

Regarding financial barriers to expanding the use of diagnostic testing, Dr. Swaminathan pointed out that not all countries face such problems. In Canada, for example, institutions have resource allocations that they can use at their own discretion. Making decisions about diagnostics at the individual level is inefficient and ill-advised, said Dr. Swaminathan. Physicians should advocate for national resource allocation and comprehensive patient care.

To address workplace health issues in the animal food producing industry, Ms. Coburn suggested looking closely at the TN (or nonimmigrant) visa program, which companies are using increasingly to hire staff from outside the country—especially veterinarians and animal scientists. TN visas are not strongly regulated. Policies like that of the Department of Homeland Security could enable more workers to speak out and provide a better understanding of what is happening in the field. Ms. Coburn contended that the alarming cases she described in her

presentation are not isolated; the concerns raised are linked to the structure of recruitment and employment.

Dr. Logan noted that disparities in care and barriers to access for the pediatric population predate the COVID-19 pandemic, but both were exacerbated by it. Public–private partnerships are key to improving access. Dr. Logan called for more focus on how to bring care to people where they are. Dr. Swaminathan recommended a return to house calls, pointing out that other countries find delivering care in a patient's home is efficient, effective, and not that expensive. Dr. Green concurred that home-based primary and preventive care is ideal.

Ms. Coburn said an important first step to improving access to care for immigrant and migrant workers is fostering relationships between local health departments and community-based organizations who can serve as messengers to the target population. Building relationships before an emergency is key. Ms. Coburn acknowledged that CDM often addresses the worst situations, but it also works with unions to align best practices and to support communication between health departments and employers. She hoped CDC would continue to fund cooperative agreements that have helped build trust and support collaborative problem-solving. She also hoped for continued oversight and regulation of employers.

Dr. Green said that publicly reporting data—specifically, measures of health equity and disparities—makes a difference in the long-term care setting. Reporting should be tied to reimbursement as an incentive to improve care.

Via chat, Dr. Jinks said the World Health Organization's constitution emphasizes equitable care as a fundamental human right and identifies the responsibility of governments to provide adequate health and social measures. He appreciated PACCARB's role in shining a light on disparities and hoped the Council would put forth clear, specific recommendations.

Addressing Equity and Health Disparities

Addressing Racial and Ethnic Health Disparities During a Pandemic

Consuelo H. Wilkins, M.D., M.S.C.I., Vanderbilt University Medical Center

Good data are key to understanding and addressing inequities and disparities in health care, specifically data on race and ethnicity, preferred or primary language, and sociodemographic factors. Dr. Wilkins' analysis found that people who were identified only as "unknown race" suffered more inequity and disparity than those for whom race or ethnicity was identified. She said it is important to work with community-based organizations to better understand cultural distinctions within subgroups, especially differences related to language.

Dr. Wilkins emphasized that race is a social construct, not a biological one. Data are captured according to standardized categories that are inherently racist. The experience of racism and discrimination has a physiologic impact that affects infectious disease and chronic disease. Race and ethnicity are linked to environmental and social factors that affect health. Dr. Wilkinson urged consideration of all the upstream factors that affect health. Inequity is built into the public health infrastructure, as evident in where and how resources are located and access to rapid testing, to name a few examples.

Those in the health care sector have more opportunities to address downstream factors that affect health. Effectively communicating risk, for example, requires partnering with community organizations to deliver messages and providing those organizations with resources and compensation to do the job. Policies must be implemented in socially and culturally acceptable ways, with attention to stigma.

Dr. Wilkins urged participants to consider structural factors underlying health data. The data may show racial disparities in MRSA, for example, but these differences are likely linked to socioeconomic factors, such as living in underserved communities and low-income or crowded households, lack of health insurance, or limited access to care, that affect the spread of infectious disease. The current health care system is built on a foundation of inequitable structures (e.g., racist and segregated care, discrimination in medical training) that must be considered in any effort to improve equity.

The COVID-19 Pandemic and Antimicrobial Stewardship in the Federal Bureau of Prisons

LCDR Tyler Campbell, Pharm.D., BCPS, AAHIVP, and CAPT Tami Rodriguez, Pharm.D., BCPS, AAHIVP, Bureau of Prisons

LCDR Campbell said the Bureau of Prisons operates one of the largest health systems in the country, with medical clinics at each of 121 facilities providing a range of services. During the COVID-19 pandemic, it has faced challenges similar to other health care systems but also some unique considerations related to the incarcerated population. The Bureau of Prisons follows national guidance and relies on the best available evidence for COVID-19 vaccination and treatment, but it has been accused of "refusing treatment" when patients request medications for which there is no clinical evidence of benefit. LCDR Campbell noted that isolation and quarantine can be particularly challenging in some institutions because of space constraints and security concerns. Transferring patients to a hospital outside the system requires extra staff and transportation. As in all health care facilities, the COVID-19 pandemic exacerbated staff and resource shortages at the Bureau of Prisons.

On the positive side, the Bureau of Prisons was recognized as its own jurisdiction, which allowed it to ensure equal and efficient access to vaccines and therapeutics for its population, rather than going through each state's prioritization process. This step was essential to providing care.

As in the general health care system, early in the pandemic, delays in diagnosis led to an increase in use of antimicrobials within the Bureau of Prisons. Balancing antimicrobial stewardship with need for treatment was challenging for providers, and competing priorities made infection control more difficult. The pandemic increased demands on health care staff time and focus. Communicating effectively to patients and providers about the appropriate use of antimicrobials has also been challenging. LCDR Campbell concluded that the Bureau of Prisons' antimicrobial stewardship efforts continue to make strides despite the setbacks of the pandemic.

Addressing AMR in the Indian Health Service (IHS)

Jonathan V. Iralu, M.D., M.A.C.P., FIDSA, IHS

Dr. Iralu said IHS is unique in that it comprises the entire spectrum of health care for members of federally recognized tribes, including primary and specialty care, hospitals, pharmacies, and public health departments. Its antibiotic stewardship efforts go back decades; community-

acquired MRSA was first detected at an IHS facility in 1997, caused by over-prescription of antibiotics. Targeted education and provider report cards on excessive antibiotic use helped address the root problem. IHS created the first national guidelines on antibiotic use in tribal facilities in 2014 and established a core formulary of recommended drugs. The guidance was updated in 2020 for inpatients and in 2021 for outpatients. Dr. Iralu said antibiotic susceptibility varies greatly across the IHS system, so guidelines can quickly become outdated.

In 2013, IHS began a collaboration with Project ECHO, which links community providers in rural areas facing complex care situations with experts in IHS or tertiary facilities for consultation. In 2021, IHS expanded the collaboration to address a number of infectious diseases, including COVID-19 and monkey pox.

IHS facilities suffered the same setbacks as other health systems with the outbreak of COVID-19: staff shortages, bed shortages, and a decline in antimicrobial stewardship. The system is working to revitalize its national antimicrobial stewardship program and to update guidance for health care providers. Dr. Iralu described a goal of ensuring every IHS facility has a pharmacist focused on antimicrobial stewardship. Efforts are underway to expand the use of regional antibiograms to inform selection of antibiotics. Dr. Iralu emphasized that IHS continues to focus on education as a key to success.

Discussion

CAPT Rodriguez said that at the peak of the COVID-19 pandemic, the Bureau of Prisons faced challenges transferring patients for outside care, such as transportation and coordinating criteria for treatment. She noted that the Bureau tries to plan ahead for release of offenders, but a lot of states have not considered how to ensure continuity of care for new Medicaid or Medicare patients released from prison. Making vaccine records accessible and useful to the community was a significant hurdle, but designating the Bureau as its own jurisdiction helped the Bureau determine how to communicate an individual's vaccine status to the public. Several questions remain concerning medical records, and more open file sharing would help improve transitions. CAPT Rodriguez said communication with community partners is needed to tackle these and other concerns.

Dr. Wilkins acknowledged public ambivalence and concerns around the collection of race and ethnicity data. It is important for health systems to collect demographic data, but it is not done well across systems. Current definitions of race and ethnicity for data collection purposes do not always correspond with how people see themselves. Some researchers are using a different approach that encourages people to describe themselves. Dr. Wilkins said that her institution explains to patients why racial and ethnic data are collected and how the information is used, emphasizing that the data are private and confidential. She noted that in analyzing the category of people of unknown race, when researchers separated out people who did not want to disclose their race, other factors emerged. For example, most preferred a language other than English, and some used different racial and ethnic categories in their country of origin. It also appears that some categories may be too broad to be meaningful to patients self-identifying their ethnicity (e.g., Asian).

Dr. Iralu said that provider report cards on antibiotic use were invaluable to addressing over-prescribing and have been used for many years. Unfortunately, the current IHS electronic medical records system requires extensive programming to provide feedback for simple infections. Dr. Iralu said IHS has focused on educating providers about appropriate antimicrobial use during the COVID-19 pandemic, but the pandemic has set back collection of data on antibiotic prescribing. Presenters briefly outlined their use of electronic medical records systems and clinical decision support tools for prescribing and testing. LCDR Campbell said it is difficult to extract data from the Bureau of Prisons system, which complicates assessment of progress in reducing unnecessary antibiotic prescriptions.

Public Comment: Innovation Spotlight

The Innovation Spotlight is an opportunity for public comment open to all individuals with relevant new and emerging technologies they wish to present to the Council. The Council does not endorse or sponsor any of the companies or products described. No public comments were provided for the Innovation Spotlight.

Council Perspectives

Council members offered their observations, takeaways and potential recommendations, which are summarized here according to broad categories of interest.

Communication Needs

- Guidance must address vulnerable and marginalized groups.
- Communication must be timely and accessible.
- Communication impacts trust, and trust impacts communication. Building relationships is key to both. National recommendations must emphasize the importance of local relationships to support effective communication in various contexts.
- Education is wasted if it is not delivered in the right language for the context.
- Experts must mount a more aggressive response to misinformation.
- The issues around AMR must be addressed at every level of care and policymaking—from the international stage down to individual facilities, which is complex.

Mechanisms to Support Access and Education

- Identify the trusted messengers within the community; cooperative extensions are also engaged in human health care and so should be considered as potential partners and messengers.
- Support integration across stakeholder groups and ensure there are feedback mechanisms to improve outreach and education.
- It would be helpful to have a repository for programs and organizations that offer services.
- More funding is needed for decision support to assist providers and patients.
- PACCARB's recommendations must address access on all fronts, including access to care, PPE, treatment, and factual information.

Areas for Investment

- It is not possible to address AMR in the population as a whole without tackling access to high-quality care for all subpopulations.
- Continued investment is needed to sustain programs that have made progress in understanding and addressing inequity.
- More surveillance is needed to gather more and better data. Sociodemographic surveillance is needed to make sure some populations are not overlooked.
- Support and expand programs that can prevent poor outcomes, such as Project ECHO for infectious disease.
- There is consistent call for more staff on the front lines of health care, including those in related fields, such as social work. Recruitment efforts should be bolstered.
- CDC and others grapple with providing resources that meet the needs of the broadest possible population but also reach subpopulations.

Areas for Research

- The upstream factors that contribute to inequity must be addressed, as well as the downstream effects of inequitable systems.
- Identify health equity metrics that can be used to shine a light on structural and systemic disparities, recognizing that most relevant data are currently underreported.

Final Comments and Adjournment

Martin Blaser, M.D., Council Chair, and Michael D. Apley, D.V.M., Ph.D., DACVCP, Vice Chair

Dr. Blaser thanked the participants, presenters, staff, and audience for a productive meeting. He adjourned the meeting at 2:29 p.m.

Appendix: Presidential Advisory Council on Combating Antibiotic-Resistant Bacteria (PACCARB) Members

January 24–25, 2023

PACCARB Voting Members Present
Martin J. Blaser, M.D., Chair
Michael D. Apley, D.V.M., Ph.D., DACVCP
Stephanie Black, M.D., M.Sc.
Helen W. Boucher, M.D., FIDSA, FACP
Virginia R. Fajt, D.V.M., Ph.D., DACVCP
Paula J. Fedorka Cray, Ph.D.
Christine Ginocchio, Ph.D., MT
Locke Karriker, D.V.M., M.S., DACVPM
Elaine Larson, Ph.D., RN
Ramanan Laxminarayan, Ph.D., M.P.H.
Armando Nahum *(day 1 only)*
Payal K. Patel, M.D., M.P.H. *(day 1 only)*
Paul Plummer, D.V.M., Ph.D., DACVIM, DECSRHM
Julia E. Szymczak, Ph.D.
David White, M.S., Ph.D.

Organizational Liaisons Present
American Association of Extension Veterinarians
Carla L. Huston, D.V.M., Ph.D., Dipl. ACVPM

American Veterinary Medical Association
Joni Scheftel, D.V.M., M.P.H., Dipl. ACVPM

Biotechnology Innovation Organization
Emily Wheeler

Pediatric Infectious Diseases Society
Jason Newland, M.D., M.Ed.

Society of Infectious Disease Pharmacists
Elizabeth Dodds Ashley, Pharm.D., M.H.S., FCCP, BCPS

Wellcome Trust
Timothy Jinks, Ph.D.

Regular Government Employees Present

U.S. Department of Health and Human Services

Michael Craig, M.P.P., Antibiotic Resistance Coordination and Strategy Unit, Centers for Disease Control and Prevention
Jasmine Dhindsa, M.D. (for Shari Ling, M.D.), Centers for Medicare & Medicaid Services
William Flynn, D.V.M., Center for Veterinary Medicine, Food and Drug Administration
Christopher Houchens, Ph.D., Biomedical Advanced Research and Development Authority, Office of the Assistant Secretary for Preparedness and Response
Melissa Miller, M.D., M.S., FCCM, Agency for Healthcare Research and Quality
Dennis M. Dixon, Ph.D., National Institute of Allergy and Infectious Diseases, National Institutes of Health

U.S. Department of Agriculture

Kis Robertson-Hale, D.V.M., M.P.H. (for Emilio Esteban, D.V.M., M.BA., M.P.V.M., Ph.D.), Food Safety and Inspection Service *(day 1 only)*
Neena Anandaram (for Emilio Esteban, D.V.M., M.BA., M.P.V.M., Ph.D.), Food Safety and Inspection Service *(day 2 only)*
Roxann Motroni, D.V.M., Ph.D. (for Jeffrey Silverstein, Ph.D.), Agricultural Research Service *(day 2 only)*
Chelsey Shivley, D.V.M., Ph.D., DACAW (for Sarah Tomlinson, D.V.M.), Animal and Plant Health Inspection Service *(day 2 only)*
Jeffrey Silverstein, Ph.D., Agricultural Research Service *(day 1 only)*
Sarah M. Tomlinson, D.V.M., Animal and Plant Health Inspection Service *(day 1 only)*

U.S. Department of Defense

Paige Waterman, M.D., FACP, FIDSA, Walter Reed Army Institute of Research

U.S. Environmental Protection Agency

Jay Garland, Ph.D., Center for Environmental Solutions and Emergency Response *(day 2 only)*

Designated Federal Official

Jomana F. Musmar, M.S., Ph.D., Advisory Council Committee Manager, Office of the Assistant Secretary for Health (OASH), Department of Health and Human Services (HHS)

Advisory Council Staff

Mark Kazmierczak, Ph.D., Gryphon Scientific
Haley Krem, Committee Management Officer, OASH, HHS
Chloe Loving, M.P.H., CHES, CPH, ORISE Fellow, HHS
Zanah Francis, M.S., Ph.D., ORISE Fellow, HHS
Sarah McClelland, M.P.H., Public Health Advisor, OASH, HHS
Jennifer Adona, Rose Li Associates

Glossary of Abbreviations

AMR	antimicrobial resistance
CDC	Centers for Disease Control and Prevention
CDM	Centro de los Derechos del Migrante
CMS	Centers for Medicare & Medicaid Services
COVID-19	coronavirus disease 2019
EPA	U.S. Environmental Protection Agency
FDA	U.S. Food and Drug Administration
HAI	health-care-associated infection
HHS	U.S. Department of Health and Human Services
IHS	Indian Health Service
MRSA	methicillin-resistant *Staphylococcus aureus*
OASH	Office of the Assistant Secretary for Health
PACCARB	Presidential Advisory Council on Combating Antibiotic-Resistant Bacteria
PPE	personal protective equipment
RSV	respiratory syncytial virus
USDA	U.S. Department of Agriculture