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CDC's Global Disease Detection Program: Safeguarding our Nation

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Good afternoon, Chairman Akaka, Ranking Member Voinovich, and Members of the Subcommittee. I am pleased to be here to discuss CDC's Global Disease Detection program and other global health investments.

The scope and nature of CDC's global engagements have changed dramatically since they began in 1958 with CDC's work in malaria control, followed by a focus on cholera and smallpox outbreaks. In 1966, CDC became a key player in smallpox eradication and measles control in 20 African countries. CDC also provided expertise to address other infectious diseases such as polio and tuberculosis. Shortly after the discovery of HIV/AIDS, CDC began to work globally to address the epidemic and today continues to be on the front lines of this international response. The agency's global health mandate has since expanded to include other diseases and conditions, and also added the goal of protecting the U.S. and world population from emerging global threats. Currently, CDC has approximately 200 staff assigned to 50 countries throughout the world and supports an additional 1200 locally employed staff in these countries.

Today I will discuss CDC's Global Disease Detection (GDD) program, highlight CDC's international efforts in detecting and responding to avian influenza, and briefly describe for the Subcommittee CDC's capacity in detecting and responding to zoonotic diseases. Finally, I will briefly describe other CDC global health programs that make up pieces of an expanding network that is helping to build capacity for disease detection and response throughout the world.

GDD Program

Experience with Severe Acute Respiratory Syndrome (SARS) demonstrated that a highly pathogenic infectious disease in a remote region can spread around the world in a matter of days or weeks. In 2004, in response to infectious disease threats – whether caused by an intentional act of terrorism or the natural emergence of a deadly infectious virus - the U.S. Congress provided funding for CDC to establish a Global Disease Detection (GDD) program.

CDC's GDD vision is to protect the health of Americans and the global community by developing and strengthening public health capacity to rapidly detect and respond to emerging infectious diseases and bioterrorist threats that occur internationally. The GDD program was built from CDC's existing international expertise in public health surveillance, training, and laboratory methods, and brought together three previously established programs:

- Field Epidemiology Training Program (FETP), which builds and strengthens public health systems and trains scientists and public health practitioners in field epidemiology and laboratory methods. In addition to the FETPs located in the GDD centers, in collaboration with USAID, CDC provides support for an additional 19 countries that have either established, or are initiating FETPs;
- International Emerging Infection Program (IEIP), which integrates disease surveillance, research, prevention, and control activities; and
- Influenza activities, to focus specifically on development of influenza surveillance capacity – both laboratory and epidemiologic containment.

The GDD program effectively coordinates these existing CDC resources to build in-country capacity and enhance rapid response capacity for emerging infectious diseases. The scientists who work in these programs collectively represent an enormous and uniquely valuable U.S. resource of expertise in infectious disease detection and control (ranging from international leadership in the control of common infectious syndromes such as pneumonia, to cutting edge laboratory detection of rare viruses such as Ebola and SARS coronavirus). Thus, CDC is well-positioned to provide assistance and scientific input in responding to the full range of emerging disease threats. In addition, the broader CDC scientific community can be called upon in response to extremely unusual circumstances where additional expertise may be needed. The GDD program also coordinates with other global health programs at CDC and leverages resources to enhance detection and response to outbreaks. For example, staff from the Global AIDS Program played a critical role in the diagnosis of the first human case of avian influenza (H5N1) in Sub-Saharan Africa, which occurred in Nigeria in 2006. The GDD program then utilized its resources to deploy staff and continue response activities such as human surveillance and monitoring of avian influenza cases.

GDD Centers

The central focus of the GDD program is the establishment and expansion of GDD Centers. Strategically positioned around the world, these Centers are CDC-funded international centers of excellence in the detection and control of emerging infectious diseases that focus on five key activities: outbreak response, surveillance, research,

training, and networking. During non-emergency settings, the Centers work with country partners to build public health capacity in routine disease detection and response interventions that help to strengthen systems that will be used in times of crisis. However, in response to major international emergencies or large-scale disease outbreaks, the Centers typically function as members of the Global Outbreak Alert and Response Network (GOARN) that is coordinated by the World Health Organization (WHO). GOARN is a technical collaboration of existing institutions and networks that pool human and technical resources for the rapid identification, confirmation and response to outbreaks of international importance.

CDC currently operates five GDD Centers – two mature centers in Thailand and Kenya which were built on established FETPs and IEIPs, and three developing centers in Guatemala, China, and Egypt. The mature centers have a full complement of six CDC staff and from 50 to 100 locally employed staff, and have established surveillance and outbreak response activities. The developing Centers are working to achieve these staffing levels and baseline activities. Each Center serves as a regional resource to assist both the host country and also neighboring countries that lack fully developed capacity of their own. Thus, CDC is able to maximize its investment with these individual Centers by also providing broader, regional support.

Locations of the GDD Centers are selected in consultation with invited countries, internal experts, and international partners. Several factors are considered during the selection process, including population density and history of infectious diseases in the

country, commitment of the country in supporting and valuing CDC partnership, and presence of other international agencies and organizations.

GDD Operations Center

The GDD Operations Center, physically located within the Emergency Operations Center at CDC Headquarters in Atlanta, serves as CDC's central analytical clearinghouse and coordination point for international outbreak information gathering and response. Information about outbreaks worldwide is collected from many sources, including GDD Centers, CDC programs, and a wide range of public and private sources, WHO, the U.S. Department of State, U.S. Agency for International Development , Department of Defense, Department of Homeland Security's National Biosurveillance Integration System, Georgetown University's Project Argus, the Global Public Health Information Network, and other governmental and non-governmental organizations. Information is analyzed using the expertise of scientists from across the agency to sort through all of the information received, determine the public health threat posed by a given event, and guide the appropriate level of response.

The current outbreak of Ebola can be used to highlight the role of the GDD Operations Center in coordinating disease detection and response activities. Beginning on August 27, 2007, the GDD Operations Center began closely tracking reports of unexplained death in the Democratic Republic of Congo (DRC). The reports initially included descriptions of multiple symptoms that could be associated with several diseases. GDD Operations Center staff worked with CDC scientists to analyze the sometimes confusing information and reports from the field, collaborated with CDC staff in the DRC to confirm

the situation, determined this was a significant health threat, and alerted WHO, GOARN members, and other staff at CDC headquarters in Atlanta about this situation. CDC also identified and deployed a CDC physician (who had previously worked in the area) to provide an assessment of the situation prior to knowing the Ebola virus etiology and guide the larger response. On September 10, this outbreak was confirmed as Ebola, after specimen testing performed at CDC and in Gabon. GDD Operations Center staff then coordinated the deployment of a response team comprised of nine CDC scientists to assist in the field response. As part of the ongoing response, the GDD Operations Center will continue to work closely with the Ministry of Health, WHO and other GOARN partners to conduct outbreak response activities, deploy CDC staff, and facilitate specimen testing by the appropriate CDC laboratories as needed.

Partners

No single country or institution has all of the capacities to respond to international public health emergencies. The GDD program represents a partnership between CDC, the host country, and participating neighboring countries. CDC also works with a variety of other domestic and international partners, including WHO, the U.S. Department of State, USAID, DOD. For example, the developmental GDD Center in Egypt is co-located with the DOD U.S. Naval Medical Research Unit (NAMRU-3). Thus, the Egypt Center leverages the considerable expertise, resources, and regional contacts of that long-standing DOD medical facility in the Middle East.

Impact of GDD Activities

CDC is currently in the process of implementing a comprehensive monitoring and evaluation framework that can be used to assess the performance and progress of the GDD Centers. During 2006, an initial framework was used to collect information about the progress and achievements of the GDD Centers. Although GDD is still considered to be in the early stages of implementation, data captured (in each of the five GDD key activity areas) from 2006 will provide a baseline from which the impact of the Centers can be assessed over time. Examples of these data include:

- Outbreak Response: During 2006, the GDD Centers collectively responded to more than 144 disease outbreaks, including avian influenza, hemorrhagic fever, meningitis, cholera, and unexplained sudden death. These emergency responses resulted in measurable health impact, such as the disease control efforts that led to an 83% decline (compared to the previous year) in *Streptococcus suis* cases in one region of China, the delivery of botulism antitoxin that likely prevented multiple deaths in Thailand, and the investigation and control measures that saved hundreds of lives from methanol intoxication in Nicaragua.
- Surveillance: The Thailand Center expanded an ongoing, active, pneumonia surveillance system developed by the Thailand IEIP in two provinces by adding advanced microbiology diagnostic capacity. Within 10 months of its implementation, data were available to begin describing the bacterial causes of pneumonia, including the identification of confirmed cases of pneumococcal disease at a rate more than six-fold higher than the previous three years combined. This new capacity produces reliable information that can be used to

identify appropriate public health interventions, including potential use of the pneumococcal vaccine.

- Research: The Kenya Center established capacity for diagnostic testing for more than five pathogens. Because this capacity had previously been unavailable in this region, it has measurably enhanced disease detection and identification of appropriate response interventions.
- Training*:* In 2006, collectively, the Centers helped to strengthen in-country and regional public health capacity for outbreak detection and response by graduating 27 FETP fellows, and providing short-term training for more than 900 public health staff. In China alone, 20 former FETP graduates now hold key positions in emergency response or infectious disease departments in 14 provinces and at China CDC.
- Networking*:* The activities and experiences from individual GDD Centers often provide benefits to other Centers in the network and in turn, to other regions of the world. For example, early in the avian influenza epidemic, the Thailand Center in collaboration with CDC's Influenza Division staff developed and hosted rapid response training for pandemic influenza that was attended by staff from the other Centers. The participating countries were then able to provide in-country training to their colleagues and establish a greater regional capacity for avian and pandemic influenza preparedness and response. This curriculum now serves as a template for trainings conducted all over the world.

Global Capacity to Detect and Respond to Avian Influenza

The National Strategy for Pandemic Influenza, which was released in November 2005, serves as the framework for pandemic influenza planning efforts in the US. In support of the National Strategy's goal to "stop, slow, or otherwise limit the spread of a pandemic to the United States," GDD Centers, CDC's Influenza Division, and other CDC programs have been actively working to advance global health capacity in the detection and response of influenza viruses with pandemic potential. CDC's international influenza efforts are focused on: improving and expanding global surveillance networks; increasing virus isolation and epidemiological data collection through expansion of capacity; and increasing timely identification, reporting, and response to outbreaks. Bilaterally and globally through WHO, CDC is providing direct support and technical assistance to over 40 countries and has a much broader reach regionally through WHO regional offices and GDD Centers. A few of CDC's key activities are highlighted below:

- CDC is one of four WHO Collaborating Centers for the Surveillance Epidemiology and Control of Influenza. As such, CDC serves as a global resource and reference center for the WHO Global Influenza Surveillance Network (GISN). This network serves as a global alert mechanism for the emergence of influenza viruses with pandemic potential and the monitoring of seasonal influenza strains circulating around the world. Information from this network is used to make recommendations on which influenza viruses should be included in annual vaccines, identify viruses with pandemic potential, and develop vaccine candidates for use worldwide. Through this system during 2003-2007, CDC received 1,445 suspect avian influenza (H5N1) specimens. Of these, 993 were from humans with 241 positive results; 444 were from animals of

which 261 were positive; and 8 were environmental specimens of which 6 were positive for H5N1.

- CDC staff have conducted numerous training programs in laboratory diagnostics, disease surveillance, field epidemiology, and outbreak response to prepare rapid response teams in Africa, Asia, Central Asia, and Latin America. The training helps to ensure that countries at high risk for avian influenza have the ability to respond quickly and appropriately to pandemic threats and have resulted in the creation of thousands of local responders.
- Since 2003, the CDC has responded to and helped contain many outbreaks (human and animal) of highly pathogenic avian influenza (H5N1) globally. During 2006 alone, the GDD Centers collectively aided in the response and containment of 28 human cases of H5N1. All of these responses were initiated within GDD's target goal of 48 hours and a number of appropriate interventions were implemented– cases were confirmed, contacts were identified, oseltamivir was provided for treatment, and patients were isolated. While some of these cases and small family clusters may have resolved without any intervention, it is also possible that the efficient and effective response by GDD Centers and their partners has had a larger impact by limiting disease transmission. In addition, CDC has contributed to outbreak responses in Laos, Cambodia, Vietnam, South Sudan, Ghana, Nigeria, Djibouti, Indonesia, and Togo through international field staff and Atlanta-based staff.

CDC currently considers avian influenza to be the most urgent threat to human health and will continue to focus efforts on increasing global health capacity to detect and respond to this virus. While it is important to recognize that countries affected by H5N1 in Asia, Africa, and the Middle East have made effective use of funds administered by HHS/CDC and progress in disease detection and response over the past two years, sustained capacity development requires longer term efforts. These countries are going beyond detection and response and are developing capacity for seasonal and avian influenza monitoring, establishing routine use of modern epidemiologic and diagnostic tools to identify and characterize novel influenza strains including other potential pandemic viruses. Most of these countries have established rapid response teams for investigating cases, and some are developing domestic capacity to manufacture seasonal and pandemic influenza vaccines.

Zoonotic Disease Capacity

Approximately 75% of recently identified emerging infectious diseases affecting humans are diseases of animal origin, including many of the major recent threats to the health and safety of American citizens. Additionally 80% of pathogens with a high potential for bioterrorism are zoonotic. For this reason, CDC has a National Center that works with a wide range of partners in both human and animal health to develop surveillance and response systems focused specifically on the human-animal interface that can greatly improve our ability to detect important zoonotic diseases in both wild and domestic animals at a much earlier stage, thereby potentially disrupting disease transmission and reducing the impact on human health. In addition, CDC recognizes the importance and need to work collaboratively, not just across the traditional public health community, but

also with agricultural, wildlife, and companion animal agencies and organizations. In particular, CDC is a World Organization for Animal Health (Office International des Epizooties, OIE) Collaborating Centre for Emerging and Reemerging Zoonoses. In this role, CDC will be better equipped to forge stronger ties between the public health and animal health sectors.

Other CDC Global Health Programs

In addition to the GDD program, CDC manages many other global health programs that collectively contribute significantly to overseas capacity in detecting and responding to a variety of diseases and emerging health issues. These programs include:

Integrated Disease Surveillance and Response (IDSR) -- CDC provides technical expertise to the WHO African Regional Office (WHO AFRO) and African Ministries of Health to implement this system (in 46 countries) which aims to improve the availability and use of surveillance and laboratory data to allow for timely and targeted public health interventions, preventing illness and death from diseases for which there are known interventions, without which inadequate capacity precludes early identification of and response to outbreaks. The IDSR infrastructure is serving as the mechanism through which the International Health Regulations (2005) as well as preparedness for pandemic influenza will be implemented in the African region.

Global AIDS Program -- CDC's Global AIDS Program is a partner in the unified U.S. Government effort to implement the President's Emergency Plan for AIDS Relief. GAP provides technical and programmatic expertise in strategic information, including

surveillance, epidemiology, evaluation, research and health informatics to strengthen technical capacity of Ministries of Health in Africa, Asia, Latin America and the Caribbean to address the HIV/AIDS epidemic as well as the local public health workforce in resource-poor nations, and has built long-lasting public health partnerships with host country governments, global health partners, and multilateral organizations such as the Joint United Nations Programme on HIV/AIDS (UNAIDS) and the World Health Organization (WHO). GAP supports the administration of large scale national population-based surveys and AIDS indicator surveys to assess HIV prevalence and other diseases such as syphilis and hepatitis which have impact on HIV populations. Sentinel surveillance systems are also in place to detect HIV prevalence and behaviors in high risk populations. Finally, GAP supports the development of national reporting systems and IT infrastructure needed for surveillance monitoring, reporting and analysis. In addition, because of the large number of CDC/GAP staff working in country offices and regional offices, they sometimes serve as initial responders to emergencies in-country involving other health issues. This provides initial response capacity while awaiting the arrival of a more specialized, technical team.

Malaria -- In support of the President's Malaria Initiative (PMI), CDC works alongside USAID and other partners in 15 focus countries to help National Malaria Control Programs implement proven malaria control interventions such as indoor spraying, insecticide treated nets, treatment with effective antimalarial drugs, and prevention in pregnancy to reduce the burden of this disease. CDC also provides assistance to host governments in PMI countries to strengthen their assessment of population coverage of

these key interventions and their impact on malaria related morbidity (anemia, infection rates) and mortality through large scale national level surveys.

Tuberculosis – GDD resources have enabled the enhanced screening for tuberculosis and drug-resistant tuberculosis in approximately 140,000 refugees residing in Thailand and scheduled for resettlement in the United States. The enhanced screening relies on improvements in laboratory capacity to culture Mycobacterium tuberculosis and conduct real-time drug-susceptibility testing to guide the appropriate treatment of refugees with tuberculosis before resettlement in the U.S. This approach will demonstrate the feasibility and benefits of a model for enhanced screening for disease detection and overseas treatment to prevent the importation of airborne infectious diseases. To accomplish this complex mission, CDC is networking with Department of State, the Thai Ministry of health, the International Office of Migration, and Doctors Without Borders (Medicins Sans Frontieres).

Food Safety and Food-borne Diseases -- CDC's PulseNet was established domestically as a national network for molecular sub-typing of foodborne pathogens, used in the surveillance and investigation of foodborne illness outbreaks. CDC has collaborated with the Food and Drug Administration, the Food Safety and Inspection Service, and internationally to establish PulseNet networks in WHO regions for the comparison of samples and other collaborations. Under the auspices of WHO's collaborating center for Salmonella Surveillance, CDC coordinates the activities of SalmSurv, a global network of more than 900 scientists representing 150 countries involved in foodborne surveillance and outbreak detection and response. This network promotes integrated,

laboratory-based surveillance to foster intersectoral collaboration among human health, veterinary, and food-related disciplines.

Arboviruses and Other Vector-Borne Infectious Diseases -- CDC is a WHO Collaborating Center on dengue, plague, and other vector-borne diseases, and it provides laboratory and epidemiological support to developing countries. For example, CDC specifically works with the Pan American Health Organization to strengthen surveillance and laboratory diagnostic capacities in Latin America and the Caribbean for West Nile Virus and Venezuelan Equine Encephalitis.

Encephalitis and Other Diseases -- CDC conducts encephalitis surveillance, prevention, and control activities in India, China, and Bangladesh, including for Japanese encephalitis, an important cause of illness and death in Asian children. CDC collaborates with Vietnam, China and other countries in identifying and characterizing previously unknown mosquito borne viruses of humans.

Polio, Measles, and Other Vaccine Preventable Diseases -- The surveillance of acute flaccid paralysis (AFP) is a central strategy for achieving polio eradication. The AFP surveillance network includes 145 local and regional reference laboratories and more than 3,200 surveillance medical officers in 54 countries. This surveillance system and laboratory network exemplifies how global surveillance investments have been leveraged to build an integrated system that can detect a number of other diseases. For instance, one of the first places to identify the SARS coronavirus was a Global Polio Network laboratory in China. The SARS coronavirus was also identified and first

sequenced at CDC, largely by scientists, laboratory capacity, and advanced technology developed for sequencing polioviruses.

The AFP surveillance network is closely tied to the measles/rubella surveillance network, which consists of 690 labs at the national, regional and global levels. Many of these institutions house polio and measles/rubella laboratories together.

Through CDC's work with Accelerated Development and Introduction Plans (ADIPs), project efforts are underway to extend the availability and use of vaccines that prevent diseases to developing countries. Rotavirus, pneumococcal disease, and *Haemophilus Influenzae* type b (Hib) ADIP projects enhance the overall global epidemiologic and laboratory surveillance capacity and infrastructure in the countries and regions in which they focus

Closing

CDC's GDD program and other global health efforts have contributed significantly to building capacity of other countries to detect and respond to emerging diseases, including avian influenza. CDC looks forward to continued collaboration with HHS, USAID, DOD, WHO, and other federal and international partners to implement additional activities that will further enhance this capacity.

CDC greatly appreciates the Subcommittee's interest in these important issues. Thank you for the opportunity to share this information with you. I will be happy to answer any questions.