1. Outbreak Management of Infection

Based on WHO Guidelines

Outline

- Definition
  - Outbreak
  - Outbreak Management
- Detection of an Outbreak
- Confirmation of an Outbreak

- Definition and Agreement Response
- Management of Response
- Public Information
  - Means of public information
  - Content of public information
- Post-outbreaks activities

What is an outbreak?

- The term outbreak is generally used when the number of cases observed is greater than the number normally expected in the same geographic area for the same period of time.

  – Example: the occurrence of a measles outbreak in a highly immunized populations does not necessarily represent a failure of the routine immunization programme.

What is Outbreak Management?

- (OM) is the PHIN functional area intended to support the needs of investigation, monitoring, management, analysis, and reporting of a public health event or act of bioterrorism.

www.ncbi.nlm.nih.gov › NCBI › Literature › PubMed Central (PMC)

Detection flow of outbreaks

Confirmation of an Outbreak

- A preliminary case investigation must be carried out to confirm the diagnosis, assess the extent of the outbreak and identify the population at risk. This is best done by health workers using a standard form, seeking details on cases (e.g. clinical syndrome and immunization status) and contacts.

- It is important that specimen samples be collected from the initial 10 reported cases of an outbreak, to confirm or not what virus causes the outbreak.

(Example in the case of measles outbreak: For countries in the measles elimination phase, laboratory investigation of all suspected measles cases is mandatory.)

- Specimen samples should be taken and sent to reference laboratories to allow virus isolation for genomic sequencing and mapping purposes. This information will be valuable in tracking virus circulation and establishing virus importation.

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- The collected data should be analyzed locally and rapidly to determine the extent of the outbreak and consequently the population at risk. This can be done by creating a line listing of cases with key variables or, more efficiently by entering the data into a computer programme.

- Analysis should include the construction of an epidemic curve, graphing the age distribution of cases and spot-mapping the cases.

- In addition, the investigation must document measures taken so far and any identifiable reasons for the outbreak.

Definition and agreement on response

The activities to be implemented as a priority during infection outbreaks will be:

1. to prevent complications and deaths through early and effective case management.
2. to review epidemiological data in order to identify the cause(s) of the outbreak
3. to increase public awareness of infection, treatment and prevention
4. to strengthen existing routine programmes, with particular attention to the identification of high-risk areas.

Example Case: Measles

In countries in the measles outbreak prevention phase and elimination phase, a further range of activities may be undertaken, such as:

- ✓ · *intensive measles surveillance* (weekly reporting, including reporting that no cases have occurred – zero reporting) and investigation of all suspected cases
- ✓ · *accelerated immunization activities* (i.e. improving coverage amongst high risk populations and supplementary immunization in areas not yet affected by the outbreak).

PRIORITY DURING OUTBREAKS IS TO PROVIDE APPROPRIATE TREATMENT AND REDUCE MORTALITY

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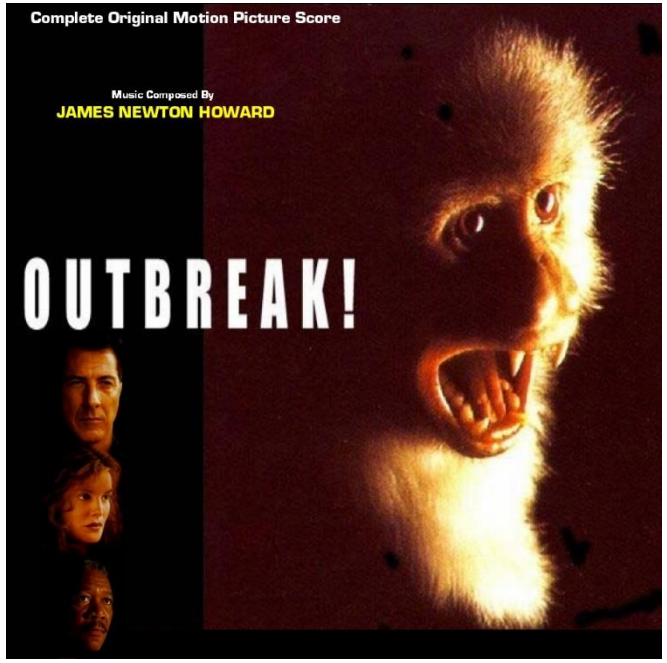

Public Information

- When an outbreak is declared, there is likely to be widespread public concern and media attention.
- It is important to keep the public informed about the outbreak and the outbreak response.
- A single spokesperson must be appointed and made known to the media
- Regular press release and conferences are essential to help the media play their role and help avoid “media hounding” of team members.

Means of Public Information

- Community
  - schools
  - community meetings
  - mass media such as radio, newspapers and television.

Simple, clear public information material can help to:

- Allay fears

- Convey public health messages regarding appropriate treatment of cases.

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Content of Public Information

- natural history of infection,
- the care of a affected person
- the signs and symptoms that should prompt to seek expert advice
- encourage the family members to notify health workers recent onset of symptoms such as fever, rashes (depending on the infection type)
- Preventive measures

Post-outbreak activities

- After an outbreak, the Epidemic Response Team must carry out a thorough evaluation of the following:

✓ cause of the epidemic
✓ surveillance of measles and detection of the outbreak
✓ preparedness for the epidemic
✓ management of the epidemic
✓ programme goals and operations.

The findings of this evaluation should documented in a written report containing clear recommendations regarding:

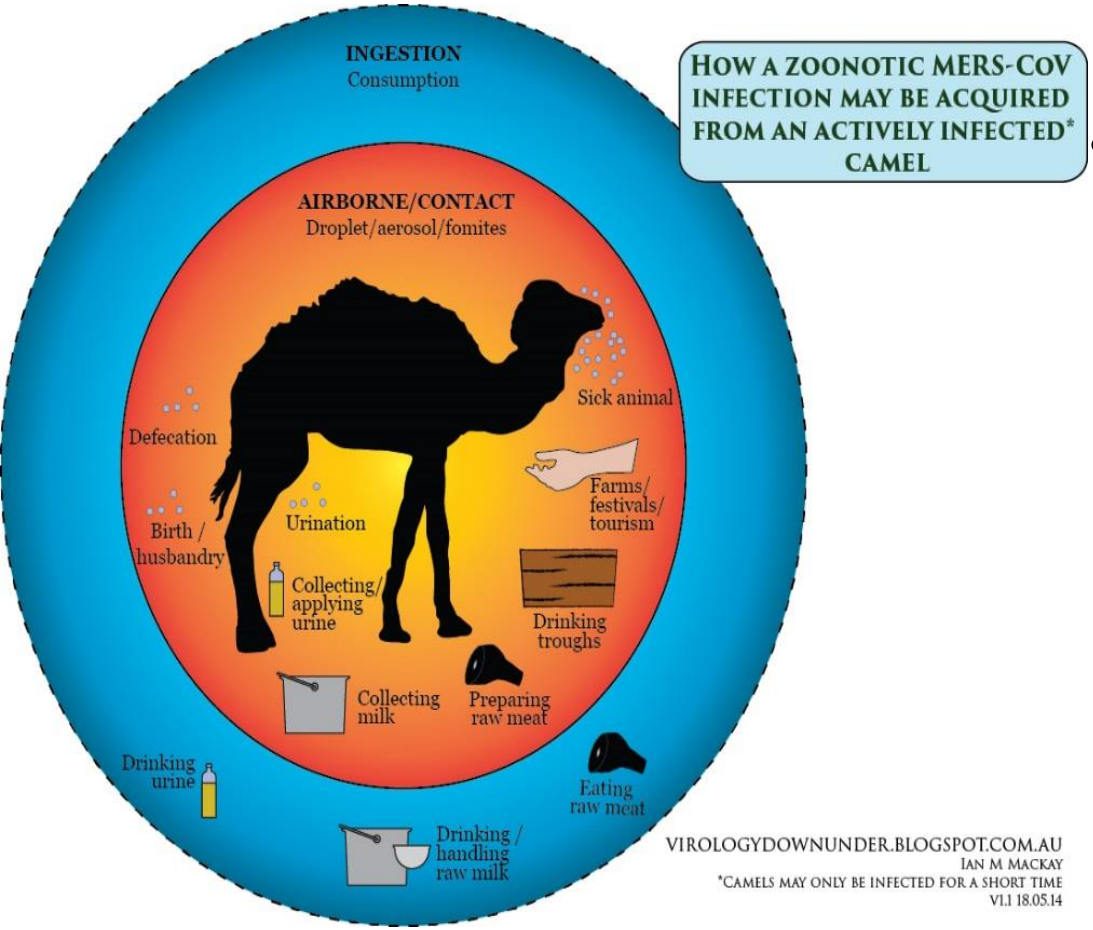
- epidemiological characteristics of the epidemic
- surveillance (example: assess the surveillance system, recommend actions to enhance measles surveillance in the affected areas)
- preparedness /recommend action to improve outbreak response
- Programme activities and strategies to increase coverage and cover high-risk areas.

National Issues: Different Outbreaks in Different Countries

Outline

- Middle East
- West Africa
- China
- Uganda

Middle East



- MERS-CoV (Middle East Respiratory Syndrome- Corona Virus)
  - is a viral respiratory illness that is new to humans.
  - It was first reported in Saudi Arabia in 2012 and has since spread to several other countries, including the United States.
  - Most people infected with MERS-CoV developed severe acute respiratory illness, including fever, cough, and shortness of breath. Many of them have died.

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Issues in the outbreak MERS-CoV

- Unknown mode of transmission
  - MERS-CoV outbreaks uncertainty prevailed with the mode of transmission being unknown.
- Inadequate environmental controls and isolation
  - patients with airborne infectious disease will pose a risk to other patients and healthcare workers.
- Healthcare associated transmission
  - The majority of patients in the Jeddah MERS-CoV outbreak had contact with a health care facility, other patients, or both. This highlights the role of health care–associated transmission. (Supported by the Ministry of Health, Saudi Arabia, and by the U.S. Centers for Disease Control and Prevention.)
- Temporary Airborne Infections isolation facilities were provided
  - provide a useful rapid response resource for patient isolation, physical barriers, air controls and staff safety precautionary measures during the uncertainty created by a novel corona virus outbreak.

West Africa

- Ebola virus disease (EVD), formerly known as Ebola haemorrhagic fever, is a severe, often fatal illness in humans.
- The virus is transmitted to people from wild animals and spreads in the human population through human-to-human transmission.
- The average EVD case fatality rate is around 50%. Case fatality rates have varied from 25% to 90% in past outbreaks.
- The first EVD outbreaks occurred in remote villages in Central Africa, near tropical rainforests, but the most recent outbreak in west Africa has involved major urban as well as rural areas.

Issues in the outbreak of Ebola

- Response teams reported lacking adequate training in case investigation, contact tracing, infection control (including safe burial practices), and health education
- Lack of trained personnel in remote areas
- Poor transportation and communication network
- Insufficient number of trained contact tracers to manage the growing number of cases.
- Essential drugs were reported lacking at rural health clinics
- Health Workers had limited supply of personal protective equipment.
- Health workers lacks training in proper use of personal protective equipment.

China

- Avian influenza A(H7N9) is a subtype of influenza viruses that have been detected in birds in the past.
- This particular A(H7N9) virus had not previously been seen in either animals or people until it was found in March 2013 in China.
- Most of the cases of human infection with this avian H7N9 virus have reported recent exposure to live poultry or potentially contaminated environments, especially markets where live birds have been sold.
- This virus does not appear to transmit easily from person to person, and sustained human-to-human transmission has not been reported.

Issues in the outbreak of Avian Influenza (H7N9)

- Great challenge in the surveillance
  - Farmers and government officials have economic reasons for not reporting suspected avian influenza outbreaks in an area.
  - Weakened and privatized health care system
    - Prevents many sick people from seeking care at a health care facility, where reporting would originate.
  - Local officials who control the work of the sectors under their jurisdiction may hide cases of disease if they suspect that reporting might result in economic losses in their communities
- Poorly prepared for a rapid response to an outbreak event.
- Crisis-management capability and ability to coordinate different agencies, such as the Ministry of Agriculture and the Ministry of Health, is weak, especially at the local level

Uganda Typhoid Fever

- On 24 February 2015, the Ministry of Health of Uganda notified WHO of a typhoid fever outbreak.
- is a bacterial disease caused by Salmonella typhi.
- It is transmitted through the ingestion of food or drink contaminated by the feces or urine of infected people.
- Symptoms usually develop 1–3 weeks after exposure, and may be mild or severe. They include high fever, malaise, headache, constipation or diarrhoea, rose-coloured spots on the chest, and enlarged spleen and liver.
- Healthy carrier state may follow acute illness. Typhoid fever can be treated with antibiotics. However, resistance to common antimicrobials is widespread. Healthy carriers should be excluded from handling food.

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Issues on the outbreak of Typhoid Fever

- Poor hygiene practices
- Contaminated drinking water
- Underreporting of milder illnesses and delayed and inadequate antimicrobial treatment contributed to high perforation rate
- Unknown biology of this human-adapted bacterial pathogen and the complexity of the disease in endemic areas, especially those in Africa
- The main barriers to control are vaccines that are not immunogenic in very young children.
- The development of multidrug resistance which threatens efficacy of antimicrobial chemotherapy

Global Issues

Outline

- Introduction
- Top 10 Diseases causing the most outbreaks
  - Zoonoses
  - Human Specific
- Infection Control Challenges

Introduction

- Infectious disease are a global concern
- Second common cause of death the world
- In a research study, analysis revealed that 65 percent of diseases in the dataset were "zoonoses," meaning they come from animals.
- Of the annual 15 million deaths, 95% occur in the developing countries (WHO, 2008)
  - Acute Respiratory Infections
  - Diarrheal diseases
  - Measles
  - AIDS
  - Malaria
  - Tuberculosis
- More than 1 billion inhabitants in this part of the world do not have access to safe water and basic sanitation
- Healthcare Associated Infections (HCAIs) constitute a health challenge worldwide and pose a major threat to patient safety.

- Risks for acquiring the infections during health care delivery have increased dramatically with advances in treatment and procedures.
- In developing countries infection prevention and control policies are either nonexistent, poorly adapted or insufficiently funded by government. Therefore, infection are between 2-6 times higher than those in developed world.
- The endemic burden of HCAIs is significantly higher in developing countries, in particular in patients admitted to ICU and neonates
- Most developing countries lack surveillance system for HCAIs

Top 10 Diseases causing the most outbreaks

For Zoonoses: Top 10 Lists

1. Salmonella
2. E. Coli
3. Influenza A
4. Hepatitis A
5. Anthrax
6. Dengue Fever
7. Shigellosis
8. Tuberculosis
9. Chikingunya
10. Trichinosis

Human Specific Infections

1. Gastroenteritis
2. Cholera
3. Measles
4. Enterovirus
5. Bacterial Meningitis
6. Legionellosis
7. Typhoid
8. Enteric Fever
9. Rotavirus
10. Mumps
11. Pertussis (Whopping Cough)

وزارة الصحة
Ministry of Health

The Ministry of Health Kingdom of Saudi Arabia

Outline

- Different Divisions

وزارة الصحة
Ministry of Health

Divisions

- Quality Division
- Central Sterilization Department
- Training and Research Division
- Surveillance and Statistics Division
- Staff Health Division
- Infection Control Division

Monitoring and Evaluation

Based on the Global Disease Detection Program in collaboration with the Center for Disease Control

Outline

- Overview
- Monitoring and Evaluation
  - Five Key Activities
  - Collaborations
  - Internal Partners

Overview

Global Disease Detection Program

- GDD is CDC's principal and most visible program for strengthening global health security and developing public health capacity to rapidly identify and contain disease threats around the world.
- The program is comprised of field-based and CDC headquarters-based components.

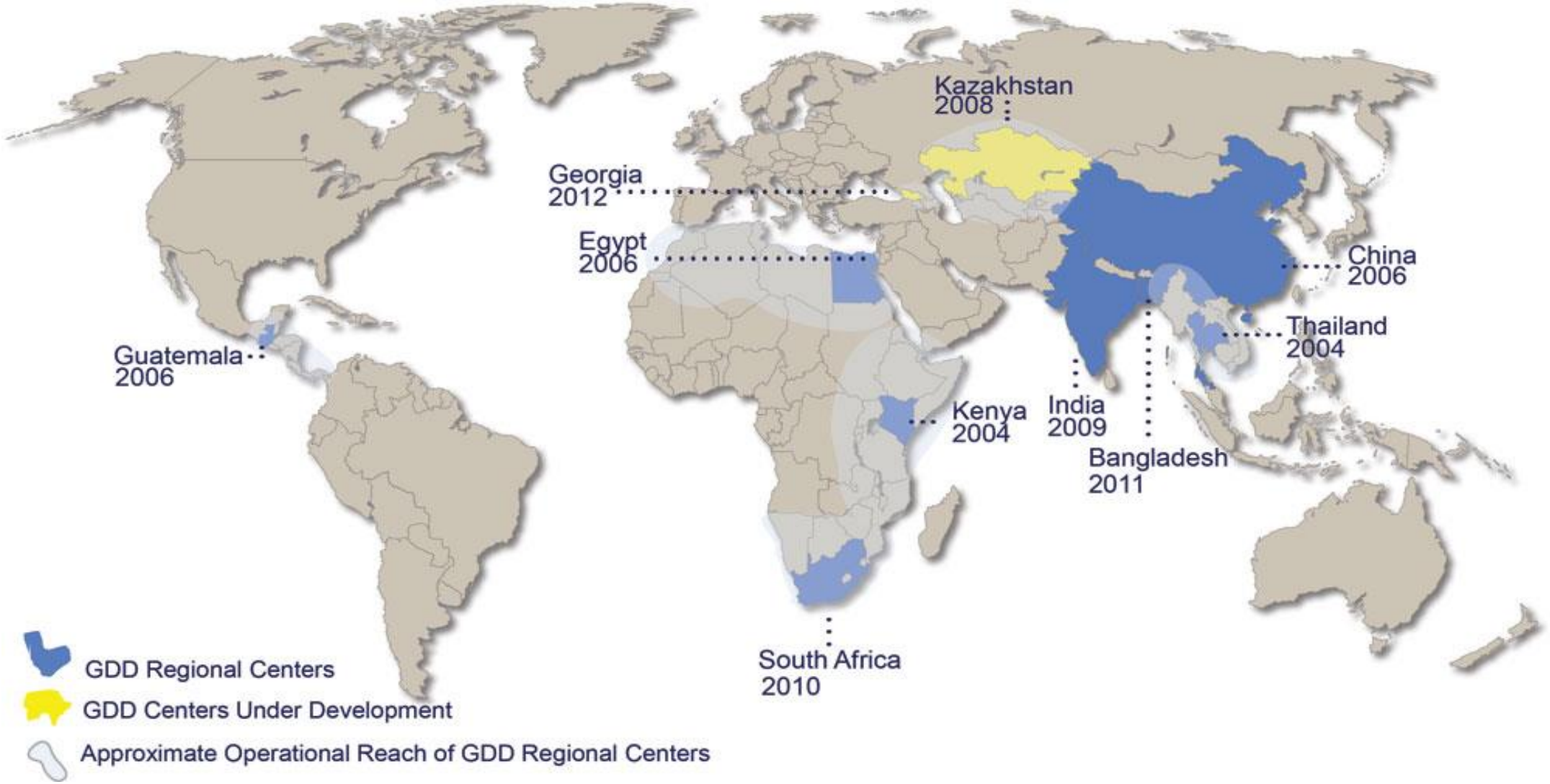
GDD Regional Centers

- A central focus of GDD is establishing and expanding GDD Regional Centers that build broad-based public health capacity in support of the IHR.
- CDC currently operates eight GDD Regional Centers at varying levels of capacity.
- GDD Regional Centers work with the host country and within the region to develop the six core capacities.

Six Core

1. Emerging infectious disease detection and response
2. Training in field epidemiology and laboratory methods
3. Pandemic influenza preparedness and response
4. Zoonotic disease detection and response at the animal-human interface
5. Emergency preparedness and risk communication
6. Laboratory systems strengthening

GDD Operation Centers



Monitoring and Evaluation

- GDD developed a comprehensive monitoring and evaluation (M&E) program in 2006 which has been used to measure progress towards building capacity to rapidly detect and contain emerging disease threats.
- This program monitors and evaluates capabilities and progress on a quarterly basis using a framework that includes quantitative and qualitative information about five key activities.

Five Key Activities

1. Outbreak Response

- Ensure outbreak investigations and responses are timely and comprehensive.

2. Pathogenic Diversity

- Advance public health knowledge through innovative research into the epidemiology and biology of emerging infections and identify novel threats before they spread

3. Training

- Build capacity and improve the quality of epidemiology and laboratory science through applied training

4. Surveillance

- Strengthen surveillance systems capable of detecting, assessing, and monitoring the occurrence and public health significance of infectious disease threats

5. Networking

- Enhance collaboration through shared resources and synergy

Collaboration

- GDD collaborates closely with Centers and programs at CDC to accomplish its mission.
- This collaboration allows GDD to draw upon expertise from across the agency.
- GDD also works closely with a variety of in-country partners including Ministries of Health, academic institutions, other U.S. government programs, and international and non-government organizations.
- These partners contribute funding, expertise, and other resources towards GDD projects and goals.
- Therefore, the results of the M&E reflect the shared accomplishments of GDD and its partners.

Internal Partners

Center for Global Health

- Division of Global HIV/AIDS

- Division of Parasitic Diseases and Malaria

- Division of Public Health Systems and Workforce Development

Internal Partners

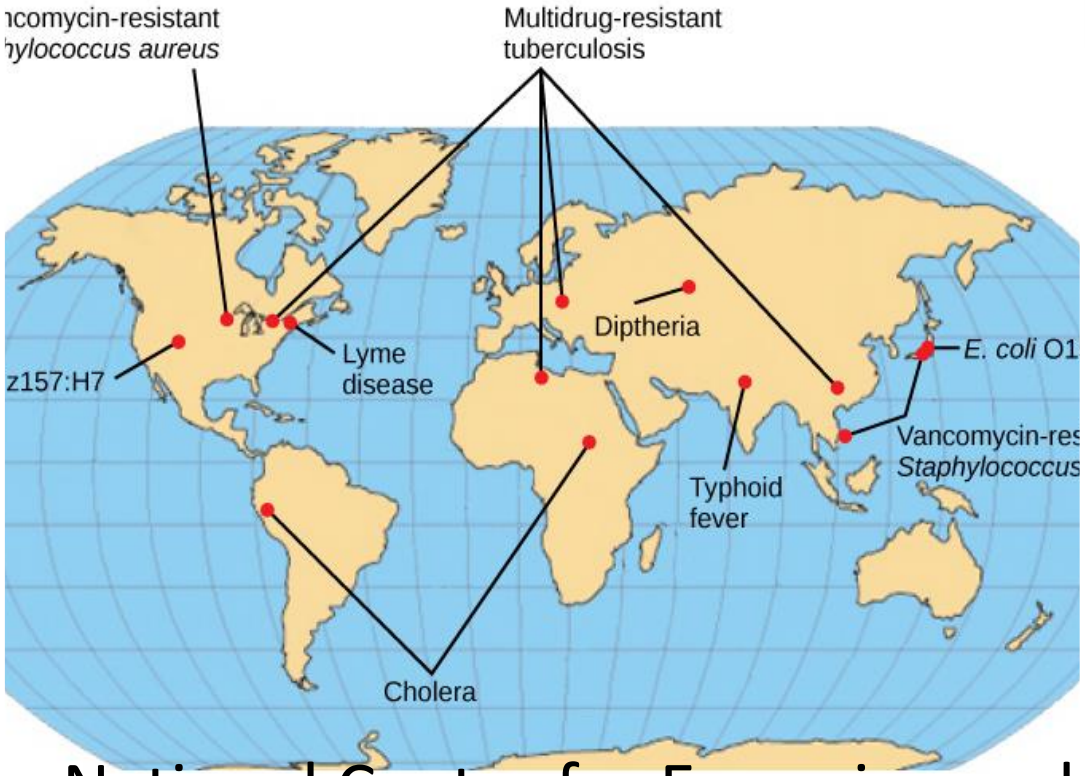
National Center for Birth Defects and Developmental Disabilities

The Division of Birth Defects and Developmental Disabilities

National Center for Environmental Health

Division of Emergency and Environmental Health Services

Internal Partners



National Center for Emerging and Zoonotic Infectious Diseases

- Division of Foodborne, Waterborne, and Environmental Diseases

- Division of Global Migration and Quarantine

-Division of Healthcare Quality Promotion

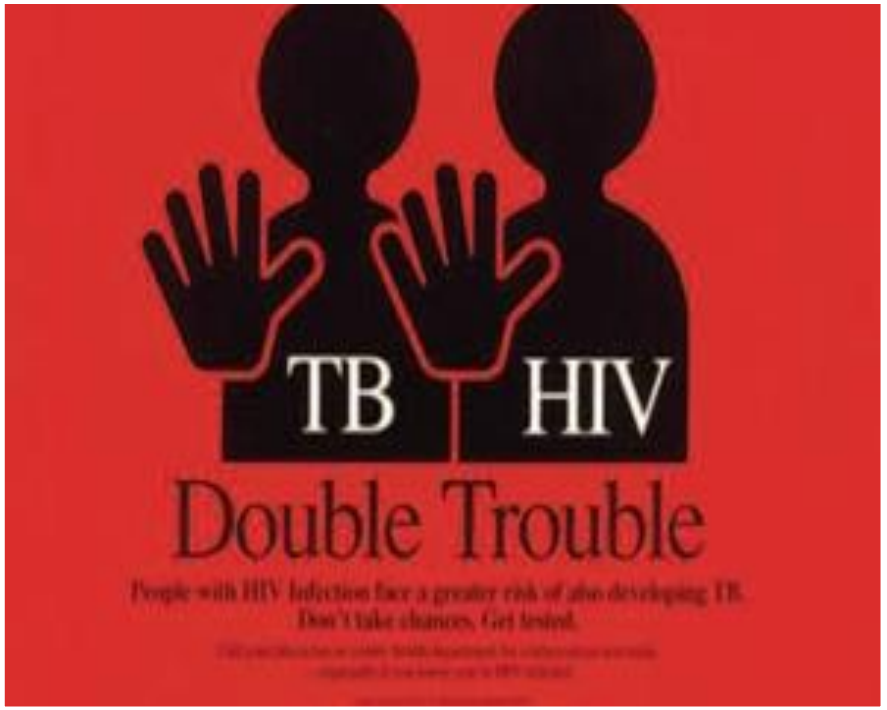
-Division of High-Consequence Pathogens and Pathology

- Division of Preparedness and Emerging Infections

- Division of Preparedness and Emerging Infections

- Division of Vector- borne Diseases

Internal Partners

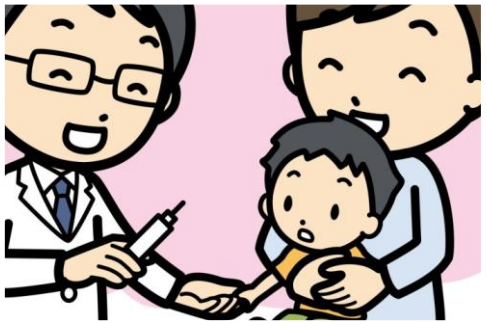


National Center for HIV/AIDS, Viral Hepatitis, STD and TB Prevention

- Division of TB Elimination

- Division of Viral Hepatitis

Internal Partners



National Center for Immunization and Respiratory Diseases

-Division of Bacterial Diseases

- Division of Viral Diseases

- Influenza Division

- Global Immunization Division