

Approaches to Outbreak Investigation From A Career 1982-2022

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Learning from Epidemics 1982-

- AIDS 1982/HIV-1 1983 (San Francisco, Boston, Texas, NIH)
- Anthrax 2001 (Washington DC)
- SARS 2003- (HK, Toronto, Guangzhou)
- H5N1 2004- (China, Thailand, Vietnam, Indonesia, Egypt)
- MERS 2013-2015- (Middle East)
- Ebola 2014-2015 (Sierra Leone, Liberia (w/MSF), Guinea)
- Zika 2016 (Recife, Brazil)
- Yellow Fever 2016 (Kinshasha, DRCongo)
- Chikungunya 2016 (Karachi, Pakistan)
- Pneumonic Plague 2017 (Madagascar w/WHO)
- SARS-CoV-2: Feb. 2020 HK, Shanghai, Cairo.

“OUTBREAK: Epidemics in a Connected World”

Smithsonian Museum 2018-2022 Washington, DC



Identify the Cause (ASAP):

Need to Act before 100% Sure

- One Virus (Pathogen) or more (a hybrid or not)
- “IAN”: Intentional, Accidental, or Natural (the great majority)
- “Intentional”: Anthrax spores in USA 2001
- Accidental: Laboratory accidents
- Natural: SARS-CoV-1, MERS-CoV, Ebola, Nipah, Zika, Plague

Origins Investigation: MERS 2013

Clinical Infect Dis 2014 (Lucey)

EDITORIAL COMMENTARY

Still Learning From the Earliest Known MERS Outbreak, Zarqa, Jordan, April 2012

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(See the Major Article by Al-Abdallat et al on pages 1225–33.)

Origins as Zoonosis or One Health: Understanding Can Help Prevention

- Zoonosis: Animal + Human Health
- One Health: Animal + Human + Environmental Health
- Case of Nipah in Bangladesh:
- Bamboo protectors around date palm sap tree buckets to prevent fruit bats from accessing sap and depositing Nipah.

One Health: Human, Animal, Environmental

- Why do outbreaks happen when and where they do (and not elsewhere at another time? Or maybe they did but not recognized).

Incubation Period:

Know the Minimum and Maximum Times

- Minimum = Until onset of illness
- Maximum = Days until out of quarantine

When does Transmission Begin? When does Transmission End

- Is there transmission before or without symptoms (e.g., cough) or signs (e.g., fever)?
- For example, Ebola is not contagious until fever or other illness starts.
- SARS-CoV-2/COVID-19: Transmission can often occur without symptoms.

Novel Infectious Pathogen or Epidemiology?

- Novel Pathogen: SARS-1, MERS-1, SARS-2

- Novel Epidemiology: Nipah Virus

In Malaysia & Singapore 1998: No person to person spread

In Bangladesh & India: some person-to-person spread

Hantavirus Sin Nombre (USA): No Person to person

Hantavirus ANDES: Some person to person spread.

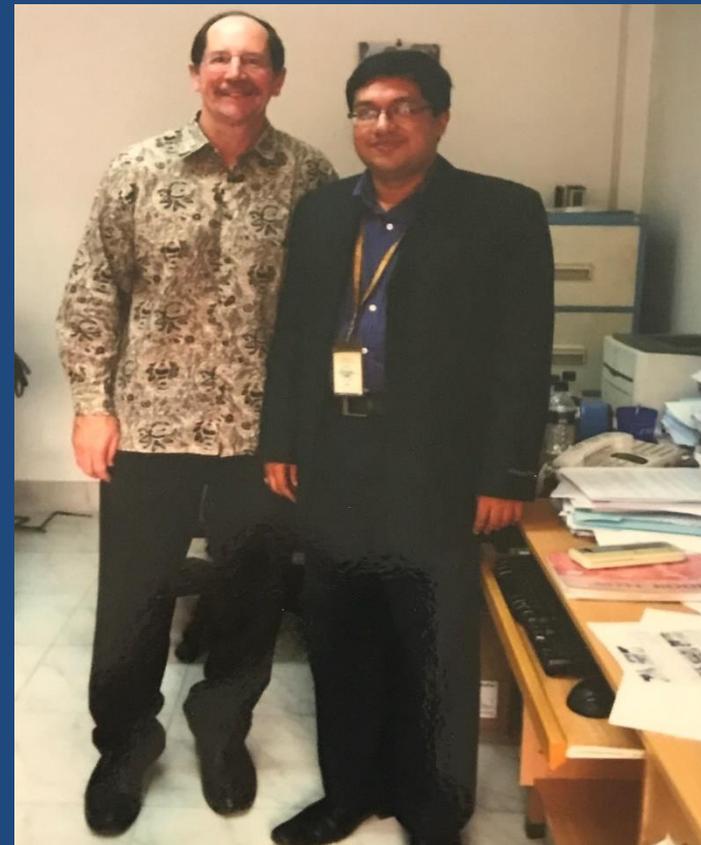
Lesson: Virus Epidemiology Can Change e.g., Nipah

Malaysia 1998 Bats-Pigs-People, to Bangladesh Bats-Palm Sap-People

To Nipah Village, Malaysia (2011)



Dhaka, Bangladesh w/Nipah Expert



Contact Tracing Protocols

- If Person to person transmission then contact tracing protocols may be needed.
- For example: SARS-CoV-1, MERS-CoV, Ebola, Nipah, SARS-CoV-2, but not influenza.
- Must coordinate well with public health authorities, communicators, community leaders, many more.

Lesson: Stop Epidemics by Working Together
Kinshasa, DR Congo Yellow Fever Aug. 2016



How is it Transmitted?

How is it Not Transmitted?

- If via air then droplet or aerosol or both?
- Body fluids?
- Fecal-Oral?
- Fomites?
- Test Blood supply?

Duration and Types of Infection

- Acute
 - Chronic
 - Relapse
 - Reinfection
-
- Post-Acute Sequelae
 - Other

Communications: Must be Trusted, Fast, & Accurate

- Risk and facts for colleagues
- Risk and facts for the Public

- Media print and TV
- Social Media

- Others

Remember the Central Role of “Communities in Communication’s



RESPONSE: The Central Role of Community



Health educators went door to door in the communities hit hardest by Ebola. They taught people about Ebola's symptoms and prevention methods and encouraged them to seek medical attention.



Artists created large, colorful murals along busy streets to communicate about Ebola symptoms and prevention graphically to reach those who cannot read.



The president of Sierra Leone, Ernest Bai Koroma, posed with some of the survivors of Ebola, in a campaign to end the stigma against Ebola survivors.

The 1st Career Reflection & Rule: Anticipate, Recognize, Act

- 1st of 40 Career Reflections 1982-2022:
Anticipate, Recognize, Act
- 40th of 40 Reflections:
“Whats’ Next” is Already Here,
We Just Haven’t Recognized It Yet.

“What’s Next?” Is Already Here,
We Just Haven’t Recognized It Yet



Infection Prevention & Control (IPC) and Personal Protective Equipment (PPE) protocols

- Protect yourself first so you can help protect and provide care for others.
- PPE for healthworkers and general population.
- What to do when insufficient?
- Ethical and Moral Issues.

Treatment(s)

- Repurposed existing drugs or antibodies?
- New Drugs or Antibodies
- Need for controlled clinical trials during an epidemic.
- They require appropriate country-specific, community-specific, international standards for ethics, statistics, transparency, IRB, stop rules for efficacy or futility, and more.

Vaccines

- Can any existing ones be helpful?
e.g., Smallpox vaccine (vaccinia) protects against monkeypox. (e.g., USA 2003).
- Making a safe and effective vaccine is necessary, but not sufficient.
- People must accept and receive the vaccinations.

Remembrance of Things Past---Remembrance of Things Future From Our Generation to the Next Generation of Epidemic Fighters

Ebola Epidemic in West Africa 2014

passion over fear.”

Ebola survivor

ai

Momodu



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“When 10-year-old Momodu arrived at the Doctors Without Borders Ebola treatment center where I volunteered in Liberia, nurses and stronger, recovering patients helped him drink enough rehydration solution until he had the strength to walk outside the tent.

A nurse gave Momodu some colored pencils and drawing paper. Each day he did a new picture. He inspired everyone who saw them. Since you can't take anything out of the high-risk zone, not even paper, we took photographs of the pictures and had them enlarged and



Before the 2014 outbreak of Ebola, there were few people who had survived the disease. Now, thousands of survivors have returned to their homes and their families. Many have health problems that continue after the virus is no longer in the body. Some face stigma and rejection, while others work to educate their communities about Ebola and how it is spread.

From This Generation to the Next:
“What’s Next?” Is Already Here,
We Just Haven’t Recognized It Yet

