

Rapid reporting of emerging disease outbreaks using unofficial sources: Lessons from ProMED

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Stockholm





Epidemiologic Notes and Reports

Pneumocystis Pneumonia --- Los Angeles

In the period October 1980-May 1981, 5 young men, all active homosexuals, were treated for biopsy-confirmed *Pneumocystis carinii* pneumonia at 3 different hospitals in Los Angeles, California. Two of the patients died. All 5 patients had laboratory-confirmed previous or current cytomegalovirus (CMV) infection and candidal mucosal infection. Case reports of these patients follow.

Patient 1: A previously healthy 33-year-old man developed *P. carinii* pneumonia and oral mucosal candidiasis in March 1981 after a 2-month history of fever associated with elevated liver enzymes, leukopenia, and CMV viremia. The serum complement-fixation CMV titer in October 1980 was 256; in May 1981 it was 32.* The patient's condition deteriorated despite courses of treatment with trimethoprim-sulfamethoxazole (TMP/SMX), pentamidine, and acyclovir. He died May 3, and postmortem examination showed residual *P. carinii* and CMV pneumonia, but no evidence of neoplasia.

Patient 2: A previously healthy 30-year-old man developed *p. carinii* pneumonia in April 1981 after a 5-month history of fever each day and of elevated liver-function tests, CMV viremia, and documented seroconversion to CMV, i.e., an acute-phase titer of 16 and a convalescent-phase titer of 28* in anticomplement immunofluorescence tests. Other features of his illness included leukopenia and mucosal candidiasis. His pneumonia responded to a course of intravenous TMP/SMX, but, as of the latest reports, he continues to have a fever each day.

Emergence of HIV/AIDS

- A plasma sample taken in 1959 from an adult male living in what is now the Democratic Republic of Congo showed HIV
- HIV found in tissue samples from an American teenager who died in St. Louis in 1969
- HIV found in tissue samples from a Norwegian sailor who died around 1976
- Evolutionary model suggests HIV transferred to humans in 1930 +/- 15 years

Why wasn't HIV detected earlier?

“Because infectious diseases have been largely controlled in the United States, we can now close the book on infectious diseases.” — (attributed to) William Stewart, US Surgeon General, 1969



“Even with my great personal loyalty to [the discipline of] infectious diseases, I cannot conceive of a need for 309 more infectious diseases experts unless they spend their time culturing each other.”

Robert Petersdorf, MD
1978

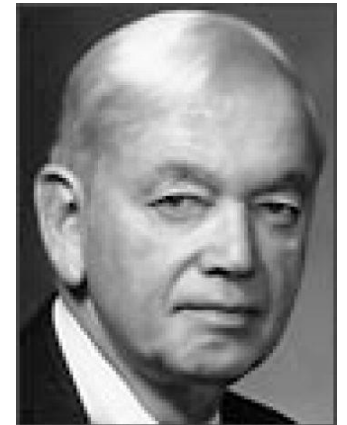
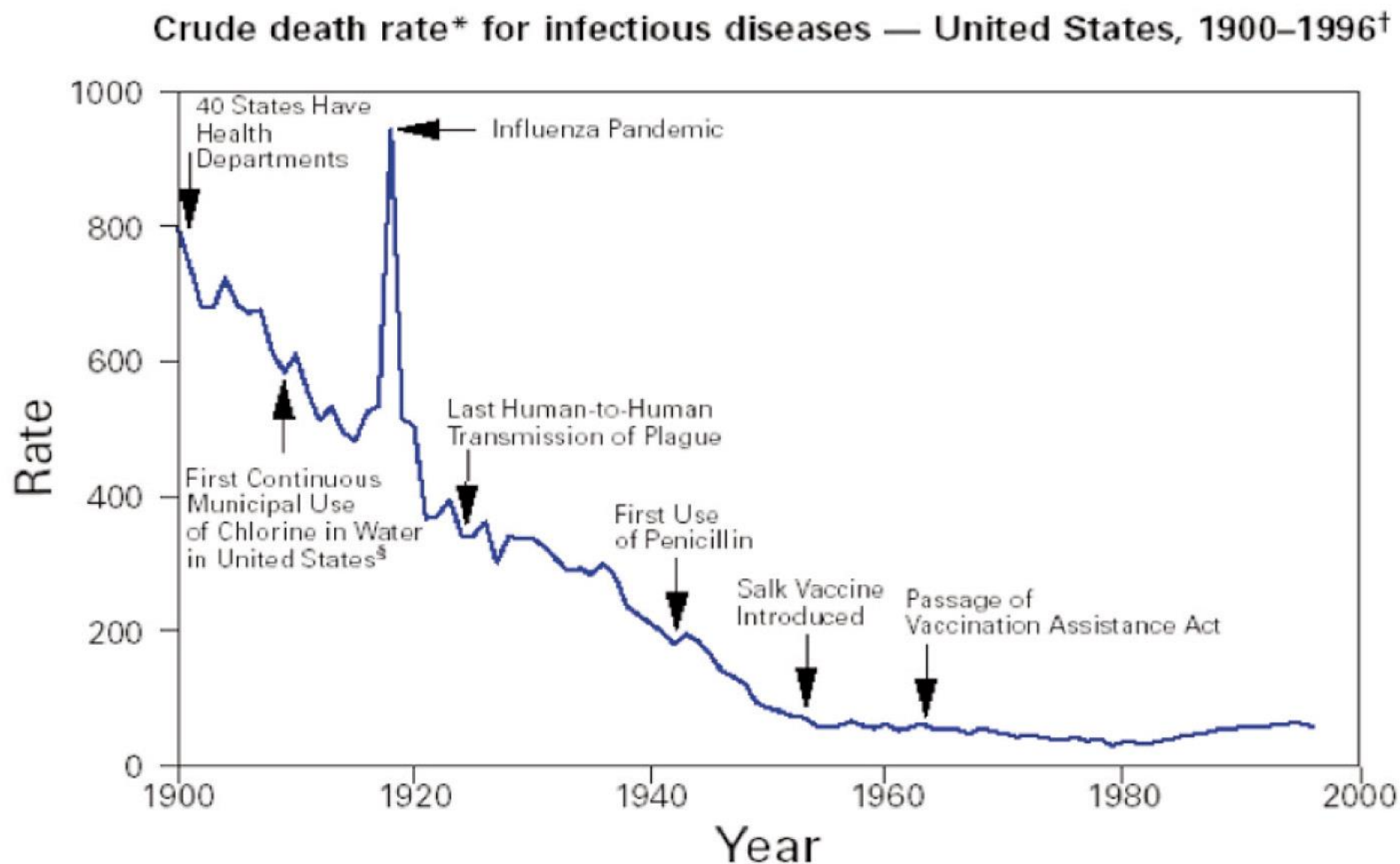


FIGURE 1. Crude death rate for infectious diseases—United States, 1900-1996

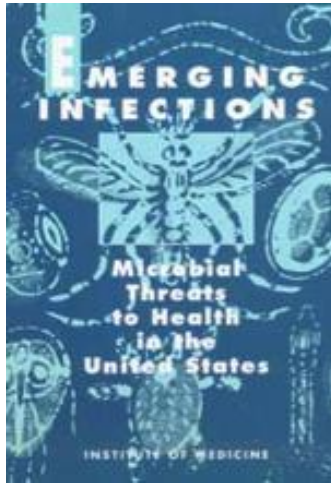
[Adapted by Rear Admiral Dr. Patrick O'Carroll, Regional Health Administrator, U.S. Public Health Service Region X]



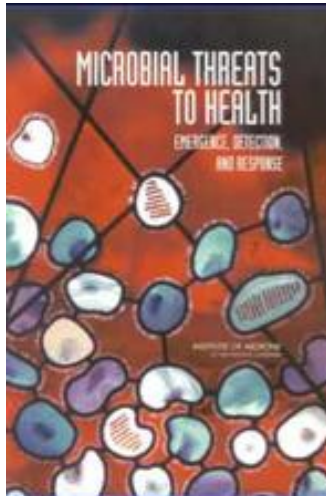
*Per 100,000 population per year.

[†]Adapted from Armstrong GL, Conn LA, Pinner RW. Trends in infectious disease mortality in the United States during the 20th century. JAMA 1999;281:61-6.

[§]American Water Works Association. Water chlorination principles and practices: AWWA manual M20. Denver, Colorado: American Water Works Association, 1973.



1992



2003

“Microbes are ranked among the most numerous and diverse of organisms on the planet; pathogenic microbes can be resilient, dangerous foes. Although it is impossible to predict their individual emergence in time and place, we can be confident that new microbial disease will emerge.”

-Institute of Medicine, 1992

The Conquest of Infectious Diseases: Who Are We Kidding?

The 20th century has seen unprecedented scientific progress and so it is ironic that as the century draws to a close, scientists and clinicians must learn to deal with emerging new infectious agents whose existence in human beings was proved only in the past few years (1).

Almost a quarter century ago, the Surgeon General of the United States testified to Congress that it was time to “close the book on infectious diseases” (2). The wide use of effective antibiotics, the potential for universal vaccination for many major childhood illnesses,

national surveillance of drug-resistant *Mycobacterium tuberculosis* was discontinued in 1984 and has only recently been reinstated. Surveillance of food-borne disease is inadequate in most areas of the United States, and many outbreaks go undetected (11).

Demographic and social changes have contributed to the emergence of infectious diseases. Changes in sexual behavior and use of illicit injection drugs have contributed to the rapid spread of HIV. The dramatic increase in the use of child-care centers as women have reentered the workplace in increasing numbers has resulted in a greater risk for infectious disease, not only for children but also for parents and child care staff (12).

1 September 1993

Ruth L. Berkelman and James M. Hughes

Annals of Internal Medicine

Could information sharing over the Internet and the use of 'informal' or unofficial information sources enhance the detection of emerging diseases?



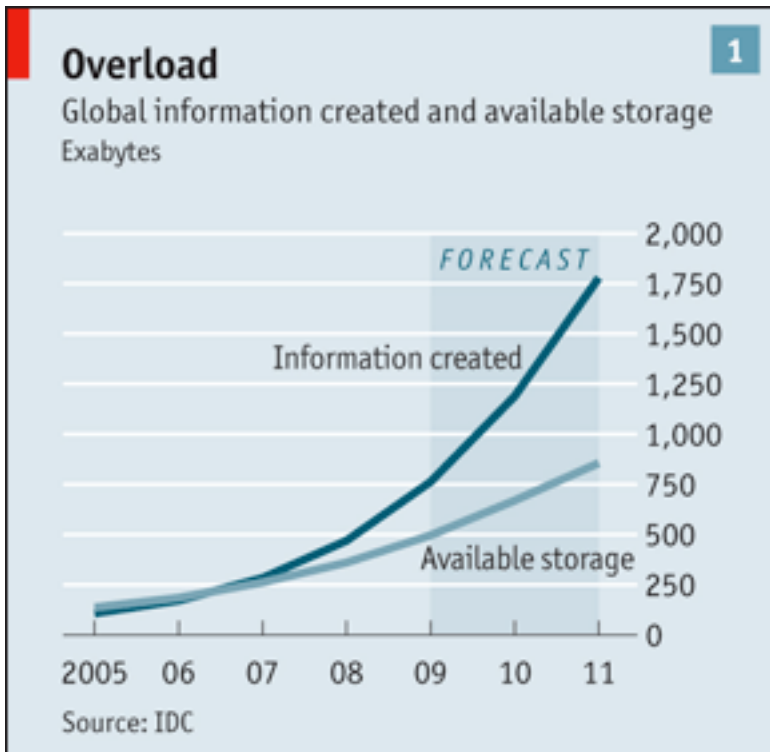
ProMED founders: Stephen Morse, Jack Woodall, Barbara Hatch Rosenberg in a 1999 photo. (Source: Nature, 432:544,2004.)

Origins

“The year was 1993 and to some attendees at a [bioweapons] conference in Geneva co-sponsored by the Federation of American Scientists (FAS) and the World Health Organization (WHO), the convergence of two important trends was becoming apparent. The first was the role of emerging infectious diseases... The second was the dramatic coming of age of the Internet.”

“At a follow-up conference in the U.S. in 1994, attendees joined an e-mail list that allowed them to stay in touch with one another and share news in their field. It began with some 40 subscribers, but as news of outbreaks spread among these inaugural subscribers was forwarded to colleagues, others sought to subscribe to the list and within months hundreds joined. The list was named ProMED-mail.”

Archives of Medical Research
36 (2005) 724–730



The Economist, 2012



Program for Monitoring Emerging Diseases

- The ProMED-mail electronic outbreak reporting system began in August 1994 to monitor emerging infectious diseases globally
- Moderated e-mail lists, website, social media
- Early warning system for emerging disease outbreaks
- Emphasis on rapid reporting
 - Posts are vetted by SMEs but not “peer reviewed”
 - Standard for <24 hour turnaround
 - Requests for Information (RFIs) for unconfirmed reports



Program for Monitoring Emerging Diseases

- Free subscription
- 82,000 subscribers in > 180 countries
- All reports are screened and commented upon by expert Moderators before posting
- Average of 8 reports per day
- Emphasis on “One Health”
- Regional network system



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Latest Posts on ProMED-mail

- 28 Nov 2016 Undiagnosed deaths, bovine - Kenya: RFI
- 28 Nov 2016 Avian influenza (116): Europe (Netherlands) poultry, HPAI H5N8
- 28 Nov 2016 Mayaro virus disease - Brazil
- 28 Nov 2016 Lyme disease - UK (03): (Scotland) Outer Hebrides
- 28 Nov 2016 Sheep pox & goat pox - Israel (02): ovine, vaccination
- 27 Nov 2016 Bovine tuberculosis - Canada (09): (AB) Mexican strain
- 27 Nov 2016 Ebola update (68): news, economy
- 27 Nov 2016 Yellow fever - Africa (110): Angola, Congo DR, WHO
- 27 Nov 2016 Avian influenza (115): Sweden HPAI H5, poultry; Finland HPAI H5N8, wildfowl, OIE
- 26 Nov 2016 Leprosy - USA (05): (TX)
- 26 Nov 2016 Foot & mouth disease - Russia (11): (ZB) bovine, susp, RFI
- 26 Nov 2016 Malaria - India (03): (JH)
- 26 Nov 2016 Mumps - USA (28): (OR,MO)
- 26 Nov 2016 Measles update (58): South Sudan, immunization
- 26 Nov 2016 Leprosy, red squirrel - UK (04): comment
- 26 Nov 2016 Avian influenza (114): India (KA) poultry, H5N8, spread, OIE
- 26 Nov 2016 Toxic algae - Australia (02): (AC)

ProMED-mail alerts on HealthMap


[View Full Map >](#)


2016
**International Meeting on
Emerging Diseases
and Surveillance**

Vienna • Austria
November 4-7 2016

Most Recent Alert

 [View printable version](#) Share this post:    

Published Date: 2016-11-28 12:29:53

Subject: PRO/AH/EDR> Undiagnosed deaths, bovine - Kenya: RFI

Archive Number: 20161128.4658102

UNDIAGNOSED DEATHS, BOVINE - KENYA: REQUEST FOR INFORMATION

A ProMED-mail post

<http://www.promedmail.org>

ProMED-mail is a program of the
International Society for Infectious Diseases
<http://www.isid.org>

Date: Sun 27 Nov 2016

Source: Xinhua via Coastweek (Nairobi) [edited]

<http://www.coastweek.com/3948-Ministry-of-Livestock-dismiss-outbreak-of-rinderpest-disease.htm>

The Kenyan government has refuted reports of an outbreak of rinderpest disease in the country as well as a threat from neighboring Tanzania. Ministry of Agriculture, Livestock and Fisheries cabinet secretary Willy Bett said Kenya has an active and passive surveillance program that ensures that there is no re-emergence of rinderpest in the country, while keeping a high level of alertness. "This surveillance program also ensures that other important trans-boundary animal diseases are controlled to safeguard our livestock herds and trade," Bett said in a statement issued in Nairobi.

The local media had reported that there was a possible outbreak of rinderpest disease, which affects livestock, in Kenya. The reports said that the disease had already killed thousands of livestock in neighboring Tanzania, with the government on high alert over a possible occurrence in Kenya.

However, Bett said that rinderpest -- a devastating contagious animal disease, also known as cattle plague, that affects cloven hoofed animals, mainly cattle and buffaloes -- was successfully eradicated the world over in 2011. Kenya had earlier eradicated the disease in 2009, and a certificate was issued to that effect by the World Organisation for Animal Health (OIE).

Bett said that an outbreak of anthrax in wild animals in Tanzania had elicited rumors to the effect that it was an outbreak of rinderpest. The rumor has attracted a lot of media attention in Kenya. "We, however, have official confirmation from the veterinary authorities in Tanzania that the outbreak was indeed anthrax and not rinderpest," Bett said.

Rinderpest is one of the world's deadliest livestock diseases, capable of clearing 90 per cent of livestock in just 10-15 days. The disease's symptoms in cattle, goats and sheep [see comment] include fever, erosive lesions in the mouth, discharge from the nose and eyes, profuse diarrhea, and dehydration, often leading to death.



Published Date: 1999-03-19 23:50:00

Subject: PRO/AH/EDR> Hendra-like virus? - Malaysia: RFI

Archive Number: 19990319.0428

HENDRA-LIKE VIRUS? - MALAYSIA: REQUEST FOR INFO

A ProMED-mail post

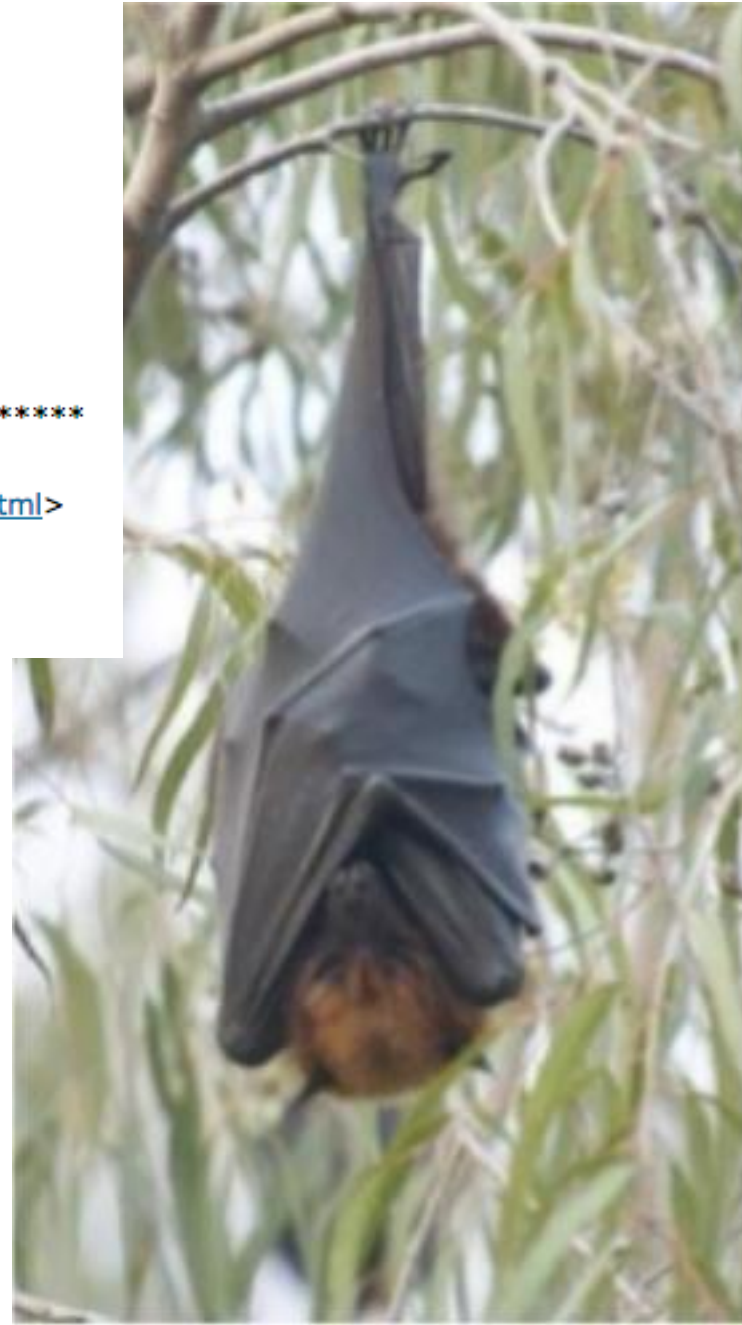
<<<http://www.healthnet.org/>><http://www.healthnet.org/programs/promed.html>>

Date: 18 March 1999

From: Charles H. Calisher <calisher@usa.healthnet.org>

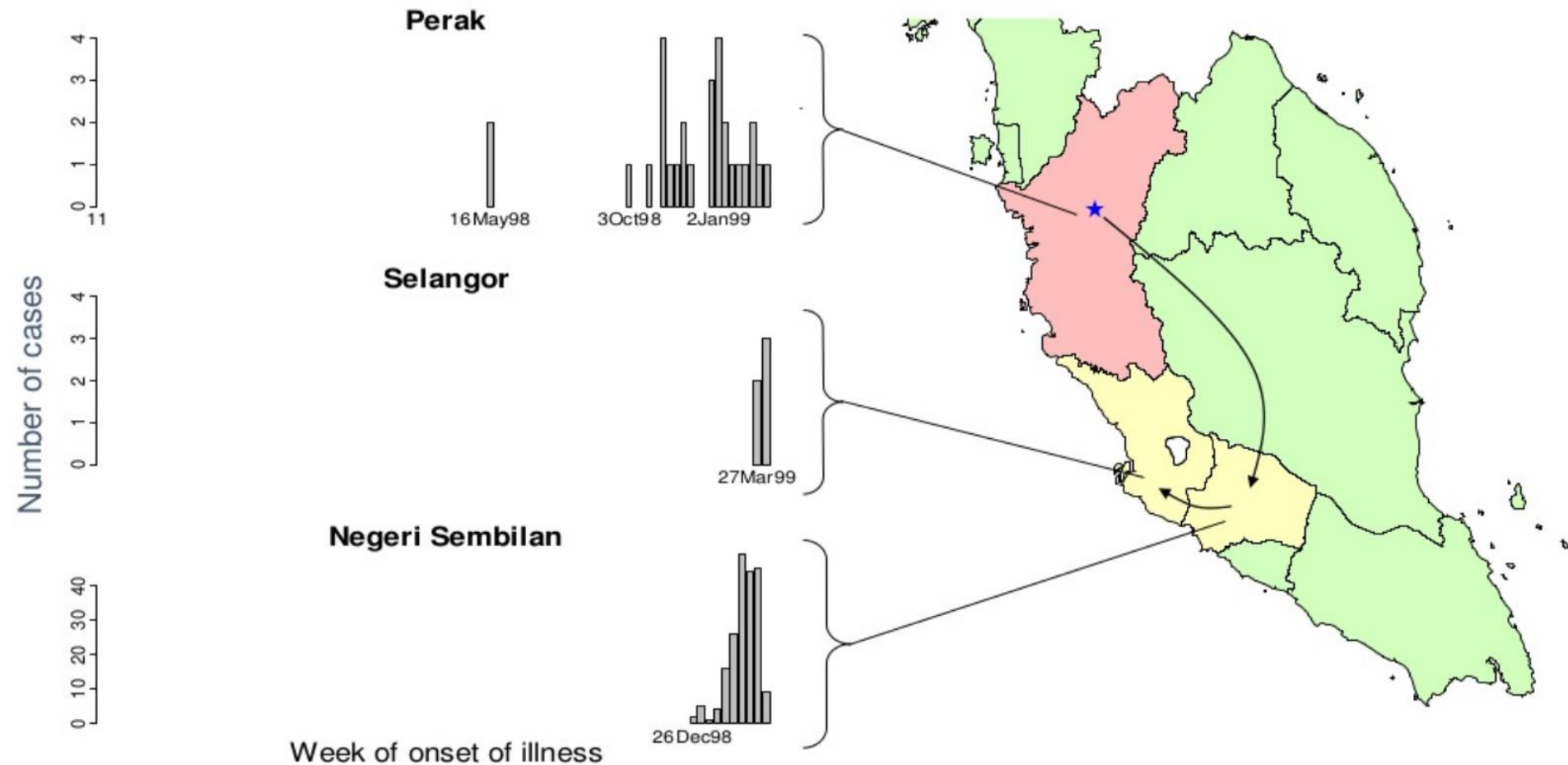
Source: Rumors

I have heard from four different sources that at least one of the isolates from Malaysia, from a pig that died of suspect Japanese encephalitis (JE), has been identified as a paramyxovirus closely related to or identical with Hendra virus. Hendra virus has so far been reported (on three occasions) only from Queensland, Australia. It is known to be a human and equid pathogen but not much more than that; there is no data with regard to porcine pathogenicity, as far as I know. Whether these rumors are true remains to be seen (and reported officially).



Nipah virus in Malaysia, 1998-1999

Human encephalitic cases



Source: Jonathan Epstein, EcoHealth Alliance

PNEUMONIA - CHINA (GUANGDONG): RFI

Date: 10 Feb 2003

From: Stephen O. Cunnion, MD, PhD, MPH

International Consultants in Health, Inc

Member ASTM&H, ISTM

This morning I received this e-mail and then searched your archives and found nothing that pertained to it. Does anyone know anything about this problem?

"Have you heard of an epidemic in Guangzhou? An acquaintance of mine from a teacher's chat room lives there and reports that the hospitals there have been closed and people are dying."

PNEUMONIA - CHINA (GUANGDONG): RFI (2)

Date: 10 Feb 2003

Moderator comment:

[ProMED-mail appreciates the preliminary information above and would be grateful for any additional information. The etiology and extent of this apparent outbreak of pneumonia are unclear, as is whether the outbreak is secondary to influenza. - Mod. LM]

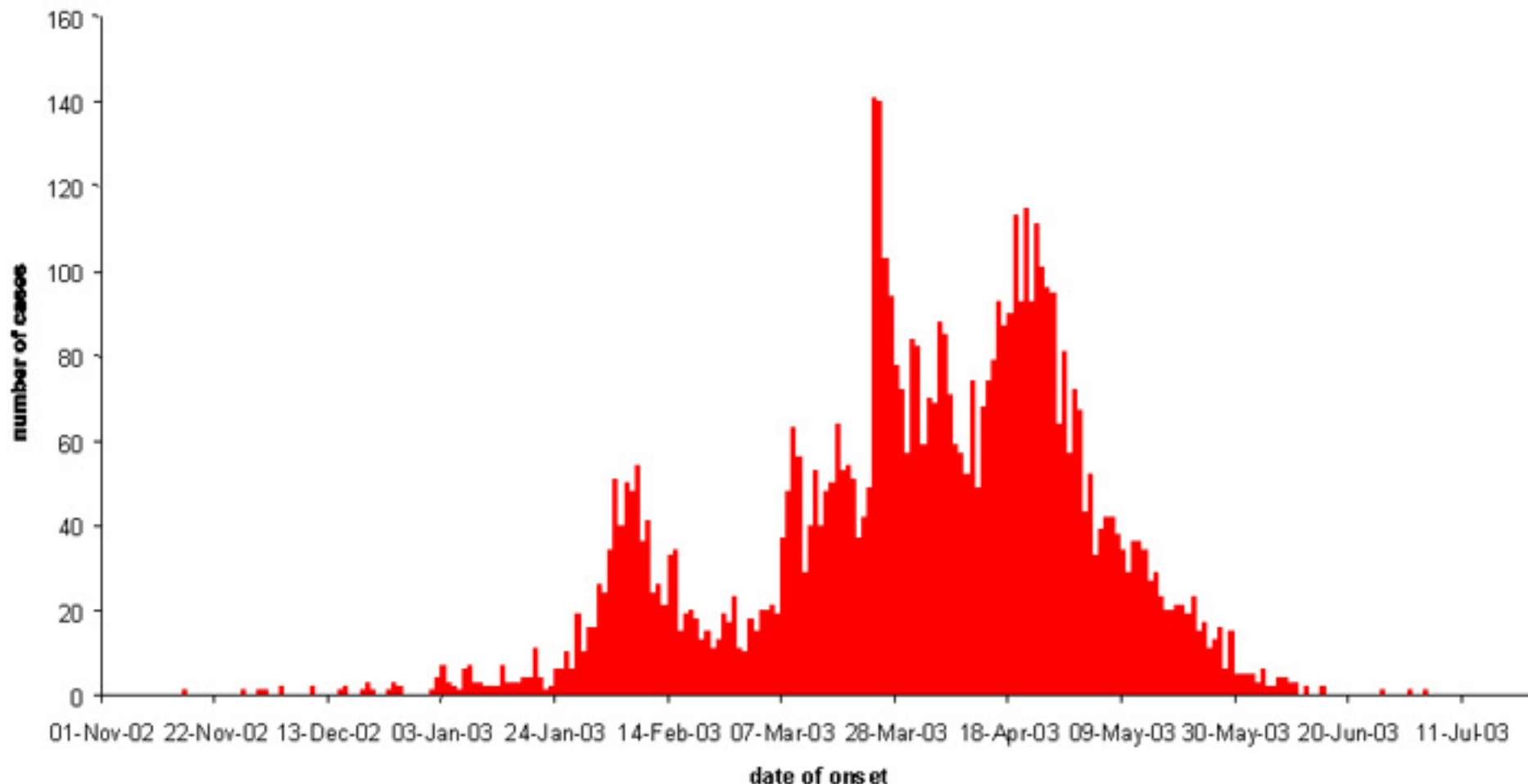
Acute Respiratory Syndrome in Hong Kong SAR, Viet Nam

- WHO Press Release 12 Mar 2003
 - WHO issues a global alert about cases of **atypical pneumonia**. Cases of severe respiratory illness may spread to hospital staff. Since mid February 2003, WHO has been actively working to confirm reports of outbreaks of a severe form of pneumonia in Viet Nam, Hong Kong Special Administrative Region (SAR), China, & Guangdong province in China.

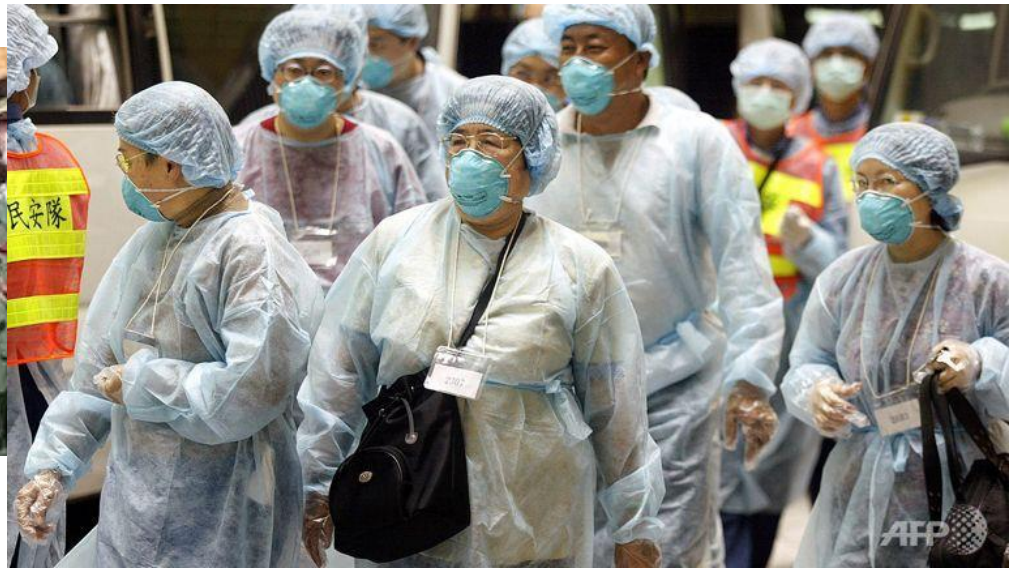
March 5: First Canadian death



Probable cases of SARS by week of onset
Worldwide* (n=5,910), 1 November 2002 - 10 July 2003

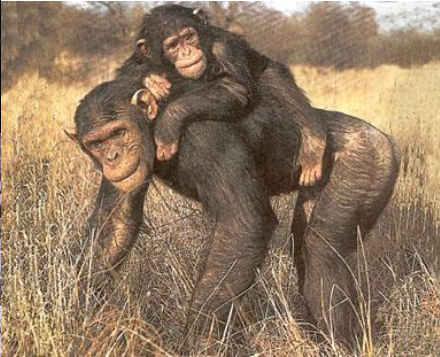


* This graph does not include 2,527 probable cases of SARS (2,521 from Beijing, China), for whom no dates of onset are currently available.



One Health

Considers disease without regard to species and recognizes the commonality of human and veterinary health



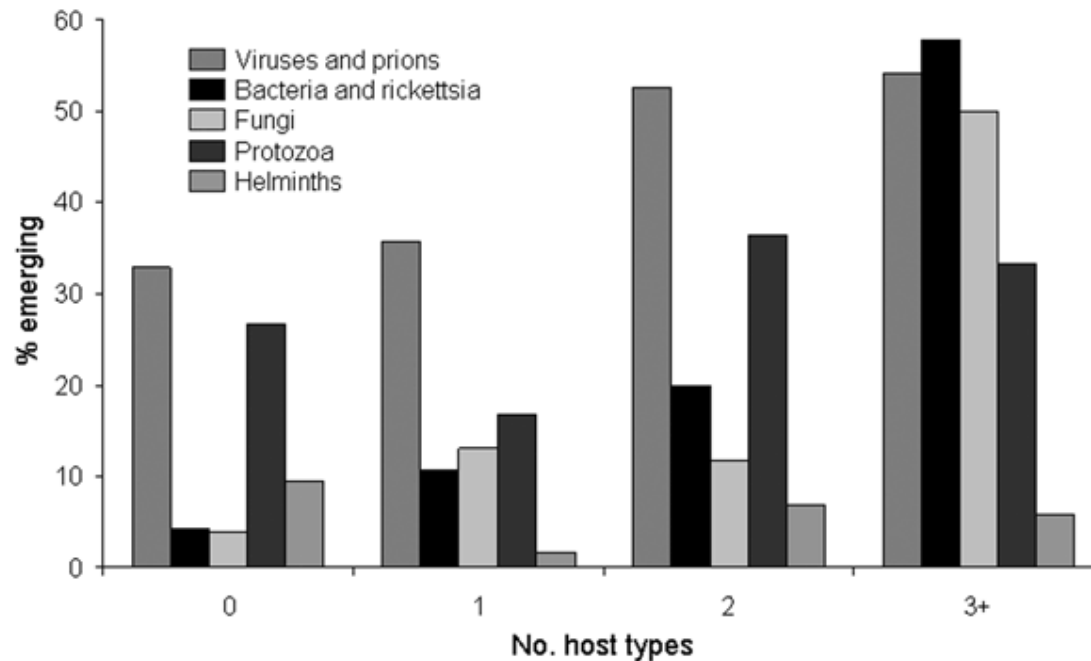
For more
virus, ple
at 788-82
or at 1-88

Zoonoses in disease emergence

- 1407 human pathogens
- 58% are zoonotic
- 130 of the 177 recently emerged pathogens zoonotic (RR=2.0)

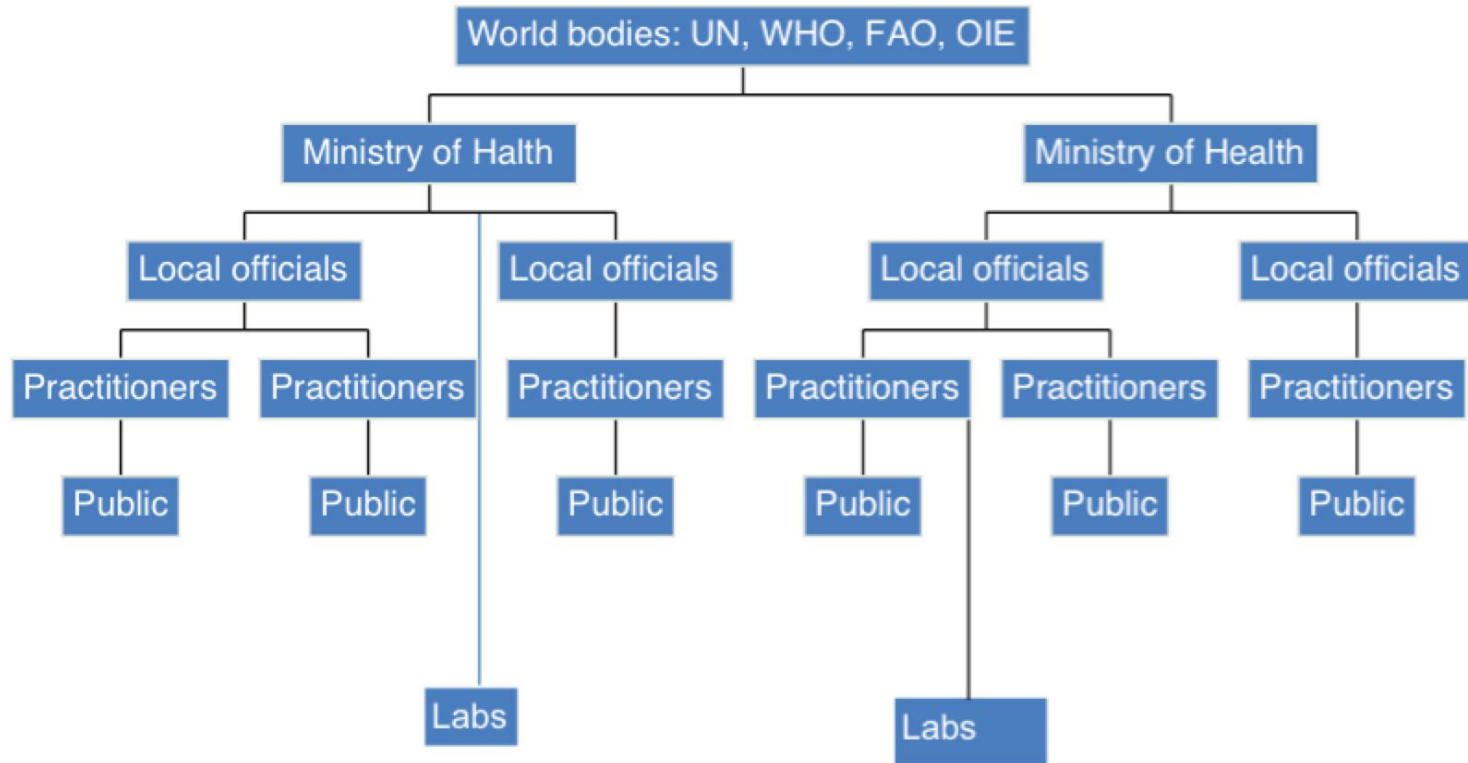
Woolhouse ME, Gowtage-Sequeria S.
Host range and emerging and
reemerging pathogens. *Emerg Infect
Dis* 2005; 11(12): 1842-7.

Breadth of host range vs. fraction regarded as emerging or reemerging



Woolhouse ME, Gowtage-Sequeria S. Host range and emerging and reemerging pathogens. *Emerg Infect Dis* 2005; 11(12): 1842-7

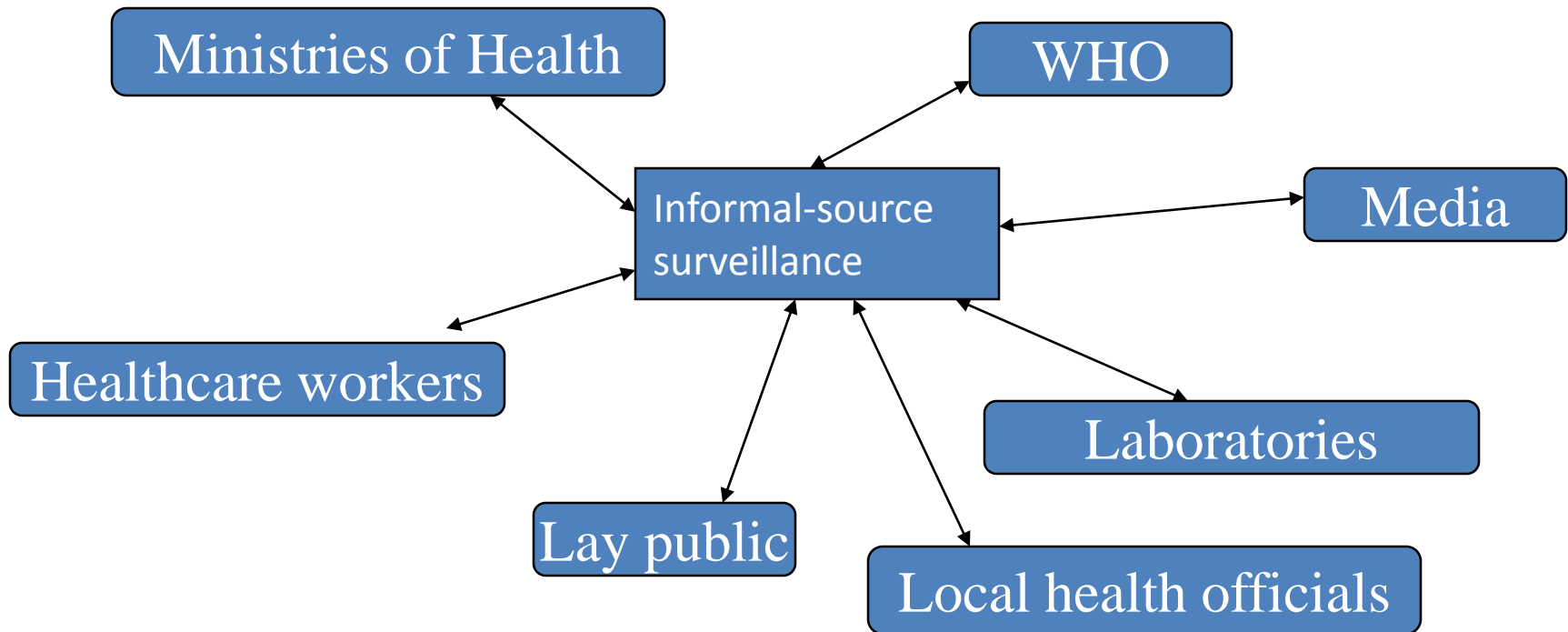
Traditional public health reporting



Traditional Public Health

- Advantages
 - Robust
 - Sensitive
 - Accurate
 - Validated
 - Quantitative
- Disadvantages
 - May be slow
 - Incentives for non-reporting
 - Broken links may lead to non-reporting
 - May miss uncharacterized or novel disease
 - Expensive

Event-based “informal” surveillance



Informal source surveillance

(Event-based surveillance, Biosurveillance)

- Advantages
 - Speed
 - Transparency
 - Multiple sources including
 - Clinicians
 - Labs
 - Media, blogs, Internet
 - Official
 - Identifies any event
 - Inexpensive
- Disadvantages
 - Potential inaccuracy
 - Non-quantitative
 - Biases
 - Information richness
 - Language
 - Sensationalism

Regional Programs of ProMED-mail

- ProMED-ESP, ProMED-Port: Latin America in Spanish and Portuguese
 - API
- ProMED-MBDS (Mekong Basin Disease Surveillance Collaboration)
 - MOHs of Cambodia, China, Laos, Myanmar, Thailand, Vietnam, WHO, Rockefeller
- ProMED-EAFR: English-speaking Africa
 - Regional network focused on anglophone Africa
- ProMED-FRA
 - Regional network focused on francophone Africa
- ProMED-RUS
 - Russian language reports from the countries of the independent states of the former Soviet Union
- ProMED-MENA
 - Middle East/North Africa in English with Arabic summaries
- ProMED-SoAs
 - South Asia – Subcontinent in English

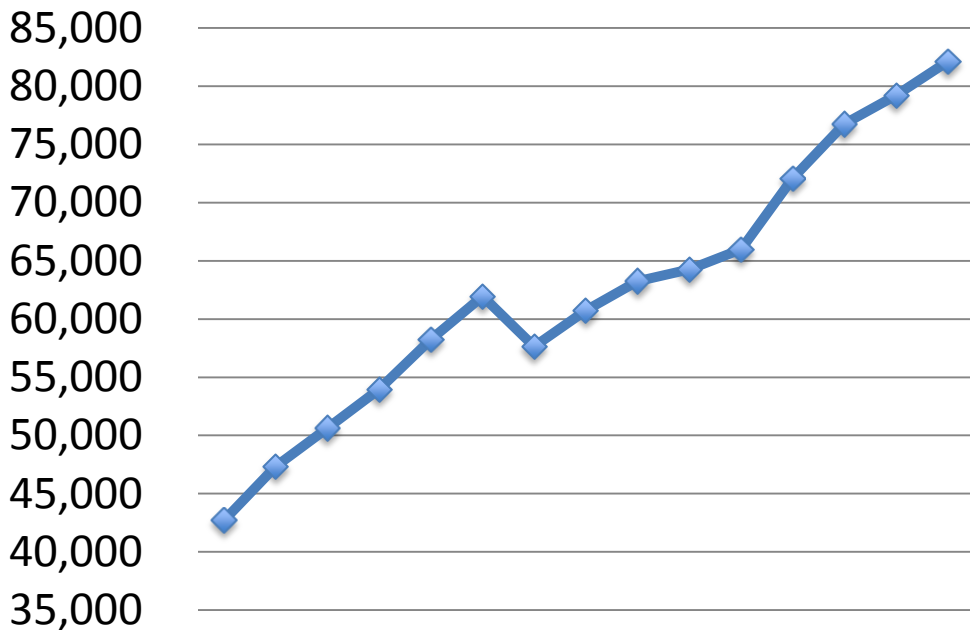
Staff Locations



59 staff in 37 countries

Number of Subscribers

Mid 09 Mid 10 Mid 11 Mid 12 Mid 13 Mar 14 Oct 15 Nov 16



Number of Posts*

Year	Posts	Posts/day
2010	2613	7.2
2011	2588	7.1
2012	2930	8.0
2013	2924	8.0
2014	3035	8.2
2015	3154	8.6
2016 (to date)	2792	9.3

*Global English network only, similar volume on regional services in addition

1060 posts refer to *Eurosurveillance* reports



Published Date: 2012-09-20 15:51:26

Subject: PRO/EDR> Novel coronavirus - Saudi Arabia: human isolate

Archive Number: 20120920.1302733

NOVEL CORONAVIRUS - SAUDI ARABIA: HUMAN ISOLATE

A ProMED-mail post

<http://www.promedmail.org>

ProMED-mail is a program of the
International Society for Infectious Diseases

<http://www.isid.org>

Date: Sat 15 Sep 2012

From: Ali Mohamed Zaki [edited]

Novel Coronavirus – Saudi Arabia

A new human coronavirus was isolated from a patient with pneumonia by Dr Ali Mohamed Zaki at the Virology Laboratory of Dr Soliman Fakeeh Hospital Jeddah Saudi Arabia.

The virus was isolated from sputum of a male patient aged 60 years old presenting with pneumonia associated with acute renal failure. The virus grows readily on Vero cells and LLC-MK2 cells producing CPE in the form of rounding and syncytia formation.

[The clinical isolate] was initially tested for influenza virus A, influenza virus B, parainfluenza virus, enterovirus and adenovirus, with negative results. Testing with a pancoronavirus RT-PCR yielded a band at a molecular weight appropriate for a coronavirus. The virus RNA was tested also in Dr. Ron Fouchier's laboratory in the Netherlands and was confirmed to be a new member of the beta group of corononaviruses, closely related to bat coronaviruses. Further analysis is being carried out in the Netherlands.

The Virology Laboratory at the Dr Fakeeh Hospital will be happy to collaborate with others in studies of this virus.

--

Ali Mohamed Zaki
Professor of Microbiology
Dr Fakeeh hospital Jeddah Saudi Arabia

Novel Coronavirus - UK

Published Date: 2012-09-23 17:29:14

Subject: PRO/AH/EDR> Novel coronavirus - Saudi Arabia (03): UK HPA, WHO, Qatar

Archive Number: 20120923.1305982

NOVEL CORONAVIRUS - SAUDI ARABIA (03): UNITED KINGDOM HEALTH PROTECTION AGENCY, WHO, QATAR

A ProMED-mail post

<http://www.promedmail.org>

ProMED-mail is a program of the
International Society for Infectious Diseases

[1] HPA press release

Date: 23 Sep 2012 Source: Health Protection Agency UK press release [edited]

<http://www.hpa.org.uk/NewsCentre/NationalPressReleases/2012PressReleases/120923acute-respiratory-illness-identified/> The Health Protection Agency (HPA) can confirm the diagnosis

of one laboratory confirmed case of severe respiratory illness associated with a new type of coronavirus. The patient, who is from the Middle East and recently arrived in the UK, is receiving intensive care treatment in a London hospital.

Novel coronavirus – Saudi Arabia

Published Date: 2012-11-04 13:11:42

Subject: PRO/AH/EDR> Novel coronavirus - Saudi Arabia (15): new case

Archive Number: 20121104.1391285

NOVEL CORONAVIRUS - SAUDI ARABIA (15): NEW CASE

Date: Nov 4, 2012 12:11 PM

From: Ziad Memish (Saudi Ministry of Health)

Subject: Re: A new Saudi novel coronavirus case diagnosed in KSA (Kingdom of Saudi Arabia) Attached is a report we would like for you to consider releasing in ProMED-mail: In accordance with Ministry of Health's (MoH) responsibilities for disease prevention and control, and in keeping with our practice to inform the public and the media about significant findings that result from MoH disease surveillance activities, we are announcing today [4 Nov 2012] that one of our hospitalized citizens has been confirmed to have pneumonia caused by novel Coronavirus (nCoV). This case had no epidemiological links to the 2 documented novel coronavirus cases to date.



Published Date: 2012-09-25 09:53:20

Subject: PRO/AH/EDR> Novel coronavirus - Saudi Arabia (04): RFI, Jordan, April 2012

Archive Number: 20120925.1308001

NOVEL CORONAVIRUS - SAUDI ARABIA (04): REQUEST FOR INFORMATION, JORDAN, APRIL 2012

A ProMED-mail post

<http://www.promedmail.org>

ProMED-mail is a program of the
International Society for Infectious Diseases

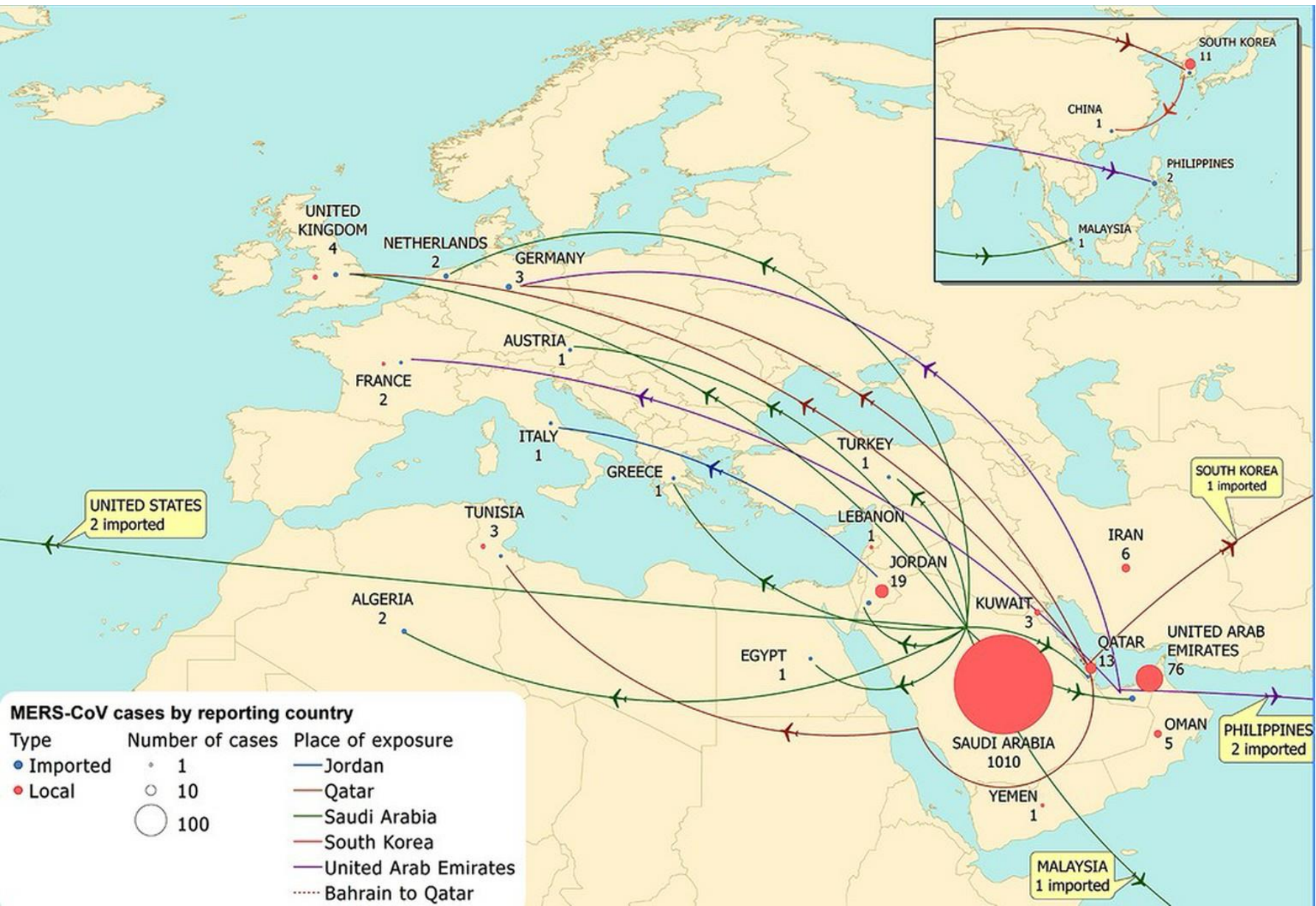
<http://www.isid.org>

Date: Sun 23 Sep 2012

From: Irene Lai <irene.lai@internationalsos.com> [edited]

“I would be interested to know whether the outbreak of severe respiratory disease of unknown origin in Jordan in April [2012] is now being reviewed for evidence of this new coronavirus.”

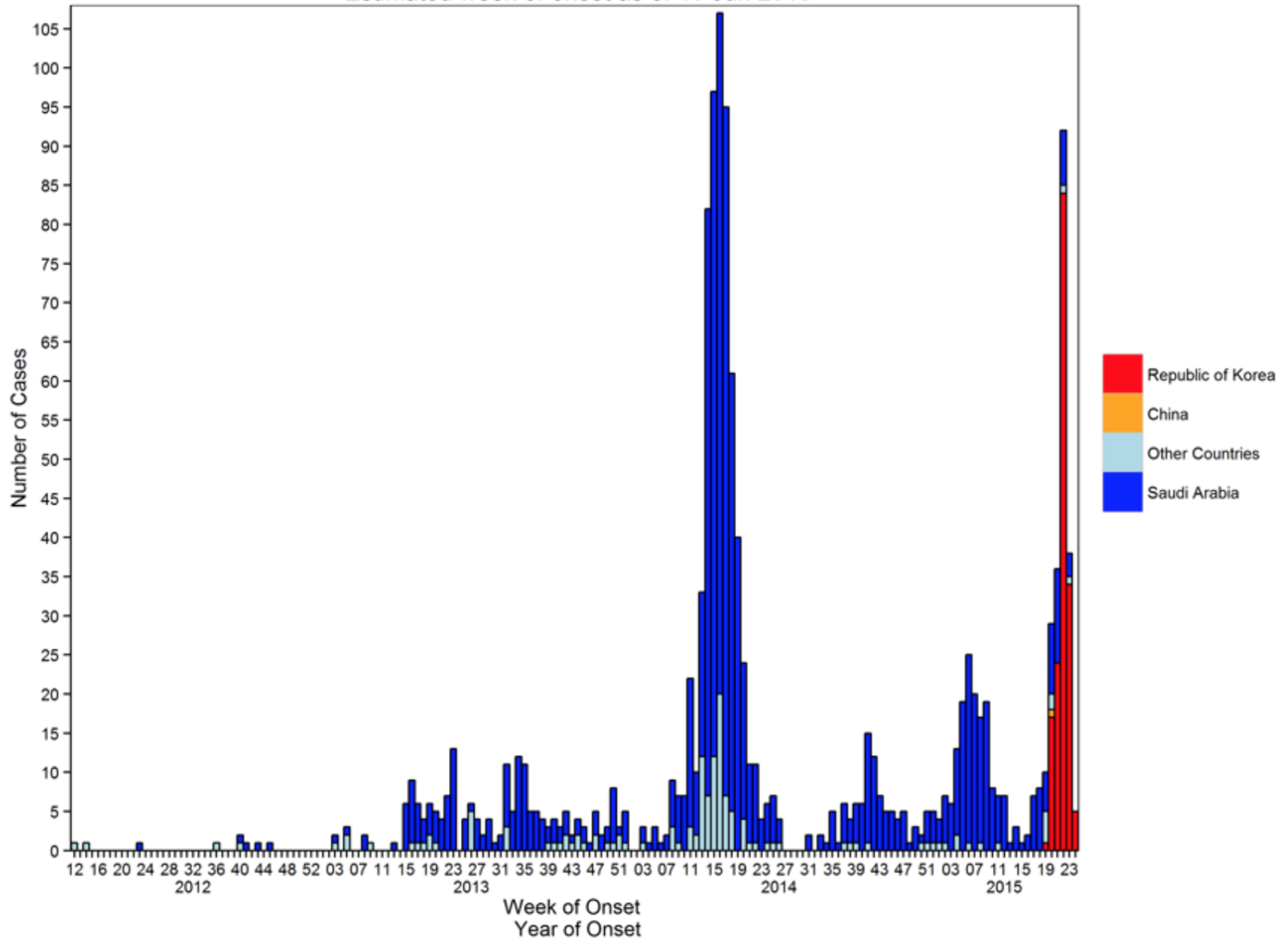




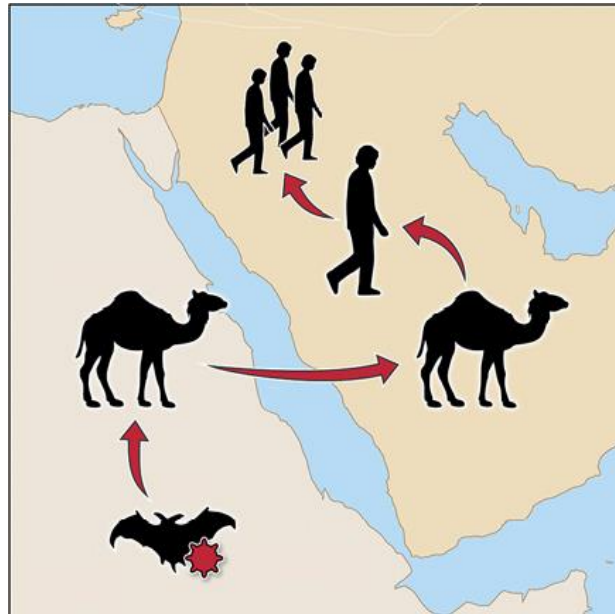
A map of the spread of MERS by the end of May 2015 © ECDC

MERS – South Korea

MERS CoV confirmed cases in Republic of Korea, China, Saudi Arabia and other Countries
Estimated week of onset as of 19 Jun 2015



Please note that the underlying data is subject to change as the investigation is ongoing. Source: WHO



ProMED and Zika



Unknown illness: Brazil (Maranhão) outbreak



Published Date: 2015-02-08 20:02:43

Subject: PRO/PORT> Doença desconhecida - Brasil (MA), surto

Archive Number: 20150208.3150347

DOENÇA DESCONHECIDA - BRASIL (MARANHÃO), SURTO

Uma mensagem / Una mensaje / de ProMED-PORT

<http://www.promedmail.org>

ProMED-mail e um programa da / es un programa de la
International Society for Infectious Diseases

<http://www.isid.org>

Data: Domingo, 08 de fevereiro de 2015

Fonte: Prefeitura Municipal de Caxias, Maranhão [04/02/2015] [editado]

<http://caxias.ma.gov.br/noticia/secretario-de-saude-adota-providencias-sobre-surto-de-virose-em-caxias>

Secretário de Saúde adota providências sobre surto de virose em Caxias

ProMED-PORT 8 Feb 2015

...The outbreak of a virus that causes fever, red spots in the body and joint pain, remains on alert health authorities of Caxias. The Municipal Health clarifies already aware of the outbreak, which is affecting hundreds of people in the city.

According to the health secretary, Vinicius Araujo, without the test result is not possible to say whether the virus has no connection or with Chikungunya fever. The agency issued a clarification note. Check the note:

"Regarding the virus outbreak that is happening in the city, were not notified to the Chikungunya fever, for all serology requested to date for the LACEN (reference laboratory tests for diagnosis of tropical diseases by the Ministry of Health in São Luís) were negative.

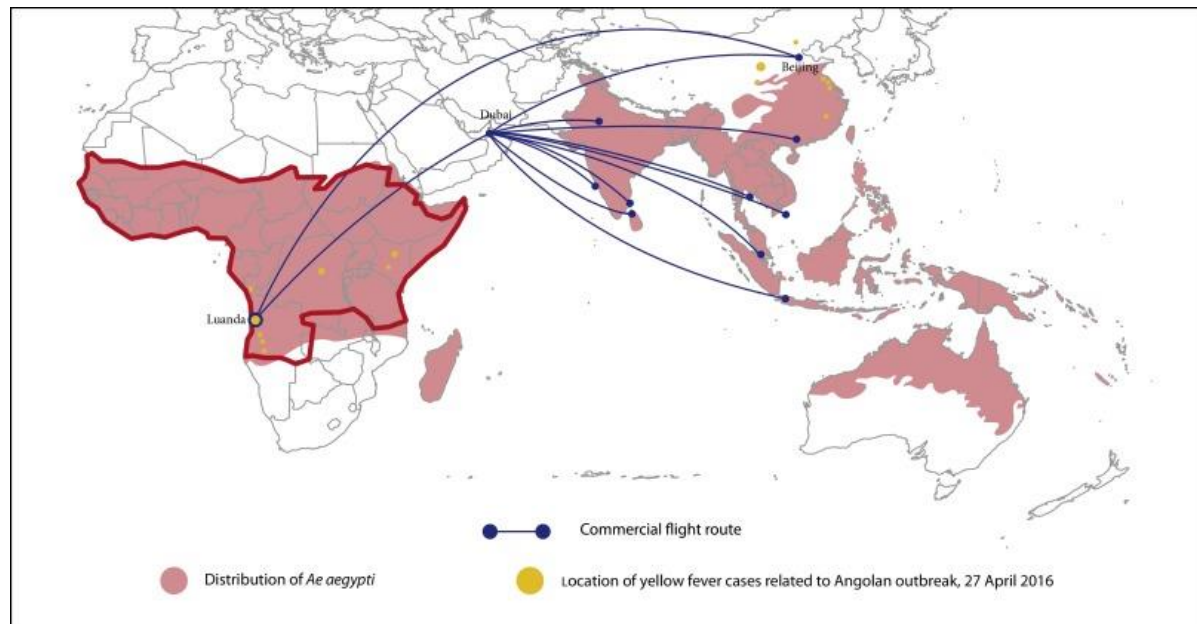
We ask the Secretary of State for Health to send technicians to our city to perform virus isolation research to clarify what type of virus could be circulating. Until next week this team should get.

Meanwhile, it is important that everyone keep the care of prevention of Dengue, for Chikungunya fever is also transmitted by mosquitoes *Aedes aegypti* infected and, less commonly, by the mosquito *Aedes albopictus*."

Editorial

Why is the yellow fever outbreak in Angola a ‘threat to the entire world’?

J.P. Woodall^a  , T.M. Yuill^b





IHR 2005 (took effect in 2007)

- Obligation to notify WHO notify of events that may constitute a public health emergency of international concern; not limited to any particular diseases
- Authorizes WHO to consider unofficial reports of public health events
- WHO now encouraging member states to adopt informal “Event-Based Surveillance”

Event-based biosurveillance

- GPHIN
- HealthMap
- Biocaster
- MediSys
- Argus
- EIN (IDSA)
- Geosentinel

- GOARN
- Epi-X
- GHSAG



Time to outbreak discovery and public communication is decreasing

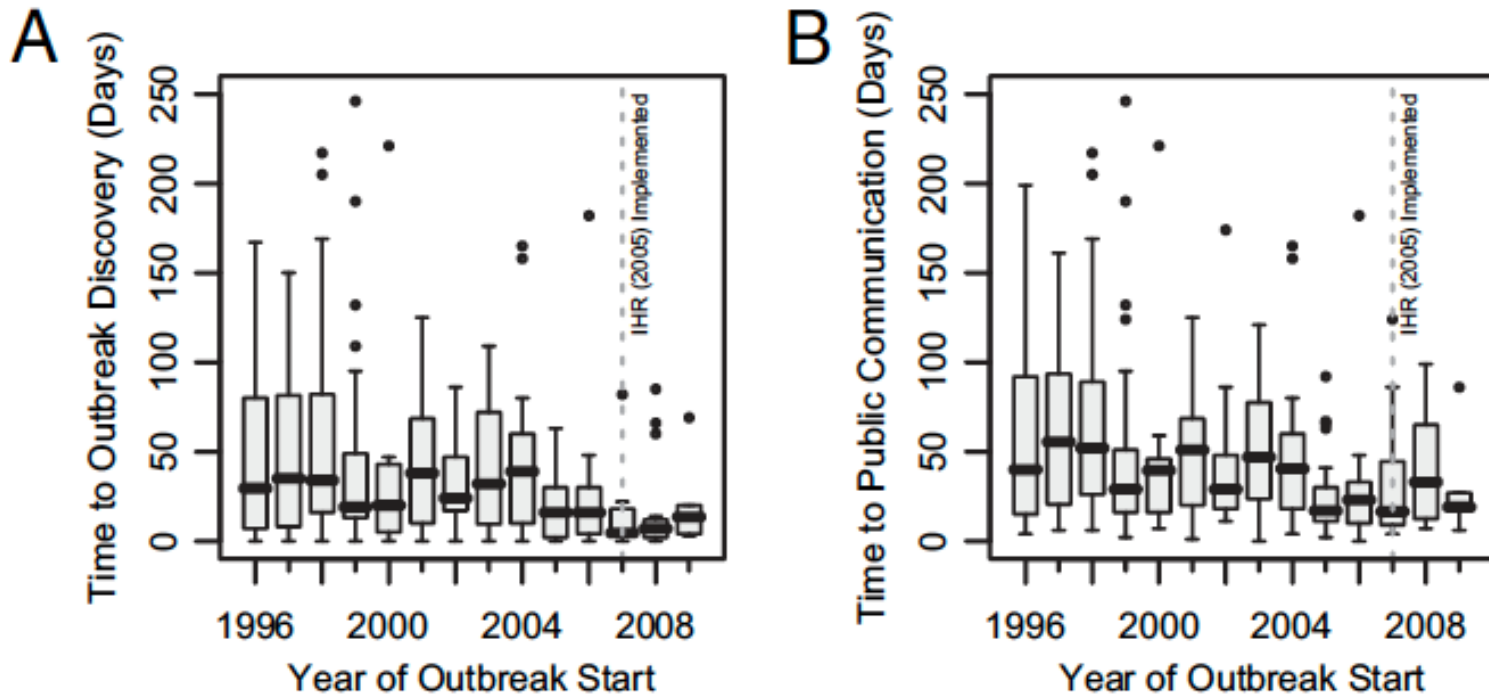
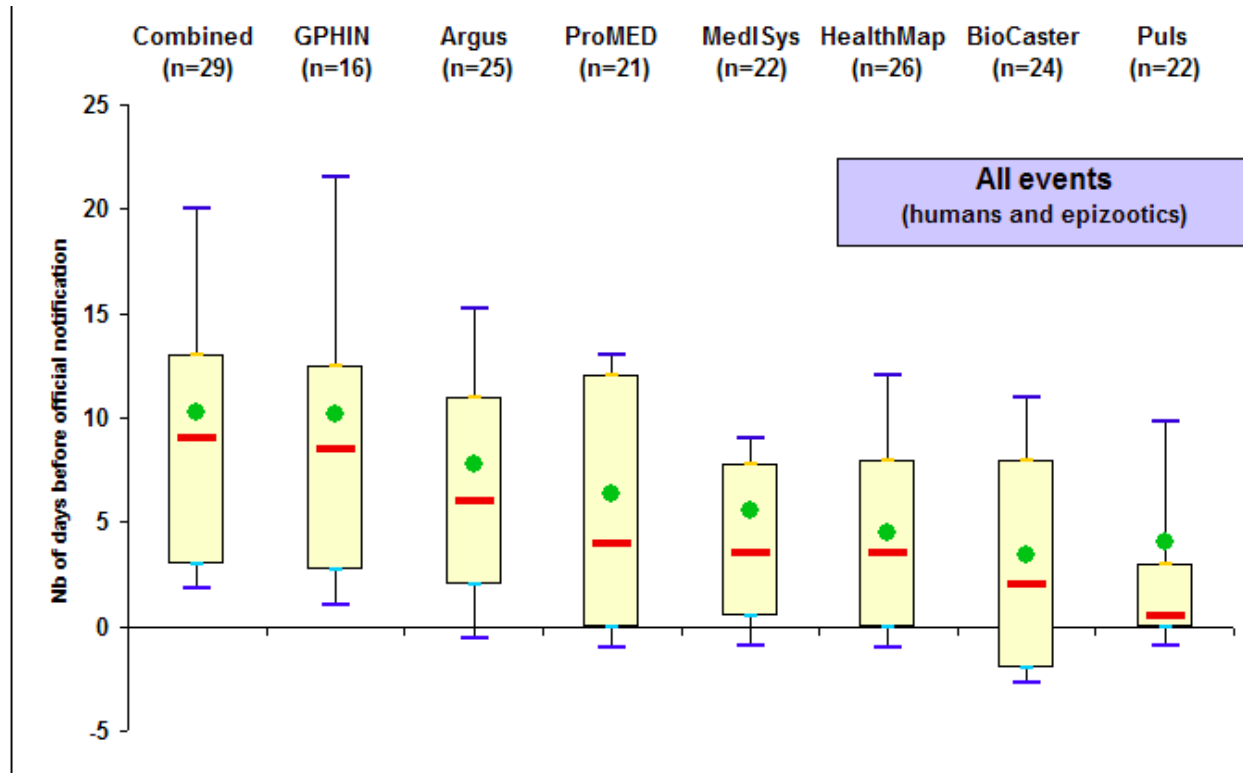


Fig. 3. Box plots of the temporal trends in the yearly median time between estimated outbreak start and (A) outbreak discovery and (B) public communication about the outbreak for selected WHO-verified outbreaks, 1996–2009. The revised International Health Regulations (IHR 2005) went into effect in 2007.

Synergy from multiple surveillance systems



Timeliness of the systems for A/H5N1 cases
(total, human, epizootic) reported in March 2010

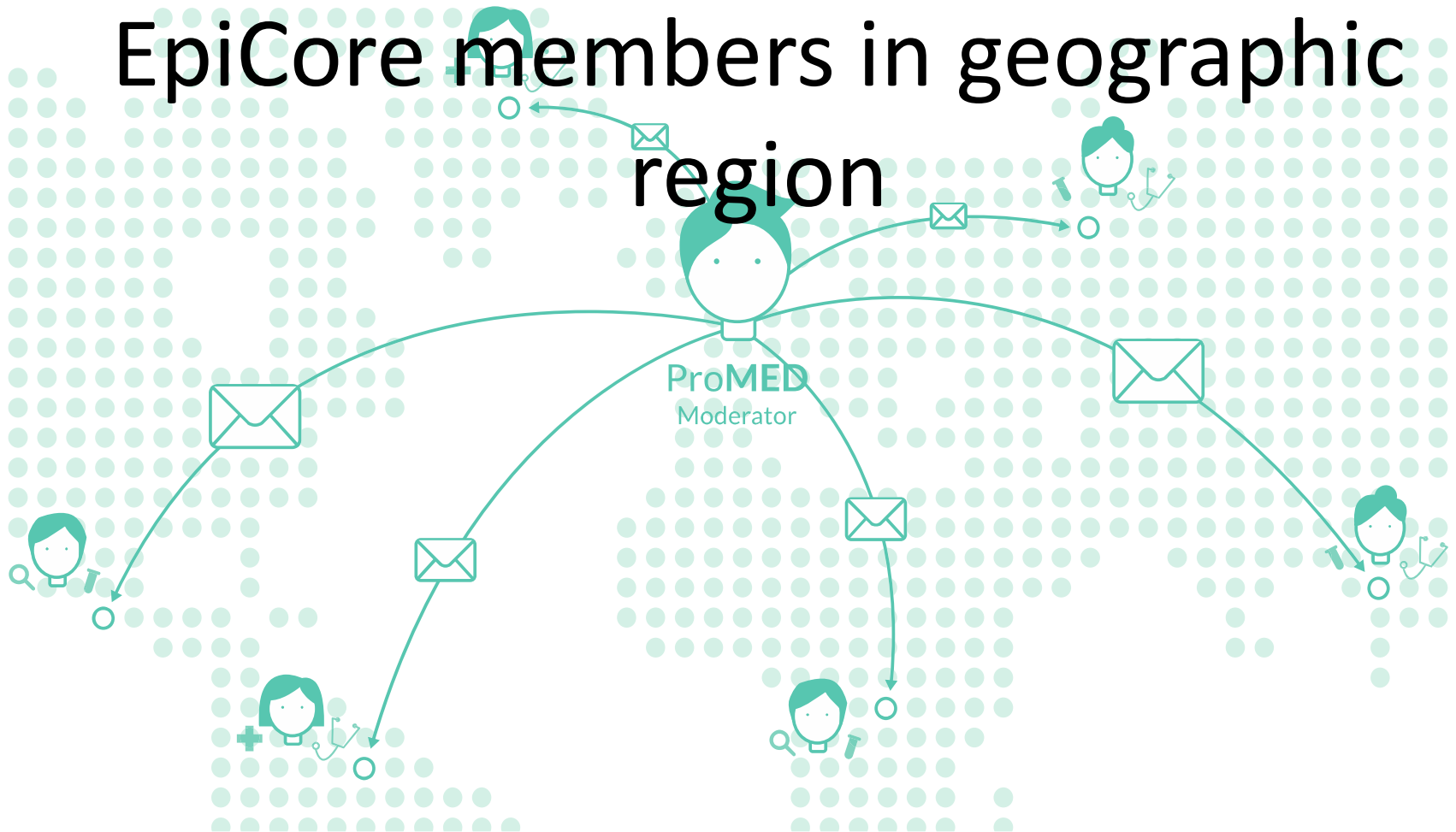
Barboza et al. Evaluation and potential of epidemic intelligence systems integrated in the Early Alerting and Reporting project for the detection of A/H5N1 avian Influenza epidemics. On behalf of the Early Alerting and Reporting Project of the Global Health Security Initiative. Manuscript submitted.

What is EpiCore?

EpiCore is a new system that finds, validates and reports outbreaks faster than traditional disease surveillance methods alone.



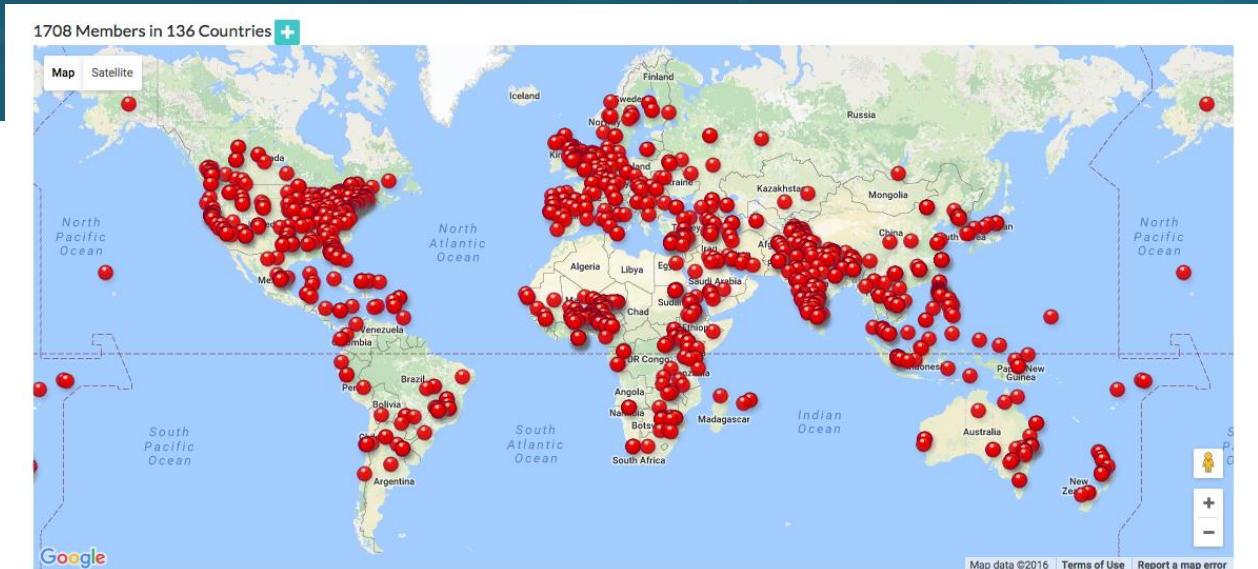
When evidence of outbreak is found, ProMED experts send RFI to EpiCore members in geographic region



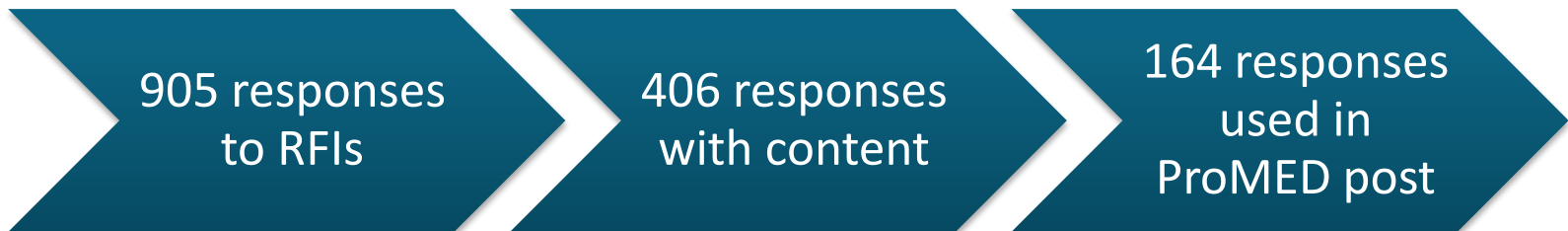
EpiCore Program Update

Membership and RFIs

- 1708 members representing 137 countries



- 378 RFIs posted in 77 countries

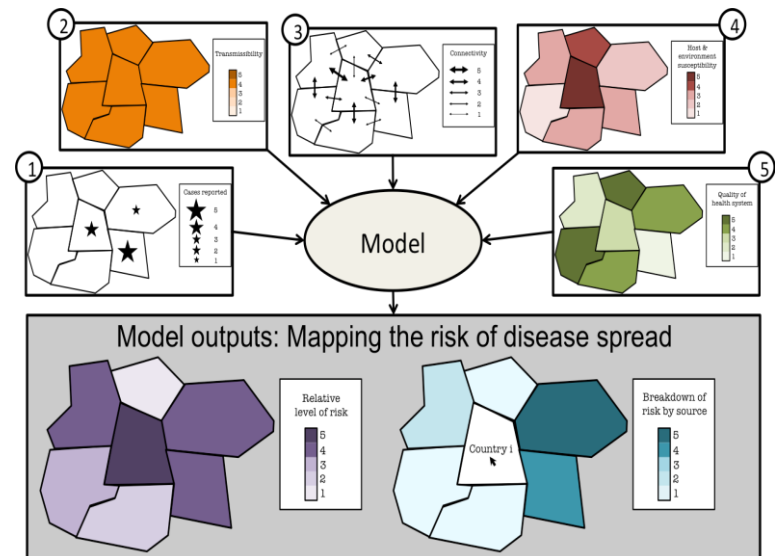


Mapping the Risk of International Infectious Disease Spread

- User-friendly tool to estimate and visualize the risks of outbreak events spreading
- Aimed at helping decision makers with health resource allocation and infectious disease threat preparedness
- Uses multiple data streams including ProMED, international flight data, and health center data
- Potential end-users include government, public health experts, health care workers, NGOs, and others

Project partners:

- **The International Society for Infectious Diseases (ISID)** and its **Program for Monitoring Emerging Diseases (ProMED)**
- **Imperial College London**
- **heathsites.io**
- **HealthMap**



Waiting for the comet



Monsieur Barbinel prévenu par sa portière de la visite de la comete.

-Daumier

Summary

- Control of outbreaks depends upon rapid detection and reporting
- Over the past 20 years, reporting based on non-traditional data has become established as an important complement to traditional public health in the detection of new pathogens
- Transparency is a guiding principle. You can't predict who needs to know what and when
- Timeliness of outbreak detection has improved as a result of these systems

Acknowledgments

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- USAID
 - Emerging Pandemic Threats PREDICT project
 - Zika and other threats
- CRDF
- Skoll Global Threats Fund
- Wellcome Trust
- Collaborators
 - HealthMap/Epidemico
 - Imperial College London
 - EcoHealth Alliance
- Past supporters
 - Oracle Corporation
 - Google.org
 - Oracle Corporation
 - Rockefeller Foundation

Thank you

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BUENOS AIRES • ARGENTINA • MARCH 1~4, 2018



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In collaboration with the
Sociedad Argentina de Infectología (SADI)



The China Problem

- 20% of world's population
- Multiple hotspots for emerging diseases
 - SARS
 - Avian flu
 - AMR
 - Yellow fever threat
- No ProMED staff in China
- Few EpiCore members in China
- Official efforts to quell unofficial information
- Great Firewall

