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Public Health & Law Enforcement: *Joint Investigations*

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**1st Qatar workshop for the “Assessing the Threats to Public Health
2-3 November 2016**



Objectives

- Overview of both law enforcement and public health to enhance understanding and appreciation of each discipline's expertise
- Discuss epidemiological and criminal investigational procedures and methodologies for a response to a biological threat
- Identify challenges to sharing information and provide potential solutions
- Demonstrate effective public health and law enforcement collaboration



Public Health and Law Enforcement Goals Compared

Law Enforcement:

- Stop further crimes
- Protect health and safety of public
- Apprehend and convict criminals



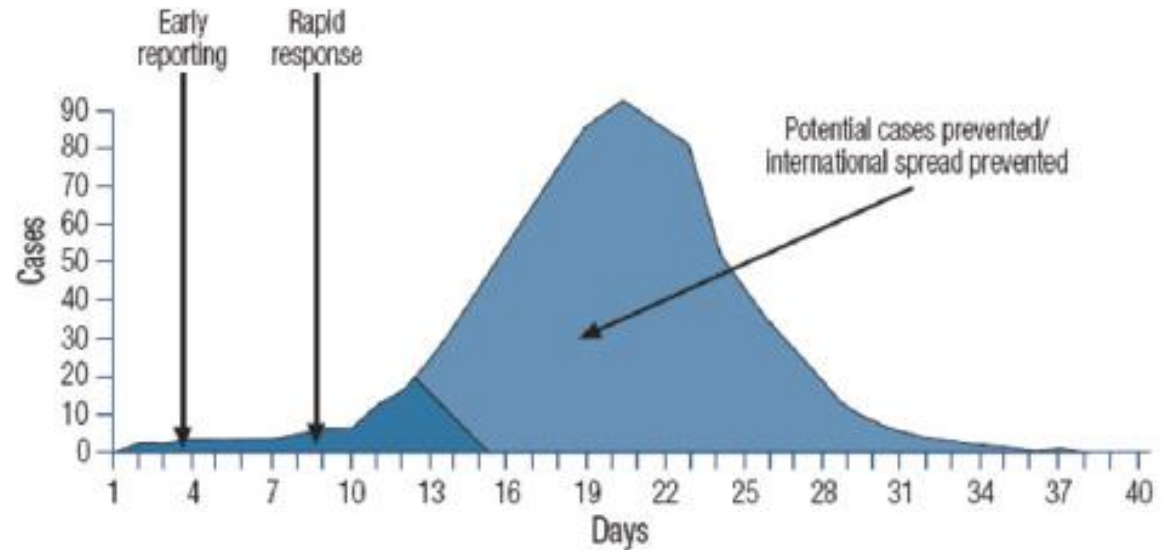
Public Health:

- Stop further cases of disease and outbreaks
- Protect health and safety of public
- Build science base for future prevention



The Three Common Goals

1. Early identification of an outbreak
2. Determining whether the outbreak is intentional or naturally occurring
3. Protecting public health and public safety



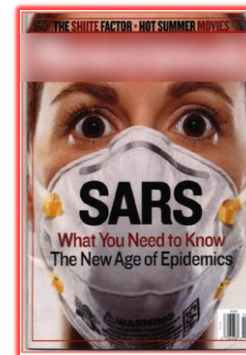
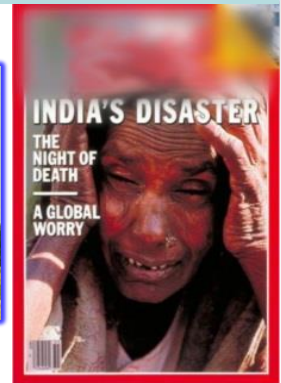
Chemical & Biological Threats

■ Chemical

- ✓ Traditional chemical warfare agents
 - (e.g., nerve agents, vesicants)
- ✓ Toxic industrial materials and toxic industrial chemicals
- ✓ Emerging and non-traditional agents

■ Biological

- ✓ Traditional biological threat agents
 - (e.g., anthrax and Ebola)
- ✓ Infectious/Communicable diseases
 - (e.g., pandemic flu, SARS, Ebola, MERS-CoV)
- ✓ Enhanced threats
 - (genetically engineered or especially virulent)



Biological Threats

- Demonstrated interest and willingness by terrorist groups and individuals to acquire and employ biological agents as weapons
- Increased interest in extracting ricin from castor beans, which are readily available to the public, to intentionally harm others
- “Dark Web” - virtual black market for drugs, guns, explosives, and other illicit materials has shown a growing number of sellers and buyers of biological material.

Dangerous ricin

Ricin is one of the most poisonous naturally occurring substances known.

Ricinus communis

Ricin is derived from beans of castor oil plant, which is easily available worldwide

Castor oil Used in food products, medicine, industry

Ricin facts

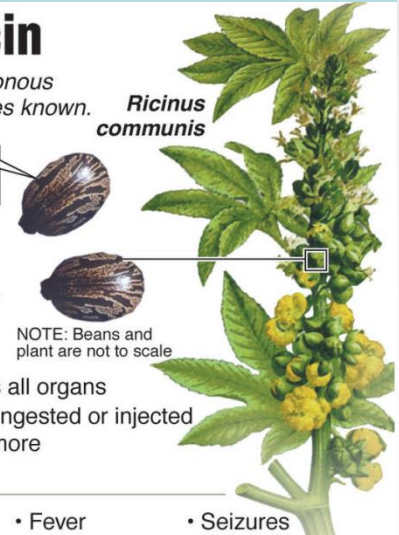
- No vaccine available
- Very toxic to cells, damages all organs
- Can be fatal when inhaled, ingested or injected
- Per gram, it is 6,000 times more poisonous than cyanide

Symptoms

• Weakness	• Fever	• Seizures	
• Cough	• Lung damage	• Heart failure	• Upset stomach

Source: eMedicine, BBC, AFP

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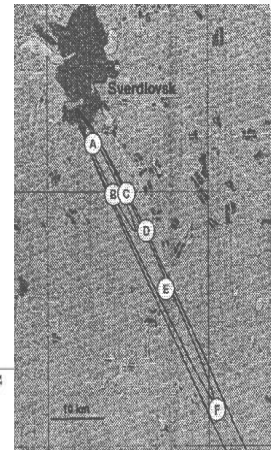
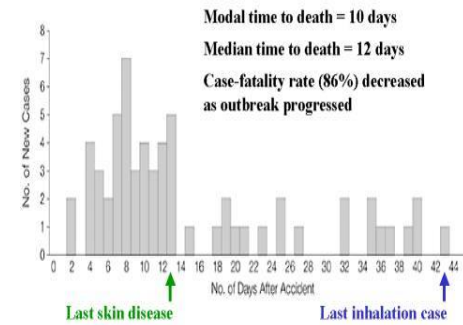


Bioterrorism: *New Trend*

- 1978: Bulgarian exile injected with ricin in London
- 1979: Sverdlovsk, USSR – accidental anthrax released – 40 fatalities
- 1984: Oregon, Salmonella – Rajneeshee cult
- 1991: Minnesota, ricin toxin
- 1994: Tokyo, Sarin and biological attacks
- 1995: Arkansas, ricin toxin
- 1995: Indiana, *Y. pestis* purchase

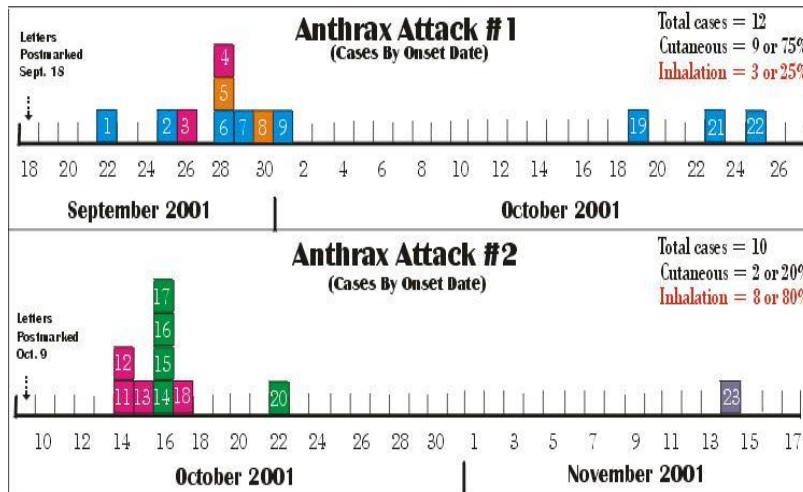


Epidemic Curve: Onset of Anthrax Cases in Sverdlovsk



Bioterrorism: *New Trend*

- 1997: Washington DC, anthrax/plague hoax
- 1998: Nevada, nonlethal strain of *B. anthracis*
- 1998-9: Multiple 'Anthrax' hoaxes
- 2001: Anthrax Outbreak USA



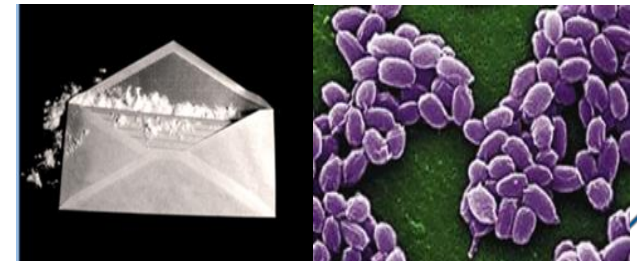
Attack #1 Victims

- #1 - Joanna Huden (c)
- #2 - Erin O'Connor (c)
- #3 - Richard Morgano (c)
- #4 - Teresa Heller (c)
- #5 - Ernesto Blanco (i)
- #6 - Casey Chamberlain (c)
- #7 - Unnamed child at ABC (c)
- #8 - Bob Stevens (i)*
- #9 - Claire Fletcher (c)
- #19 - Unnamed at NY Post (c)
- #21 - Mark Cunningham (c)
- #22 - Kathy Nguyen (i)*

Attack #2 Victims

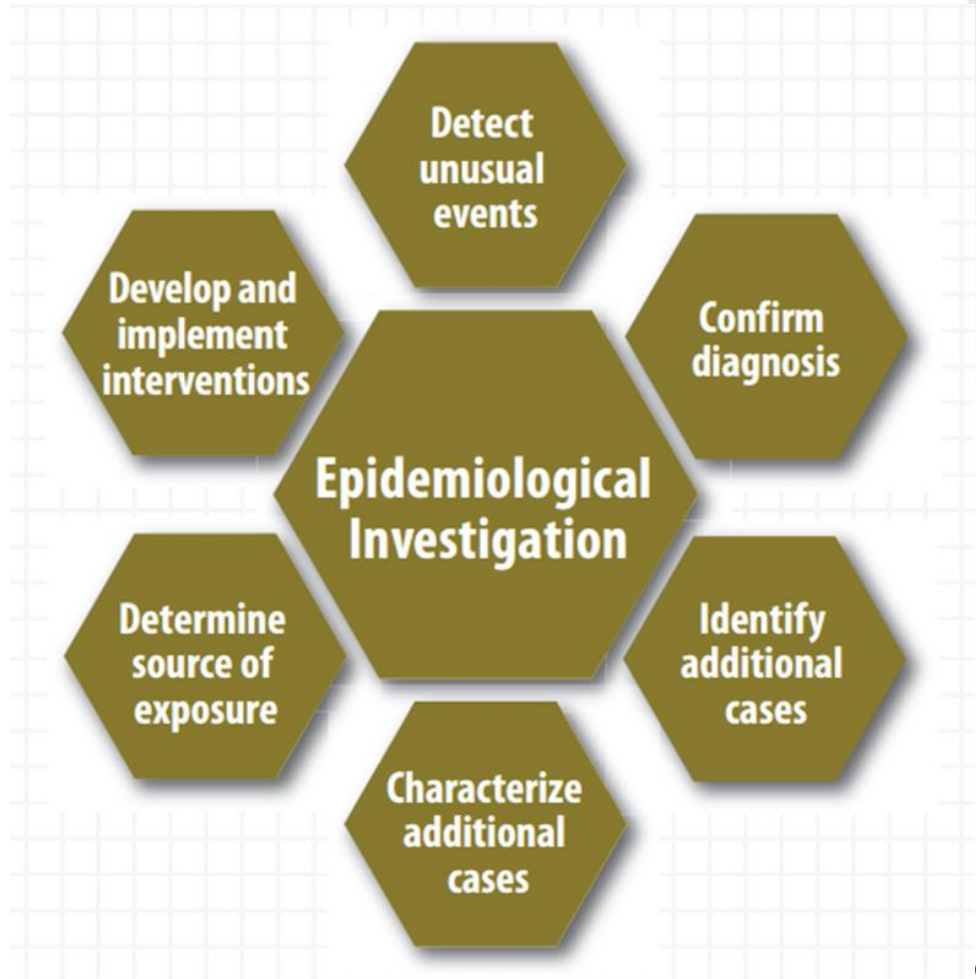
- #11 - Norma Wallace (i)
- #12 - Patrick O'Donnell (c)
- #13 - Jyotsna Patel (i)
- #14 - Leroy Richmond (i)
- #15 - Thomas Morris Jr. (i)*
- #16 - Joseph Curseen Jr. (i)*
- #17 - George Fairfax (i)
- #18 - Linda Burch (c)
- #20 - David Hose (i)
- #23 - Otilie Landgren (i)*

* = died, (i) = Inhalation case, (c) = Cutaneous case (Case #10 withdrawn by the CDC)



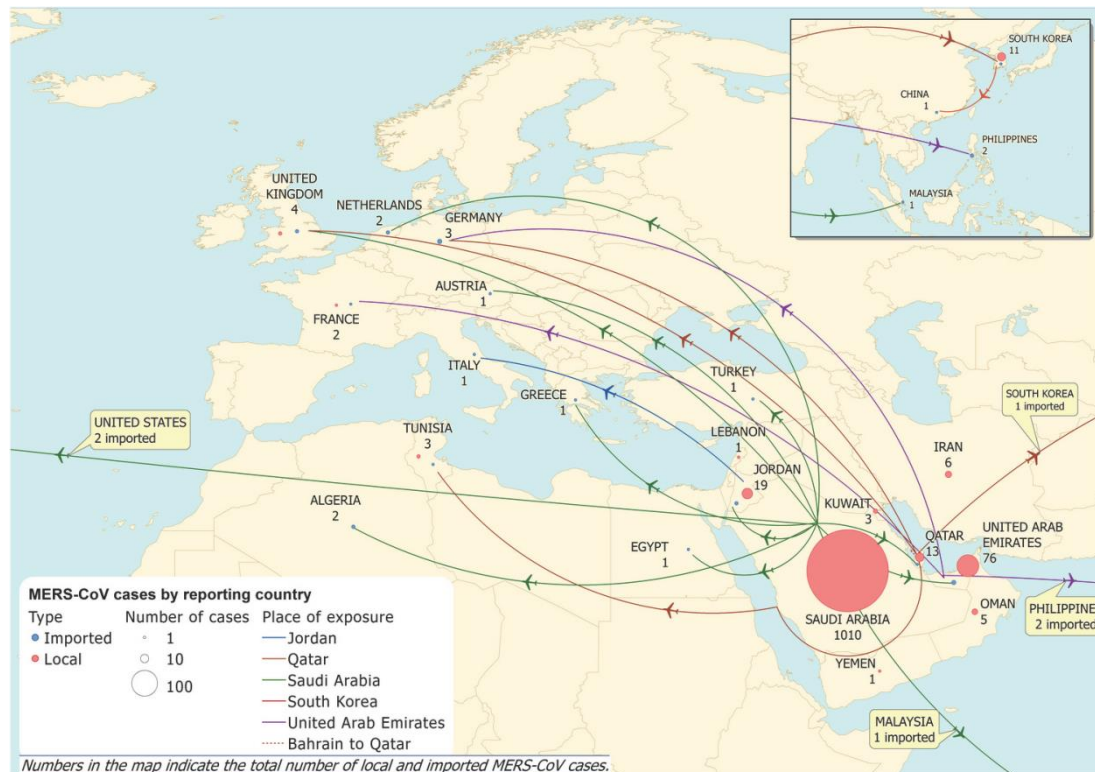
Epidemiological Investigation

- Goals of an epidemiological investigation include:
 - Stopping the spread of disease (identify causative agent, determine source, mode of transmission and population at risk)
 - Protecting the public's health (surveillance, medical countermeasures, health education)
 - Protecting public health and other response personnel (protective equipment and preventive vaccines/medications)



Epidemiology

- According to the World Health Organization (WHO):
“Epidemiology is the study of the distribution and determinants of health-related states or events (including disease), and the application of this study to the control of diseases and other health problems.”

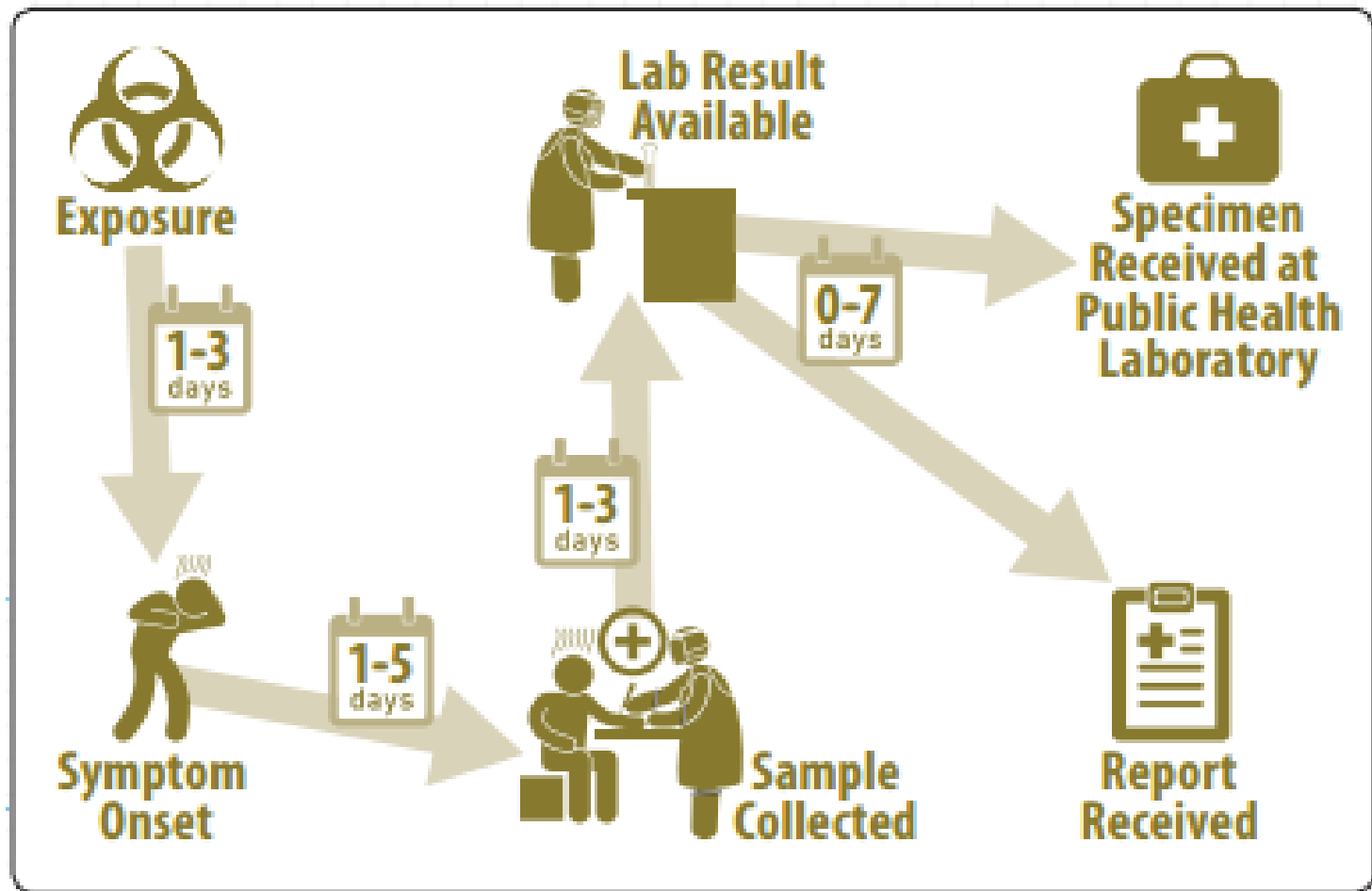


What is an Outbreak, Epidemic, Pandemic?

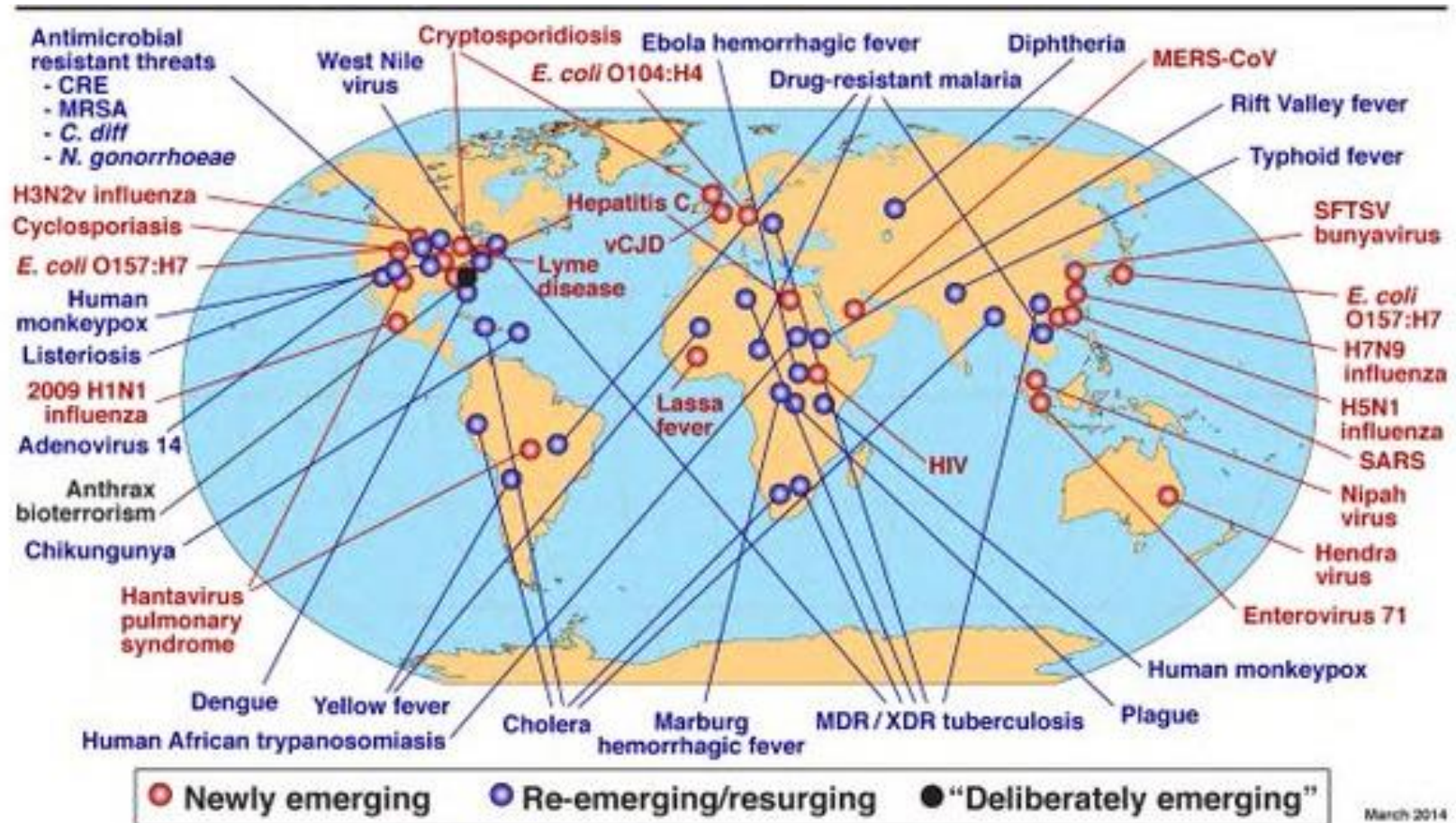
- An **outbreak** is the occurrence of more cases of a disease than expected in a population during a certain time
- One case of smallpox, anthrax, plague, botulism, or tuberculosis anywhere in the US is an outbreak requiring immediate response
- An **epidemic** is the rapid spread of infectious disease to a large number of people in a given population within a short period of time, usually two weeks or less
- A **pandemic** is an epidemic of infectious disease that has spread through human populations across a large region; for instance multiple continents, or even worldwide



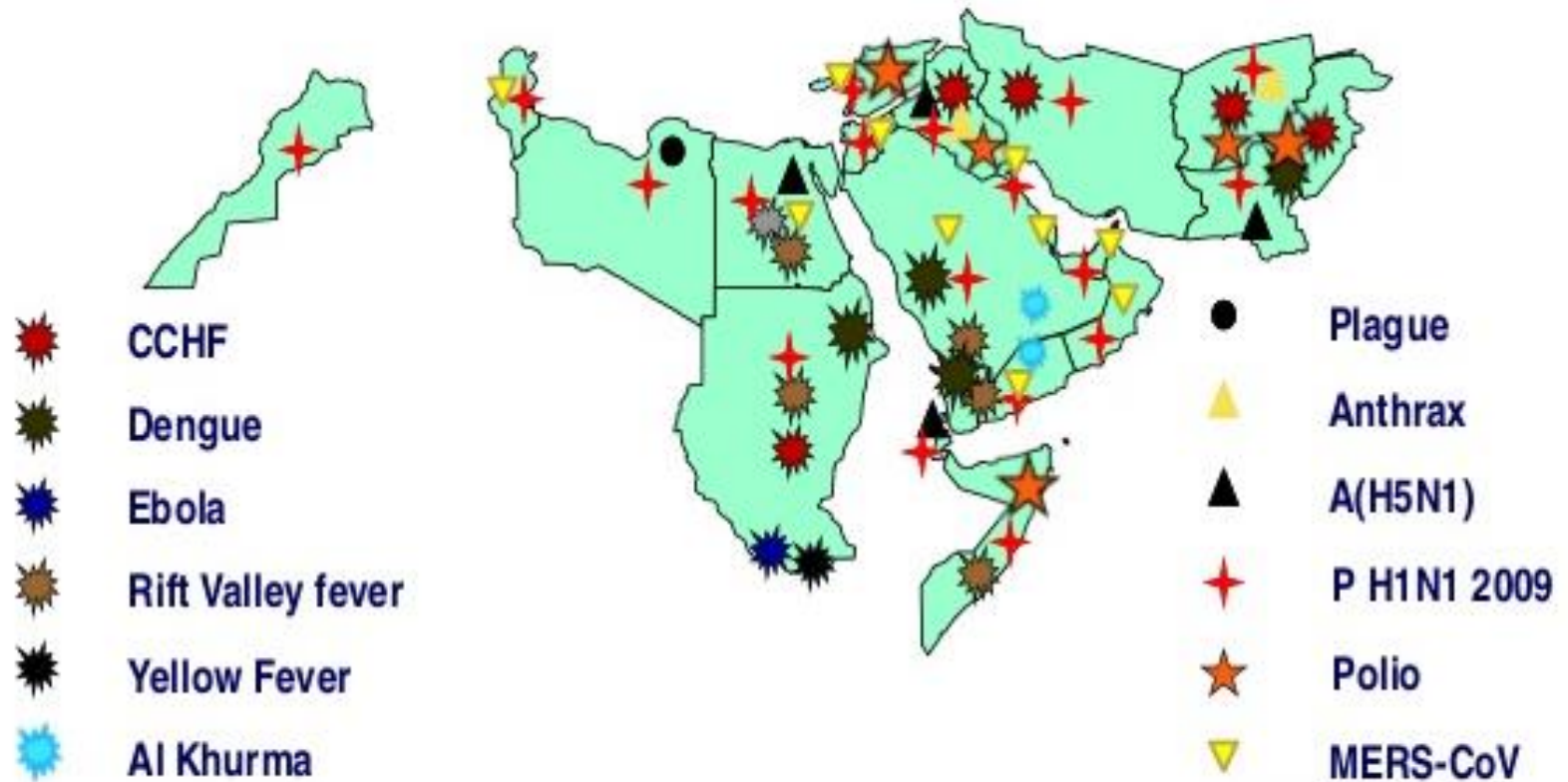
From Exposure to Reporting



Infectious Diseases: *Emerging & Re-emerging*

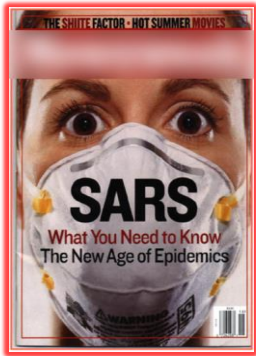
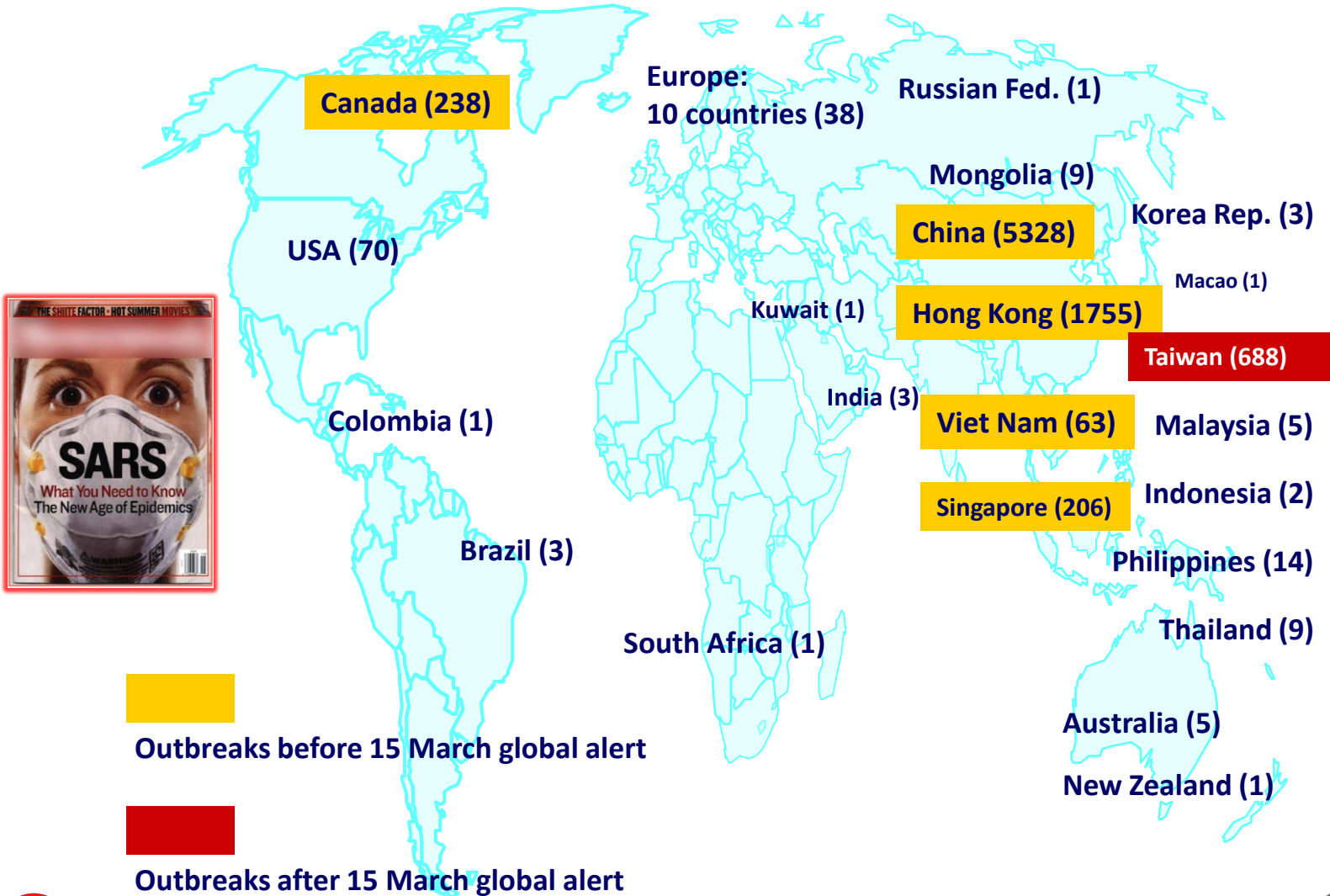


Emerging & Re-emerging Diseases: WHO EMR 1994-2014

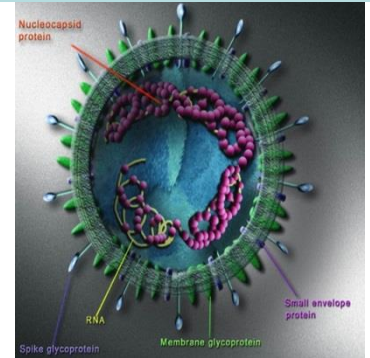
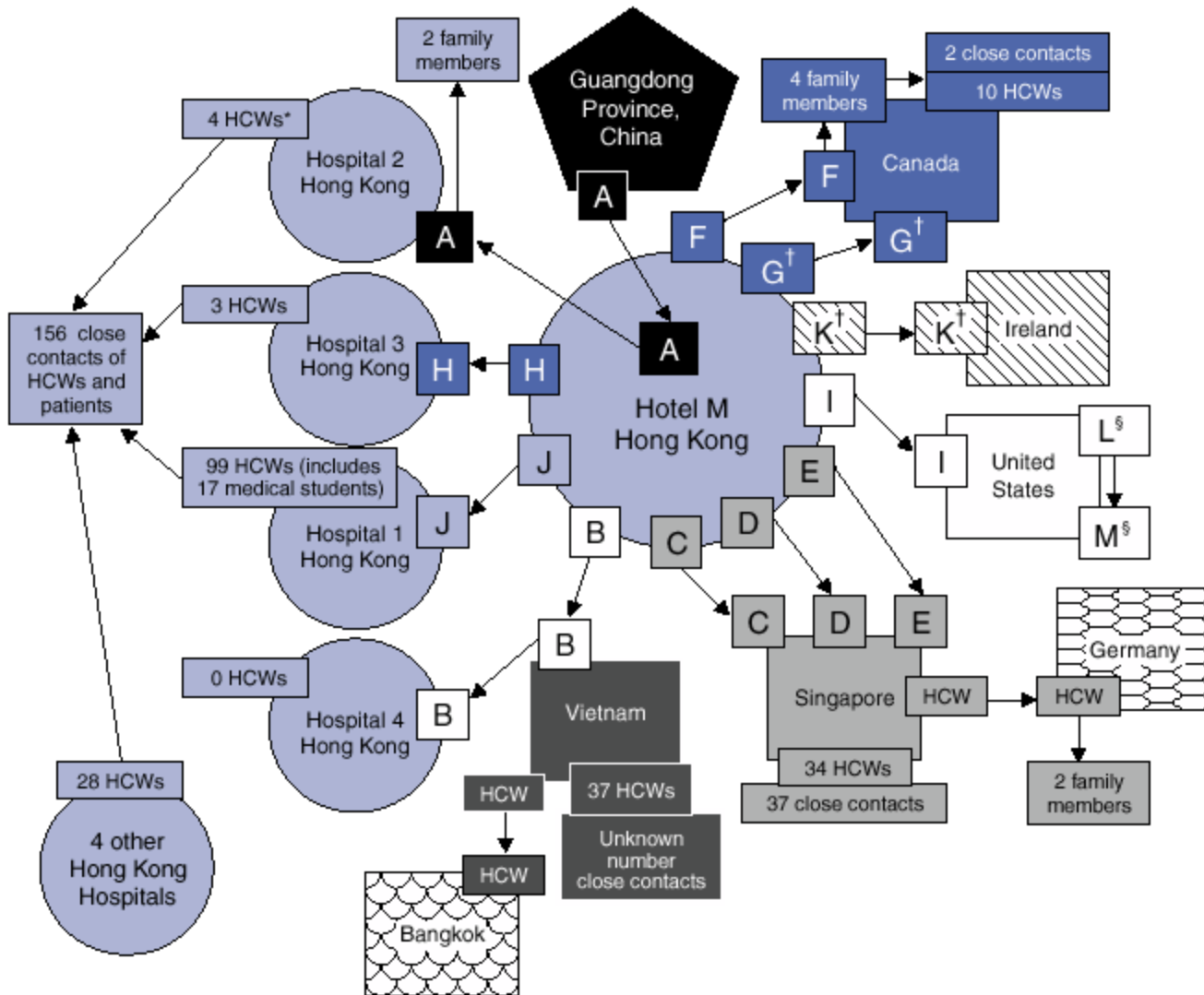


SARS 2003: Probable Cases Worldwide

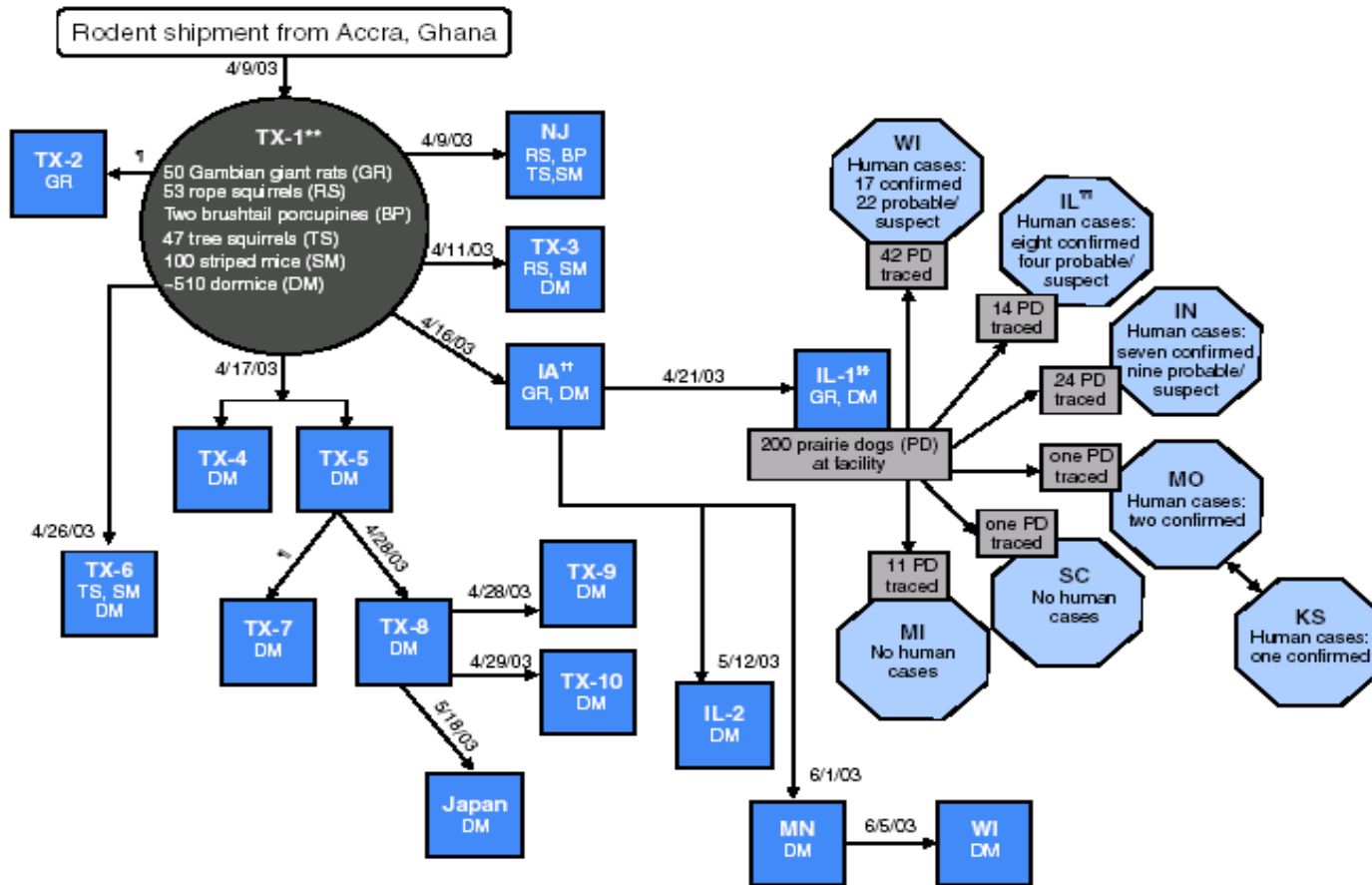
~8500 cases, ~800 deaths



SARS: *The Outbreak – Hotel M*



Monkeypox Outbreak USA 2003

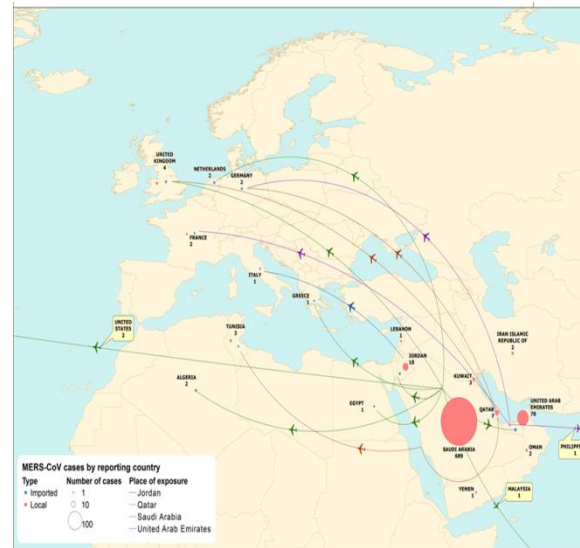
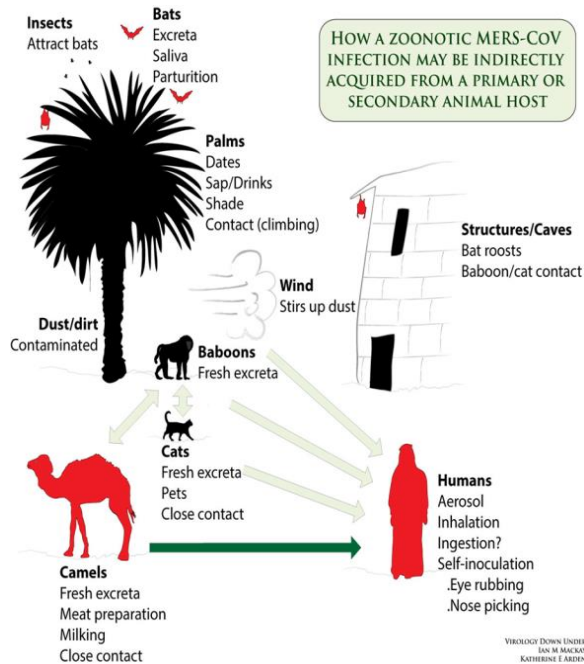


Gambian rat from Chicago-area pet distributor

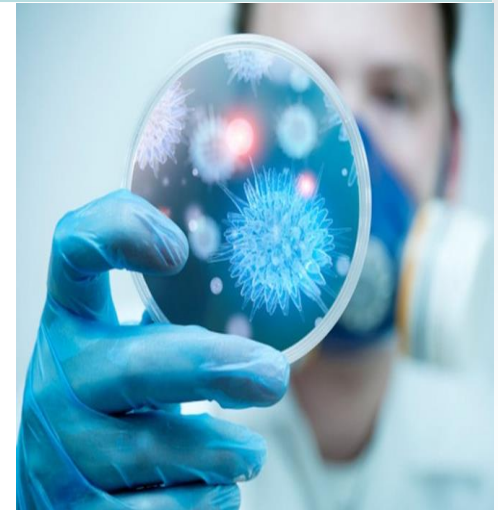
Movement of imported African rodents to animal distributors and distribution of prairie dogs from an animal distributor associated with human cases of monkeypox – 11 states.

MERS-CoV

- Globally, since September 2012, WHO has reported 1,813 laboratory-confirmed cases of infection with MERS-CoV, including at least 643 related deaths in 27 countries.



Distribution of Confirmed Cases of MERS-CoV by Reporting Country & Place of Probable Infection, March 2012 – June 2014 (n=815)



Ebola Viral Disease (EVD)

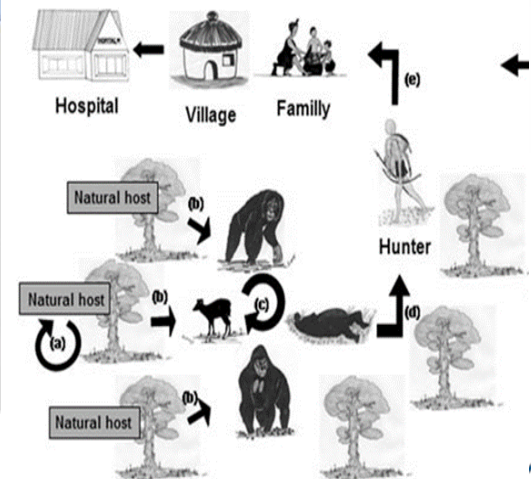
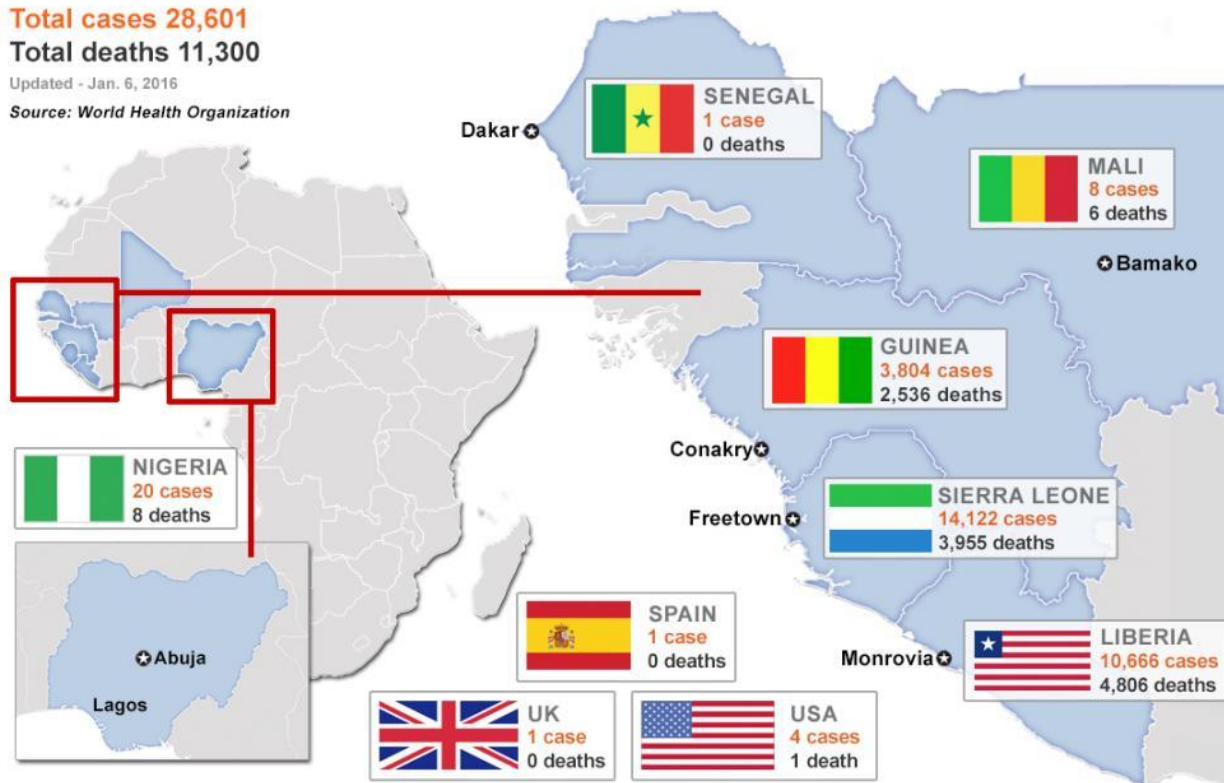
SPREAD OF EBOLA OUTBREAK: IN AFRICA & ABROAD

Total cases 28,601

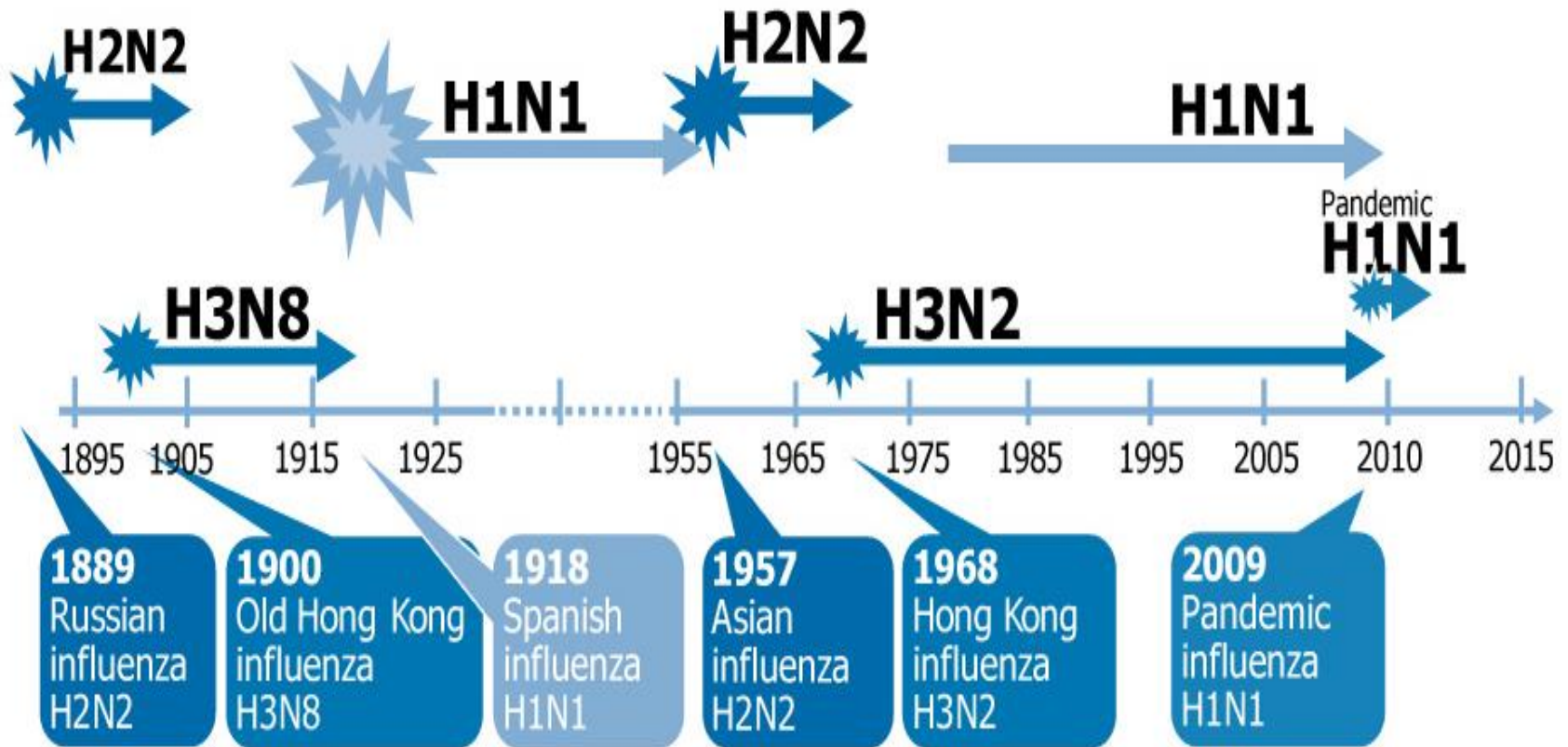
Total deaths 11,300

Updated - Jan. 6, 2016

Source: World Health Organization



Influenza: *Recorded Human Influenza Since 1885*

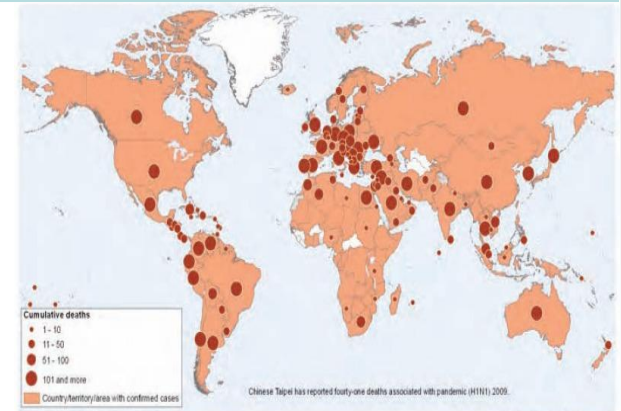


Source: European Centre for Disease Prevention and Control (ECDC) 2009

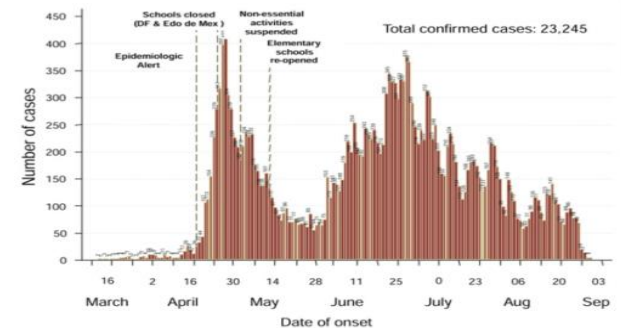
Reproduced and adapted (2009) with permission of Dr Masato Tashiro, Director, Center for Influenza Virus Research, National Institute of Infectious Diseases (NIID), Japan.

Influenza: Impact of 2009 Pandemic

- WHO: Total deaths reported from 214 countries (lab confirmed cases) ~19,000
- CDC in 2012 revised the numbers and estimated the global death toll at **284,000**, 15 times the number of lab-confirmed death reported by WHO in 2009
 - 210,000 respiratory deaths
 - 83,000 due to cardiovascular disease associated with H1N1
 - Continent of Africa accounted for 51% of all deaths
 - Total years of life lost – 9,707,000 yrs.
 - 80% who died were younger than 65 yrs.



2009-H1N1 influenza A pandemic laboratory-confirmed cases and cumulative number of deaths as reported to WHO as of March 7, 2010



Epidemic curve in Mexico, cumulative through early September 2009. SOURCE: Ruiz-Palacios (2009)

Law Enforcement

- **To prevent a criminal act and subsequent attacks:** Through ongoing surveillance, investigation, and intelligence-gathering techniques
- **To identify, apprehend, and prosecute the perpetrators:** Once a biological attack occurs, law enforcement gathers evidence and information to identify and apprehend the individual(s) responsible for the crime.
- **To protect law enforcement personnel:** Law enforcement personnel, are likely to encounter situations where they may be at risk for exposure to a biological agent.

Law Enforcement

- Preventing Biological Attacks:
 - Identify potential terrorists or terrorist organizations that are both capable of and have intent to execute a biological attack.
- WMD Threat Credibility Evaluation—Real or Hoax
 - Technical Feasibility: Does the threat require technical expertise; if so, are those involved technically competent? (Will it work?)
 - Operational Practicality: Does the operation that is used to carry out the threat seem practical? (Can it be done?)
 - Adversarial Intent: Does the person display the behavioral resolve to carry out the operation? (Would the person do it?)



Elements of Criminal Investigation

- 1. Gather Evidence:** The process of gathering evidence during the criminal investigation of a potential biological threat will involve collection of physical evidence, clinical specimens, documents, photographs, and witness statements.
 - **Chain of Custody:** Both law enforcement and public health personnel must provide accountability at each stage of collection, handling, testing, storing, transporting the evidentiary items, and reporting any test results.



Elements of Criminal Investigation

- **Delivery of Biological Samples to the LRN:** Only laboratories within the Laboratory Response Network (LRN) should be used to test for biological agents.
- **Documents:** Original documents should be obtained by law enforcement when possible.
- **Witness Statements:** Witness descriptions of dissemination devices, vehicles, suspects, odors, tastes, sounds, and other specific information must be obtained as soon as possible following a potential pathogen release.



Elements of Criminal Investigation

2. Evaluate Evidence

Type of Evidence	Explanation	Example
Direct	Documents, records, physical evidence, notes, computer data, videotapes, or other types of information that directly relate to the case	Vehicle rental agreements, purchase receipts, phone records, eyewitness statements, dissemination device
Circumstantial	Facts, if proven, that allow the investigator to draw conclusions. Circumstantial evidence often has the same probative or substantiating value as direct evidence,	Suspect was treated for cutaneous anthrax at or about the same time a release of anthrax was attempted
Trace	Very small particles of matter that can be examined microscopically, physically, and/or chemically	Biological agent residue, fingerprint, DNA, biological properties of the agent
Hearsay	Statements offered to prove the truth of the matter asserted; the person who made the statement is unavailable for cross-examination	A statement taken from a third party who heard another person describe seeing the suspect spray a substance during the time in question
Eyewitness Testimony	Observation or sensation personally seen, smelled heard, felt, or tasted	Witness reported smelling a particular odor, hearing a specific sound, or seeing someone

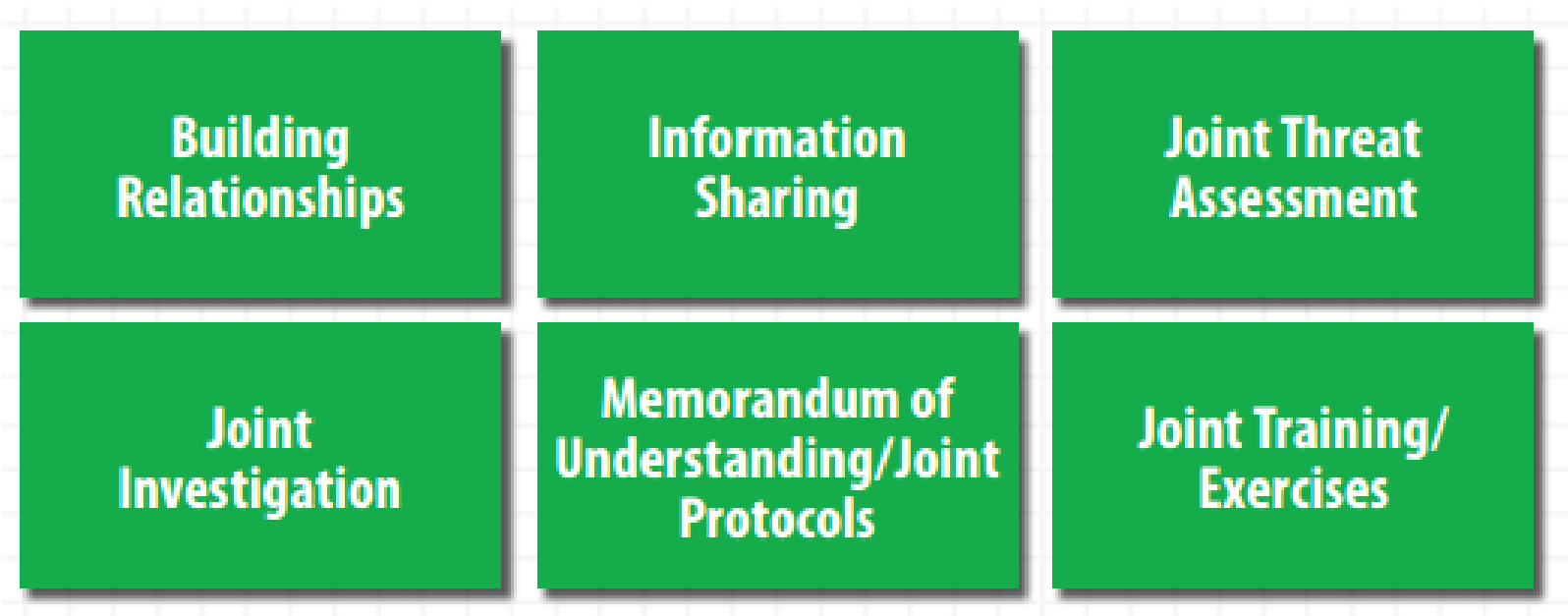
Elements of Criminal Investigation

- 3. Apprehend Suspect(s):** Once the threat to public health and safety has been eliminated, the top priority for law enforcement is the apprehension and prosecution of those responsible for the attack.
- 4. Provide Testimony:** Each law enforcement investigator involved in the case and potential witness should be available to meet with the prosecutor before he or she testifies at trial.



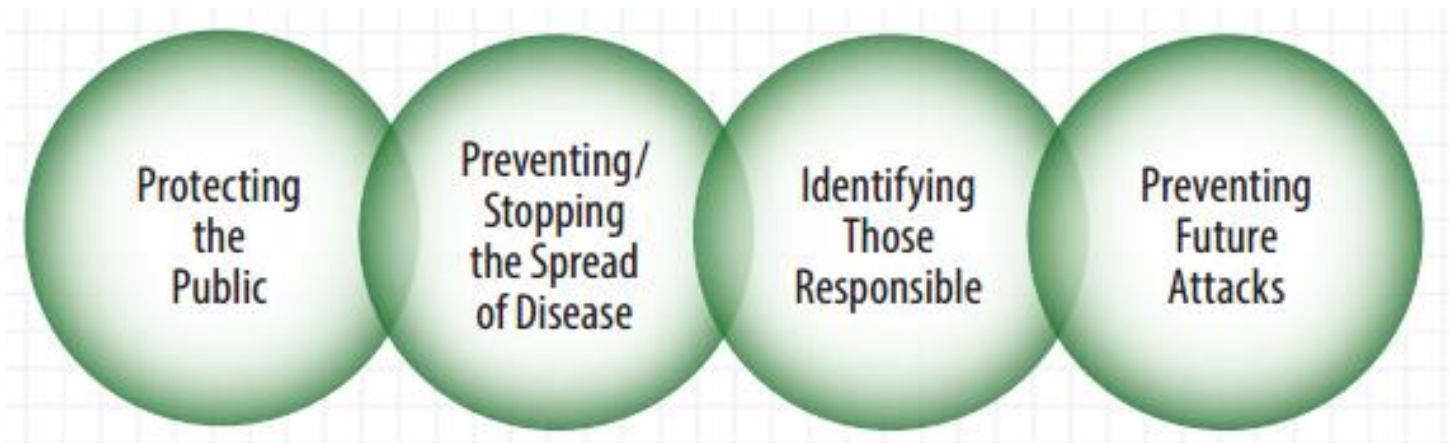
Joint Investigation Model

- This model is not solely limited to the investigative process; rather, it incorporates a number of procedures and methodologies that require interaction between law enforcement and public health prior to the detection of a biological threat and through its resulting investigation.



Joint Investigation Model

- This model is not solely limited to the investigative process; rather, it incorporates a number of procedures and methodologies that require interaction between law enforcement and public health prior to the detection of a biological threat and through its resulting investigation.
- Benefits: Public health and law enforcement share a set of common goals during the response to a biological threat, including:



Joint Investigation Model Benefits

Public Health Benefits	Law Enforcement Benefits
Access to law enforcement case information that may help to determine the source of the illness	Access to experts who understand disease epidemiology (e.g., symptoms, diagnosis, possible causes)
Assistance in containing the outbreak from law enforcement (who can help identify information that may lead to apprehending the perpetrator, thus preventing future releases, exposure and illness)	Access to relevant public health/medical information (e.g., results of the epidemiological investigation that may inform the criminal investigation)

Public Health Triggers

- Any specimens (clinical) or samples (environmental) submitted to public health for analysis that test positive for a potential biological threat-related agent
- Large numbers of patients with similar symptoms or disease
- Large numbers of unexplained symptoms, diseases, or deaths
- Disease with an unusual geographic or seasonal distribution (e.g., plague in a non-endemic area)
- Unusual disease presentation (e.g., inhalational vs. cutaneous anthrax)
- Endemic disease with unexplained increase in incidence (e.g., tularemia, plague)
- Higher than expected morbidity and mortality associated with a common disease and/or failure of patients to respond to traditional therapy
- Unusual “typical patient” distribution (i.e., several adults with an unexplained rash)
- Death or illness in humans preceded or accompanied by death or illness in animals that is unexplained or attributed to a zoonotic biological agent

Law Enforcement Triggers

- Any intelligence or indication that any individual or group is unlawfully in possession of any biological agent
- Seizure of bio-processing equipment from any individual, group, or organization
- Seizure of potential dissemination devices from any individual, group, or organization
- Identification or seizure of literature pertaining to the development or dissemination of biological agents
- Any assessments that indicate a credible biological threat exists in an area
- A HAZMAT response that involves the presence of biological agents

Public Health Information for Law Enforcement

1. Time and locations where exposures may have occurred (may be based on agent-specific characteristics or other investigational findings)
2. Names (including date of birth) for all confirmed, probable, and exposed case-patients
3. Positive laboratory results for a biological threat agent from an approved laboratory
4. Case definition (epidemiological picture of the outbreak)
5. Risk factors that may be associated with exposure (e.g., demographics, occupation, or other activities)
6. Hypotheses generated by the epidemiological investigation
7. Notification about when public health is planning to conduct interviews with case-patients or contacts
8. National or international health alerts that may be related to the current biological threat
9. Laboratory results used to characterize the specific biological agent (e.g., strain, genetic sequencing, antimicrobial resistance)
10. Identification of any unusual cases (e.g., past case-patients, coroners' reports)
11. Any other investigative information that may be relevant to the biological threat (e.g., requests or theft of antibiotics, identification of a laboratory in someone's home)

Law Enforcement Information for Public Health

1. Law enforcement investigative information (e.g., interviews scheduled and planned search warrants) that may assist public health with the identification of the agent and determination of the source of the outbreak
2. Information regarding any known group or sector that may be targeted (e.g., government or financial, entertainment, religious/ethnic groups) for an attack
3. Other law enforcement cases which may have ties to the existing biological threat investigation
4. Pre-incident indicators (e.g., videotaping, sketching maps, break-ins, perimeter breaches at facilities) that may be related to the biological threat incident
5. Information developed by law enforcement regarding the biological agent used, mechanism for delivery/dissemination, date, time and locations of exposures
6. Information regarding any medical equipment, chemicals, toxins, biological agents or laboratory supplies stolen, developed, or uncovered that may be related to the biological threat
7. Intelligence information regarding the characteristics of the biological agent (e.g., strain, antimicrobial resistance, or weaponized nature)

**Building
Relationships**

**Information
Sharing**

**Joint Threat
Assessment**

**Joint
Investigation**

**Memorandum of
Understanding/Joint
Protocols**

**Joint Training/
Exercises**

Concerns that nefarious actors might use biological material as a weapon will likely remain a persistent threat for years to come, especially as scientific advancements in technical capability, knowledge, and accessibility continue to grow.

Intentional use of biological agents as a weapon still poses challenges to both public health and law enforcement due to the unique circumstances of a biological incident

As Qatar assesses the threat to public health, it is highly recommended that public health and law enforcement responders conduct exercises for joint investigations and coordinate in order for the response to be effective.

Joint training should be conducted for criminal and epidemiological investigations, enhancing appreciation for each discipline's expertise, help participants anticipate common issues that arise during an interagency response, and foster development of solutions through best practices when conducting joint threat assessments, investigations, and interviews.

