Surveillance and Notifiable Diseases

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What is a notifiable disease?

A notifiable disease is one for which **regular**, **frequent**, and **timely** **information** regarding **individual cases** is considered **necessary** for the prevention and control of the disease.

Notifiable diseases are usually INFECTIOUS diseases

What determines if a disease is notifiable?

A notifiable disease is any disease that is **required by law to be reported to government authorities.**

The collation of information allows the authorities to monitor the disease, and provides early warning of possible outbreaks.

Internationally notifiable Diseases

- **Cholera**
- **Yellow Fever**
- **Plague**

The list also includes:

These include Lyme disease, Ebola and Marburg haemorrhagic fevers, Nipah virus/Hendra disease, West Nile fever, dengue fever, malaria, Chikungunya fever and avian influenza

National notifiable lists may include additional diseases depending upon the local prevailing transmissible diseases of potential public threat in case of declaration of an epidemic.

Surveillance المراقبة

(Watching not Waiting)

Epidemiological Intelligence

Public Health Surveillance is ……..
Information for Action

Surveillance applies to infectious and non-infectious diseases

Surveillance

Surveillance is the entire process of collecting, analyzing, interpreting, and reporting data on the incidence of death, as well as disseminating the findings on the Internet and in other publication venues.

Which conditions to monitor?

Conditions of public health significance, meeting one or more of the following criteria:

– **Cause serious** morbidity or death
– **Potential to affect** more people than the reported case(s)
– **Considered new** or emerging
– **Clear link between** a case report and control or prevention
– **Ability to take action** is essential

Surveillance may be either passive or active

Passive Surveillance

Physicians, clinics, laboratories, and hospitals that are required to report disease are given the appropriate forms and instructions, with the expectation that they will record all cases of reportable disease that come to their attention.

Passive Surveillance

- Most public health surveillance systems are passive
- Advantages:
  - Less expensive
  - Less resource intensive

Passive Surveillance

Limitations:

– Under-reporting/selective reporting,

May result in

- Distorted information
- Distorted trends, risk factors and geographic distribution
- Prevent timely identification of disease outbreaks
- Prevent accurate evaluation of control programs

Passive Surveillance

Ways to improve reporting

- Improve awareness among reporting sources
- Frequent feedback to reporting sources
- Simplify reporting
  - Electronic reporting
- Active surveillance

Active Surveillance

Requires periodic (usually weekly) telephone calls, electronic contact or personal visits to the reporting individuals and institutions to obtain the required data.

Active surveillance is more labor intensive and costly, so it is seldom done on a routine basis.

Active Surveillance

Advantages:

- More complete coverage:
- e.g. Cancer Registry

Active Surveillance

- Expensive
- Resource intensive
- Usually higher quality data

Surveillance System

1 **Establishment** of Baseline Data

Usual (baseline) rates and patterns of diseases can be known only if there is a regular reporting and surveillance system.

Epidemiologists study the patterns of diseases by the time and geographic location of cases and the characteristics of the persons involved.

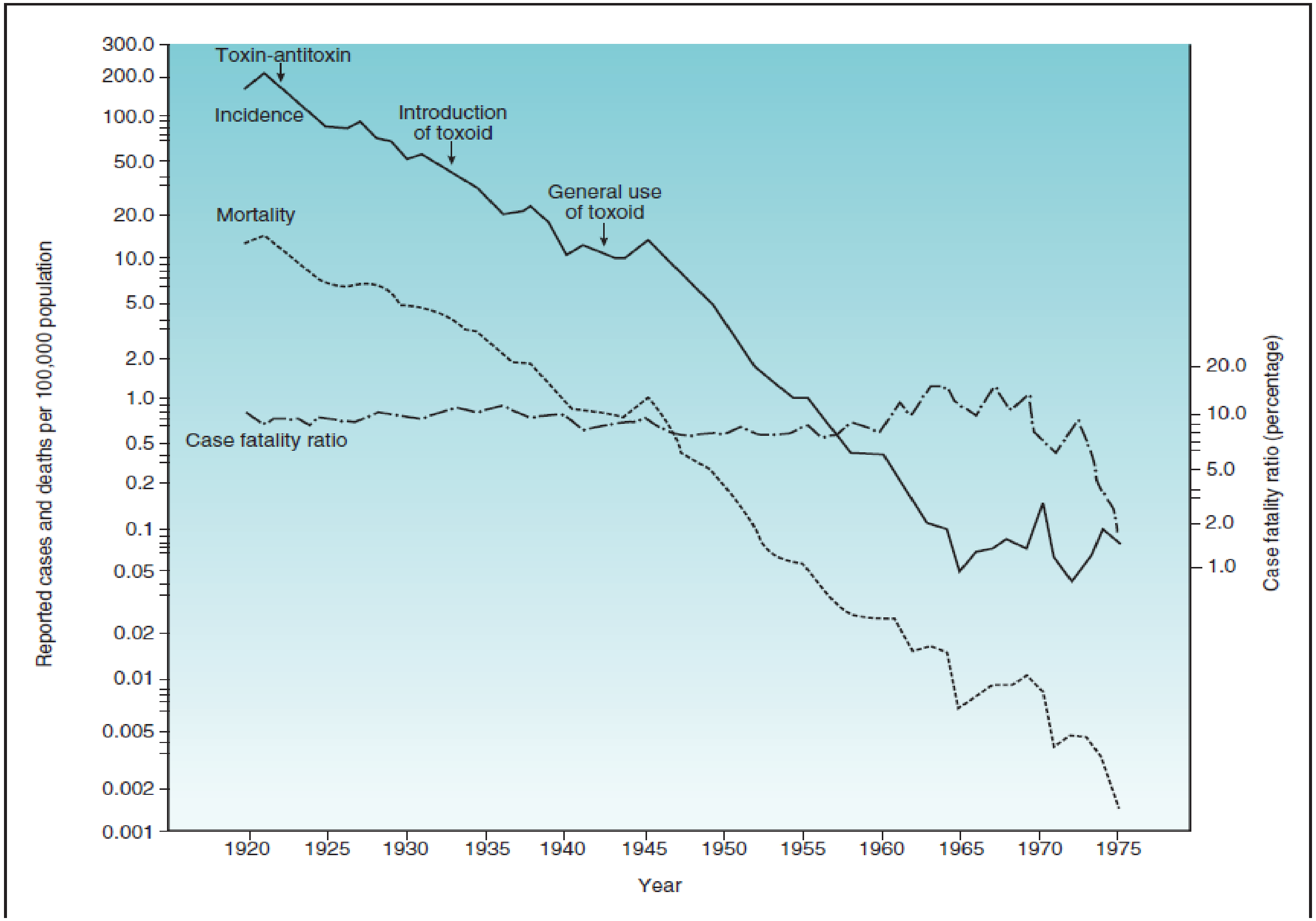
Continued surveillance allows epidemiologists to detect deviations from the usual pattern of data, which prompt them to explore whether an epidemic (i.e., an unusual incidence of disease) is occurring or whether other factors (e.g., alterations in reporting practices) are responsible for the observed changes.

Surveillance System

2 **Analysis and Interpretation** of Time Trends

SECULAR (LONG-TERM) TRENDS

The implications of secular (or long-term) trends in disease are usually different from those of outbreaks or epidemics and often carry greater significance.

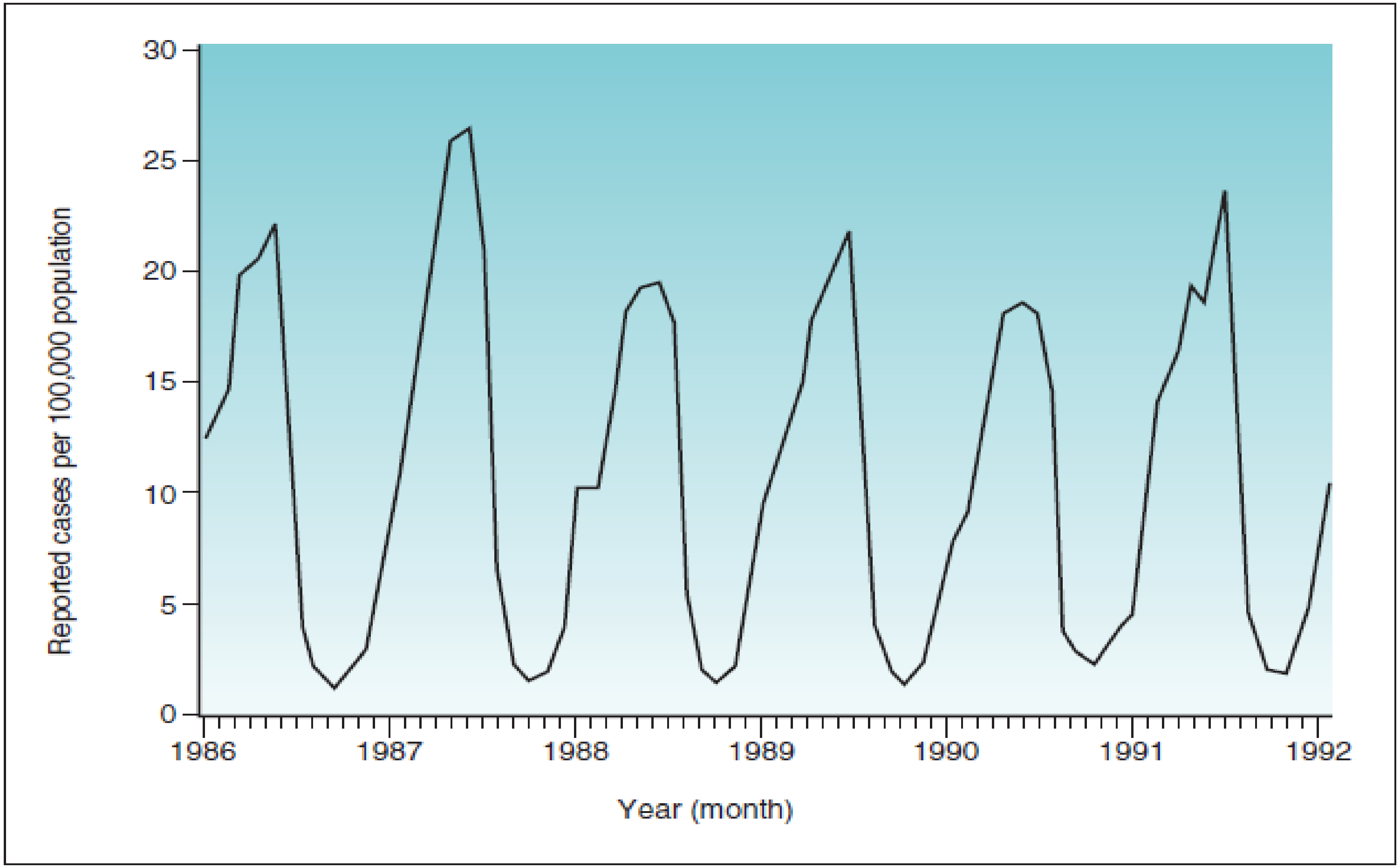


Incidence rates, mortality rates, and case fatality ratios for diphtheria in the United States, by year of report, 1920-1975. (Data from Centers for Disease Control and Prevention: Diphtheria surveillance summary. Pub No (CDC) 78-8087, Atlanta, 1978, CDC.)

SEASONAL VARIATION

Many infectious diseases show a strong seasonal variation, with periods of highest incidence usually depending on the route of spread.

To determine the usual number of cases or rates of disease, epidemiologists must therefore incorporate any expected seasonal variation into their calculations.



Incidence rates of varicella (chickenpox) in the United States, by month of report, 1986-1992. (Data from Centers for Disease Control and Prevention: Summary of notifiable diseases, United States, 1992. MMWR 41:53, 1992.)

Infectious diseases that are spread by the respiratory route, such as influenza, colds, measles, and varicella (chickenpox), have a much higher incidence in the winter and early spring in the Northern Hemisphere.

Seasonal variation for varicella in the United States, by month, over a 6-year period. Notice the peaks after January and before summer of each year.

Such a pattern is thought to occur during these months because people spend most of their time close together indoors, where the air changes slowly.

The drying of mucous membranes, which occurs in winter because of low humidity and indoor heating, may also play a role in promoting respiratory infections.

Since the introduction of varicella vaccine, this seasonal pattern has been largely eliminated.

Surveillance System

3 Identification and Documentation of Outbreaks

An epidemic, or disease outbreak, is the occurrence of disease at an unusual (or unexpected) frequency.

The term “outbreak” اندلاع / نشوب typically is used for a localized epidemic.

SURVEILLANCE FOR BIOTERRORISM

For at least a century, epidemiologists have worried about the use of biologic agents for military or terrorist purposes.

The most important need is for rapid detection of a problem. With regard to bioterrorism, special surveillance techniques are being developed to enable rapid detection of major increases in the most likely biologic agents

A technique developed for more rapid detection of epidemics and possible bioterrorism is **syndromic surveillance**

The goal of this surveillance is to characterize “**syndromes**” متلازمة that would be consistent with agents of particular concern and to prime the system to report any such syndromes quickly.

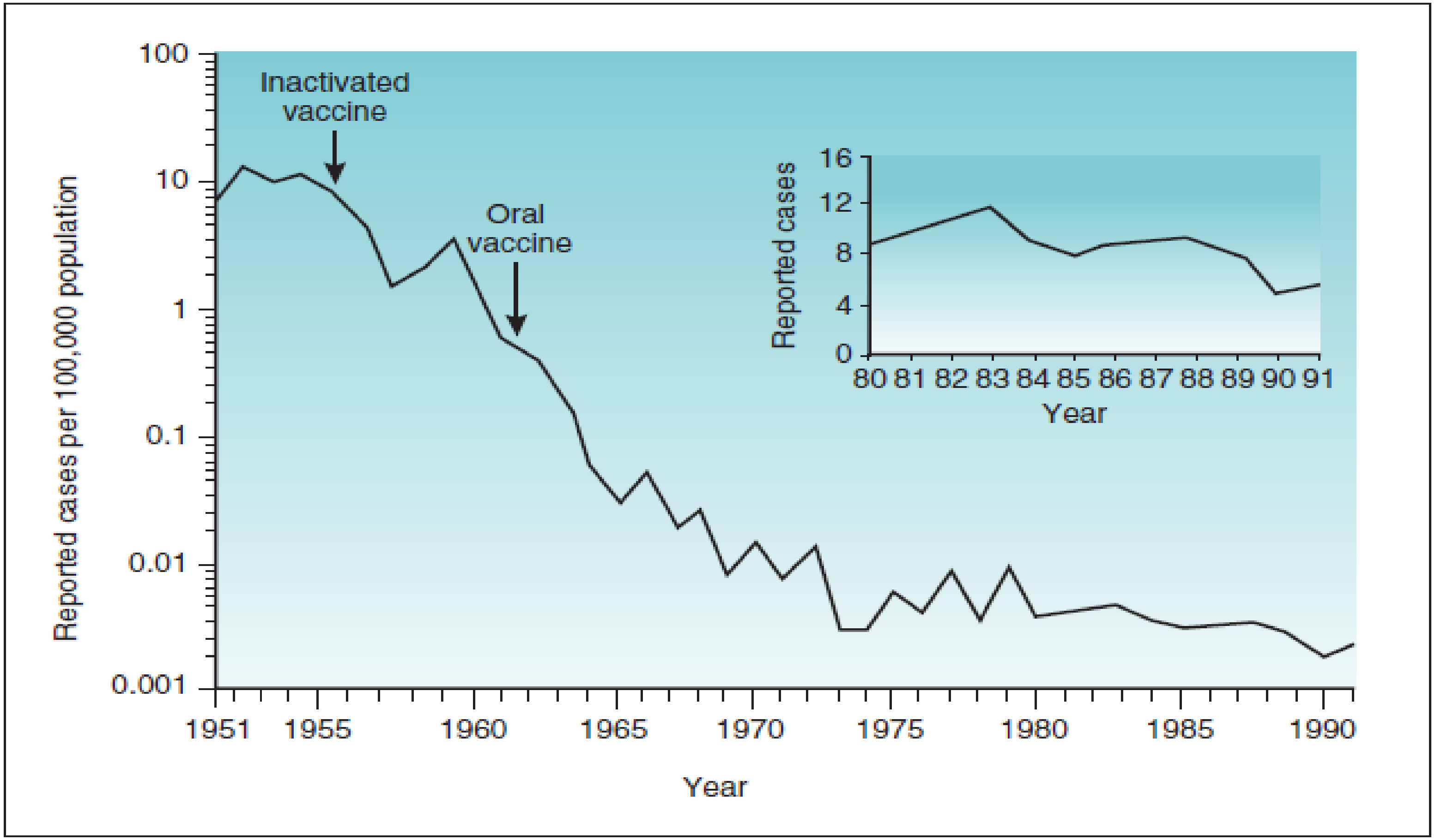
Rather than trying to establish a specific diagnosis before sounding an alert, this approach might provide an early warning of a bioterrorism problem.

Surveillance System

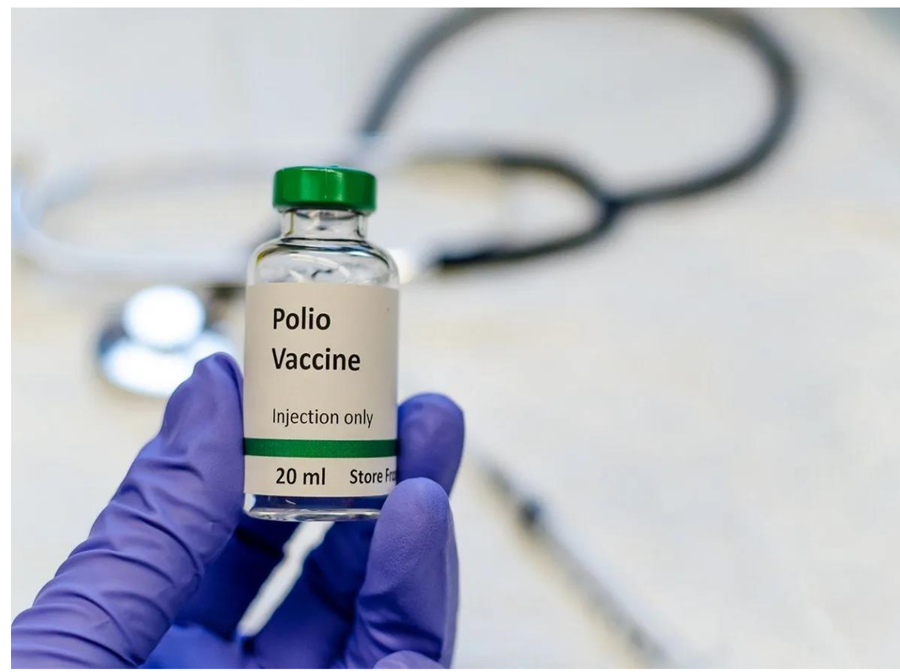
4 **Evaluation** of Public Health and Disease Interventions (Post-marketing surveillance)

The introduction of major interventions intended to change patterns of disease in a population, especially the introduction of new vaccines, should be followed by surveillance to determine if the intended changes were achieved.

Example: Poliomyelitis Vaccine



Incidence rates of paralytic poliomyelitis in the United States, by year of report, 1951-1991. (Data from Centers for Disease Control and Prevention: Summary of notifiable diseases, United States, 1991. MMWR 40:37, 1991.)


Polio
Vaccine
Injection only
20 ml
Store

The figure shows that when the inactivated vaccine was introduced in 1955, the rates of paralytic disease declined quickly. The public tended to think the problem had gone away, and many parents became less concerned about immunizing newborns.

Because the inactivated vaccine did not provide herd immunity, however, the unimmunized infants were at great risk. A recurrent poliomyelitis spike occurred in 1958 and 1959, when most of the new cases of paralytic poliomyelitis were in young children who had not been immunized.

The rates declined again in 1960 and thereafter because the public was shaken out of its complacency to obtain vaccine and because a newer oral vaccine was introduced.

The failure of a vaccine to produce satisfactory immunity or the failure of people to use the vaccine can be detected by one of the following:

- A lack of change in disease rates

- An increase in disease rates after an initial decrease

- An increase in disease rates in a recently vaccinated group

Example: Measles Vaccine

The importance of post-marketing surveillance was underscored through continued evaluation and close surveillance of measles rates in the United States.

Investigators were able to detect the failure of the initial measles vaccines and vaccination schedules to provide long-lasting protection


1 Single-dose 0.5-mL
MEASLES, MUMPS,
RUBELLA VIRUS VAC
M-M-R® II
Manuf. and Dist. by:
Merck Sharp & Dohme
a subsidiary of
MERCK & CO., INC.
Whitehouse Station, NJ

Research into this problem led to a new set of recommendations for immunization against measles.

According to the 2006 recommendations, two doses of measles vaccine should be administered to young children.

The first dose should be given when the child is 12 to 15 months old (to avoid a higher failure rate if given earlier) and the second dose when the child is 4 to 6 years old, before school entry.

A third dose at about age 18 is also recommended

Surveillance System

5 Setting of Disease Control Priorities

Data on the patterns of diseases for the current time and recent past can help governmental and voluntary agencies establish priorities for disease control efforts. This is not a simple counting procedure. A disease is of more concern if its rates increase rapidly than if its rates are steady or declining.

The severity of the disease is a critical feature, which usually can be established by good surveillance.

e.g;

AIDS received high priority because surveillance demonstrated its severity and its potential for epidemic spread.

Surveillance System

6 Study of Changing Patterns of Disease

By studying the patterns of occurrence of a particular disease over time in populations and subpopulations, epidemiologists can better understand the changing patterns of the disease.

A new pattern of occurrence may be more ominous than a mere increase in the incidence of a disease.

Example:
Tuberculosis

In the case of tuberculosis in the United States, yearly incidence decreased steadily from 1953 (when reporting began) until 1985, when

22,201 cases were reported.

Thereafter, yearly incidence began to rise again.

Of special concern was the association of this rise with the increasing impact of the AIDS epidemic and the increasing resistance of Mycobacterium tuberculosis to antimicrobial agents.

This concern led to greater efforts to detect tuberculosis in people with AIDS and to use directly observed therapy to prevent antimicrobial resistance.

Tuberculosis rates peaked in 1992, when 26,673 cases were reported, and then began declining again.

Global Surveillance

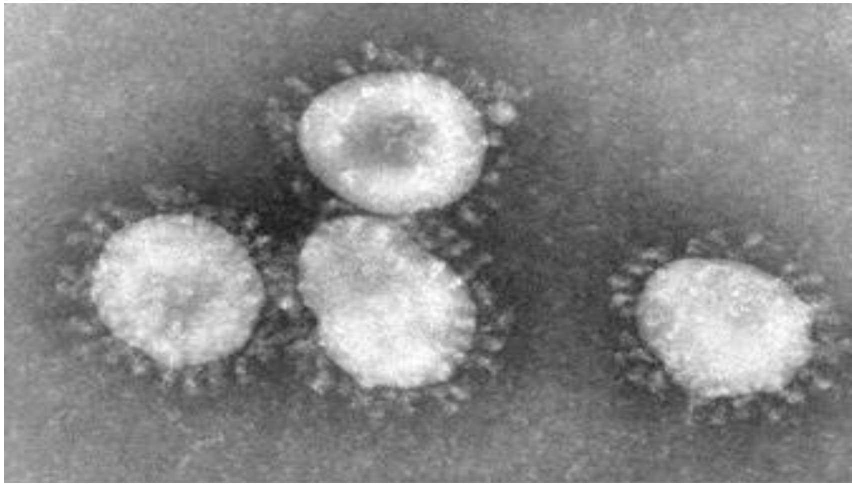
EXAMPLE

The timeline of a critical global health incident The SARS (sudden acute respiratory syndrome) epidemic

November 2002: two GOARN (Global Alert and Response Network) partners, the **WHO Global Influenza Surveillance Network** and the **US Global Emerging Infections Surveillance and Response System**, noted media reports of influenza in China.

GOARN

Global Outbreak Alert and Response Network




Russia
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Mongolia
Kyr.
Taj.
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Beijing
N. Korea
Pakistan
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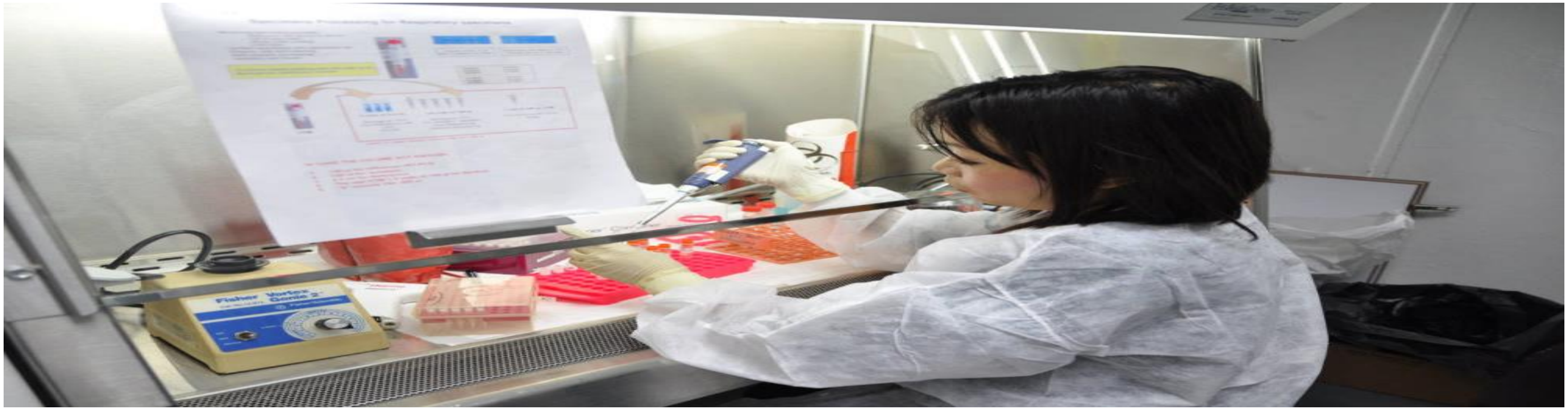
Chongqing
Taiwan
India
Guangzhou
Myan.
Viet.
Laos
Hong Kong
Macau



December 2002: an influenza B epidemic was **virologically confirmed** by Chinese authorities. In retrospect those early media reports were probably also the first indication of SARS, which also erupted at that time as seemingly unrelated clusters of atypical pneumonia in the south of China (atypical pneumonia is common in that region each winter).

20 February, 2003: Hong Kong confirmed two human cases of much-feared avian influenza (H5N1). This was soon after the Chinese government had reported that the atypical pneumonia had been **unusually lethal** in many cases.

21 February, 2003: just as the WHO prepared for an influenza pandemic, a Chinese doctor was admitted to a local Hong Kong hospital; staff adopted strict precautions against bird influenza but he had already infected several people at the hotel he occupied the night before.

They spread the virus to other hospitals, the Hong Kong community, Canada, Vietnam and Singapore.

12March, 2003: GOARN had gathered enough data from those countries and Hong Kong for the WHO to issue its first global alert.

15March, 2003: the disease was given the name severe acute respiratory syndrome (SARS). GOARN then linked laboratory scientists, clinicians and epidemiologists all over the world.

July 2003: the causative agent, incubation period, infectious period and usual modes of transmission had been determined, good diagnostic tests and surveillance and control programmes had been devised and implemented, and human transmission ceased.

Thank You