# Research Methods: Outbreak Investigation

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# Session Outline

- Introduce the concept of outbreaks and epidemics;
- Overview of the systems and processes involved in identifying and investigating outbreaks;
- Explore the public health interventions or actions that can be used to control outbreaks.

# Learning Objectives

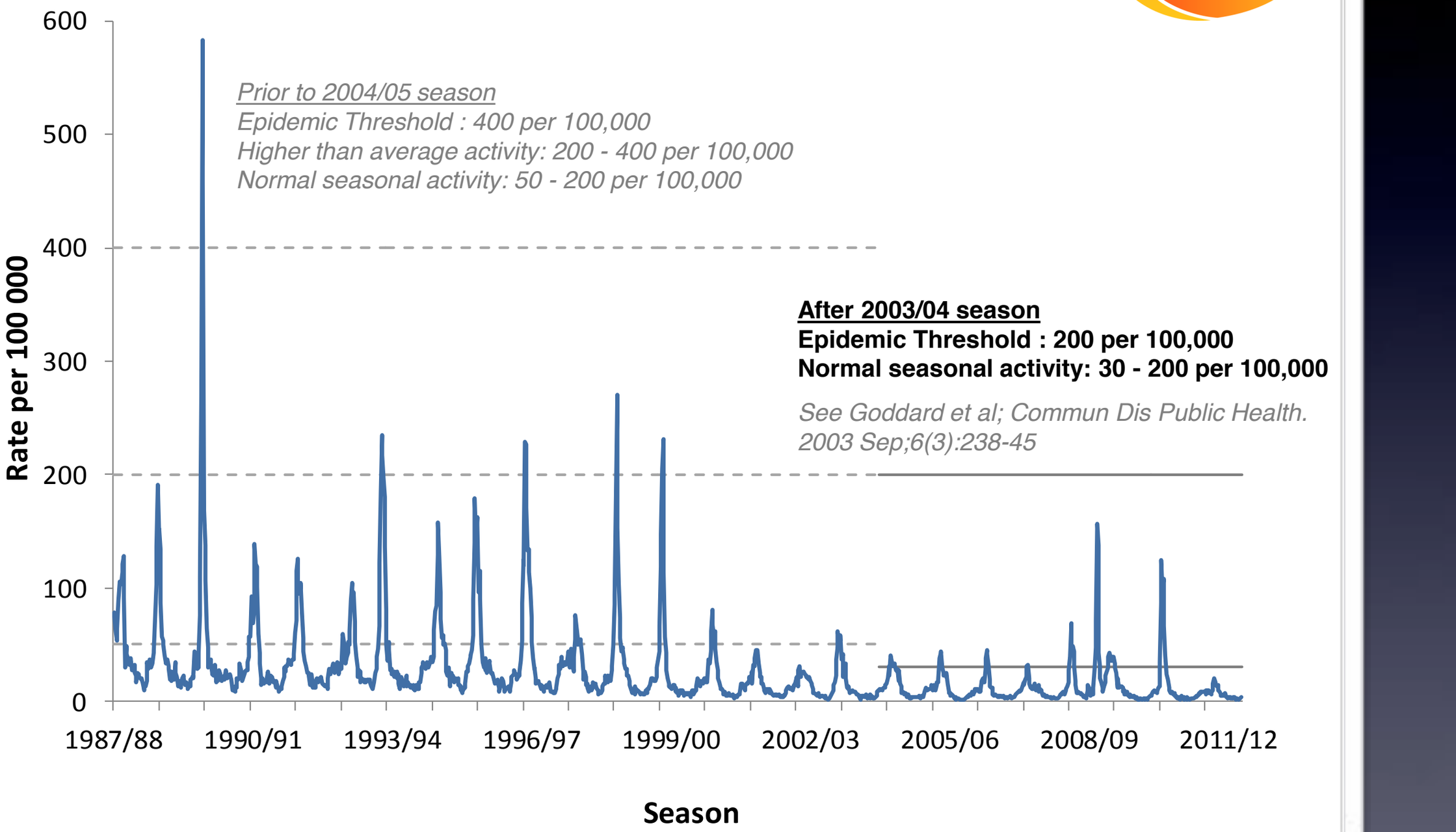
1. To define an outbreak;
2. To understand why outbreaks are investigated;
3. To describe how outbreaks are identified;
4. To describe the steps in an outbreak investigation;
5. To understand the role of public health interventions in outbreak control.

# What is an Epidemic?

- An increase, often sudden, in the number of cases of a disease above what is normally expected in that population in that area

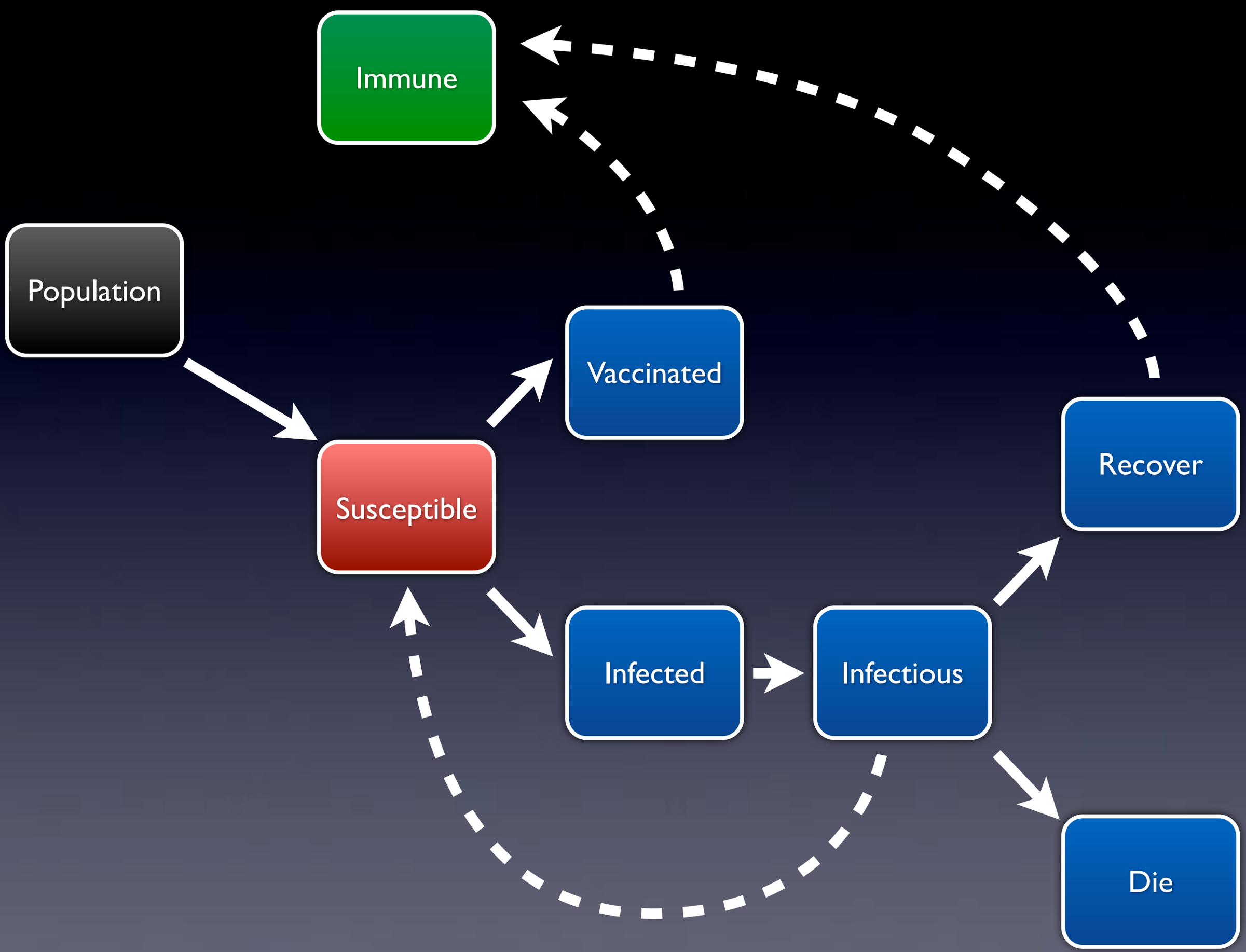
Principles of Epidemiology in Public Health Practice, 3rd Edition. Atlanta, GA: CDC; 2006
Available from: http://www.cdc.gov/osels/scientific_edu/SS1978/SS1978.pdf

# RCGP: Influenza-like illness, 1987 onwards



# Why Do Epidemics Occur?

- A recent increase in the amount or virulence of the agent;
- The recent introduction of the agent into a setting where it has not been before;
- An enhanced mode of transmission so that a larger number of susceptible persons are exposed;
- A change in the susceptibility of the host to the agent;
- Factors that increase host exposure or involve introduction through new portals of entry.


Immune
Population
Vaccinated
Recover
Susceptible
Infected
Infectious
Die

# What is a Pandemic?

- An epidemic that has spread over several countries or continents, usually affecting a large number of people.

Principles of Epidemiology in Public Health Practice, 3rd Edition. Atlanta, GA: CDC; 2006
Available from: http://www.cdc.gov/osels/scientific_edu/SS1978/SS1978.pdf


You little bugger.
YOU'VE KILLED US ALL.

## 26 April 2009: 2 countries, reporting 38 cases


© WHO 2009. All Rights Reserved. Disclaimer.

## 29 April 2009, 18:00 GMT: 9 countries, reporting 148 cases


© WHO 2009. All Rights Reserved. Disclaimer.

## 02 May 2009, 18:00 GMT: 16 countries, reporting 658 cases


© WHO 2009. All Rights Reserved. Disclaimer.

## 27 May 2009, 06:00 GMT: 48 countries, reporting 13 398 cases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# What is an Outbreak?

- An incident in which two or more people experiencing a similar illness are linked in time or place;
- A greater than expected rate of infection compared with the usual background rate for the place and time where the outbreak has occurred;
- A single case for certain rare diseases such as diphtheria, botulism, rabies, viral haemorrhagic fever or polio;
- A suspected, anticipated or actual event involving microbial or chemical contamination of food or water.

The Communicable Disease Outbreak Plan. London, UK: Health Protection Agency; 2012. Available from: http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1317135166228

# Famous Outbreaks

- 1955:
  - Paralytic polio in children who received polio vaccine – the 'Cutter Incident'
- 1976:
  - Pneumonia at the Convention of the American Legion in Philadelphia – Legionnaire's Disease
- 1976:
  - Outbreak of haemorrhagic fever near the Ebola river
- 1981:
  - Pneumocystis Carinii Pneumonia (PCP) in gay men in the USA
- 2009:
  - Influenza A(H1N1)

# Other Outbreaks

- Biological:
  - Salmonella outbreak linked to Cadbury's chocolate, UK 2006
  - *E.coli* linked to a petting farm, UK 2009
- Chemical:
  - Scrotal cancer in Chimney sweeps, first described by Potts in 1775
- Radiological:
  - Acute radiation syndrome, Goiania, Brazil, 1988

# Why Do We Investigate Outbreaks?

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# Why Do We Investigate Outbreaks?

1. Prevent primary cases:
   - Identify and control source
2. Prevent secondary cases:
   - Identify cases and take action
   - Identify those at risk and take action
3. Prevent similar events in the future:
   - Learn from outbreak and implement strategies to reduce risk
4. Learn about the disease and its epidemiology

# Identifying Outbreaks

- Potential sources of information:
  - Report from a clinician or laboratory
  - Report from a patient(s) or member(s) of the public
  - Routine surveillance systems
  - Media reports

# Communicable Disease Surveillance

The continuous monitoring of the frequency and the distribution of disease, and death, due to infections that can be transmitted from human to human or from animals, food, water or the environment to humans, and the monitoring of risk factors for those infections.

Health Protection Agency – Surveillance.
Available from: http://www.hpa.org.uk/web/HPAweb&HPAwebStandard/HPAweb_C/1195733739153

# Types of Surveillance

- Passive:
  - Routine, 'always on' systems
  - Notifications from clinicians and / or returns from laboratories
  - e.g. RCGP influenza-like illness returns (weekly reports)
- Active:
  - Often bespoke, disease-specific and in response to a current or potential threat to health
  - Surveillance team actively seeks out cases
  - e.g. as part of an outbreak investigation

# Purposes of Surveillance

- Monitor burden and distribution of infectious disease:
  - Inform priorities for control and prevention activities
  - Inform targeting of control and prevention activities by time, place and person

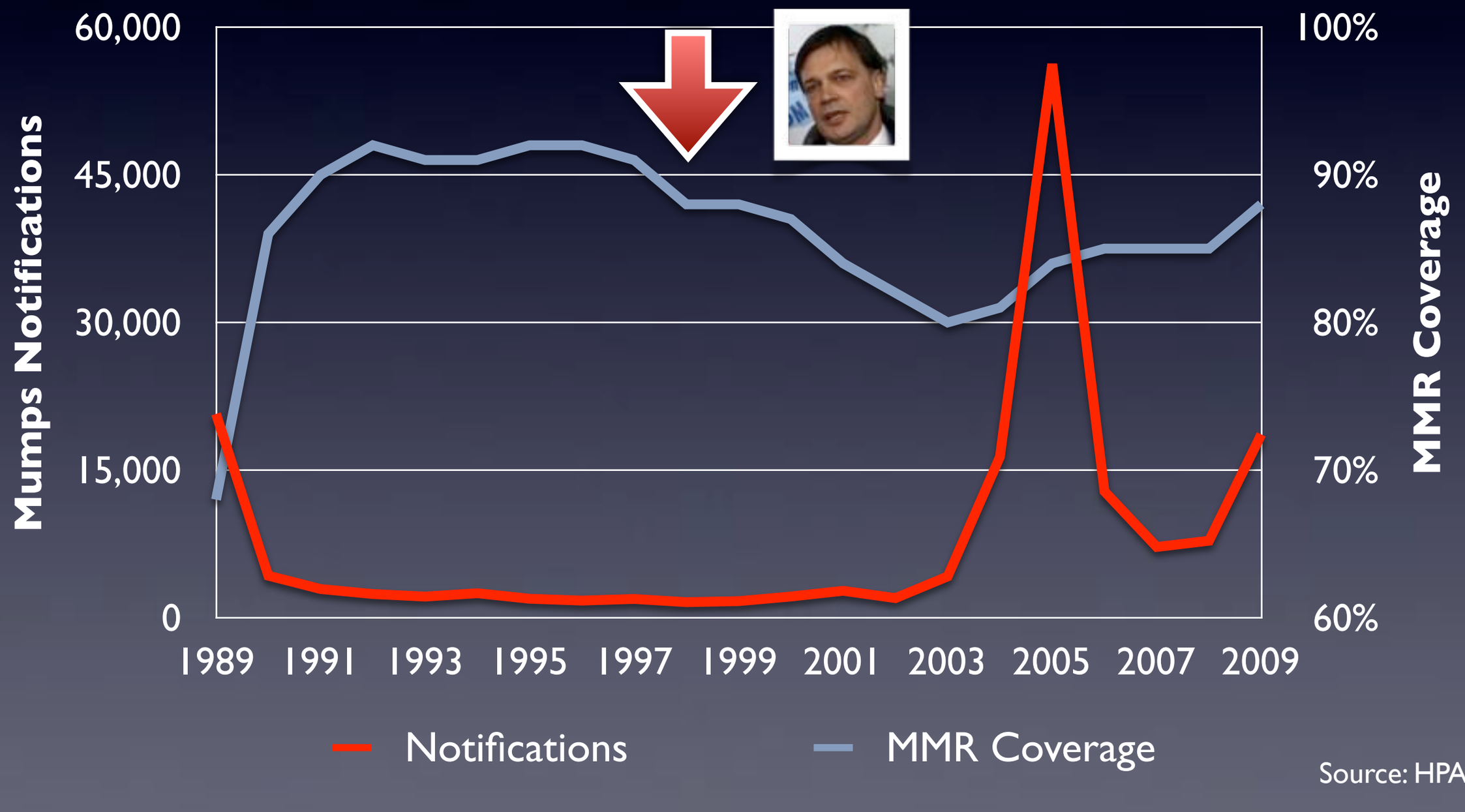
# Purposes of Surveillance

- Detect the occurrence of outbreaks or epidemics:
  - Identify and control the source (e.g. food poisoning)
  - Prepare services for responding to increased demand (e.g. influenza epidemics)

# Purposes of Surveillance

- Evaluate the impact of control and prevention activities
  - e.g. rates of childhood infectious diseases that are routinely vaccinated against

# Surveillance – Mumps Notifications




Source: HPA

RETRACTED

Early report

# Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children

A J Wakefield, S H Murch, A Anthony, J Linnell, D M Casson, M Malik, M Berelowitz, A P Dhillon, M A Thomson, P Harvey, A Valentine, S E Davies, J A Walker-Smith

## Summary

**Background** We investigated a consecutive series of children with chronic enterocolitis and regressive developmental disorder.

**Methods** 12 children (mean age 6 years (range 3–10), 11 boys) were referred to a paediatric gastroenterology unit with a history of normal development followed by loss of acquired skills, including language, together with diarrhoea and abdominal pain. Children underwent gastroenterological, neurological, and developmental assessment and review of developmental records. Ileocolonoscopy and biopsy sampling, magnetic resonance imaging (MRI), electroencephalography (EEG), and lumbar puncture were done under sedation. Barium follow-through radiography was done where possible. Biochemical, haematological, and immunological profiles were examined.

**Findings** Onset of behavioural symptoms was associated by the parents, with measles, mumps, and rubella vaccination in eight of the 12 children, with measles infection in one child, and otitis media in another. All 12 children had intestinal abnormalities ranging from lymphoid nodular hyperplasia to aphthoid ulceration. Histology showed patchy chronic inflammation in the colon in 11 children and reactive lymphoid hyperplasia in seven, but no granulomas. Developmental disorders included autism (nine), disintegrative psychosis (one), and possible postviral or vaccinal encephalitis (one). There were no focal neurological abnormalities and MRI and EEG tests were normal. Abnormal laboratory results were significantly raised urinary methylmalonic acid compared with age-matched controls (p<0·01), low haemoglobin in five children, and low IgA in two children.

**Interpretation** We identified associated gastrointestinal disease and developmental regression in a group of previously normal children, which was generally associated in time with possible environmental triggers.

Lancet 1998; 351: 637–41
See Commentary page

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Correspondence to: Dr A J Wakefield

## Introduction

We saw several children who, after a period of apparent normality, lost acquired skills, including speech, together with bowel symptoms. They all had gastrointestinal symptoms, including abdominal pain, diarrhoea, and vomiting and, sometimes, food intolerance. We describe the clinical findings and gastrointestinal features of these children.

## Patients and methods

12 children, consecutively referred to a department of paediatric gastroenterology with a history of a pervasive developmental disorder with loss of acquired skills and intestinal symptoms, including abdominal pain, diarrhoea and food intolerance, were investigated. All children were admitted to the ward for work-up, accompanied by their parents.

### Clinical investigations

A work history, including details of immunisations and exposure to infectious diseases, was assessed for children. In 11 cases the history was obtained by the senior clinician (JW-H). Neurological and psychiatric assessments were done by consultant staff (TM, MM) with ICD-10 criteria.[7] Developmental history included a review of prospective developmental records (nursery records, health visitors, and general practitioners). Five children did not undergo psychiatric assessment in hospital, all had been assessed professionally elsewhere, so these assessments were used as the basis for their behavioural diagnosis.

After bowel preparation, ileocolonoscopy was performed by DUM or JWAS under sedation with midazolam and pethidine. Paired ileocaecal and ileoileo-fixed mucosal biopsy samples were taken from the terminal ileum, ascending, transverse, descending, and sigmoid colons, and from the rectum. The procedure was recorded by video or still images, and were compared with images of the previous seven consecutive paediatric colonoscopies (four normal colonoscopies and three on children with ulcerative colitis), in which the physician reported normal appearances to the terminal ileum. Barium follow-through radiography was possible in seven cases.

Also under sedation, cerebral magnetic resonance imaging (MRI), electroencephalography (EEG) including visual, brainstem auditory, and somatic evoked potentials (where compliance could be possible), and lumbar puncture were done.

### Laboratory investigations

Thyroid function, serum long-chain fatty acids, and cerebrospinal-fluid lactate were measured to exclude known causes of childhood neurodegenerative disease. Urinary methylmalonic acid was measured in random urine samples from eight of the 12 children and 14 age-matched and sex-matched normal controls, by a modification of a technique described previously.[8] Chromatograms were assessed digitally on computer, to analyse the methylmalonic acid areas from cases and controls. Urinary methylmalonic acid concentrations in patients and controls were compared by a two-sample $t$ test. Urinary creatinine was estimated by Jaffe spectrophotometric assay.

Children were screened for enteroviral antibodies and faeces were screened for Anglia-B. If they had not been done

# Approaches To Surveillance

- UK:
  - Statutory notification of infectious diseases (NOIDs)
  - Laboratory reports
  - Sentinel surveillance (e.g. RCGP ILI)
  - Enhanced surveillance (e.g. invasive pneumococcal disease)

# Notifiable Diseases - England

- Acute encephalitis
- Acute meningitis
- Acute poliomyelitis
- Acute infectious hepatitis
- Anthrax
- Botulism
- Brucellosis
- Cholera
- Diphtheria
- Enteric fever (typhoid or paratyphoid fever)
- Food poisoning
- Haemolytic uraemic syndrome (HUS)
- Infectious bloody diarrhoea
- Invasive group A streptococcal disease and scarlet fever
- Legionnaires' Disease
- Leprosy
- Malaria
- Measles
- Meningococcal septicaemia
- Mumps
- Plague
- Rabies
- Rubella
- SARS
- Smallpox
- Tetanus
- Tuberculosis
- Typhus
- Viral haemorrhagic fever (VHF)
- Whooping cough
- Yellow fever

# Approaches To Surveillance

- European Centre for Disease Prevention and Control (ECDC):
  - Co-ordinate surveillance across EU member states
  - Monitor trends of diseases across Europe to provide rationale for public health actions
  - Support strengthening of national surveillance systems

# Approaches To Surveillance

- World Health Organisation (WHO):
  - Integrated disease surveillance programme
  - Aims for all member states:
    - timely, complete, regular and high quality information
    - early detection and prediction of epidemics (early warning systems)
    - objective assessment of interventions during epidemics;
    - efficient monitoring of intervention programmes.

# Outbreak Investigation

# Tasks in an Outbreak Investigation

- Epidemiological investigation
- Environmental investigation
- Control measures (action)
- Communication

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# Epidemiological Investigation

- Confirm whether an outbreak actually exists!
  - ≥ 2 cases linked by time, place or person
- If there is an outbreak, form an outbreak control team (OCT):
  - Public Health and Health Protection doctors and nurses, administrative support, communications, environmental health etc.

# Epidemiological Investigation

1. Case definition
2. Confirm cases
3. Case finding
4. Collect information
5. Describe the epidemiology of cases
6. Generate a hypothesis
7. Test the hypothesis

# An Outbreak of *Salmonella typhimurium* 108/170 at a Privately Catered BBQ at a Sydney Sports Club

Jardine *et al. Foodborne Pathogens and Disease* 2011;8(11):1215–1219

# The Scenario

- 1st February 2009
  - 2 Public Health Units in Sydney notified by 2 Accident & Emergency Departments of multiple cases of diarrhoea
  - Cases had a common history of attending a BBQ on 30th Janurary 2009
- Is this an outbreak? **YES!**
- What should the PHUs do immediately?

**Convene an Outbreak Control Team**

# Case Definition

- Usually specific to a particular outbreak
- Describes the characteristics that cases should have if they are part of the outbreak
- Includes:
  - Person
  - Place
  - Time
- Often changes as more information becomes available

# Case Definition

- What was the case definition used in this outbreak investigation?

# Case Definition

- Suspected case:
  - Person:
    - Attended the BBQ and experienced symptoms (diarrhoea + ≥ 1 of nausea, vomiting, abdominal cramps, fever, arthralgia, headache)
  - Place:
    - Sydney Sports Club
  - Time:
    - 30th January 2009

# Confirm Cases

- The criteria needed to convert a suspected case to a confirmed case
- For example:
  - Positive culture for a specific infectious agent
- Lab quality assurance is essential

# Confirm Cases

- How was a confirmed case defined in this outbreak?

# Confirm Cases

- Confirmed case:
  - Met criteria for being a suspected case
  - Stool sample positive for *S.typhimurium* with phage type 108/170

# Case Finding

- Need to be sure that you have captured as many cases as possible
  - Often requires a proactive approach
  - Especially important if disease is readily transmissible!

# Case Finding

- Ask to be informed of cases that fit the case definition
  - e.g. GPs, laboratories, schools
- Case finding allows for:
  - Determining actual scale of an outbreak
  - Identify the range of clinical presentations
  - Meaningful descriptive and analytic epidemiology as part of investigation

# Case Finding

- How was active case finding performed in this investigation?

# Case Finding

- GPs and Emergency Departments contacted
- Local surveillance system
- Advert in local paper
- Information poster at venue
- ‘Snowballing’
  - Ask suspected cases to provide details of other attendees

# Collect Information from Cases

- Why?
  - Looking for links between cases
- How?
  - Questionnaire (face-to-face or over the ‘phone)
- What?
  - Basic information about case (age, sex, occupation, travel)
  - Specific questions related to type of outbreak:
    - Food borne → food diary
    - Airborne → location of home, work and recent travel
    - Person-to-person → contact history (e.g. household contacts)

# Collect Information from Cases

- How was information collected in this scenario?
  - Telephone questionnaire:
    - Demographic information
    - Food history
    - Clinical syndrome / symptoms

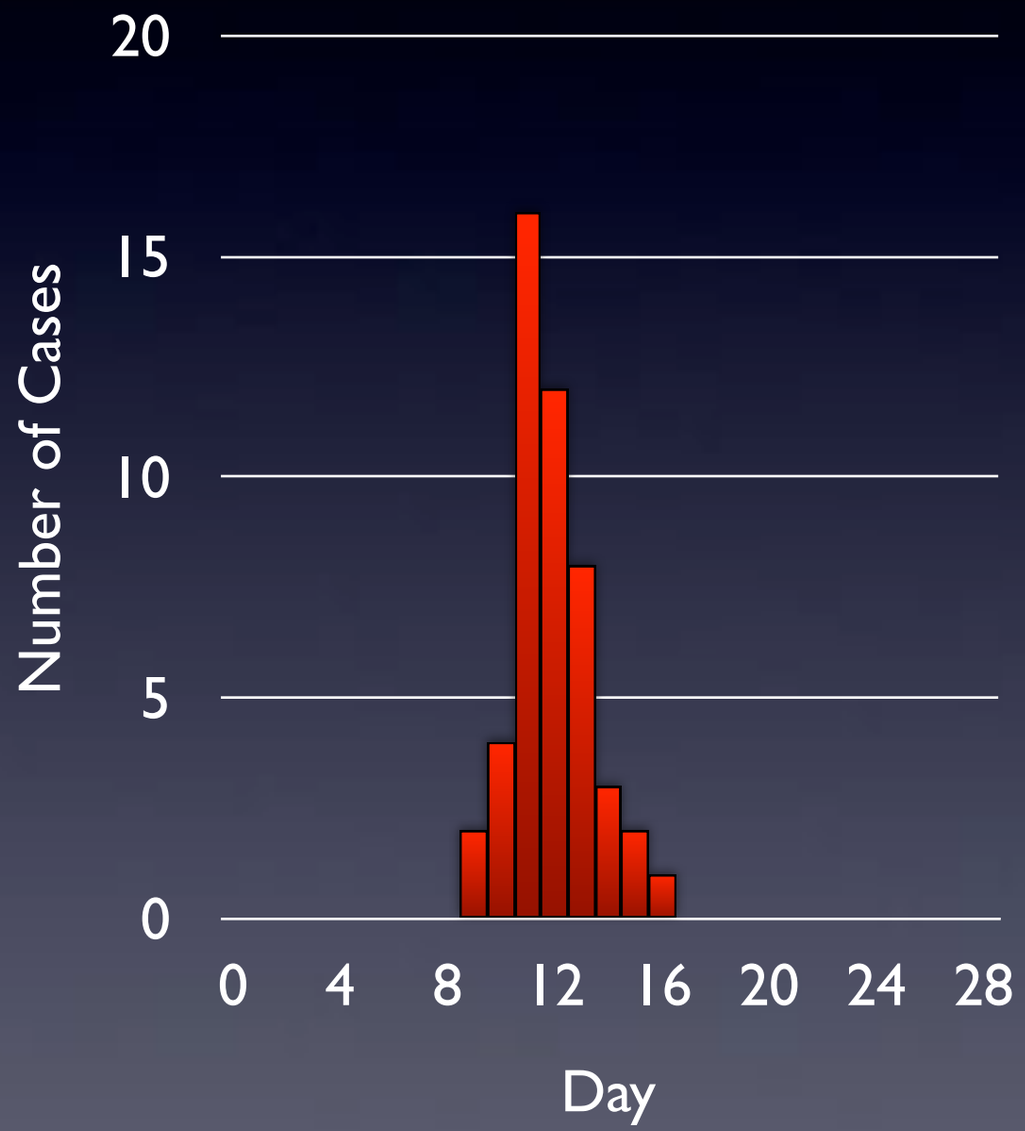
# Describe The Epidemiology of Cases

- Time
  - Dates of symptom onset and resolution
- Person
  - Demographic information and clinical syndrome / symptoms
- Place
  - Where they live, work and recent travel history

# Epidemic Curves

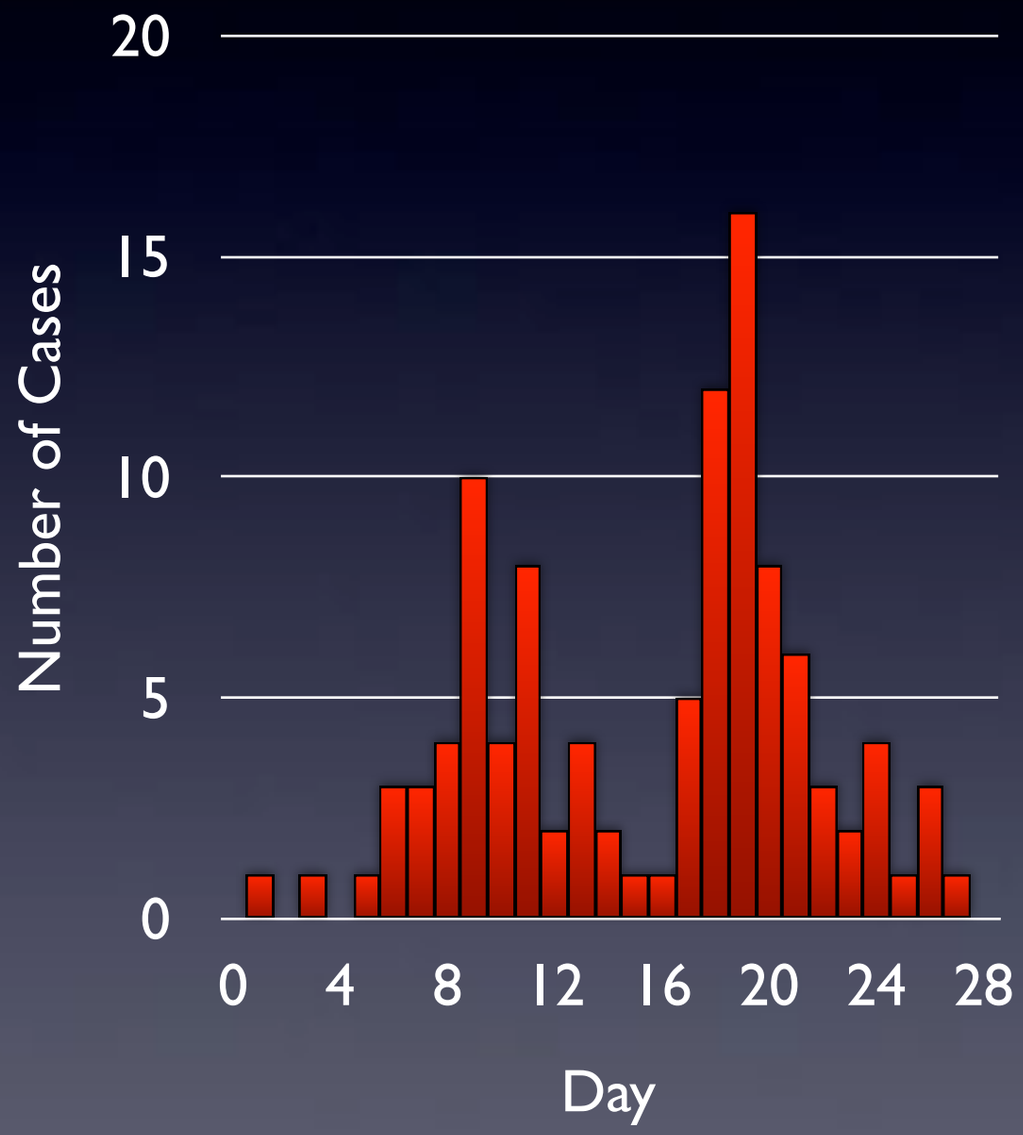
- Quick and easy to interpret way to visualise time-course of outbreak
- Plot the date that each case became symptomatic
- Shape of curve can indicate nature of outbreak:
  - Point source
  - Continuing source
  - Propagated source

# Point Source



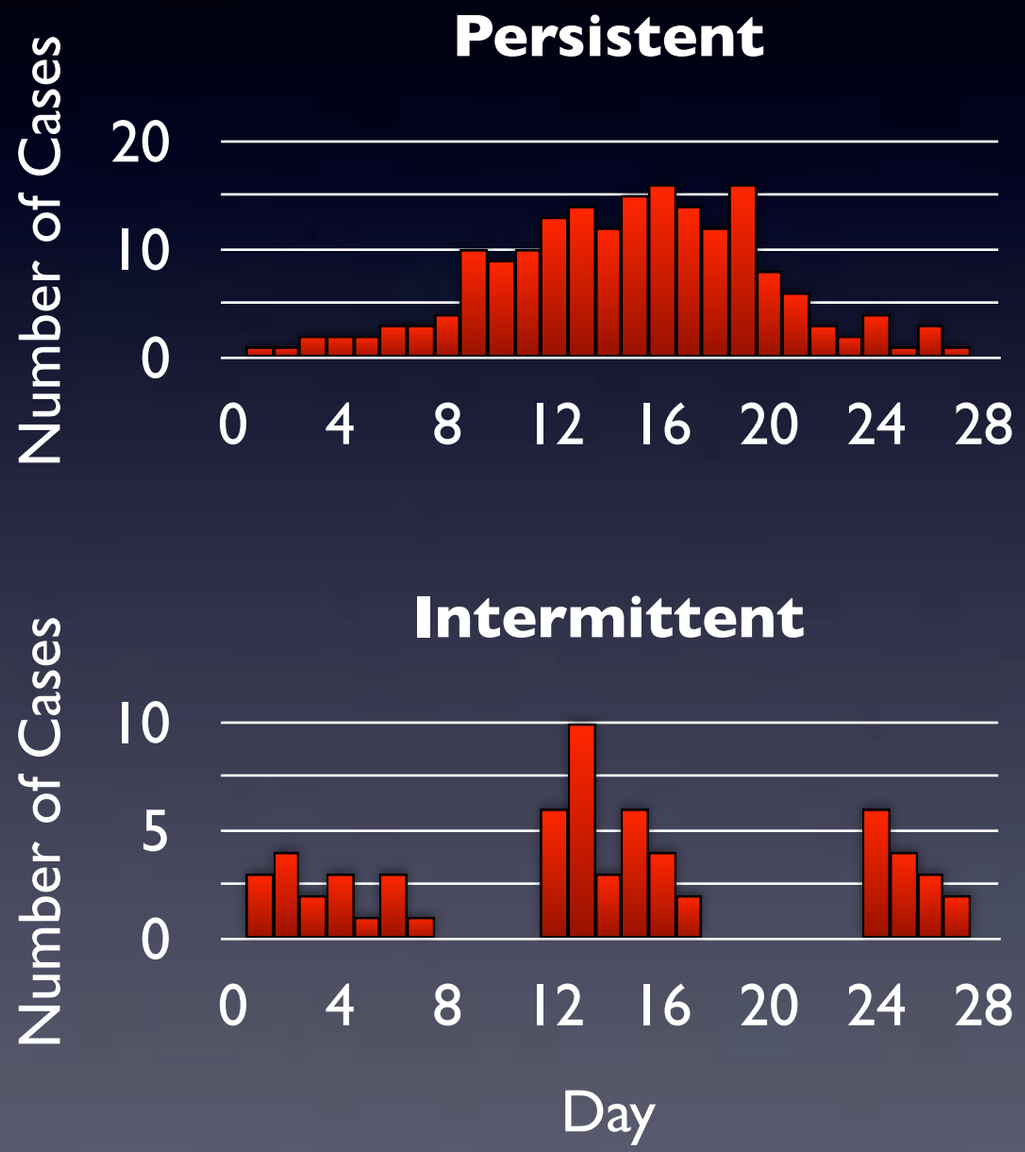

- All cases exposed over a short period
- Single peak
- All infections within one incubation period
- e.g. Food poisoning from a contaminated BBQ

# Propagated Source



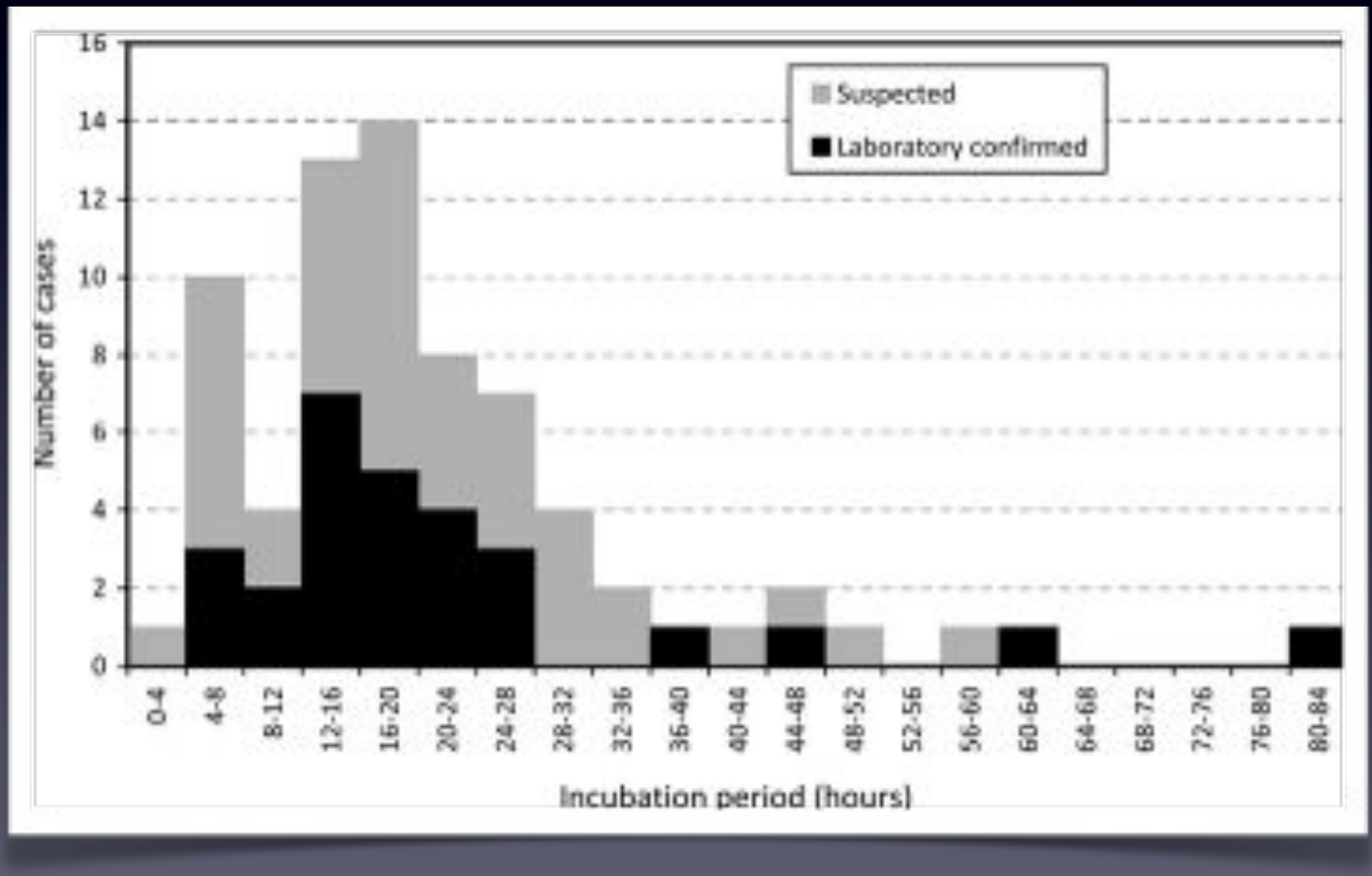

- Infection can spread from one person to another
- Multiple peaks
- Infections occur over multiple incubation periods
- e.g. Measles outbreak at a school

# Continuing Source




- Ongoing source
- Infections have no relation to incubation period
- e.g. Legionella from a contaminated air conditioning unit

# Epidemic Curve
# Sydney BBQ




Epidemic curve compatible with a point source

# Generate a Hypothesis

- Use the information currently available to you to construct the most likely scenario that would lead to the observed outbreak

- What's a reasonable hypothesis for this case?
  - This outbreak of gastrointestinal illness as a result of *S.typhimurium* infection was due to consumption of contaminated food by guests at the BBQ held at Sydney Sports Club on 30th January 2009.

# Test The Hypothesis

- Cohort Study:
  - Groups defined by <u>exposure</u>
  - Outcome is estimate of relative risk
- Case Control:
  - Groups defined by <u>outcome</u>
  - Outcome is estimate of the odds ratio

# Test The Hypothesis

- What kind of study was used to test the hypothesis that a common exposure at the BBQ was the cause of the outbreak?
  - Cohort study
    - 85 attendees completed questionnaire
    - 71 suspected/confirmed cases
    - 14 controls

# Questionnaire

- Respondents asked:
  - Which food items they had put on their plate
  - Which food items they had eaten

# Questionnaire Results

| | | Outcome | | |
|---|---|---|---|---|
| | | **Unwell (Cases)** | **Well (Controls)** | **Total** |
| **Exposure** | **Salad** | 59 | 5 | **64** |
| | **No Salad** | 12 | 9 | **21** |
| | **Total** | **71** | **14** | **85** |

# Calculating Odds

$$odds = \frac{p}{(1-p)}$$

- Basically:
  - The ratio of the probability of the event happening (illness) to the probability of the event <u>not</u> happening (no illness)

# Questionnaire Results

| | | Outcome | | |
|---|---|---|---|---|
| | | **Unwell (Cases)** | **Well (Controls)** | **Total** |
| **Exposure** | **Salad** | 59 | 5 | **64** |
| | **No Salad** | 12 | 9 | **21** |
| | **Total** | **71** | **14** | **85** |

# Calculating Odds

- Odds of illness in those who ate salad:

$$odds_S = \frac{(59 \div 64)}{(5 \div 64)} = 11.8$$

- Odds of illness in those who did not eat salad:

$$odds_{NS} = \frac{(12 \div 21)}{(9 \div 21)} = 1.3$$

# Odds Ratio

- An odds ratio describes the effect that a given exposure has on the outcome of interest
- In this outbreak, the exposure is eating salad and the outcome is gastrointestinal illness

$$OR = \frac{odds_S}{odds_{NS}} = \frac{11.8}{1.3} = 8.85$$

# Tasks in an Outbreak Investigation

- Epidemiological investigation
- Environmental investigation
- Control measures (action)
- Communication

# Environmental Investigation

- In this outbreak investigation:
  - Environmental sampling in kitchen, food storage area and BBQ venue
  - Food samples, surface swabs, samples of materials in contact with food

# Environmental Investigation

- Findings:
  - *S.typhimurium* 108/170 isolated from raw egg mayonnaise
  - Eggs traced back to supplier and farm
    - No *S.typhimurium* detected at either location

# Tasks in an Outbreak Investigation

- Epidemiological investigation
- Environmental investigation
- Control measures (action)
- Communication

# Control


- Each outbreak will have a specific:
  - Source
  - Route of transmission
  - Susceptible population

- Control Measures Must be:
  - Safe
  - Effective
  - Appropriate (vs. risk)
  - Timely

# Control


- Alternative water supply
- Disinfection
- Treat cases

- Isolate cases
- Handwashing
- Needle exchange

- Vaccination
- Prophylactic antibiotics

# Control Activities

| Outbreak Scenario | Immediate Action | Definitive Action |
|---|---|---|
| **Meningitis at a school** | Prophylactic antibiotics for contacts | MenC vaccination |
| **Salmonella in food** | Advise public not to consume affected foodstuff(s) | Product recall |
| **Measles in a community** | Vaccination / HNIg | Public information campaign / vaccination campaign |
| ***E.coli* in water supply** | Issue a 'boil water' notice | Water company to find fault, decontaminate and safeguard for future |

# Tasks in an Outbreak Investigation

- Epidemiological investigation
- Environmental investigation
- Control measures (action)
- Communication

# Communication

- Between outbreak control team and:
  - Other professionals
  - Those affected, involved or at risk
  - The community and general public
  - Media

# Communication

- Purpose of communication:
  - Inform parties of outbreak
  - Inform parties of nature of illness
  - Inform parties of investigative and control action being taken
  - If applicable, advice on how to reduce risk
  - Reassurance that the situation is being managed
  - Declare the outbreak over

## Case of Lassa Fever in Specialist Unit in London

**23 January 2009**

The Health Protection Agency can confirm that a patient is being treated for Lassa fever at the high security infectious diseases unit at the Royal Free Hospital. This is an isolated case in a traveller who returned to the UK from Nigeria, on the 6th January. There is no risk to the general public as a result of this case.

The patient was initially admitted to Homerton University Hospital on 8th January, and then transferred to the Hospital for Tropical Diseases, University College Hospital on 22nd January. The Homerton carried out testing for a wide range of common infections associated with travel to Africa, all of which tested negative. Following this samples were referred to the Health Protection Agency and the diagnosis of Lassa fever was made on the 22nd January. At this point the patient was moved to the Royal Free where they could receive the appropriate treatment.

Dr Dilys Morgan a Lassa fever expert at the Health Protection Agency said; "This is an isolated case of Lassa fever in a traveller who has recently returned from Nigeria. It is important to stress that there is no risk to the general public from this patient.

"Lassa fever is an infection that is found in West Africa and is seen rarely in this country in those who have travelled to parts of the world where it is common. The infection is not easily spread to others and then only by direct contact with bodily fluids. The usual incubation period for Lassa fever is 7-10 days. The symptoms include a fever, headache, sore throat, cough, nausea, vomiting, diarrhoea and muscle pain.

"We are working closely with Homerton University Hospital and the Hospital for Tropical Diseases, University College Hospital to identify any members of staff who may have been involved in the care of this patient, and who came into contact with their bodily fluids. These people will be provided with information about Lassa fever and asked to get in contact with us should they develop any symptoms. Patients and visitors to the hospital are not at risk"

**Notes to Editors:**

Lassa fever is an acute illness caused by Lassa virus and known to be endemic in Nigeria, Sierra Leone, Liberia, Guinea and the Central African Republic, and there is evidence of infection in nearby countries including Mali, Senegal, and the Democratic Republic of Congo.

## Patient dies from Lassa Fever at a London Hospital

**18 February 2009**

**The Health Protection Agency can confirm that a patient has sadly died from Lassa fever at University College Hospital in London.**

This is an isolated case in a person who was working in Mali and flown back on a specialist medical flight on 17th February. The patient was admitted to UCH and died on the same day. There is no risk to the general public as a result of this case.

Dr Dilys Morgan a Lassa fever expert at the Health Protection Agency said: "This is an isolated case of Lassa fever in a person who has recently returned from Mali. We would like to offer our condolences to the family of this patient at this sad time.

"Lassa fever is an infection that is found in West Africa and is seen rarely in this country in those who have travelled to parts of the world where it is common. The infection is not easily spread to others and then only by direct contact with bodily fluids. The usual incubation period for Lassa fever is 7-10 days. The symptoms include a fever, headache, sore throat, cough, nausea, vomiting, diarrhoea and muscle pain.

"We are working closely with University College Hospital to identify any members of staff, and other healthcare providers, who may have been involved in the care of this patient, and who came into contact with their bodily fluids. These people will be provided with information about Lassa fever and asked to get in contact with us should they develop any symptoms. Patients and visitors to the hospital are not at risk"

**Notes to Editors:**

1. Lassa fever is an acute illness caused by Lassa virus and known to be endemic in Nigeria, Sierra Leone, Liberia, Guinea and the Central African Republic, and there is evidence of infection in nearby countries including Mali, Senegal, and the Democratic Republic of Congo.
2. The virus is shed in the urine and droppings of infected rats so most infections arise through contact with materials contaminated by these.
3. Information on Lassa fever and other viral haemorrhagic fevers can be found at www.hpa.org.uk/infections/topics_az/VHF/menu.htm

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# Acute respiratory illness associated with a new virus identified in the UK

**23 September 2012**

**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.**

In recent months, this new human coronavirus was also identified in a patient with acute respiratory illness in Saudi Arabia, who subsequently died.

Coronaviruses are causes of the common cold but can also include more severe illness, such as the virus responsible for SARS (Severe Acute Respiratory Syndrome). This new virus, however, is different from any that have previously been identified in humans. Preliminary enquiries have revealed no evidence of illness in contacts of these two cases, including healthcare workers. Based on what we know about other coronaviruses, many of these contacts will already have passed the period when they could have caught the virus from the infected person.

We are also aware of a small number of other cases of serious respiratory illness in the Middle East in the past three months, one of whom was treated in the UK but has since died. This person's illness is also being investigated although there is no evidence at present to suggest that it is caused by the same virus or linked to the other two cases. No other confirmed cases have been identified to date in the UK.

Professor John Watson, head of the respiratory diseases department at the HPA, said: "The HPA is providing advice to healthcare workers to ensure the patient under investigation is being treated appropriately.

"In the light of the severity of the illness that has been identified in the two confirmed cases, immediate steps have been taken to ensure that people who have been in contact with the UK case have not been infected, and there is no evidence to suggest that they have.

"Further information about these cases is being developed for healthcare workers in the UK, as well as advice to help maintain increased vigilance for this virus. This information is also being shared with national and international authorities including the World Health Organization and the European Centre for Disease Control.

"As we are aware of only two cases worldwide and there is no specific evidence of ongoing transmission, at present there is no specific advice for the public or returning travellers to take but we will share any further advice with the public as soon as more information becomes available."

**Ends**

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    - 2006
    - 2005
  - Notes for the media
- Events
- Fact sheets
- Multimedia
- Contacts

# Swine influenza

Statement by WHO Director-General, Dr Margaret Chan
25 April 2009

In response to cases of swine influenza A(H1N1), reported in Mexico and the United States of America, the Director-General convened a meeting of the Emergency Committee to assess the situation and advise her on appropriate responses.

The establishment of the Committee, which is composed of international experts in a variety of disciplines, is in compliance with the International Health Regulations (2005).

The first meeting of the Emergency Committee was held on Saturday 25 April 2009.

After reviewing available data on the current situation, Committee members identified a number of gaps in knowledge about the clinical features, epidemiology, and virology of reported cases and the appropriate responses.

The Committee advised that answers to several specific questions were needed to facilitate its work.

The Committee nevertheless agreed that the current situation constitutes a public health emergency of international concern.

Based on this advice, the Director-General has determined that the current events constitute a public health emergency of international concern, under the

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Related link

Swine influenza

International Health Regulations (IHR)

# World now at the start of 2009 influenza pandemic

Dr Margaret Chan
Director-General of the World Health Organization

Statement to the press by WHO Director-General Dr Margaret Chan
11 June 2009

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Ladies and gentlemen,

In late April, WHO announced the emergence of a novel influenza A virus.

This particular H1N1 strain has not circulated previously in humans. The virus is entirely new.

The virus is contagious, spreading easily from one person to another, and from one country to another. As of today, nearly 30,000 confirmed cases have been reported in 74 countries.

This is only part of the picture. With few exceptions, countries with large numbers of cases are those with good surveillance and testing procedures in place.

Spread in several countries can no longer be traced to clearly-defined chains of human-to-human transmission. Further spread is considered inevitable.

I have conferred with leading influenza experts, virologists, and public health officials. In line with procedures set out in the International Health Regulations, I have sought guidance and advice from an Emergency Committee established for this purpose.

# H1N1 in post-pandemic period

Director-General's opening statement at virtual press conference
10 August 2010

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The world is no longer in phase 6 of influenza pandemic alert. We are now moving into the post-pandemic period. The new H1N1 virus has largely run its course.

These are the views of members of the Emergency Committee, which was convened earlier today by teleconference.

The Committee based its assessment on the global situation, as well as reports from several countries that are now experiencing influenza. I fully agree with the Committee's advice.

As we enter the post-pandemic period, this does not mean that the H1N1 virus has gone away. Based on experience with past pandemics, we expect the H1N1 virus to take on the behaviour of a seasonal influenza virus and continue to circulate for some years to come.

In the post-pandemic period, localized outbreaks of different magnitude may show significant levels of H1N1 transmission. This is the situation we are observing right now in New Zealand, and may see elsewhere.

In fact, the actions of health authorities in New Zealand, and also in India, in terms of vigilance, quick detection and treatment, and recommended vaccination, provide a model of how other countries may need to respond in the immediate post-pandemic period.

Related links
Frequently asked questions
WHO recommendations for the post-pandemic period

## Media centre

Media centre
- News
  - News releases
  - Statements
    - 2011
    - 2010
    - 2009
    - 2008
    - 2007
    - 2006
    - 2005
  - Notes for the media
- Events
- Fact sheets
- Multimedia
- Contacts

# Statement of the World Health Organization on allegations of conflict of interest and 'fake' pandemic

Statement
22 January 2010

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Providing independent advice to Member States is a very important function of the World Health Organization (WHO). We take this work seriously and guard against the influence of any improper interests. The WHO influenza pandemic policies and response have not been improperly influenced by the pharmaceutical industry.

WHO recognizes that global cooperation with a range of partners, including the private sector, is essential to pursue public health objectives today and in the future. Numerous safeguards are in place to manage conflicts of interest or perceived conflicts of interest among members of WHO advisory groups and expert committees. Expert advisers provide a signed declaration of interests to WHO detailing any professional or financial interest that could affect the impartiality of their advice. WHO takes allegations of conflict of interest seriously and is confident of its decision-making independence regarding the pandemic influenza.

Additional allegations that WHO created a 'fake' pandemic to bring economic benefit to industry are scientifically wrong and historically incorrect.

- Lab analyses showed that this influenza virus was genetically and antigenically very different from other influenza viruses circulating among people
- Epidemiological information provided by Mexico, the US and Canada demonstrated person-to-person transmission.

**Related links**

WHO use of advisory bodies in responding to the influenza pandemic

# Learning Objectives

1. To define an outbreak;
2. To understand why outbreaks are investigated;
3. To describe how outbreaks are identified;
4. To describe the steps in an outbreak investigation;
5. To understand the role of public health interventions in outbreak control.

# Questions?

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