MINISTRY OF HEALTH
SINGAPORE

# Outbreak prevention, investigation and management in RCHEs


BIRD FLU...
ME?? I FEEL GREAT! HONESTLY! JUST FINE. NOT EVEN A HINT OF A SNIFFLE... NEVER BEEN BETTER...
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OUTBREAK
WARNER BROS. PRESENTS
AN ARNOLD KOPELSON PRODUCTION
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OUTBREAK

# What is an Outbreak

Occurrence of disease above the expected levels.
e.g., endemic (usual occurrence) vs. epidemic (exceeds usual occurrence)

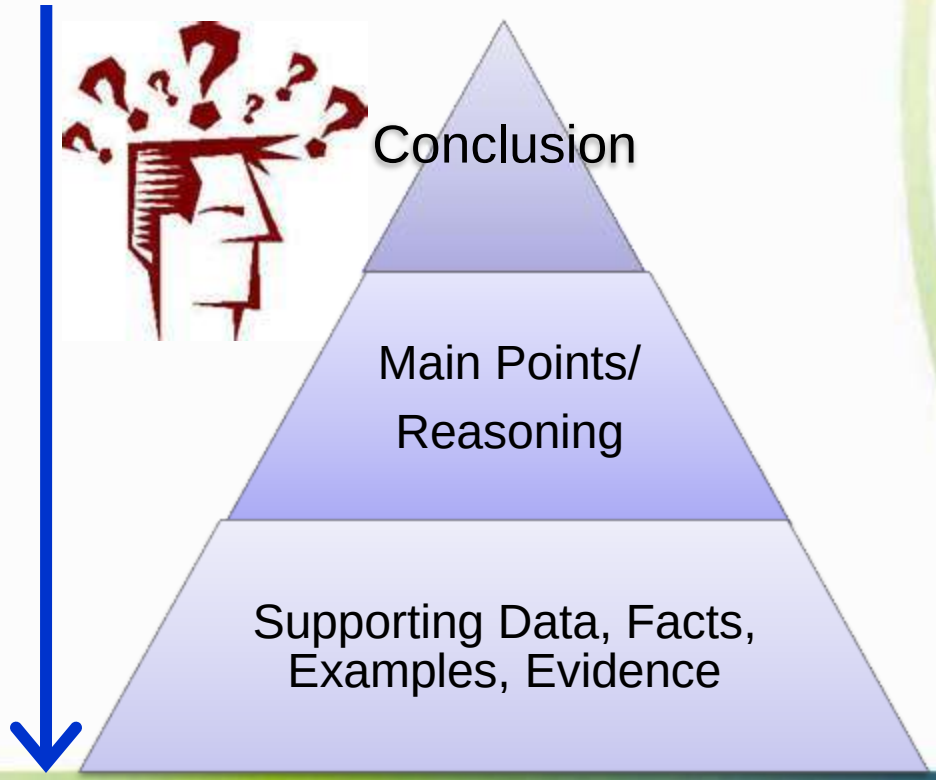
The unexpected occurrence of more than 2 cases:

a) identified with infection – an “uncommon happening”
b) of an usual organism
c) of unusual antibiotics resistance patterns.

# In Early Years


## ICN/ ICO

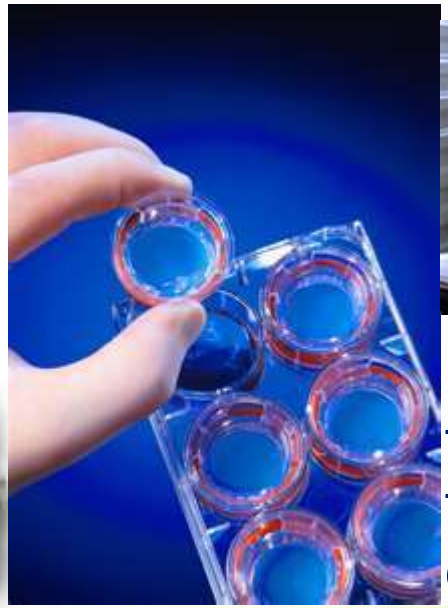





# A Team:

- IP/ICO/ICN
- Micorbiologist
- PHOs
- IDs
- statisticians

# In Present Day



Technology
Techniques
GIS

# Outbreaks in Residential Care Home For the Elderly

- Occur because of
  - susceptible population, multiple potential for exposures and transmission
- Preparation includes
  - clear policies and procedures for investigation of clusters or epidemics
- Potential causes include:
  - Influenza like illness, other respiratory illness, foodborne, norovirus, conjunctivitis ,etc

# Purpose of Outbreak Investigation

- Identify the etiologic agents
- Identify the unique reservoir
- Identify the mode of transmission
- Eliminate the reservoir and transmission
- Prevent future outbreaks

In addition:

•To strengthen surveillance activities at local level
•To advance the knowledge about the disease
•To provide training opportunity

# Steps in Outbreak Investigation

1. Verify the diagnosis
2. Confirm the outbreak
3. Case definition
4. Define population at risk
5. Test and formulate the hypothesis:

   a) source of the agent
   b) mode of transmission - vector or vehicle
   c) exposure that caused disease
   d) analysis and data interpretation

6. Implement control measures
7. Refine the hypothesis
8. Write and distribute a report


- Sequence may vary
- Many steps occur simultaneously and in conjunction with outbreak control
- Facility outbreak Policy and Procedure

# Initial Call

# What to do?

# First….

# Steps in Outbreak Investigation

1. Verify the Diagnosis


Are the cases real infections?

# 1. Verify The Diagnosis

Infection Control Officer/Nurse:

- review clinical findings and laboratory results of the cases identified - check with the laboratory –to exclude errors

- review and summarise clinical findings of the cases identified

-determine/characterise the infections

-reviews laboratory findings to help in diagnosing the infections

# Other Possible Actions to Verify the Diagnosis

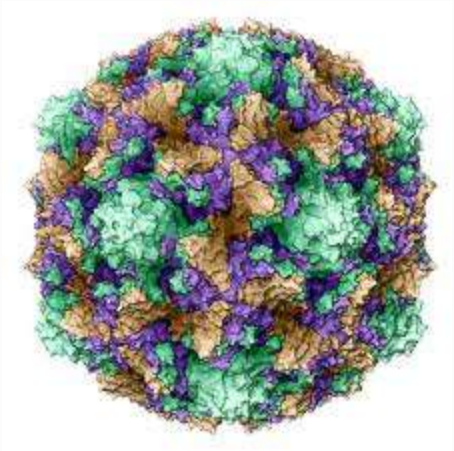
- See and talk with patient's direct care providers or patients if necessary to:
  - Better understand clinical features of infection
  - Gather critical information
    - What they think caused the infection
    - Knowledge of others with similar infections
    - Ideas for hypothesis about etiology, "causes", and transmission (if applicable

# Case Study: An Outbreak of Conjunctivitis in Peaceful Valley Residential Home

Verify and determine the source of contaminant?

Investigations

# Findings in Conjunctivitis Outbreak



# Steps in Outbreak Investigation

1. Verify the diagnosis
2. **Confirm that there is an outbreak**

Does it really exist?

# 2. Confirm existence of the outbreak

- Is there really a problem? Is outbreak truly occurring?

a) True outbreak

b) Sporadic and unrelated cases of same diseases

c) Unrelated cases of similar but unrelated diseases

Supporting Data, Facts, Examples, Evidence

- Determine the expected number of cases before deciding whether the observed number exceeds the expected number

- Compare observed with expected
- Through surveillance data and laboratory records
- Hospital discharge data, registries, mortality statistics

# Epidemic or Outbreak

- Increase in incidence beyond the expected in a defined geographic area, within a defined period of time
- A significant increase ($p < 0.05$) in the rate of certain events above that noted in the past

- Residents or staff or both develop similar symptoms, one after another, and the incidence rate is higher (epidemic) than at ordinary times (endemic levels). Example, influenza.

Guidelines on Prevention of Communicable Diseases in RCHEs; 2nd Ed; 37.

# 2. Confirm existence of the outbreak

- Is there really a problem? Is an outbreak truly occurring?
  - True outbreak
  - Sporadic and unrelated cases of same disease
  - Unrelated cases of similar but unrelated disease
- Determine the expected number of cases before deciding whether the observed number exceeds the expected number

# Confirm existence of an outbreak

- Compare observed with expected
  - through surveillance data and laboratory records
  - discharge data, registries, mortality statistics
  - data from other facilities, surveys of health care providers
  - community survey

Questions during this phase?

# Implement Control Measures

- With a suspected diagnosis and outbreak control measures should be implemented as soon as possible to manage the infected patients, staff and spread of infection.

# Control measures can be implemented at any time during an outbreak investigation

Examples:

- Isolate residents and arrange medical treatment if indicated
- Instruct staff and residents
- Avoid group activities if appropriate
- Minimize contact between residents and staff of different units to avoid cross contamination
- Alert staff, families, authorities
- Limit visitors

# 3. Develop a Case Definition

# Establish a case definition

- Case definition
  - Includes clinical criteria and restrictions by time, place and person
  - Often contains laboratory data
  - Must be applied consistently and without bias to all persons under investigation
  - Must not contain an exposure or risk factor to be tested (e.g., surgeon, cleaning agent)

# Establish Case Definition –How?

- Classification:
  - Definite (confirmed by lab)
  - Probable (not confirmed by lab- but typical clinical features)
  - Possible (suspected- less clinical features)

- Early in investigation will establish a wide (broad) case definition:

  - better to collect more than less
  - to identify extent of problem and population affected
  - to generate hypothesis

- Later in investigation- the case definition may be “tightened” when hypothesis are sharpened

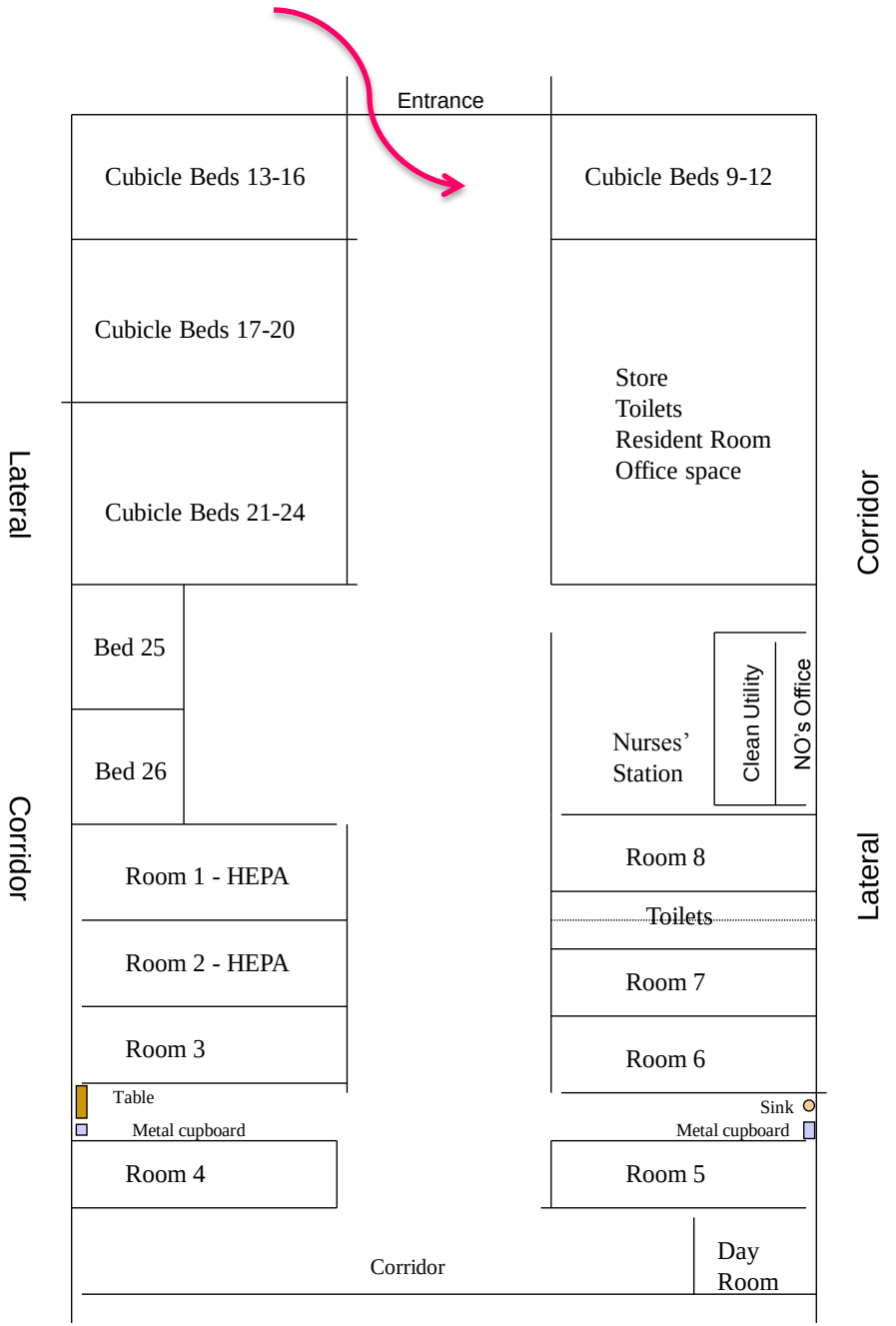
# Action to be taken

With a suspected diagnosis:

Initiate/ implement outbreak control measures as soon as possible to manage the infected residents/staff and spread of infection.

# 4. Define population at risk

# SCHEMATIC DIAGRAM OF PEACEFUL VALLEY RESIDENTIAL HOME



# 4. Define population at risk

1. Determine Information to be collected
- Administrative data

Lab report, duplicate records, location & demographics

- Clinical finding
- Risk factor information

2. Develop data collection forms

Standard case report form/ questionnaire

3. Line listing

Should contain Key information

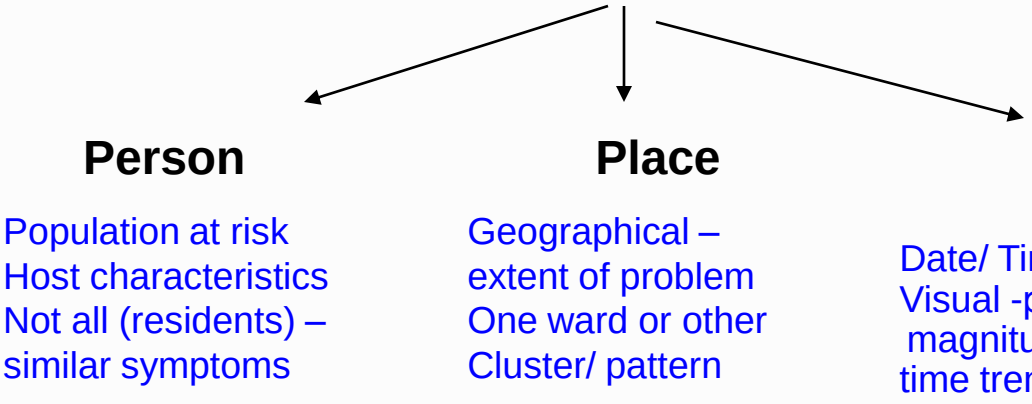
# Line Listing of Cases

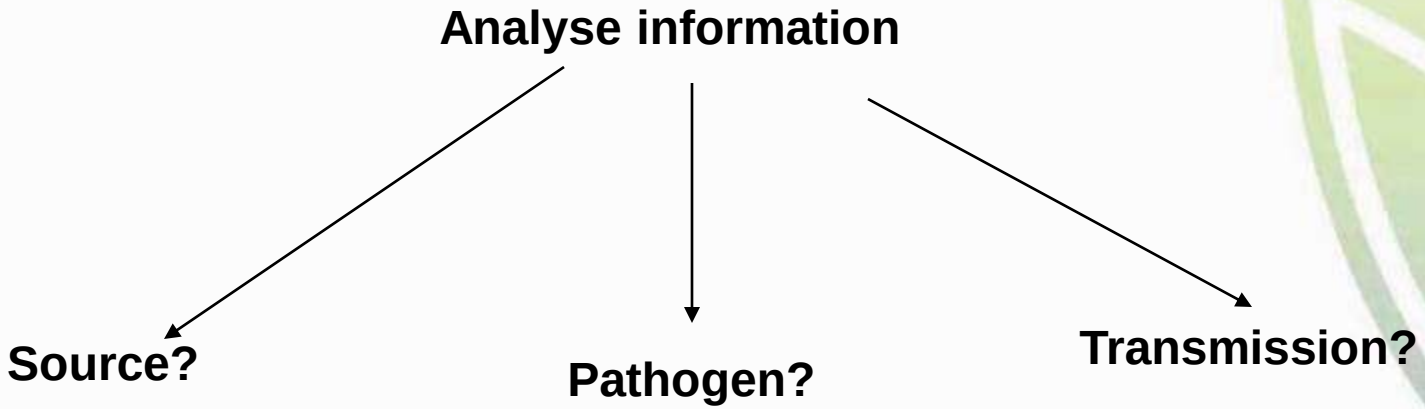
| CASE # | Init | Date of Report | Date of Onset | MD DX | N | V | F | Other | Lab | Age / Gend | Ward |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | JG | | | | + | + | - | | | | |
| 2 | BC | | | | + | + | - | | | | |
| 3 | LW | | | | + | + | + | | | | |
| 4 | RD | | | | + | + | + | | | | |
| 5 | KW | | | | + | + | - | | | | |

# Laboratory Investigation

- Appropriate clinical specimens
- Time of sample collection
- Method
- Selection of transport media
- Labeling
- Storage and transportation of  samples
- District laboratory

# From the data-characterize the outbreak by:



# 5. Formulation of hypothesis (1)

Based on data analysis and interpretation

Hypothesis should address:

-Source of the agent

-Mode of transmission

vector or vehicle

- Exposure that caused disease

# 5 .Formulation of hypothesis (2)

Develop hypotheses

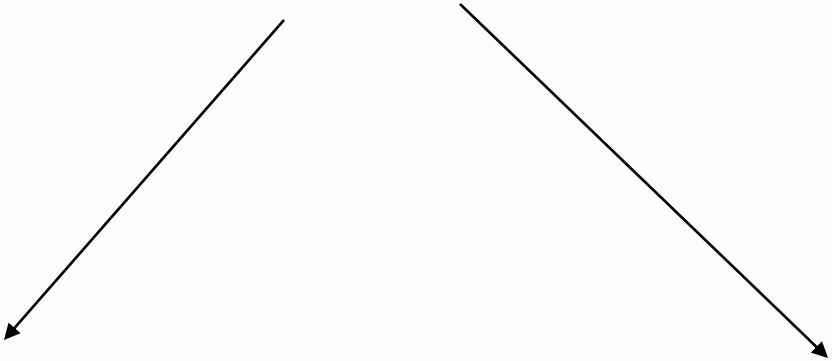
- Who is at risk of becoming ill?
- What is the disease causing the outbreak?
- What is the source of infection?
- What is the mode of transmission?

**Compare hypotheses with facts**

# 5. Formulation of hypothesis (3)

Test specific hypotheses

Analytical epidemiological studies
Test specific hypotheses
Formulation



Cohort

Cohort: a well-defined group of people who have had a common experience or exposure. eg all attended the same dinner

Case-control

Starts with effect disease) and looks for cause(exposure)
- Cases (with disease) are identified
- Controls are chosen for comparison
- Uses retrospective data
- Useful for analysis of HAI outbreaks

# Attack rate (AR)

- Risk during an outbreak-

  Usually expressed for the entire epidemic period, from the first to the last case

Eg: Outbreak of cholera in country X in March 1999

- Number of cases = 490
- Population at risk = 18,600
- Attack rate = 2.6%

# Case-fatality (CFR)

**The proportion** of people with a disease who dies from *that disease* during a time period that usually corresponds to the duration of the disease. Used for acute diseases. The cumulative incidence of deaths.

**The risk** of dying from a disease in a time period (the duration of the disease)

**CFR** = $\frac{\text{number of deaths from the disease}}{\text{number of people with the disease}}$

***CFR = 0 to 1, or percent, per million etc., but the period must be stated***

# 6. Implement Prevention/ Control Measures

Implement control measures as soon as possible

May be aimed at agent, source or reservoir

Short or long term

# 6. Implement Prevention/ Control Measures (2)

Basic control measures

Institute as early as possible!

HH
Use effective product eg chlorites

Control the reservoir or source of infection

Remove the source/ thorough cleaning

Interrupt route(s) of transmission

Segregate affected residents
Wear appropriate PPE

Modify host response

Communication
-Staff informed of findings
- additional precautions/measures?

Prevent recurrence

# 8. Refine Hypothesis/Additional Studies

- What control measures – to consider at this point?
- What further studies – you might do?

# 9. Write a Report

- Summary/ Abstract
- Background
- Description of the outbreak
- Methods
- Results
- Discussions
- Lessons Learned
- Recommendations
- Conclusions

# Outbreak Investigation Report:
## Who writes, when, who reads

- Who writes
  - The outbreak investigation team
  - Other authors as assigned
- When
  - When the investigation is ‘complete’
  - When the investigation is ‘ongoing’
- Who reads
  - All agencies involved in outbreak investigation and response
  - Policy making bodies, professional colleagues
  - The public, the lawyers, the media

# Outbreak Investigation Report: What and Why

- What
  - Findings during different stages of outbreak investigation
- Why
  - To document for action
  - Share new insights
  - Provide record of performance
  - To verify and substantiate recommendations

In order to:

  - To enhance quality of investigations
  - prevent future outbreaks
  - assist in investigation and control of similar incidents
  - provide a document for potential legal issues

# Summary

- Effective outbreak management:
- - early reporting /identification
- - rapid implementation of control measures
- - outbreak control team
- - roles and responsibilities
- - communication
- - implement recommendations

# Summary: Steps in Outbreak Investigation

- Verify the diagnosis
- Confirm the outbreak
- Case definition
- Descriptive epidemiology
- Develop a hypothesis
- Test the hypothesis
- Implement Control Measures
- Refine hypothesis / Execute additional studies
- Write and distribute a report

Acknowledgement and thanks for sharing her materials for this presentation:

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MINISTRY OF HEALTH
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# Thank You