

Student Materials

Dr. Wanda B. Better

Phone Interview

Ohio State Health Department Official

Dr. Better places the phone call. The conversation begins with the health department official taking the call.

1. Good morning, Ohio State Health Department this is _____.
2. An increase of how much over what period of time?
3. Ok, that does sound suspicious. Have there been any recent medical advances that would allow for a better diagnosis of pulmonary hemorrhaging compared with previous years?
4. Has there been a sudden increase in the number of people in the region your hospital serves?
5. Dr. Better, have you noticed any similarities between the cases?
6. Really....I'm going to need access to the medical records to verify these cases and look at the addresses. Can you copy the medical records of all infant pulmonary hemorrhaging cases in your hospital over the past 11 years?
7. Did any of these cases result in death of the infant?
8. Were there any other recurrences after the infant was discharged?
9. OK. I'll arrange to come by the hospital to view the medical records. I'll also keep you informed about the status of the investigation. That's all the questions I have now. Thank you for help.

Phone Interview

Dr. Wanda B. Better

(The health department official begins the dialogue)

1. Good morning, my name is Wanda B. Better and I am a doctor over at the Somewhere Town Children's Hospital. I have noticed a sudden increase in infants being admitted to the emergency room for pulmonary hemorrhaging and thought I should report it.
2. I checked our hospital records and found that 12 cases were admitted in the past 2 years alone. Whereas, in the ten years prior we only have 3 cases recorded.
3. That's a great question and I wish that were the case. However, we basically still use the same techniques to diagnose the illness as we did 10 years ago.
4. Since we are a children's hospital we've served all of Eastern Ohio for at least the past 15 years. Though the area's grown, we still see about the same number of children per year.
5. Yes. Of the 12 cases in the past 2 years, nine were male, the majority of cases seemed to come from the East side of town, and most of them lived in a home where a family member smoked.
6. Sure. I'll have those ready within a couple of days.
7. Two of the 12 cases that occurred in the past 2 years. One of those was due to a reoccurrence after the infant was discharged and went back into the home.
8. Yes. A total of 5 including the infant who died.
9. Thank you.

CLUSTER BUSTERS : Student Note Sheet

CASE: Dr. Wanda B. Better

<http://swehsc.pharmacy.arizona.edu/coep/clusterbusters/>

I. DESCRIBE THE CLUSTER & VERIFY THE CASES:

Determine geographic locations, type, number of cases, ages, and time period.

Obtain medical records of disease cases and death certificates.

(You can obtain this information from the introduction, the interviews, your teacher, and the website)

INTERVIEW NOTES: Interview with Dr. Better

Type of Disease (be specific):

Total Number of Disease Cases Reported:

Approximate Ages of People with Disease:

Possible Cluster Locations:

Other Information from the Interview:

Map the Case Locations: Map addresses from the case summary table.

Define Cluster Region – Based on what you see, how might you define the cluster region?

[Outline the defined region with a highlighter or marker]

Cluster Details:

Based on your map and Case Summary Table, list the case numbers to be included in the “cluster” investigation:

What is the defined time period for your investigation? (This is based on the cases)



N ↑
Somewhere Town, Ohio
|-1/2 mile -|

1600

3200

4800

6400

0

1000

2000

3000

4000

5000

6000

12300

12306

12305

Main St.

Quick Ave.

12301

Industrial Ave.

Ohio Rd.

Midwest Blvd.

25th Ave.

12304

12303

33rd Ave.

12355

Somewhere Ave.

12302

City Blvd.

12356

12357

12358

II. RISK ASSESSMENT

Characterize the disease group cases by age and time lived in the defined region. Determine the disease rate for comparison populations (e.g. state, county, zip code, and/or US)

(This information you obtain from the website)
(You may need to calculate some of the averages yourself)

Average Ages (for defined time period):

Age Ranges (for defined time period):

Range of Time Patients Lived at the Location When the Illness Occurred (include gestation time, i.e. 9 months + age):

Identify Some Comparison Populations You Can Use. Briefly Explain Why You Selected Those Populations:

Compare the disease rates of the “cluster” versus the comparison population to determine if you have a real “cluster.”

(This information you obtain from the website)

1. Find the disease incidence rates for the nation and the defined cluster region.
 - a. Disease Incidence Rate for the Nation:

Data Analysis & Statistics Activities

1. Calculate the *Average* and the *Standard Deviation* for the Fungi Air Sample for *Stachybotrys atra*. Use the table below to help guide you.

Year (=sample#)	Number of Cases	Deviation (cases – average)	Deviation Squared (deviation) ²
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
	Sum = Average =		Sum of deviations ² =

Standard Deviation [sum of deviations/(n-1)]:
(n = the number of samples or years)

Are the case and control data significantly different from one another?
(You determine this by adding & subtracting the standard deviation from your sample averages and see if the ranges of the two samples overlap. If they do not overlap then they are different from one another).

2. Using EXCEL, find the *average* and the *standard deviation* for the rest of the fungi data and summarize your results below.

Stachybotrys atra surface samples

	<u>CASE DATA</u>	Control Data
Average		
Standard Deviation	±	±

Are the case and control data significantly different from one another?

Cladosporium spp. air samples

	<u>CASE DATA</u>	Control Data
Average		
Standard Deviation	±	±

Are the case and control data significantly different from one another?

Cladosporium spp. surface samples

	<u>CASE DATA</u>	Control Data
Average		
Standard Deviation	±	±

Are the case and control data significantly different from one another?

IV. DETERMINE CLUSTER SIGNIFICANCE

Determine if this investigation merits further action.

1. Answer the following questions:

- a. Does the cluster disease incidence rate significantly exceed the comparison population incidence rate?
- b. Was the disease population exposed to any known environmental or occupational contaminants?
- c. If an exposure did occur, is there a biological link between the disease and the contaminant?

2. Refer to your answers to the above questions and to the “Cluster Significance Chart” to determine if further action is recommended.

- a. High Disease Rate (Yes or No):
- b. Documented Exposure (Yes or No):
- c. Biologic Plausibility (Yes or No):
- d. Further Action Recommended (Yes or No):

V. REPORT RESULTS (Summary)

1. Write your conclusions about the presence of a disease cluster and your recommendations for further action. Justify your conclusions with the information and data you collected.

State Health Department Response Protocol for Reports on Disease Clusters

Adapted from: Fiore, B.J., Hanrahan, L.P., and Anderson, H.A. (1990) State health department response to disease cluster reports: A protocol for investigation. American Journal of Epidemiology, 132, supplement (1), S14-S21.

Use this protocol as a guide for your investigation

Describe the Cluster

Determine geographic locations, type, number of cases, age, time period

Verify the Cases

Obtain medical records of disease cases, death certificates

Risk Assessment

Characterize disease group cases by age and time lived in defined region. Determine comparison population's disease rate (via state, county, zip code, or US census)

Statistically Analyze Disease Rates

Compare the disease rates of the "cluster" vs. the comparison population

Examine Potential Exposure

Investigate environmental or occupational exposures

Determine if the Disease is

Biologically Plausible

Does the type of disease match the exposure?

Determine Cluster Significance

Determine if this investigation merits further action
Refer to the "Cluster Significance Chart"

Report Results

Write a report on the investigation. This is kept on file and used for future reference, especially if a full investigation is done.

Cluster Significance Chart

Use this chart to help you determine if further action is needed for your investigation. If you answer “yes” to more than one of the three criteria (high disease rate, documented exposure, or biologic plausibility), further action is probably needed. You may personally draw a different conclusion, which is fine, just be sure to justify your decision.

High Disease Rate +	Documented Exposure	+ Biologic Plausibility	= Further Action
Yes	Yes	Yes	Yes
Yes	No	Yes	Yes
No	Yes	Yes	Yes
Yes	Yes	No	Yes
No	No	No	No
Yes	No	No	No
No	Yes	No	No

Adapted from: Fiore, B.J., Hanrahan, L.P., and Anderson, H.A. (1990) State health department response to disease cluster reports: A protocol for investigation. *American Journal of Epidemiology*, 132, supplement (1), S14-S21.

Vocabulary

References: Dorland, W.A.N., The American Illustrated Medical Dictionary, 21st Edition, W.B. Saunders Company, 1949.

Webster's II New Riverside University Dictionary, The Riverside Publishing Company, 1988.

1. acute hemoptysis – Severe bleeding for a short duration.
2. anemia – A condition in which the blood is deficient either in quantity or in quality.
3. bilateral pulmonary infiltrates – Foreign material deposited in both lungs.
4. bronchoalveolar lavage - Washing of the broncheal tube and lung air sac.
5. cyanotic – Blueness of the skin.
6. dyspnea – Difficult or labored breathing.
7. endotracheal intubation – Insertion of a tube into the trachea to open breathing passage.
8. erythrocytes – red blood cells
9. etiology – The study or theory of the causation of a disease
10. febrile seizure – seizure associated with a high fever
11. hemoglobinuria – The presence of hemoglobin in the urine.
12. hemosiderosis – A condition when hemosiderin (an iron containing pigment in blood cells) is deposited in the tissues due to the destruction of blood cells. It is generally in indication of chronic, rather than acute, hemorrhaging.
13. hypernatremic – Excessive amount of sodium in the blood.
14. idiopathic – of unknown causation.
15. jaundice – A syndrome characterized by deposition of bile pigment in the skin and mucous membranes resulting in a yellow appearance.
16. pallor – extreme or abnormal paleness.
17. pleural effusions – bloody fluid in one or both of the membranous sacs which line either side of the thoracic cavity and envelopes the adjacent lung.
18. pneumonia- an acute or chronic disease caused by viruses, bacteria, or physical and chemical agents and characterized by inflammation of the lungs.
19. pneumothorax – accumulation of air or gas in the pleural cavity, occurring as a result of injury or disease.
20. polycythemia – a condition characterized by an abnormally large number of red cells in the blood.
21. pulmonary hemorrhage – Bleeding in the lungs.
22. trachea – Tube extending from the larynx to the bronchi and carrying air to the lungs.
23. sickle cell anemia – A disease marked by anemia and by ulcers and characterized by the red blood cells of the patient a sickle-like or crescent shape. This disease is hereditary and appears to be confined to the black population.
24. sudden infant death syndrome – The unexpected death of an apparently healthy infant that usually occurs during the first four months of life while the infant is sleeping.