Making the Case

Name: _____ Date: _____

Directions
Dr. Alison, one of CDC's disease detectives, interviews Eddie's family, primary care providers, and friends while at the hospital. Eddie's family and primary care providers describe Eddie's clinical signs and symptoms, such as fever (measured temperature of 100°F or greater), cough, and muscle aches. They also provide information about Eddie's other health condition, asthma. Preexisting health conditions, like asthma, can put a person at a higher risk for developing severe disease.

Eddie's friends provide information on what activities Eddie was involved with at the Thomas County Fair. They provide important epidemiologic information on place (i.e., the geographic location of where Eddie recently visited, such as visiting the animal areas at the fair); and time (i.e., when Eddie may have been exposed and infected), such as before or during the Thomas County Fair and when Eddie started showing clinical signs and symptoms of infection.

After collecting some initial information, Dr. Alison and the other disease detectives work together to create a case definition. They will use the case definition to see if anyone else who is ill should be included in the investigation.

A **case definition** is a set of uniformly applied criteria for determining whether an event (e.g., disease or injury) should be considered as part of the outbreak. A case definition often includes medical features (e.g., clinical signs and symptoms), epidemiologic information, and laboratory test results. Epidemiologic information can include criteria on the demographic characteristics such as sex and age (i.e., person), geographic location of where an ill person lives or visited recently (i.e., place), and onset of clinical signs and symptoms (i.e., time).

Reread pages 37–40 of CDC's *The Junior Disease Detectives, Operation: Outbreak* graphic novel. Then, use Eddie's case to write an initial case definition for the outbreak investigation. Remember to include medical features—clinical signs and symptoms and epidemiologic information—person, place, time.

Initial Case Definition

Case Reports

Name: _____ Date: _____

Directions: On pages 40–41, Dr. Alex, a CDC EIS officer, asks Andy Duncan, the Thomas County Fair director, if he is aware of any illness reported among people who attended the fair. Mr. Duncan explains that a few people told him that they or someone in their family got sick with some kind of respiratory bug after the fair.

Dr. Alex suspects that these may be additional cases in this outbreak. Dr. Alex requests the contact names and telephone numbers to follow up with the three additional patients. He uses a case report form to make sure he asks the right questions.

1. Read through the completed case report forms provided. Generate a possible hypothesis about if Eddie and the other patients' illness might be linked. Consider the medical features (i.e., clinical signs and symptoms) and epidemiologic information (i.e., person, place, and time) as clues.

   Hypothesis Generation

2. Use your hypothesis to update your case definition.

   Case Definition 2.0

Eddie

Interviewer: EIS officer, Dr. Alison **Interview date:** 9/19

Demographics

Sex: Male **Age:** 17 years **City, State:** Slayerville (Thomas County)

Clinical signs and symptoms

Fever ≥100ºF?	✓ Yes	☐ No	☐ Unknown	**Onset?** 9/17
Cough?	✓ Yes	☐ No	☐ Unknown	**Onset?** 9/14
Sore throat?	✓ Yes	☐ No	☐ Unknown	**Onset?** 9/15
Muscle Aches?	✓ Yes	☐ No	☐ Unknown	**Onset?** 9/17

Epidemiologic risk factors

Attended fair?	✓ Yes	☐ No	☐ Unknown	**Date?** 9/14
Date(s) attended	✓ On the day of illness onset ☐ 1 day before illness onset	☐ 2 days before illness onset ☐ 3 days before illness onset	☐ 4 days before illness onset ☐ 5 days before illness onset	☐ 6 days before illness onset ☐ 7 days before illness onset
Sick before the fair?	☐ Yes	✓ No	☐ Unknown	
Direct contact with (touch, pet, or kiss) livestock animal?	☐ Horses ☐ Cows	☐ Goats ☐ Poultry	☐ Sheep ✓ Pigs or hogs	☐ Other ☐ No Contact
Where did direct contact occur?	✓ Home ☐ Work	✓ Fair ☐ Petting Zoo	☐ Live Animal Market	☐ Other
Indirect contact with (walk through or come within 6 feet of) livestock animals?	☐ Beef or Dairy Barn ☐ Horse Barn ✓ Poultry Barn	☐ Sheep or Goat Barn ✓ Swine Barn ☐ Horse Arena	✓ Practice Ring A ☐ Practice Ring B	☐ Arena A ☐ Arena B ✓ Other: Home Barn ☐ No Contact
Where did indirect contact occur?	✓ Home ☐ Work	☐ Work ✓ Fair	☐ Live Market ☐ Petting Zoo	☐ Other

Influenza testing

Result	☐ Influenza A ☐ Influenza B	☐ Influenza A/B (not distinguished)	☐ Negative ☐ Other	✓ Not yet known
If influenza A, what is the subtype?	☐ Human seasonal influenza A (H1N1) ☐ Influenza A (H1N1) variant ☐ Avian influenza A (H5N1)	☐ Human seasonal influenza A (H3N2) ☐ Influenza A (H1N2) variant	☐ Avian influenza A (H7N2) ☐ Influenza A (H3N2) variant	☐ Avian influenza A (H7N9) ☐ Other __ ✓ Not yet known

Patient A

Interviewer: EIS officer, Dr. Alex **Interview date:** 9/19

Demographics

Sex: Female **Age:** 16 years **City, State:** Archerville (Thomas County)

Clinical signs and symptoms

Fever ≥100ºF?	✓ Yes	☐ No	☐ Unknown	**Onset?** 9/16
Sore throat?	✓ Yes	☐ No	☐ Unknown	**Onset?** 9/15
Cough?	✓ Yes	☐ No	☐ Unknown	**Onset?** 9/15
Muscle Aches?	✓ Yes	☐ No	☐ Unknown	**Onset?** 9/16

Epidemiologic risk factors

Attended fair?	✓ Yes	☐ No	☐ Unknown	**Date?** 09/15
Date(s) attended	✓ On the day of illness onset ☐ 1 day before illness onset	☐ 2 days before illness onset ☐ 3 days before illness onset	☐ 4 days before illness onset ☐ 5 days before illness onset	☐ 6 days before illness onset ☐ 7 days before illness onset
Sick before the fair?	☐ Yes	✓ No	☐ Unknown	
Direct contact with (touch, pet, or kiss) livestock animal?	☐ Horses ✓ Cows	☐ Goats ☐ Poultry	☐ Sheep ✓ Pigs or hogs	☐ Other ☐ No Contact
Where did direct contact occur?	✓ Home ☐ Work	✓ Fair ☐ Petting Zoo	☐ Live Animal Market	☐ Other
Indirect contact with (walk through or come within 6 feet of) livestock animals?	✓ Beef or Dairy Barn ☐ Horse Barn ☐ Poultry Barn	☐ Sheep or Goat Barn ✓ Swine Barn ☐ Horse Arena	✓ Practice Ring A ☐ Practice Ring B	✓ Arena A ☐ Arena B ✓ Other: Home Barn ☐ No Contact
Where did indirect contact occur?	✓ Home ☐ Work	☐ Work ✓ Fair	☐ Live Market ☐ Petting Zoo	☐ Other

Influenza testing

Result	☐ Influenza A ☐ Influenza B	☐ Influenza A/B (not distinguished)	☐ Negative ☐ Other	✓ Not yet known
If influenza A, what is the subtype?	☐ Human seasonal influenza A (H1N1) ☐ Influenza A (H1N1) variant ☐ Avian influenza A (H5N1)	☐ Human seasonal influenza A (H3N2) ☐ Influenza A (H1N2) variant	☐ Avian influenza A (H7N2) ☐ Influenza A (H3N2) variant	☐ Avian influenza A (H7N9) ☐ Other _____ ✓ Not yet known

Patient B

Interviewer: EIS officer, Dr. Alex **Interview date:** 9/19

Demographics

Sex: Male **Age:** 14 years **City, State:** Germ town (Thomas County)

Clinical signs and symptoms

Fever ≥100ºF?	✓ Yes	☐ No	☐ Unknown	**Onset?** 9/17
Sore throat?	✓ Yes	☐ No	☐ Unknown	**Onset?** 9/17
Cough?	✓ Yes	☐ No	☐ Unknown	**Onset?** 9/17
Muscle Aches?	☐ Yes	☐ No	✓ Unknown	**Onset?** N/A

Epidemiologic risk factors

Attended fair?	✓ Yes	☐ No	☐ Unknown	**Date(s)?** 9/14, 9/15
Date(s) attended	☐ On the day of illness onset ☐ 1 day before illness onset	✓ 2 days before illness onset ✓ 3 days before illness onset	☐ 4 days before illness onset ☐ 5 days before illness onset	☐ 6 days before illness onset ☐ 7 days before illness onset
Sick before the fair?	☐ Yes	✓ No	☐ Unknown	
Direct contact with (touch, pet, kiss) livestock animal?	☐ Horses ☐ Cows	☐ Goats ☐ Poultry	☐ Sheep ☐ Pigs or hogs	☐ Other ✓ No Contact
Where did direct contact occur?	☐ Home ☐ Work	☐ Fair ☐ Petting Zoo	☐ Live Animal Market	☐ Other
Indirect contact with (walk through or come within 6 feet of) livestock animals?	☐ Beef/ Dairy Barn ☐ Horse Barn ☐ Poultry Barn	✓ Sheep or Goat Barn ✓ Swine Barn ☐ Horse Arena	☐ Practice Ring A ☐ Practice Ring B	✓ Arena A ✓ Arena B ☐ Other: Home Barn ☐ No Contact
Where did indirect contact occur?	☐ Home ☐ Work	☐ Work ✓ Fair	☐ Live Market ☐ Petting Zoo	☐ Other

Influenza testing

Result	✓ Influenza A ☐ Influenza B	☐ Influenza A/B (not distinguished)	☐ Negative ☐ Other	☐ Not yet known
If influenza A, what is the subtype?	☐ Human seasonal influenza A (H1N1) ☐ Influenza A (H1N1) variant ☐ Avian influenza A (H5N1)	☐ Human seasonal influenza A (H3N2) ☐ Influenza A (H1N2) variant	☐ Avian influenza A (H7N2) ☐ Influenza A (H3N2) variant	☐ Avian influenza A (H7N9) ☐ Other _____ ✓ Not yet known

Patient C

Interviewer: EIS officer, Dr. Alex **Interview date:** 9/19

Demographics

Sex: Male **Age:** 41 years **City, State:** Slayerville (Thomas County)

Clinical signs and symptoms

Fever ≥100ºF?	✓ Yes	☐ No	☐ Unknown	**Onset?** 9/14
Sore throat?	✓ Yes	☐ No	☐ Unknown	**Onset?** 9/14
Cough?	☐ Yes	✓ No	☐ Unknown	**Onset?** N/A
Muscle aches?	✓ Yes	☐ No	☐ Unknown	**Onset?** 9/15

Epidemiologic Risk Factors

Attended fair?	✓ Yes	☐ No	☐ Unknown	**Date(s)?** 9/14, 9/15, 9/16
Date(s) attended	✓ On the day of illness onset ☐ 1 day before illness onset	☐ 2 days before illness onset ☐ 3 days before illness onset	☐ 4 days before illness onset ☐ 5 days before illness onset	☐ 6 days before illness onset ☐ 7 days before illness onset
Sick before the fair?	☐ Yes	☐ No	✓ Unknown	
Direct contact with (touch, pet, kiss) livestock animal?	☐ Horses ✓ Cows	☐ Goats ✓ Poultry	☐ Sheep ✓ Pigs or hogs	☐ Other ☐ No Contact
Where did direct contact occur?	✓ Home ☐ Work	✓ Fair ☐ Petting Zoo	☐ Live Animal Market	☐ Other
Indirect contact with (walk through or come within 6 feet of) livestock animals?	✓ Beef or Dairy Barn ☐ Horse Barn ✓ Poultry Barn	☐ Sheep or Goat Barn ✓ Swine Barn ☐ Horse Arena	✓ Practice Ring A ☐ Practice Ring B	✓ Arena A ✓ Arena B ✓ Other: Home Barn ☐ No Contact
Where did indirect contact occur?	☐ Home ☐ Work	☐ Work ✓ Fair	☐ Live Market ☐ Petting Zoo	☐ Other

Influenza Testing

Result	☐ Influenza A ☐ Influenza B	☐ Influenza A/B (not distinguished)	✓ Negative ☐ Other	☐ Not yet known
If influenza A, what is the subtype?	☐ Human seasonal influenza A (H1N1) ☐ Influenza A (H1N1) variant ☐ Avian influenza A (H5N1)	☐ Human seasonal influenza A (H3N2) ☐ Influenza A (H1N2) variant	☐ Avian influenza A (H7N2) ☐ Influenza A (H3N2) variant	☐ Avian influenza A (H7N9) ☐ Other ☐ Not yet known

Case Classifications

Name: _____ Date: _____

A more detailed case definition typically includes **case classifications** — suspected, probable, or confirmed. CDC provides a case definition for novel influenza A virus infections[1] to help disease detectives determine if patient illnesses can be classified as a case of novel influenza A virus infection or not.

Suspected
A case meeting the clinical criteria (fever with measured temperature of 100°F or greater, with cough or sore throat), pending laboratory confirmation. Any case of human infection with an influenza A virus that is different from currently circulating human influenza H1 and H3 viruses is classified as a suspected case until the confirmation process is complete.

Probable
A case meeting the clinical criteria (fever with measured temperature of 100°F or greater, with cough or sore throat) and epidemiologically linked to a confirmed case (i.e., the patient has had contact with one or more persons who either have or had the disease, and transmission of the agent by the usual modes of transmission is plausible), but for which no confirmatory laboratory testing for influenza virus infection has been performed or test results are inconclusive for a novel influenza A virus infection.

Confirmed
A case of human infection with a novel influenza A virus confirmed by CDC's influenza laboratory or by public health laboratories following CDC-approved protocols. (Note: Although flu has a confirmed case definition that does not require symptoms, the confirmed case definition for other diseases may include clinical illness. For example, the confirmed case definition for other diseases might be "laboratory confirmation of infection in a patient with compatible symptoms".

[1]CDC. Novel Influenza A Virus Infections, 2014 Case Definition. Available at: https://wwwn.cdc.gov/nndss/conditions/novel-influenza-a-virus-infections/case-definition/2014/

1. At each point in time, identify to what extent Eddie meets the case definition for a novel influenza A virus infection. Justify your answer.

Date	Classification	Justification
Friday, Sept. 14–Monday, Sept. 17 **(p. 16–26)**	□ Not a case □ Suspected □ Probable □ Confirmed	
Early Wednesday, Sept. 19 **(p. 29–41)**	□ Not a case □ Suspected □ Probable □ Confirmed	
Later Wednesday Sept. 19 **(p. 42–48)**	□ Not a case □ Suspected □ Probable □ Confirmed	

2. Case classifications allow disease detectives to identify the likelihood that other patient's illnesses are associated with the outbreak. Assume that Eddie's case has been confirmed as a novel influenza A virus infection. Based on the information provided in the case report forms, classify Patients A, B, and C.

	□ Not a case □ Suspected □ Probable □ Confirmed
	□ Not a case □ Suspected □ Probable □ Confirmed
	□ Not a case □ Suspected □ Probable □ Confirmed