

Epidemiology



New for 2016-2017

A new website from the Office of Assistant Secretary for Preparedness and Response has been added for Public Health Emergencies. Test plan has been changed to better align with resources.

Purpose: To encourage HOSA members to study the effects of health and disease in populations, to improve their scientific literacy, and to provide insights into public health careers.

Description This event shall be a written examination of concepts related to the study of epidemiology. Individual competitors shall be expected to recognize, identify, define, interpret and apply these concepts in a 50-item multiple-choice test and in written responses to a case study.

Dress Code: Competitors must be in official HOSA uniform or in proper business attire. Bonus points will be awarded for proper dress.

- Rules and Procedures**
1. Competitors in this event must be active members of HOSA in good standing in the category division in which they are registered to compete (Secondary or Postsecondary/Collegiate).
 2. Competitors must be familiar with and adhere to the "General Rules and Regulations of the National HOSA Competitive Events Program (GRR)."
 3. The test will consist of fifty (50) multiple-choice items, AND a case study consisting of between five (5) and twenty (20) short answer questions worth 50% of the final total score.
 4. The official references for the development of all test items and the case study will be entirely web-based.

- **CDC Websites**

- <http://www.cdc.gov/ophss/csels/dsepd/ss1978/lesson1/index.html>
 - <http://www.cdc.gov/ophss/csels/dsepd/ss1978/lesson6/section2.html>

- **Young Epidemiology Scholars**

- <http://yes-competition.org/yes/epidemiology-resources.html>
 - <http://yes-competition.org/yes/epidemiology-resources/glossary.html>
 - <http://yes-competition.org/yes/teaching-units/intellectual-framework.html>

- **Basic Epidemiology – World Health Organization**

- http://apps.who.int/iris/bitstream/10665/43541/1/9241547073_eng.pdf

- **Emerging and Re-emerging Infectious Diseases**

- http://science.education.nih.gov/supplements/nih1/diseases/guide/pdfs/NIH_Diseases.pdf

- **Public Health Careers**

- <http://www.publichealth.org/careers/>

- **CDC: Disaster Epidemiology and Assessment**
<http://www.cdc.gov/nceh/hsb/disaster/epidemiology.htm>
- **Office of Assistant Secretary for Preparedness & Response**
<http://www.phe.gov/preparedness/Pages/default.aspx>

5. The test plan for the multiple choice items is listed below and separated by website:

CDC website

- An Introduction to Epidemiology 10%
- Steps of an Outbreak Investigation 10%

Young Epidemiology Scholars website

- Intellectual Framework 15%
- Epidemiology glossary 10%

Basic Epidemiology – World Health Organization

- *What is Epidemiology?* 15%
- Measuring Health and Disease
- Types of Studies

Emerging and Re-emerging Infectious Diseases (NIH website)

- Understanding Emerging and Re-emerging Infectious Diseases 15%

Public Health Careers

- Careers in public health 5%

Disaster Epidemiology and Assessment (CDC website)

- CDC Activities 10%
 - Mission, goals and objectives
 - Application and service in disaster settings: surveillance and rapid needs assessment
 - Applied research to prevent injuries, illnesses and deaths
 - Consultation and training
 - Field investigations

Office of the Assistant Secretary for Preparedness & Response

- Under the preparation tab
- Responders, Clinicians & Practitioners 10%
 - International Preparedness & Response
 - Public Health Emergency Response

6. In addition to the multiple-choice items, competitors will apply their knowledge of epidemiology and investigative skills to an epidemiological scenario in the form of a case study. The written case study will be a part of the test packet, and will include background information about a selected public health situation and a series of short answer questions about the case study. (A sample case study is included with these guidelines. The actual case study used in HOSA competition will be a secret problem.)

7. All competitors shall report to the site of the event at the time designated for the event orientation. The test will immediately follow the orientation. **No proxies will be allowed for the orientation.** Calculators may NOT be used.

8. Test Instructions: The competitors will be given instructions and will be notified to start the test. There will be a maximum of two (2) hours to complete the test and case study. A notice will be given when fifteen (15) minutes are remaining. Competitors should leave the testing site promptly after completion of the test.

NOTE: *States/regions may use a different process for testing, to include but not limited to pre-conference testing, online testing, and testing at a computer. Check with your Area/Region/State for the process you will be using.*

9. The tie-breaker will be the case study score.

Competitor Must Provide:

- Event guidelines (orientation)
- Pens (blue or black ink only to complete case study)
- #2 lead pencils with eraser
- Watch with second hand (optional)

Required Personnel (Per Section):



1. One Event Manager (per event)
2. One Section Leader
3. Two to three Proctors
4. Two Courtesy Corps Members
5. One - Two judges per section
6. One QA to provide quality assurance for the event by ensuring that the guidelines are followed and all event documents are complete.

Facilities, Equipment and Materials (Per Section):

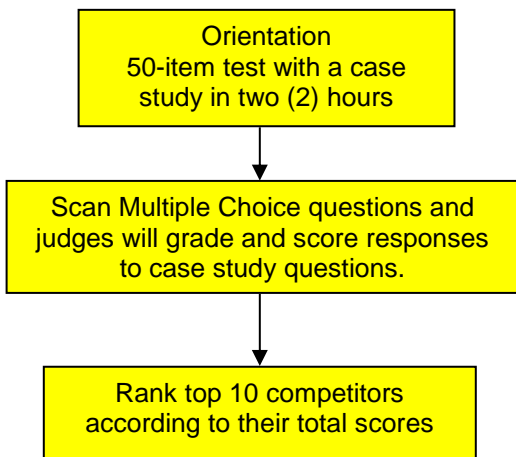
Checklist

- One room to accommodate the total number of competitors
- Tables/chairs or schoolroom desks/chairs for total number of competitors
- Table/chairs for event personnel to provide for registration, and distribution of materials
- Key for judging the case study portion
- Clock or timer
- Test packets pre-numbered and Scantron / answer forms
- Evaluation Forms – competitor, judge, and personnel
- #2 lead pencils with eraser to complete evaluations

Icon Key

	The orientation includes an event element. Competitors must bring pencils.
	Includes a secret topic that may not be discussed or revealed to others until the event has concluded.

Event Flow Chart



Sample Multiple Choice Test Questions

1. The portion of the incidence of a disease in the exposed that is due to the exposure is:
 - A. attributable risk.
 - B. cohort study.
 - C. risk benefit.
 - D. benefit group.
2. If a study is designed to determine the number of pregnancies during the junior year of high school and *only* includes minority populations, the study is said to be:
 - A. biased.
 - B. confounded.
 - C. limited.
 - D. nonessential.
3. The re-emergence of some infectious diseases, such as the diphtheria outbreak in Russia in the 1990s, is caused by:
 - A. improper sanitation.
 - B. lapses in vaccination programs.
 - C. malnutrition which compromises the immune system.
 - D. radiation from nuclear accidents.

Sample Case Study

Disease Investigation --- Maryland, 2008

In the late night hours of July 8, 2008, six adult family members were admitted to a hospital emergency department in Maryland with hallucinations, confusion, mydriasis, and tachycardia of approximately 3--4 hours duration. The six affected persons came from one family and included three men and three women ranging in age from 38 to 80 years (median age: 42 years).

At 9:15 pm on July 8, 2008, a 10 year-old child at the home of the victims called a relative to ask for help, stating that "my momma's sick." Approximately 1 hour later, the relative arrived at the home and discovered the six affected family members laughing, confused, and complaining of hallucinations, dizziness, and thirst. One of the family members vomited. The child had no symptoms of illness. The unaffected relative called emergency medical services, and all six adults were transported to the hospital by ambulance.

On admission to the emergency department, two of the six patients were unconscious. The other four were awake and had altered mental status; complete history of meal preparation and food exposures could not be obtained. Physical examinations revealed tachycardia and dilated, sluggishly reactive pupils in five of the six patients. Temperatures ranged from 98.0°F (36.7°C) to 99.4°F (37.4°C). Respirations ranged from 17 to 22 breaths per minute.

During the next 6 hours in the emergency department, the six patients continued to experience tachycardia, mydriasis, and altered mental status. One remained unconscious. The others demonstrated confusion, aggression, agitation, disorganized speech, incoherence, and hallucinations. All six were admitted to the hospital, five to the intensive-care unit. The unaffected relative reported to providers that there was a leftover pot of stew in the kitchen and the adults had eaten the stew for dinner. The child did not eat the stew. Pesticides had been sprayed on mint leaves that might have been incorporated into the stew. However, a treating physician consulted the poison control center hotline and established that the illnesses were not consistent with cholinergic poisoning, as would be expected with ingestion of organophosphate pesticides, but were consistent with anticholinergic poisoning.

Complete blood counts, basic metabolic panels, comprehensive metabolic panels, and urinalysis generally were within normal limits. Urine screenings for amphetamines, barbiturates, benzodiazepines, tetrahydrocannabinol, opiates, phencyclidine, and cocaine were negative among four patients tested.

Over the course of their hospitalizations, the patients' signs and symptoms of anticholinergic toxicity fluctuated. In addition to tachycardia, mydriasis, and altered mental status, two patients experienced urinary retention, and one had a small pleural effusion identified by computed tomography scan. The patients received supportive care, including cardiac monitoring and intravenous fluids. Four of six patients were administered lorazepam to control agitation. None were administered physostigmine. Their neurologic statuses improved during hospitalization and were normal by the time of discharge. Four were discharged on the third hospital day, one on the fourth hospital day, and one on the fifth hospital day, each with a final diagnosis of altered mental status secondary to food poisoning. The patient reported to have eaten the most stew was the slowest to recover and had the longest stay. All patients fully recovered.

On July 9, 2008, MCDHHS and MDHMH began an investigation. At that time, the patients were still too disoriented to provide reliable information. Investigators interviewed unaffected family members about meal

preparation and asked them to collect samples of the plants they thought had been used in the stew. One plant was identified as mint. Interviews with the patients on July 10 confirmed that all patients had consumed the stew and no one else had eaten the stew. The preparer of the stew recalled that it consisted mainly of potatoes but also included garlic, onion, tomato, curry powder, and leaves from two plants growing in the yard. One plant was confirmed to be mint. The meal preparer did not know what the other plant was, only that it grew wild in the yard.

On July 10, the public health investigators and a horticulture expert visited the home, located in a suburban Maryland neighborhood, to verify the stew ingredients and identify any ingredients that could cause anticholinergic poisoning. They found leftover stew, which was green in color with cooked leaves visible in the bottom of the pot. They also discovered plant material in the kitchen trash, identified by the horticulture expert as jimsonweed. In the outdoor location described by the stew preparer, the horticulture expert identified jimsonweed plants with recent cutting marks. They collected plant samples and leftover stew from the home for testing at the Maryland Department of Agriculture Laboratory. Atropine and scopolamine were detected in leftover stew by liquid chromatography-tandem mass spectrometry. Chaconine and solanine, glycoalkaloids normally present in potatoes, also were detected.

Editorial Note

Jimsonweed grows wild and is used as an ornamental plant in much of the United States. It contains alkaloids such as atropine and scopolamine, which can cause anticholinergic toxicity. The concentration of anticholinergics can vary over time and in different parts of a plant, with the seeds having the highest concentration, containing approximately 0.1 mg of atropine per seed. A dosage of ≥ 10 mg of atropine can be fatal. Cooking does not substantially affect the potency of the leaves, and atropine and scopolamine remain intact during baking.

Sample Case Study Questions

Disease Investigation - - Maryland, 2008

1. If you were working in the Maryland Department of Health on the night of July 8, 2008, and had received the call about a possible foodborne illness, what are the 5 MOST IMPORTANT questions you would want to ask?

2. How is this disease distributed and what hypothesis might explain that distribution?

3. What was the agent? _____
4. On a scale of 1 – 10, with 1 being the least virulent, what was the virulence of the agent? _____
5. How many cases would fit in each of the following classes:
 - a. Confirmed cases _____
 - b. Probable cases _____
 - c. Possible cases _____

6. What was the case fatality rate?

7. In the space below, create a contingency table to represent the findings of this disease investigation.

8. In this investigation, does the hypothesis need to be tested? _____ If yes, what type of study should be used: a cohort study or case-control study? _____

9. Is there an association between the hypothesized cause and the disease?

10. What disease prevention strategies could be implemented by the Maryland Department of Health?