DISEASE DETECTIVES B

1. **DESCRIPTION:** Participants will use their investigative skills in the scientific study of disease, injury, health, and disability in populations or groups of people.

   A TEAM OF UP TO: 2

   APPROXIMATE TIME: 50 minutes

   CALCULATOR: Class II

2. **EVENT PARAMETERS:**
   a. Each team may bring writing utensils.
   b. Each team may bring two Class II calculators.
   c. Each team may bring one (1) 8.5" x 11" sheet of paper that may contain information on both sides in any form and from any source. The sheet of paper may be laminated or placed in a sheet protector to increase durability. Affixed labels, as well as multiple sheets of paper (whether in a single sheet protector or not) are prohibited.
3. **THE COMPETITION:**
   a. This event addresses three topics related to disease, injury, health, and disability in populations or groups of people. Each part should count approximately equally towards a team's final score. Questions should be process-oriented and involve skills in evaluation and interpretation. Matching pathogens with specific diseases (i.e. – What causes X disease?) or knowledge of signs, symptoms or epidemiologic characteristics such as incubation or latency periods or infectious dose is not part of this event. However, it is appropriate to provide this information as background information and expect competitors to be able to use it.
   b. The topics for this event are as follows:
      i. Background & Surveillance
         (1) Understand the Clinical Approach (health of individuals) vs Public Health Approach (health of populations).
         (2) Understand the history and development of epidemiology.
         (3) Understand the roles of epidemiology in public health and the steps in solving health problems.
         (4) Understand the Natural History and Spectrum of Disease. Understand in broad terms the impact of infectious (bacterial, viral, fungal, protist and prion diseases) and noninfectious causes of disease (such as accidents, exposures, and toxicities).
         (5) Understand the basic epidemiological and public health terms found in the glossary of CDCs Principles of Epidemiology in Public Health Practice (e.g., outbreak, epidemic, pandemic, surveillance, risk, vector, etc.).
         (6) Understand the role of Surveillance in identifying health problems, the 5-Step Process for Surveillance, the types of surveillance and the attributes of a surveillance system.
      ii. Outbreak Investigation
         (1) Analyze actual or hypothetical outbreaks given in case scenarios.
         (2) Understand Experimental and Observational studies and the Types of Epidemiological Studies – (e.g., case control, cohort, ecological, cross-sectional). Know the advantages and disadvantages of each. Recognize various fundamental study designs and identify which is appropriate to use in analysis of presented outbreak scenarios.
         (3) Identify the Steps in an Outbreak Investigation and how they guide hypothesis generation.
         (4) Identify the problem using person, place, and time triad to formulate case definitions.
         (5) Interpret epi curves, line listings, cluster maps, subdivided tables, PFGE gels, SNP mapping and the PulseNet concept.
         (6) Understand the agent, host, environment triad and chain of transmission.
         (7) Evaluate data by calculating and comparing simple rates and proportions such as attack rate, relative risk, odds-ratio, and explain their meaning. Determine whether presented data support hypotheses of disease within scenarios, and revise hypotheses as appropriate.
         (8) Apply the Bradford Hill Criteria for Verifying the Cause of presented outbreaks. Compare the accuracy of Bradford Hill criteria, Koch's and Evan's postulates, and newer causality models such as Directed Acyclic graphs, Sufficient/component cause models, and GRADE methods.
         (9) **State and Nationals Only: Recognize factors such as study design/biases, errors, and**

confounding that influence results.

(10) **<u>State and Nationals Only:</u> Understand the concept of herd immunity. Know the experimental and observational methods used to calculate vaccine effectiveness and efficacy and be able to use them.**

iii. Patterns, Control, and Prevention
   (1) Identify patterns and trends of epidemiologic data in charts, tables and graphs.
   (2) Using given data, calculate disease risk and frequency ratio, proportion, incidence proportion (attack rate), incidence rate, prevalence death rate and mortality rate.
   (3) Understand the Strategies of Disease Control as they apply to given disease scenarios.
   (4) Understand Strategies for Prevention, including the Scope and Levels of Prevention.

4. **<u>SCORING</u>:**
   a. High Score wins.
   b. Preselected questions will be used as tiebreakers.
   c. Points will be assigned to the various questions and problems. Both the nature of the questions and scoring will emphasize an understanding that is broad and basic rather than detailed and advanced.
   d. Depending on the problem, scoring may be based on a combination of answers, including graphs/charts, explanations, analysis, calculations, and closed-ended responses to specific questions. Critical reasoning skills and data interpretation with hypothesis generation will be evaluated.
   e. Points will be awarded for both quality and accuracy of answers, the quality of supporting reasoning, and the use of proper scientific methods.

In partnership with the Centers for Disease Control (CDC)

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