

Title: Paving the road using preventing medicine for respiratory diseases.

Principal Instructor:
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Abstract:

Emerging pathogens are a global issue of growing concern that should be addressed in the schools. Early detection and prevention of respiratory diseases are a challenge for our developing world; this prevalence has been generating problems in public health worldwide; therefore, the Department of Education of Florida should be working in the life science curriculum in order to arrange a new pattern in community medicine. As a Middle school medical science academy teacher, setting a new module to adjust this purpose will be a challenge for the upcoming academic year. This proposal describes a module that will be included as part of the respiratory system unit in the Medical skills and services class. Basic genetics will be the first step to study (DNA structure and physiology); following by the effects of emerging pathogens and their diverse disorders on the human body. This module will include a discussion of diverse ways of managing respiratory diseases in our community; understanding the interaction between viruses and the immune system, consequences of bioterrorism. In addition, Biotechnology and labs will be a critical component which helps the students to increase their knowledge and experience in the biomedical science field; for instance, Microarray and Enzyme-Linked Immunosorbent Assay (ELISA) simulations. Finally, the students will have the opportunity to visit UF/ FAU campus in order to have a learning experience in the University lab where they will perform a DNA extraction, PCR, and verification of PCR using gel electrophoresis. In conclusion, the students will work in groups to choose randomly an emerging pathogen related with respiratory diseases, finding ways to prevent the development of this disease.

Mission Statement:

In order to be aware about the threat of these crucial incidents, students must increased their knowledge and understanding of the growing cases of FLU and related respiratory diseases that affect the majority of the student population. The students will be mindful of learning strategies to stay healthy and know how to prevent the development of any type of respiratory diseases associated with emerging pathogens.

Description of Teaching Unit:

To have a better idea of the background my students had about genetics, emerging pathogens, and biotechnology, I will perform a pre-assessment test at the beginning and a post-assessment test at the end of the module. Based on the knowledge about Health Occupations (introduction of different types of Medical careers) learned by the Medical Science Academy students, I will introduce the basic of genetics and the main procedures in biotechnology. The etiology and

major vectors concerning emerging pathogens related with respiratory disorders will be critical to achieve our goal in this module. All these will be taught during twelve class periods.

Objectives

Students will be able to:

1. Learn the basics of generics(molecular science)
2. Understand how biotechnology is related to genetics and emerging pathogens
3. Comprehend the antigen - antibody interaction through the Microarray simulation.
4. Compare and contrast the effects of emerging pathogens in the respiratory system with other systems.
5. Collaborate finding ways to prevent and detect respiratory diseases in early stages.
6. Develop a critical thinking about the interaction of emerging pathogens and immune system.
7. Criticize and create an input in community medicine concerning bioterrorism.
8. Set up diverse biotechnology techniques (PCR, gel electrophoresis, DNA extraction).
9. Created their own brochures concerning methods of transmission and prevention of the most common respiratory diseases.
10. Educate and aware the community on emerging pathogens and their effect in respiratory disorders, and ways to prevent the transmission of these diseases.
11. Interact with high school Medical Academy students in order to improve skills and critical thinking related to the project-basic research.

The following is a proposed schedule for the completion of this module:

- **Day 1**

Pretest assessment: students will be tested on basic knowledge about genetics, emerging pathogens and biotechnology.

Introduction of basic genetics: explanation of DNA structure. Activity: hands on: double helical model

- **Day 2**

Lecture regarding biotechnology application in genetics and emerging pathogens

- **Day 3**

Activity: Microarray simulation kit lab.

- **Day 4**

Lecture summarizing the effects of emerging pathogens in the respiratory system.

- **Day 5**

Community medicine: Debate: students will talk about finding different ways to prevent and detect respiratory diseases in early stages.

- **Day 6**

Lecture and discussion about interaction of emerging pathogens, respiratory diseases, and the immune system.

- **Day 7**

Students will be aware of the consequences of emerging pathogens in the community, methods of prevention. Discovery Education video (Bioterrorism)

- **Day 8**

Early diagnosis (Biotechnology procedure) – ELISA simulation.

- **Day 9**

Field trip: Students will have the opportunity to interact with scientist at UF/FAU University in order to perform hands on activity labs (DNA extraction, PCR, gel electrophoresis).

- **Day 10**

Improve critical thinking with a project research regarding emerging pathogens and respiratory diseases. The students will emphasize methods of transmission and prevention (Brochure).

- **Day 11**

Closing activity: pre-med track students Medical Science Academy, Lake Work (Dr. Jairo Garcia) will visit our school in order to share their projects and learning experience with my students.

- **Day 12**

Posttest assessment: students will be test in order to know how much understanding and consciousness they have about what they learned.

Expertise and Contribution of the Principal Instructor

I graduated as a Dentist in an excellent university in Colombia (South America); afterwards, I worked in health education for a few years. In addition my expertise and knowledge in the medical arena were improved at the Medical office (Palm Beach District). Currently I have been working as an educator and would like to be successful in the Medical Science Academy, forming the new generation. My excellent academic background in health science and the intensive training in community medicine allow me to attain my goals and the student's achievements. ICORE seminar program regarding emerging pathogens has been an outstanding experience in the last two weeks; therefore, the combination of knowledge and experience acquired will be the output for my pupils in the upcoming academic year.

Materials

Bio-Rad Laboratories, Inc. (2008). Bio-Rad Laboratories. Retrieved June 24 2009 from <http://222.bio-rad.com/>. Budget and Budget Justification. Bio-Rad ELISA Immuno Explorer Kit (Catalog # 166-2400EDU) \$150.00 166-2400EDU.

Immunology classroom study kit, includes antigen, antibodies, HRP enzyme substrate, 10x PBS, 10% Tween, pipets, test tubes, bottles/caps, microplates, curriculum, for 48 students; education use only Bio-Rad 50 µl Fixed-Volume Micropipette, blue (Catalog # 166-0515EDU) \$31.00 x 8 . Bio-Rad BR-35 Pipette Tips (Catalog # 223-9035EDU) \$31.00

TOTAL \$438, 00

The Bio-Rad ELISA Immuno Explorer Kit is an integral part of the unit on Molecular Genetics. This laboratory activity will provide the students with a vital hands-on experience using this technique. The micropipettes and micropipette tips are required to complete the Immuno Explorer activity as presented in the kit.

Field Trip: UF/FAU

Literature:

Frederick Southwick, M.D. Professor of Medicine University of Florida

www.epi.ufl.edu/?q=node/31

Dr. Paul Gibbs, College of Veterinary Medicine University of Florida "Continental Viral Invaders of the 21st Century"

ICORE conference 2009 Dr. Grant McFadden "Viruses and the Immune System"

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