

Academy of Health Professions

Structure and Functions of the Human Body

Length of Course-I semester

Overview

Students continue the study of human body systems that was begun in Course 1. The activities, projects and problems emphasize the structural and functional interactions between body systems in normal and abnormal, or disease, states. Through case studies, students investigate the ways in which the body maintains homeostasis and responds to the external environment.

This course is built around five distinct case studies, each of which focuses on a different health-related theme. In each case study, one or more health issues affecting multiple body systems are presented and discussed. Activities, projects and problems allow students to further investigate the ways in which the body systems work together to prevent disease states, what goes wrong in body systems during disease, and how body systems respond to the environment and disease states. Treatment options for specific diseases are also explored, in the context of the body's responses to these treatments.

Unit I-A Case of the Flu?

This case study is centered on the experiences of Kate, a fictitious newly qualified **Physician's assistant** who is beginning her first day of employment in this role. Unfortunately she is beginning her new job in the middle of a H1N1 epidemic, which brings her some specific challenges.

Through this 11-part case study, students will examine the role of both a **Physician's assistant** and a **respiratory therapist**. They will also explore many issues raised by the H1N1 epidemic, such as its affect on body systems, as well as the medical complications which can arise. They will also practice infection control procedures and discuss the efficacy and ethics of vaccination.

Case Study Learning Objectives:

After completing this case study students will be able to:

1.1 First Day Nerves

- Differentiate between a pandemic and an epidemic
- Recognize the level of education required for a career as a **Physician's Assistant**
- Describe the role and responsibilities of a **Physician's Assistant** in a healthcare setting.

1.2 Infant Swine Flu

- Identify the causative organism associated with common infections
- Select the most appropriate type of isolation for common hospital infections
- Adopt the appropriate personal protective equipment for each type of infection
- Utilize appropriate hand hygiene procedures for infection control

1.3 Infant Examination

- Identify the causative organism associated with H1N1
- Understand the effect of viral infections on body systems
- Be familiar with the treatment of viral infections

1.4 Infant Ear Infections

- Explain why the anatomy and physiology of infants makes them susceptible to ear infections
- Describe any complications of infections in infants

1.5 I Can't Breathe!

- Understand how the structure of the respiratory system relates to its function
- Analyze the affect of the environment and infection on the respiratory system

1.6 Asthma Management

- Describe the effect of asthma medication on the respiratory system
- Identify antiviral medications
- Recognize the level of education required for a career as a **Respiratory Therapist**
- Describe the role and responsibilities of a **Respiratory Therapist** in a healthcare setting

1.7 Get the Shot!

- Understand the ethical issues surrounding compulsory vaccination
- Read, understand, evaluate and interpret a wide variety of media, including research reports, related to health care issues

1.8 Drug Safety

- Understand the role of the FDA in drug safety
- Read, understand, evaluate and interpret a wide variety of media, including research reports, related to health care issues

1.9 Vaccine Safety

- Explain the role of antibodies in fighting infection
- Describe how vaccines protect against disease
- Discuss the safety of vaccines

1.10 The Importance of Vaccination

- Make decisions based upon scientific facts
- Use scientific facts to make recommendations
- Describe the benefits of population vaccination

Relevant National Healthcare Foundation Standards

- Standard 1: Academic Foundation: Healthcare professionals will know the academic subject matter required for proficiency within their area. They will use this knowledge as needed in their role. The following accountability criteria are considered essential for students in a health science program of study.

1.1 Human Structure and Function

- **Accountability Criteria 1.11** – Classify basic functional and structural organization of the human body (chemical, cellular, tissue, organ, and system).
- **Accountability Criteria 1.13** – Analyze basic structure and function of the human body

1.2 Diseases and Disorders

- **Accountability Criteria 1.21** – Describe common diseases and disorders of each body system (prevention, pathology, diagnosis, and treatment).
- **Accountability Criteria 1.22** – Recognize emerging diseases and disorders.
- **Accountability Criteria 1.23** – Investigate biomedical therapies as they relate to prevention, pathology, and treatment of disease.

Standard 4: Employability Skills – Healthcare professionals will understand how employability skills enhance their employment opportunities and job satisfaction. They will demonstrate key employability skills and will maintain and upgrade skills, as needed.

4.3 Career Decision-making

- **Accountability Criteria 4.31** – Compare careers within the health science career pathways (diagnostic services, therapeutic services, health informatics, support services, or biotechnology research and development).
- **Accountability Criteria 4.32** – Recognize levels of education, credentialing requirements, employment opportunities, workplace environments, and career growth potential.

4.4 Employability Preparation

- **Accountability Criteria 4.41** – Develop components of a personal portfolio.
- **Accountability Criteria 4.42** – Demonstrate process for obtaining employment.

6: Safety Practices Ethics

Healthcare professionals will understand accepted ethical practices with respect to cultural, social, and ethnic differences within the healthcare environment. They will perform quality healthcare delivery.

6.1 Ethical Boundaries

- **Accountability Criteria 6.11** – Differentiate between ethical and legal issues impacting healthcare.
- **Accountability Criteria 6.12** – Compare personal, professional, and organizational ethics.
- **Accountability Criteria 6.13** – Recognize ethical issues and their implications related to healthcare.

6.2 Ethical Practice

- **Accountability Criteria 6.21** – Apply ethical behaviors in healthcare.
- **Accountability Criteria 6.22** – Apply procedures for reporting activities and behaviors that affect health, safety, and welfare of others

6.3 Cultural, Social, and Ethnic Diversity

- **Accountability Criteria 6.31** – Understand religious and cultural values as they impact healthcare.
- **Accountability Criteria 6.32** – Demonstrate respectful and empathetic interactions with diverse age, cultural, economic, ethnic, and religious groups.

Standard 7: Safety Practices

Healthcare professionals will understand the existing and potential hazards to clients, co-workers, and self. They will prevent injury or illness through safe work practices and follow health and safety policies and procedures.

7.1 Infection Control

- **Accountability Criteria 7.11** – Explain principles of infection control.
- **Accountability Criteria 7.12** - Describe methods of controlling growth of microorganisms.

7.2 Personal Safety

- **Accountability Criteria 7.21** – Apply personal safety procedures based upon Occupational Safety and Health Administration (OSHA) and Centers for Disease Control (CDC) regulations (including standard precautions).
- **Accountability Criteria 7.22** – Apply principles of body mechanics and ergonomics.

7.3 Environmental Safety

- **Accountability Criteria 7.31** - Apply safety techniques in the work environment

Standard 9: Health Maintenance Practices – Healthcare professionals will understand the fundamentals of wellness and the prevention of disease processes. They will practice health behaviors among the clients.

9.1 Healthy Behaviors

- **Accountability Criteria 9.11** - Apply behaviors that promote health and wellness.
- **Accountability Criteria 9.12** – Describe strategies for prevention of diseases including health screenings and examinations.
- **Accountability Criteria 9.13** – Apply practices that promote prevention of disease and injury.
- **Accountability Criteria 9.14** – Apply appropriate safety practices as related to high-risk behaviors.
- **Accountability Criteria 9.15** – Discuss complementary and alternative health practices.

Unit II Mental Illness

This case study is centered on a teenager, Kristen, who has an eating disorder. As students observe the effects on Kristen's body, they will learn about the structure and function of different body systems. In addition, they will investigate mental health issues such as how mood affects what we eat, as well how body images are portrayed and perceived.

Case Study Learning Objectives:

After completing this case study students will be able to:

2.2 Pregnant!

- Describe the female reproductive cycle
- Explain how hormones regulate the female reproductive cycle
- Understand how disturbances in hormone levels lead to female reproductive disorders.

2.3 Comfort Food

- Determine if their mood affects what they eat
- Present data graphically
- Analyze data to recognize trends and make recommendations

2.4 Calories

- Discuss the calorie content of foods
- Conduct an experiment to determine the calorie content of foods
- Analyze data to recognize trends and make recommendations
- Make informed diet choices based upon calorie content.

2.5 Body Image

- Use Body Mass Index (BMI) values to determine the weight status of an individual
- Discuss how body images are portrayed in the media
- Explain the basis of eating disorders
- Correlate the structure of the brain with its function

2.6 Extreme Weight Loss

- Describe the effect of starvation on the different body systems
- Discuss the medical complications of eating disorders

Relevant National Healthcare Foundation Standards

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1.1 Human Structure and Function

- **Accountability Criteria 1.11** – Classify basic functional and structural organization of the human body (chemical, cellular, tissue, organ, and system).

- **Accountability Criteria 1.13** – Analyze basic structure and function of the human body.

1.2 Diseases and Disorders

- **Accountability Criteria 1.21** – Describe common diseases and disorders of each body system (prevention, pathology, diagnosis, and treatment).
- **Accountability Criteria 1.23** – Investigate biomedical therapies as they relate to prevention, pathology, and treatment of disease.

1.3 Medical Mathematics

- **Accountability Criteria 1.31** – Apply mathematical computations related to healthcare procedures (metric and household, conversions and measurements).
- **Accountability Criteria 1.32** – Analyze diagrams, charts, graphs, and tables to interpret healthcare data.

Standard 4: Employability Skills – Healthcare professionals will understand how employability skills enhance their employment opportunities and job satisfaction. They will demonstrate key employability skills and will maintain and upgrade skills, as needed.

4.4 Employability Preparation

- **Accountability Criteria 4.41** – Develop components of a personal portfolio.

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Unit III Steroids

This case study is based upon a New York Times article describing steroid abuse in the former East Germany. In an interview with a former athlete, Andreas Kreiger, the author describes how young athletes were given performance-enhancing drugs and documents the life-long consequences of this action.

Through the activities contained in this case study, students will learn about the function of the endocrine system, and the properties, uses and abuses of steroids. They will conduct a urinalysis assay, and also test the effect of common (legal) drugs on the heart rate of *Daphnia*.

Case Study Learning Objectives:

After completing this case study students will be able to:

3.1 Steroids and Drug Testing

- Describe the natural function of steroid hormones in the human body
- Explain how the properties of steroid hormones have led to their misuse
- Describe the health consequences of steroid misuse
- Relate the properties of urine to the function of the genitourinary system
- Explain the purpose of urinalysis
- Conduct a urinalysis procedure
- Correlate urinalysis data with disorders

3.2 Steroid Abuse

- Describe the effects of steroid abuse on different body systems

3.3 Legal Drug Use

- Describe the effects of common, legal drugs on the cardiovascular system
- Calculate averages from raw data
- Present data graphically
- Conduct a controlled scientific investigation

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Unit IV Immune System Disorders

This case study uses two true-life narratives to introduce students to the immune disorders of AIDS and diabetes. In the first part, students learn about the effect of the HIV virus on body systems, diagnostic assays, and the global issues of HIV infection.

In this section students will learn about diabetes as an example of an autoimmune disease. They will research the cause of diabetes, and the body systems affected. They will relate the structure of the eye to its function by a dissection of a cow's eye, and then correlate this with the eye disease associated with diabetes.

The third section focuses on allergies, and students investigate the effect of allergies on different body systems.

Case Study Learning Objectives:

After completing this case study students will be able to:

4.1: Immune System Failure: HIV And AIDS

- Identify the cause of AIDS
- Discuss the difference between HIV+ and AIDS
- Describe the effect of the HIV virus on different body systems
- Explain how HIV is transmitted
- Identify precautions for preventing the transmission of HIV
- Describe how antiviral medications work to prevent progression to AIDS
- Discuss how HIV infection is diagnosed
- Explain the function of the immune system
- Describe the role of lymphocytes in immune system function
- Describe the properties of antibodies
- Conduct an ELISA assay
- Evaluate the results of an ELISA assay

- Examine the social, economic, and political effects of HIV on individuals, families, and communities
- Explore the efforts of a philanthropist
- Research global health issues and infectious diseases.
- Determine ways to address global health issues
- Write a grant proposal.

4.2: Autoimmune Disorders: Diabetes

- Describe the cause of diabetes
- Relate the symptoms of diabetes to the structure and function of the endocrine system
- Explain the basis of autoimmune disease
- Relate the structure of a mammalian eye to its function

4.3 Allergies

- Describe the cause of allergies
- Explain the affect of allergies on the different body systems
- Identify the symptoms of anaphylaxis
- Describe treatment strategies for allergies

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Standard 3: Systems – Healthcare professionals will understand how their role fits into their department, their organization, and the overall healthcare environment. They will identify how key systems affect services they perform and quality of care.

3.1 Healthcare Delivery Systems

- **Accountability Criteria 3.11** – Understand healthcare delivery system (public, private, government, and non-profit).
- **Accountability Criteria 3.12** – Explain factors influencing healthcare delivery systems.

- **Accountability Criteria 3.14** – Explain the impact of emerging issues such as technology, epidemiology, bioethics, and socioeconomics on healthcare delivery systems.

Standard 4: Employability Skills – Healthcare professionals will understand how employability skills enhance their employment opportunities and job satisfaction. They will demonstrate key employability skills and will maintain and upgrade skills, as needed.

4.4 Employability Preparation

- **Accountability Criteria 4.41** – Develop components of a personal portfolio.

Standard 6: Safety Practices Ethics

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Unit V Health and Aging of the Human Body

In the first part of this case study, students will review the structure and function of all of the body systems by producing a marketing presentation and guide for a tour of the human body. They will be guided in the content of this marketing presentation and guide through activities, which explore the different physical and chemical environments of the human body, and compare the male and female urogenital systems. In addition, they will learn about the effect of lifestyle, environment, and aging on body systems, and the preventative measures, which can be taken to minimize these effects.

In the second part, students will further investigate the effect of aging by investigating the effect of a common aging disorder on the human body, and in the final section of this case they will learn about life expectancy. They will investigate the differing life expectancies of various cultures, and as well as the impact of medical advances on life expectancy.

Case Study Learning Objectives:

After completing this case study students will be able to:

5.1: Tour of the Human Body

- Describe the relationship between the structure and function of all body systems
- Explain the different physical conditions which exist within the human body
- Describe the principle of homeostasis, and explain how this is achieved for common parameters such as pH, temperature, water balance, and pressure
- Compare and contrast the male and female urogenital systems, and the rat and human urogenital systems.
- Use appropriate directional terms and anatomical planes related to body structure and systems
- Describe the effects of aging, lifestyle, and environment on the different body systems
- Identify preventative healthcare measures

5.2: Complaint Letter

- Describe a disorder of aging, and explain its effect on the human body.

5.3: Aging and Life Expectancy

- Identify factors which impact life expectancy
- Compare the life expectancies of different countries
- Identify medical advances
- Discuss the effect of medical advances on life expectancy