ANATOMY AND PHYSIOLOGY WORLDWIDE

Course
Practicum in Health Science

Unit V
Anatomy & Physiology & Pathophysiology

Essential Question
How is the body organized for systematic study?

TEKS
130.205 (c)
1A,B,C,D, E, F, H

Prior Student Learning
Understanding Basic A&P of the human body

Estimated time
2-6 hours

Rationale
It is vital for any healthcare practitioner to be knowledgeable about the human body and diseases that affect varies population around the world.

Objectives
Upon completion of this lesson, the student will be able to:

- Research different health care issues in our global society
- Identify the changes that occur in specific systems/organisms with increasing age, and compare them with the normal functioning of that body system/organ

Engage
Health issues vary from person to person, however, we do see trends of certain disorders or diseases occurring in certain groups or populations around the world. What are some of the disorders we frequently see in the United States? What disorders do neighboring countries worry about? How does world travel affect our health care concerns? Are their diseases affecting certain age populations?

Key Points

I. Human Body
   A. complex structure made up of many different body systems that work interdependently of each other
   B. from the tiniest cell to the largest organ, the body relies on these complex systems to stay in a state of homeostasis to stay healthy
   C. body cells, tissues and organs can be damaged by many different forces -- from pathogens that attack the body, to environmental factors that damage the body, to hereditary issues passed down through families
   D. because the organ systems do not work in isolation, homeostasis is threatened and people become sick

II. Physical Illness or Disability
   A. can occur at any age
   B. understanding the etiology (cause) of a disorder is important when working with a patient
   C. birth defects are present at birth and may be inherited or due to failure of development, occurring in-utero (in the mother’s womb), or due to complications during or around the time of birth; some examples of birth defects include:
      1. Cerebral Palsy
      2. Cleft lip or Cleft Palate
3. Down’s Syndrome
4. Hydrocephaly
5. Spina Bifida

D. injuries can occur at any age, ranging from trauma to accidents, such as drowning or choking on something occluding the airway, leaving the patient with lasting physical problems

E. debilitating illnesses occur at any age: depending on the severity of the disease, physical changes may be minimal or very extensive, and as the disease progresses the physical problems can worsen and cause death; some examples of debilitating diseases include:
   1. Arteriosclerosis
   2. Alzheimer’s
   3. Cancer
   4. Cardiovascular diseases
   5. Cystic fibrosis
   6. COPD
   7. Multiple sclerosis
   8. Parkinson’s disease

III. Scientists have classified diseases according to their basic etiology
    A. idiopathic (unknown)
    B. iatrogenic (disease that arises as a complication of medical or surgical intervention)
    C. inflammatory (marked by inflammation)
    D. ischemic (a temporary deficiency of blood flow to an organ or tissue)
    E. immunologic (result of an antigen/antibody reaction)
    F. infectious (contagious – caused by a pathogen)
    G. neoplastic (new abnormal growth – could be cancerous or non-cancerous)
    H. metabolic (disease due to abnormal biochemistry)
    I. nutritional
    J. genetic (inherited)
    K. congenital defects (born with disorder, not necessarily genetic)

IV. Physiological aging of the human body by systems
    A. skin, hair and nails
       1. Loss of subcutaneous fat
       2. Thinning of the skin
       3. Decreased collagen and elastin.
       4. Decline in cell replacement
       5. Wounds heal more slowly
       6. Women show aging about 10 years earlier than men because skin is thinner and drier
       7. Mucous membranes become drier and sweat output decreases
       8. Body temperature more difficult to regulate because of less
sweat glands and reduced subcutaneous fat
9. Hair pigment decreases and hair turn gray or white
10. Hair thins
11. Hormonal changes cause loss of pubic hair
12. Nails may be brittle and flake
13. Toe nails may discolor

B. Eyes and vision
1. Eyelids lose their elasticity and become baggy and wrinkled
2. Eyes sit deeper in their sockets
3. Conjunctiva becomes thinner and yellow
4. Quantity of tears decreases
5. Cornea loses its luster and flattens
6. Iris fades or develops irregular pigmentation
7. Pupil becomes smaller, letting in less light; older adults need about three times as much light as a younger person
8. Night vision and depth perception diminish
9. Vitreous humor can degenerate causing “floaters”
10. Lens enlarges and loses transparency
11. Accommodation decreases resulting in presbyopia
12. Impaired color vision, especially of blues and greens because cones deteriorate
13. Predisposed to glaucoma because there is a decreased absorption of intraocular fluid

C. Ears and hearing.
1. Slowly develop an irreversible, sensorineural loss of hearing that might start in middle age
2. Men more affected by this loss of hearing than women
3. Called presbycusis
4. There are four forms: most common is caused by the atrophy of the organ of Corti and the auditory nerve
5. Loss occurs in the higher range of sound
6. By age 60 most adults have difficulty hearing above 4000Hz
7. Normal speech is at the range of 500-2000 Hz

D. Respiratory system
1. Lungs become more rigid; diffusing capacity declines
2. Pulmonary function decreases due to respiratory muscle degeneration or atrophy
3. Number and size of alveoli decreases
4. Vital capacity declines due to decreased inspiratory and expiratory muscle strength
5. The chest cavity might change due to bony changes from osteoporosis
6. A reduction in respiratory fluid increases the risk for infections and plugs
E. Cardiovascular system
1. Heart becomes smaller and less elastic with age
2. By age 70 cardiac output is reduced by 30%
3. Heart valves might become sclerotic
4. Heart muscle becomes more irritable resulting in more ectopic beats
5. More chance for arrhythmias in general as the heart ages
6. Arteries become more rigid, resulting in hypertension in some cases
7. Veins dilate, resulting in reduced blood flow
8. Heart takes longer to return to normal after physical or emotional stress

F. GI system
1. Reduced GI secretions, which modifies processes such as digestion and absorption
2. Reduced salivation makes eating and chewing more difficult and reduces the pleasure associated with eating
3. Reduction in taste buds, causing the taste of foods to be reduced and/or altered -- again reducing the pleasure associated with eating
4. Aging in the past was associated with becoming edentulous; now proper oral hygiene, greater understanding of dental care, plus changes in dental care allow most elderly to keep their own teeth until they die
5. GI motility reduces
6. Decreased weight of the liver
7. Reduced regenerative capacity of the liver
8. Liver metabolizes drugs and detoxifies less efficiently.

G. Renal system
1. After age 40 renal function decreases
2. By age 90 will have lost 50% of renal function
3. Glomerular filtration (in part from reduced cardiac output), tubular reabsorption and concentration of urine reduced
4. Size and number of nephrons decrease
5. Bladder muscles weaken with age resulting in incomplete emptying of bladder
6. Less able to clear drugs from the system
7. Diminished kidney and bladder size

H. Reproduction
1. Male
   a. reduced testosterone production, which may cause a reduced libido
   b. Testes atrophy and soften
   c. Decrease in sperm production between ages 60-80 to as much as 50%
d. Prostate gland enlarges

e. Seminal fluid decreases and becomes less viscous

f. Erections of the penis require more time and stimulation

g. Erections aren’t as hard or full

h. Refractory period after ejaculation may lengthen to days

2. Female

a. Declining estrogen and progesterone levels

b. Ovulation ceases about 2 years before menopause

c. Vulval tissue flattens and shrinks

d. Introitus constricts and loses elasticity

e. Vagina atrophies, causing it to shorten and become drier

f. Uterus shrinks

g. Breasts become pendulous as ligaments lose elasticity and fatty tissues atrophy

h. Nipples decrease in size and become flat

i. Urinary stress incontinence might occur as pelvic ligaments weaken

I. Neurological system

1. Neurons of central and peripheral nervous system degenerate

2. Nerve transmission slows down

3. Hypothalamus less effective in regulating body temperature.

4. Decrease in deep sleep, causing frequent awakening, and reduced REM sleep

5. After age 50 the brain loses about 1% of neurons every year; not noticeable until aging is more advanced

J. Musculoskeletal System

1. Adipose tissue increases with age

2. Lean body mass decreases

3. Bone mineral content diminishes

4. Decrease in height resulting from exaggerated curvature of the spine and narrowing of the intervertebral spaces

5. Less resilience in connective tissue

6. Synovial fluid more viscous

7. All of these changes might result in balance problems

K. Immune system

1. Decline of immune function begins at sexual maturity and continues with age

2. Trouble differentiating between self and non-self and incidence of auto-immune disease increases

3. Unable to locate and destroy mutant cells

4. Decreased antibody response in elderly makes them more susceptible to infection

5. Fatty marrow replaced red marrow and blood production doesn’t happen as efficiently as before

6. Vitamin B12 absorption might decrease, resulting in decreased
hemoglobin and hematocrit

L. Endocrine system
   1. Decreased ability to tolerate stress -- best seen in glucose metabolism
   2. Elderly people should be evaluated for diabetes
   3. Estrogen levels decrease in women resulting in possibility of coronary thrombosis and/or osteoporosis
   4. Other decreases in hormones are testosterone, aldosterone, cortisol, and progesterone

V. Health care workers around the world work together to share information and treatments. Health care agencies report information to government agencies that collect data from all over the country in order to get a better picture of the health issues plaguing the nation. The United States then in turn share this data with many different agencies and other nations around the world. Different agencies are concerned with different types of data depending on their goal or focus. A few of the major agencies we send data to and examples of the types of information gathered is listed below:
   A. World Health Organization
      1. United Nations
      2. Goal: Attainment by all peoples of the highest possible level of health
      3. Definition of health: The state of complete physical, mental and social wellbeing -- not merely the absence of disease or infirmity
      4. Selected programs/committees
         a. Communicable Disease -- Vision: Every country should be able to detect, verify rapidly, and respond appropriately to epidemic prone and emerging disease threats when they arise to minimize their impact on the health and economy of the world’s population.
         b. Biosafety Program
            i. Naturally occurring endemic, emerging, and re-emerging disease threats challenge global health security.
            ii. Global health can also be threatened by the accidental, intentional or unintentional release of etiological agents of disease.
            iii. To promote safe practices in the handling of pathogenic microorganisms based on best practices and international rules and regulations in
               a. Health care facilities
               b. Manufacturing
               c. Laboratories
               d. Field interest
e. Transportation
iv. To strengthen, coordinate, and evaluate for the establishment of national, regional and global plans of actions for safe handling of infectious substances
v. To promote safety standards in lab facility construction and post construction evaluation
c. Violence and Health
i. Violence is a major problem worldwide.
ii. Millions die each year as a result of injuries due to violence.
iii. It is among the leading causes of death for 15-44 year olds worldwide.
iv. It contributes to
   a. Death
   b. Disability
   c. Depression
d. Alcohol & substance abuse, smoking
e. Eating and sleeping disorders
f. HIV and STD’s
v. Prevention
   a. Create safe and healthy communities
   b. Education
d. Traditional Medicine Program
i. Definition: Ways of protecting and restoring health that existed before the arrival of modern medicine
ii. Components of
   a. Acupuncture
   b. Traditional birth attendants -- assist in up to 95% of all rural births and 70% of urban births in developing countries
iii. Mental healers
e. Herbal medications
   i. Primary health care in some countries
   ii. Policies being formulated to
      a. Study the potential usefulness
      b. Evaluate the practices
      c. Examine safety and efficacy of remedies
d. Update the knowledge of traditional and modern health practitioners
e. Educate and inform the general public about proven traditional healer practices
f. Medicinal plants
   1. Oldest known health care products
2. Not a structured control model for licensing, dispensing, manufacturing, or trading
3. Discrepancies in safety, quality, and efficacy
4. In most countries, herbal markets are not adequately regulated
5. Products are frequently unregistered
6. Often not controlled by regulatory bodies

B. United States Department of Health and Human Services
   1. Office of Global Health Affairs - Mission: To promote the health of the world’s population by advancing the Department of Health and Human Services’ global strategies and partnerships, thus serving the health of the people of the United States
   2. Regional Offices
      a. Asia and The Pacific
      b. China
      c. India
      d. Indonesia
      e. Japan
      f. Pakistan
      g. Vietnam
      h. US Associated Island Jurisdiction
      i. Europe and the New Independent States
      j. Middle East
      k. Americas
      l. Africa

C. The Center for Disease Control and Prevention
   1. Is recognized as the lead federal agency for protecting the health and safety of people at home and abroad, providing credible information to enhance health through strong partnerships.
   2. Serves as the national focus for developing and applying disease prevention and control, environmental health, health promotion and education activities designed to improve the health of people of the United States.
   3. Protects health and safety
   4. Provides credible information on health and diseases
   5. Promotes health through partnerships

Activity

I. Visit the World Health Organization (WHO) website,
I. Visit http://www.who.int/country/, and select various countries around the world to research and complete the Global Health Issues Research handout. Create charts and graphs depicting information gathered from each country.

II. Compare and contrast steps various countries take to contain and eradicate a specific disease, i.e. SARS, TB. Organize results in a power point presentation using charts and graphs.

III. Research and prepare an oral report on “common debilitating illnesses and the effect the aging process” has on them.

IV. Interview local health department or other personal and make a “Public Service Announcement” informing the public on avoidance of a disease or health concern plaguing your area.

Assessment
Project Rubric
Oral Presentation Rubric
PSA Rubric

Materials
Internet access
Copies of Global Health Issues Research handouts
Copies of PSA guidelines – http://www.hosa.org

Accommodations for Learning Differences
For reinforcement, students will research current health issues in your area and present in a written report.

For enrichment, students will make a “Body Graph” using the information gathered by students in the class and “Map out” the different disorders by placing the country name and disorder on the body diagram showing the system effected.

National and State Education Standards
National Health Science Cluster Standards
HLC01.01 Academic Foundations
Health care workers will know the academic subject matter required (in addition to state high school graduation requirements) for proficiency within their area. They will use this knowledge as needed in their role.

HLC10.01 Technical Skills
Health Care Workers will apply technical skills required for all career specialties. They will demonstrate skills and knowledge as appropriate.

TEKS
130.205 (c)(1)(A) interpret data from various sources in formulating conclusions
130.205 (c)(1)(B) compile information from a variety of sources to create a technical report
130.205 (c)(1)(C) plan, prepare, and deliver a presentation
130.205 (c)(1)(D) examine the environmental factors that affect homeostasis
130.205 (c)(1)(E) relate anatomical structures to physiological function
130.205 (c)(1)(F) distinguish atypical anatomical structure to physiology in the human body system
130.204 (c)(1)(H) compare and contrast health issues in the global society

**Texas College and Career Readiness Standards**

**English Language Arts**

II. B. Understand new vocabulary and concepts and use them accurately in reading, writing and speaking.

III. B. Develop effective speaking styles for both group and one-on-one situations.

IV. A. Apply listening skills as an individual and as a member of a group in a variety of settings.

IV. B. 2. Listen actively and effectively in one-on-one communication situations.

**Science**

1.E.1. Use several modes of expression to describe or characterize natural patterns and phenomena. These modes of expression include narrative, numerical, graphical, pictorial, symbolic, and kinesthetic.

1.E.2. Use essential vocabulary of the discipline being studied.

3.A.1. Use correct applications of writing practices in scientific communication.
GLOBAL HEALTH ISSUES RESEARCH

Country Name: 

Total population: 

Life expectancy: 

Access to safe drinking water: 

Child mortality rate: 

Top 3 causes of death for children under 5
1. 
2. 
3. 

Total Health Expense: 

Recent disease outbreak: 

Biggest health issues: 

Percent of adults die due to:
  Communicable: 
  Non-communicable: 
  Injuries: 

Number of HC workers:

MD’s: 

Nurses: 

Midwives: 

Dentists: 

Pharmacists: 
# PROJECT RUBRIC

Student: __________________________ Date: __________________________

<table>
<thead>
<tr>
<th>Scoring criteria</th>
<th>4. Excellent</th>
<th>3. Good</th>
<th>2. Needs Some Improvement</th>
<th>1. Needs Much Improvement</th>
<th>N/A</th>
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</thead>
<tbody>
<tr>
<td>Clearly/effectively communicates the main idea or theme/</td>
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<td>Reflects application of critical thinking.</td>
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<td>Information clearly provided in an organized and thoughtful manner.</td>
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<td>Strong examples used to describe the theme or objective.</td>
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<td>Illustrations follow a logical reasoning.</td>
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<td>Each image and font size is legible to entire audience.</td>
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<tr>
<td>No spelling, grammatical or punctuation errors.</td>
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*NOTE: N/A represents a response to the performance which is "not appropriate."*
ORAL PRESENTATION RUBRIC

Student: ______________________  Date: ______________________

<table>
<thead>
<tr>
<th>Scoring criteria</th>
<th>4. Excellent</th>
<th>3. Good</th>
<th>2. Needs Some Improvement</th>
<th>1. Needs Much Improvement</th>
<th>N/A</th>
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<tbody>
<tr>
<td>Clearly and effectively communicates the main idea or theme.</td>
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<td>Presenter is self-confident and clearly expresses ideas.</td>
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<td>Presenter answers questions with well thought out responses.</td>
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<td>Holds audience attention and maintains eye contact.</td>
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<td>Visual aids are clear and add to the presentation.</td>
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*NOTE: N/A represents a response to the performance which is "not appropriate."*
# PUBLIC SERVICE ANNOUNCEMENT RUBRIC

Student: __________________________  Date: __________________________

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<thead>
<tr>
<th>Areas Evaluated</th>
<th>Points Possible</th>
<th>Points Awarded</th>
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<tbody>
<tr>
<td>Purpose (relevant, powerful message, important information)</td>
<td>10 8 6 4 2</td>
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<td>Effectiveness (captures attention, the critical message stands out, evokes emotion)</td>
<td>10 8 6 4 2</td>
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<td>Treatment (effective for target audience, encourages positive behavior)</td>
<td>10 8 6 4 2</td>
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<tr>
<td>Writing (clear wording, appropriate language, accurate information)</td>
<td>10 8 6 4 2</td>
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<td>Originality</td>
<td>10 8 6 4 2</td>
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<td>Technical Quality (Visual imagery, Audio, Clean transitions)</td>
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<td>Demonstrated a clear understanding of subject/theme and purpose of the PSA</td>
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<td>Described the creative process and how they think the public will/respond/ed to their PSA</td>
<td>10 8 6 4 2</td>
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<tr>
<td>Spoke clearly and distinctly with good grammar and articulation</td>
<td>10 8 6 4 2</td>
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<td>PSA is 29-31 seconds in length</td>
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<td>Presentation by at least 3 team members</td>
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**Total Points**

Adapted from PSA Event Guidelines – http://www.hosa.org