History of Pathophysiology

Course
Pathophysiology

Unit I
History, Trends, and the Future

Essential Question
How does pathophysiology help healthcare providers find answers to important questions about disease processes?

TEKS
130.208 (c)
2A, 2B, 3B, 3D

Prior Student Learning
none

Estimated time
3 hours

Rationale
Pathology is a result of disease and changes in homeostasis. It is important to understand the evolution of this science.

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

- Define pathophysiology
- Explain the evolution of this field in medicine
- Identify people important in the history of Pathophysiology

Engage
You are at the hospital during your clinical rotations. The physician comes in with a medical student to evaluate a patient that has recently been diagnosed with diabetes. The physician says you can stay in the room and observe if the patient approves. The two review blood test results with the patient and explain some of the signs and symptoms of diabetes. List some signs and symptoms of diabetes and explain why they are important to monitor.

Key Points

I. What is Pathophysiology?
Focuses on either the bodily function changes that cause an illness or the bodily function changes that the illness causes.

II. Pathophysiology and the disease process
   A. What is the cause of disease?
   B. What are the mechanisms responsible for disease onset, progression and recovery?
   C. What are the mechanisms responsible for development of symptoms and signs of disease?

III. History of Disease
   A. Primitive people
      1. Diseases/conditions that prehistoric man suffered from:
         a. tuberculosis and parasitic infections
         b. under-calcified bones (osteoporosis)
         c. caries (decayed teeth)
         d. pyorrhea (eroded teeth from discharge of pus from inflamed gums)
         e. skeletal fractures
      2. Health issues for prehistoric women:
         a. had much shorter lifespan than men due to difficult childbirth
         b. weakened immune systems

i. birthing and nursing children
ii. malnourishment since best food was for men and boys because they were/would be leaders, hunters, and warriors

3. Therapeutic techniques used by primitive healers/shaman
   a. praying
   b. chanting
   c. hallucinogenic trances – a means of communication with the spirit world
4. Prehistoric medicinal herbs
   a. foxglove plant (digitalis) -- treatment for failing heart
   b. birch fungus -- treatment that stops bleeding and acts as a disinfectant
   c. peek-a-boo plant (“toothache plant”) -- treatment of toothaches and oral infections
   d. bark of cinchona tree (quinine)-- treatment for malaria
   e. opium poppy (morphine)-- treatment for relief of severe pain
   f. belladonna plant also known as “deadly nightshade plant” (atropine)-- treatment for spastic colon and gastric ulcers

B. The Egyptians (3150 BC)
   1. First to keep accurate written health records
      a. The most important sources are the Edwin Smith Papyrus (17th century BC) and Papyrus Ebers (about 1550 BC)
      b. These records contain information on different types of bone injuries, trachoma (Nile valley), ulcerating lumps (cancer), and parasites
   2. Medical practice included bloodletting, monthly purging, making prosthetic devices, embalming
   3. Surgeons in ancient Egypt were both priests and doctors who blended ritual with medicine

C. Ancient India (3300 BC)
   1. Detected diabetes by smelling and tasting urine for sweetness
   2. Practiced surgical procedures such as hernia repairs, amputations, C-sections, cosmetic surgery to nose, earlobes and harelips

D. Ancient China (15 Century BC)
   1. Illness was still seen as a violation of a god
   2. Male doctors didn’t directly examine women
   3. Ivory dolls were used by doctors to diagnose woman (they would point to the area of discomfort or pain)
   4. Also used acupuncture to treat ailments (believed that the needles stimulated energy points throughout the body, relieving obstructions, enabling the body to heal)
   5. Used a variety of herbs to treat diseases, which were thought to throw away the evil intruders of the body
      a. ginseng – reduces stress

b. rhubarb – enhances body strength
c. licorice – relieves muscle spasms
d. ginger – treats diarrhea
e. peony – regulates blood
f. salvia – relieves pain of inflammation

E. Ancient Greece
1. The first to study the cause of disease
a. looked for natural explanations, not just divine ones
b. made discoveries in science, math, and astronomy
2. Hippocrates (460-370 BC) was one of the most famous of the ancient Greek physicians
a. Based his knowledge of anatomy on observation of the external body since human dissection was taboo during this time
b. First to construct theories of the causes of diseases based on what he observed in his patients
c. Responsible for writing the first known oath of medical ethics: The Hippocratic Oath
d. Later became known as the “Father of Modern Medicine”
3. Greek **balance theory** – theory held that the human body was filled with four basic substances called humors, which are in balance when the person is healthy
a. Four humors:
i. black bile
ii. yellow bile
iii. blood
iv. phlegm
b. These humors were connected with the four elements:
i. earth
ii. fire
iii. air
iv. water
c. They were also related to the four seasons:
i. autumn
ii. winter
iii. spring
iv. summer
d. Humors, elements, and seasons were all linked to the human body; an imbalance in any of these caused illness

F. Ancient Rome
1. Learned about disease and cleanliness from the Greeks
2. This period marks the beginning of public health and sanitation
a. developed sanitation system of aqueducts to bring clean water to cities and sewers to carry off waste
b. built public baths with filtering systems

3. Aqueducts
    a. collected water from several natural springs, which were located far away from cities
    b. water was chosen according to many factors: position of its springs, purity of its water, its taste, alleged medical properties due to mineral salts
    c. gravity moved water towards cities (aqueduct acted as a continuous slope)
4. Sewers
    a. underground sewers were covered by stones
    b. waste flushed from toilets flowed through central channel into the main sewage system into a nearby stream away from the city
5. Bath and spas (not just for bathing)
    a. a place to meet friends, relax, play games
    b. public baths were cheap to enter, so both rich and poor could afford to go often
    c. men and women bathed in separate facilities

G. Dark Ages (AD 400-800) to High Middle Ages (AD 800-1400)
1. "Dark Ages" was a term used by European historian in the 18th century to designate the period in Western Europe after the fall of the Western Roman Empire.
2. During this time, church began to dominate practice of science and medicine and the study of medical science all but stopped
3. Treatment for ill during this time: prayer, exorcism saintly relics, superstition
4. Terrible outbreak of epidemics occurred during this period:
    a. bubonic plague (black death – responsible for death of 60 million people)
    b. smallpox
    c. syphilis
    d. diphtheria
    e. tuberculosis

H. The Renaissance period (AD 1350 – 1650)
1. Period which marked the rebirth of learning
2. Building of universities and medical schools
3. There was a search for new ideas rather than the unquestioning acceptance of disease as the will of God
4. Acceptance of dissection for purpose of anatomical study
5. Development of printing press and publishing of books, which allowed more access to knowledge

I. Sixteenth and seventeenth centuries
1. Leonardo da Vinci (1452 – 1519)
    a. Italian artist, scientist, engineer
    b. Studied anatomy of body by dissection of human corpses

2. William Harvey (1578-16570
    a. Discovered circulation of blood in the body
3. Anton van Leeuwenhoek (1632 – 1723)
    a. Dutchman who invented the microscope
    b. His early microscope was a lens mounted in a tiny hole of a brass plate
    c. He held the plate to the light to see his specimen
    d. Discovered tiny moving microorganisms that he referred to as “animacules”

J. Eighteenth century
1. Edward Jenner (1749 – 1823)
    a. English country doctor
    b. Observed that the milkmaids who caught less serious cowpox generally did not catch smallpox
    c. Led him to discover technique of vaccination when he deliberately infected a small boy with cowpox
    d. He coined the word “vaccination” for cow (*vacca* means cow in Latin)
    e. This word was later adopted by Louis Pasteur for immunization against any disease
2. Rene Laennec (1781 – 1826)
    a. French physician who invented the cylinder stethoscope
    b. Originally made from paper, although later made from a hollow wooden tube
    c. Before the cylinder stethoscope, doctors put their ear directly to a patient’s body
    d. He is hailed as the “Father of Thoracic Medicine”

K. Nineteenth century
1. James Blundell (1790 – 1877)
    a. Performed the first successful human blood transfusion from a husband to his wife by means of a syringe
    b. He performed 10 transfusions; only half were successful since blood typing had not been developed
2. Ignaz Semmelweis (1818 --1865)
    a. Known as an early pioneer of antiseptic procedures
    b. Discovered how to prevent the transmission of puerperal fever in 1847
3. William Morton (1819 – 1868)
    a. Dentist who developed anesthesia techniques that made surgery painless
    b. He developed an ether inhaler
    c. Before anesthesia, operations were limited to amputations and the removal of external growths
4. Florence Nightingale (1820 – 1910)
    a. Pioneer of nursing

    b. She reformed hospital sanitation methods and campaigned to improve health standards
5. Rudolf Carl Virchow (1821-1902)
    a. Known as "the father of modern pathology"
    b. His work helped to discredit humorism, bringing more science to medicine
6. Louis Pasteur (1822 – 1895)
    a. “Father of Bacteriology”
    b. With his microscope, he showed that by heating foods, harmful bacteria was prevented from growing; hence the term “Pasteurization”
    c. Pasteur also developed several vaccines including ones against anthrax and rabies
7. Sir Joseph Lister (1827-1912)
    a. Discovered that carbolic acid killed germs
    b. Used as an aseptic in surgery
    c. The mouthwash *Listerine* was named after Joseph Lister
8. Robert Koch (1843-1910)
    a. German physician and pioneering microbiologist
    b. Discovery of the causative agent of anthrax led to the formation of a generic set of postulates
9. Wilhelm Roentgen (1845 – 1923)
    a. German physicist who discovered x-rays
    b. His first medical x-ray was of his wife’s hand
10. Paul Ehrlich (1854-1915)
    a. Invented the precursor technique to Gram staining bacteria
    b. Described magic bullets – antibodies

L. Biomedical firsts of the 20th century:
1. EKG Machines
2. Respirators
3. MRI/CT scans
4. Laser surgery
5. Organ transplants
6. Open-heart surgery
7. Pacemakers
8. Remote surgery

M. The future
1. Cell-based disease
2. Gene-based disease
3. Individual molecules
4. Nanopathology

Activity
I. Complete the Timeline Activity.

Assessment
Successful completion of the History of Pathophysiology Quiz
Timeline Rubric

Materials
History of Pathophysiology Quiz
Presentation rubric
Internet access

http://www.datesandevents.org/events-timelines/10-history-of-medicine-timeline.htm

Accommodations for Learning Differences
For reinforcement, the student will create an outline of the history of disease.

For enrichment, the student will research branches in medicine currently using nanotechnology.

National and State Education Standards
National Health Science Cluster Standards
HLC01.01 Academic Foundations: Health care workers will know the academic subject matter required for proficiency within their area. They will use this knowledge as needed in their role. Compare selected diseases/disorders including respective classifications causes, diagnoses, therapies, and care/rehabilitation to include biotechnological applications.

HLC02.01Communications: Use medical terminology within a scope of practice in order to interpret, transcribe and communicate information, data and observations

TEKS
130.208 (c)(2)(A) know the definition of science and understand that it has limitation, as specified in subsection (b) (2) of this section.
130.208 (c)(2)(B) know that hypotheses are tentative and testable statements that must be capable of being supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories.
130.208 (c)(3)(B) communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles and marketing material.
130.208 (c)(3)(D) evaluate the impact of scientific research on society and the environment

Texas College and Career Readiness Standards
English-Reading
B.1 Identify new words and concepts acquired through study of their relationships to other words and concepts
2 Apply knowledge of roots and affixes to infer the meaning of new words
3.Use reference guides to confirm the meanings of new words or concepts

Science-Nature of Science: Scientific Ways of Learning and thinking
E.2. Use essential vocabulary of the discipline being studied

Science-Foundation Skills
B 3 Recognize scientific and technical vocabulary in the field of study and use this vocabulary to enhance clarity of communication

History of Pathophysiology Quiz

1. Define Pathophysiology

2. Who were the first to first to keep accurate written health records?

3. What are some diseases/conditions that prehistoric man suffered from?

4. Name one medical practice of Ancient Egyptians.

5. How did Ancient Indians check for diabetes?

6. How did Ancient Chinese doctors diagnose women?

7. Who became known as the “Father of Modern Medicine”?

8. Who developed a sanitation system of aqueducts to bring clean water to cities and sewers to carry off waste?

9. Who is known as the father of modern pathology?

10. Before Laennec’s stethoscope, how did physicians listen to heart and lung sounds?

11. What was the 1st code of medical ethics called?

12. Name one of the body’s humors.

13. The word *vaccination* is derived from a Latin word, which means…?

14. Who discovered x-rays?

15. Who performed the first successful human blood transfusion?

History of Pathophysiology Quiz -- KEY

1. Define Pathophysiology
   Focuses on either the bodily function changes that cause an illness or the bodily function changes that the illness causes.
2. Who were the first to first to keep accurate written health records?
   The Egyptians
3. What are some diseases/conditions that prehistoric man suffered from?
   tuberculosis and parasitic infections, under calcified bones (osteoporosis), caries (decayed teeth), pyorrhea (eroded teeth from discharge of pus from inflamed gums), skeletal fractures
4. Name one medical practice of Ancient Egyptians.
   bloodletting, purging, making prosthetic devices, embalming
5. How did Ancient Indians check for diabetes?
   smelled & tasted urine for sweetness
6. How did Ancient Chinese doctors diagnose women?
   had them point to area of pain or discomfort on an ivory female doll
7. Who became known as the “Father of Modern Medicine?”
   Hippocrates
8. Who developed a sanitation system of aqueducts to bring clean water to cities and sewers to carry off waste?
   Ancient Romans
9. Who is known as the “Father of Modern Pathology?”
   Rudolf Carl Virchow
10. Before Laennec’s stethoscope, how did physicians listen to heart and lung sounds?
    put their ear directly to patient’s body
11. What was the 1st code of medical ethics called?
    Hippocratic Oath
12. Name one of the body’s humors.
    yellow bile, black bile, blood, phlegm
13. The word *vaccination* is derived from a Latin word, which means…?
    cow
14. Who discovered x-rays?
    Wilhelm Roentgen
15. Who performed the first successful human blood transfusion?
    James Blundell

Timeline Activity

INSTRUCTIONS:
Depict a period or individual in disease history. The drawing must include title, date, and a short description. You may use pictures, graphs, maps, etc. to explain the significance or development of events on your period or individual. Each drawing will be presented to the class, placed in order, and taped together in one BIG horizontal timeline.

MATERIALS:
- blank paper for each student
- pencil
- colored pencils or markers

Students may need time to look up their medical period on the computer before the activity to get drawing ideas

1.	Primitive people (superstitions and illness)
2.	Ancient herbal medicine
3.	Ancient Egyptian medicine
4.	Ancient Indian medicine
5.	Ancient Chinese “diagnostic dolls”
6.	Ancient Greece: Hippocrates
7.	Ancient Greece: Balance Theory
8.	Ancient Rome: aqueducts/baths
9.	Medicine in the Dark Ages
10.	Renaissance medicine
11.	Leonardo da Vinci’s contributions to medicine
12.	Anton van Leeuwenhoek
13.	Edward Jenner
14.	Rene Laennec
15.	James Blundell
16.	William Morton
17.	Florence Nightingale
18.	Louis Pasteur
19.	Sir Joseph Lister
20.	Wilhelm Roentgen
21.	William Harvey
22.	Ignaz Semmelweis
23.	Rudolf Carl Virchow
24.	Robert Koch
25.	Wilhelm Roentgen
26.	Paul Ehrlich

Timeline Rubric

Student: _____ **Date:** _____

Scoring criteria	4 Excellent	3 Good	2 Needs Some Improvement	1 Needs Much Improvement	N/A
Included events are important and interesting. No major details are excluded.					
Facts were accurate for all events reported.					
Information clearly provided in an organized and thoughtful manner.					
Illustrations follow a logical reasoning.					
Each image and font size is legible to entire audience.					
No spelling, grammatical or punctuation errors.					
Presenter is self-confident and clearly expresses ideas.					

NOTE: N/A represents a response to the performance which is "not appropriate."