ECHO 101

Cardiac Pathology

3 Credits

University of Nebraska Medical Center

FALL 2024

Course Outline

Course Description:

Cardiac pathology introduces diseases of the cardiovascular system. Students will learn the basic mechanisms by which cardiac illnesses develop to facilitate clinical diagnosis and therapy. Students will be introduced to basic cardiac anatomy and physiology, major groups of cardiovascular diseases, and major classes of cardiovascular drugs. It is intended to help students in training form a foundation in the knowledge of diseases of the heart and circulation.

Required Textbook:

Pathophysiology of Heart Disease: An Introduction to Cardiovascular Medicine*, Leonard S. Lilly, MD*. ISBN-10: 1975120590.

Learning Outcomes:

After participating in this unit, attendees should be able to:

1. Identify normal cardiac structure and function.
2. Name different types of cardiac murmurs.
3. Demonstrate diagnostic techniques used to assess cardiovascular disorders.
4. Analyze basic electrocardiogram readings.
5. Explain the effects of atherosclerosis on the heart.
6. Illustrate signs and symptoms associated with myocardial infarction.
7. Classify the pathophysiology of valvular heart disease.
8. Explain the pathophysiology, causes, and treatments of heart failure.
9. Interpret classification and treatment of cardiomyopathies.
10. Recognize basic cardiac arrhythmias.
11. Review the effects of hypertension on the heart.
12. Identify diseases of the pericardium.
13. Review clinic use of cardiovascular drugs.

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Assessment:

Week	Topic	Module	Learning Outcomes
1	Normal Cardiac Structure and Function	• Reading: Lilly Chapter 1 • Introductory Activity (*Things and Lies*) • Assignment: Matching – Names and Structures of the heart	1
2	The Cardiac Cycle: Mechanisms of Heart Sounds and Murmurs	• Reading: Lilly Chapter 2 • Watch: Learn Heart Murmurs video (https://www.youtube.com/watch?v=IrWEAucHoA0) • Quiz: Basic Cardiac Structure and Function	2
3	Imaging and Hemodynamic Assessment	• Reading: Lilly Chapter 3 • Activity: Lab – Watching echocardiogram and learning probe manipulation for proper imagining assessment • Exam 1: Chapters 1-3	3
4	The Electrocardiogram	• Reading: Lilly Chapter 4 • Activity: Play/Practice EKG game • Assignment: Matching – Cardiac Rhythms with Rhythm Strips	4
5	Cardiac Arrhythmias	• Reading: Lilly Chapter 11 • Assignment: Matching Cont'd – Cardiac Arrhythmias with Rhythm Strips • Quiz: Basic EKG readings	10
6	Atherosclerosis	• Reading: Lilly Chapter 5 • Reading: Article (John Hopkins – Atherosclerosis)	5
7	Ischemic Heart Disease	• Reading: Lilly Chapter 6 • Reading: Article (Wall Motion Abnormalities)	6
8	Acute Coronary Syndromes	• Reading: Lilly Chapter 7 • Assignment: Matching – Regional Wall Motion with Coronary Artery Distribution • Exam 2: Chapters 5-7	6

9	Valvular Heart Disease	• Reading: Lilly Chapter 8 • Activity: Jeopardy! Game of valvular heart disease • Assignment: Concept Map – Similarities and Differences of Valve Disease	7
10	Heart Failure	• Reading: Lilly Chapter 9 • Watch: Heart Failure – Compensation and Decompensation • Exam 3: Chapters 6,8-9	8
11	Cardiomyopathies	• Reading: Lilly Chapter 10 • Assignment: Group Presentation of one of the following cardiomyopathies: Dilated, Hypertrophic, Restrictive, or Takotsubo	9
12	Hypertension	• Reading: Lilly Chapter 13 • Reading: Article (Echocardiography and Blood Pressure Management)	11
13	Diseases of the Pericardium	• Reading: Lilly Chapter 14 • Exam 4: Chapters 10, 13-14	12
14	Cardiovascular Drugs	• Reading: Lilly Chapter 17 • Assignment: Group Presentation of one of the following heart medications: Anticoagulants, ACE inhibitors, Beta blockers, Calcium channel blockers, or vasodilators	13
15	Final	• Assignment: Case Study – Choose one cardiac pathology discussed and give a presentation involving the pathology diagnosis, physical exam findings, echocardiography findings, and prognosis • Complete Course Evaluation	1-13

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Teaching Strategy:

This class will rely on the information processing theory principle of retrieval-based learning. Students must be able to retrieve and construct this knowledge when they become sonographers to assess and diagnose cardiac pathology competently. Quizzes and exams are administered throughout the course as a retrieval method to promote learning. Formative assessments such as low-stakes quizzes can help the instructor assess the level of student understanding while also preparing the student for summative assessment exams. Another form of retrieval the student will use is studying by reading textbook chapters and online articles. When students study, they sometimes stop reading and attempt to recall what they have read (Schunk, 2020). This is considered a form of active rehearsal, and when combined with studying, it produces superior learning (Schunk, 2020). To help promote long-term retention and transfer, students can learn context with varied methods, including games, videos, text, assignments, and group projects. Specifically, group projects have been shown to promote knowledge acquisition, comprehension, problem-solving, metacognition, and motivation (Shunk, 2020). Ideally, this course would be taught face-to-face, as instructors can help serve as models for transfer. For example, when asking questions during a lecture, the instructor can cue students to help them use already gained knowledge in new ways.

References

Schunk, Dale H. *Learning Theories: An Educational Perspective*. Pearson, 2020.