Lesson Plan: Cardiac Clinic

General Description
In this activity, students apply their knowledge of the heart and the circulatory system to diagnosing and making recommendations for individuals with different heart related problems. Inquiry is not a significant component of this activity, although students do defend an argument both verbally and in writing.

Objectives
1. Students will learn symptoms and recommended treatments for several medical conditions related to the heart and circulatory system.
2. Students will review heart morphology and functioning.
3. Students will practice using appropriate physiological terminology.
4. Students will communicate a complex argument in writing and verbally.

Concepts
all terms associated with Chapter 42

Time
50 minutes

Prerequisite Skills
Students should be familiar with heart morphology and functioning.

Materials
Team cards
Accountability cards
Handout of all conditions for students to take
UTI Instructions: Cardiac Clinic

Introduction:
In this complex instruction activity, students work together to create a recommendation for a person with cardiac difficulties. Students practice communicating with peers and review circulatory system morphology and functioning.

Procedure:
1. The week before class, tell students to bring their textbook to the next meeting.

2. Introduce the activity as challenges for their understanding of circulation and heart functioning. Divide students into the appropriate number of groups (6-7) with no more than 4 students per group.

3. Distribute the task cards to the teams. Tell them that everyone should read the card, and then they should collaborate on the task. Every member of the team must be involved in the task. Announce that they have ten minutes to prepare their presentation (this announcement warns groups that they must work on task and collaboratively in order to finish).

4. Circulate among the groups, answering any questions. Particularly provide encouragement for students utilizing alternative strategies to complete the task. Allow the teams to develop their own presentation without pushing in a particular direction. Provide a two-minute warning at the appropriate time (this depends on the number of groups*).

5. Have teams make their presentation to the class. Note any particularly meaningful episodes in the presentations.

6. In the final five minutes of class, distribute the Individual Accountability cards to the teams. Have each student write a response to the question. Collect responses as students leave. Comment positively on various contributions. The student responses should be marked for thoughtfulness rather than for correctness.

* Allow five minutes for each group to give their presentation and five minutes for the individual accountability exercise. If your discussion has 6 groups, then you should allow 35 minutes to complete the presentations and accountability exercise. This requirement means that the groups will receive less time to prepare their presentation. Be particularly mindful of the time, as you want each group to present (it is possible that students will view the exercise as a waste if they don’t get to share their task).
Pre-Activity Worksheet: Cardiac Clinic

General Description
In the activity you will do this week during your learning/discussion group, you will be examining the morphology and functioning of the circulatory system. In order to be prepared for this activity, complete this worksheet.

Reading
Browse the “Circulation and Gas Exchange” chapter in your text. Pay particular attention to figures 42.3, 42.4, 42.5, 42.7, and 42.9. Read the section on Circulation in Animals beginning on pg. 871.

Definitions
Write a definition of the following words. Use your text, textbook glossary, and your previous knowledge to create the best definition possible. Remember to connect your definitions to circulation.

1) double circulation

2) cardiac cycle

3) blood pressure

4) cardiovascular disease (and examples)

Questions
Answer the following questions. You will explore your answers to these questions in-depth during learning/discussion group.

1) Which ventricle in the mammalian heart is more important to heart function? Why?

2) Name three functions of the circulatory system.

3) Athletes generally have lower blood pressures and lower pulses than non-athletes. Explain the connection between pulse and blood pressure and why athletes are lower in both measures.
Cardiac Clinic

This page contains all of the information distributed to every group in this activity. You may find it helpful to your learning to work through some additional problems, either by yourself or with study partners.

The Patient: Beth is a very successful living mannequin. She stands still all day, and has been having fainting spells at work recently. Because her work is lucrative, Beth is reluctant to change jobs.

The Task: Recommend the best treatment for Beth’s condition. Prepare a physiology-based presentation that explains the condition and your treatment to Beth and her family. Include a simplified diagram of the problem and your proposed solution to clarify your presentation.

Individual Accountability: What other circulation problems might Beth experience if she continues working as a mannequin? What would be the effects of those problems? Defend your answer using correct physiological terminology in four or five sentences.

The Patient: Jane has mitral valve prolapse, meaning she has a faulty bicuspid valve. She has lived with it for many years, but the problem gets worse as she ages. The standard treatment is valve replacement. However, Jane is not a good surgery candidate since she is 80 years old and recently had colon cancer.

The Task: Recommend the best treatment for Jane’s condition. Prepare a physiology-based presentation that explains the condition and your treatment to Jane and her family. Include a simplified diagram of the problem and your proposed solution to clarify your presentation.

Individual Accountability: What other heart problems might Jane experience as a result of her mitral valve prolapse? Defend your answer using correct physiological terminology in four or five sentences.

The Patient: Bob has “heart block”—his atrioventricular node is blocked so the ventricles don’t receive electrical stimulation. The intrinsic contraction frequency of the ventricles is too low to provide adequate cardiac output. Bob finds climbing stairs difficult and is often tired.

The Task: Recommend the best treatment for Bob’s condition. Prepare a physiology-based presentation that explains the condition and your treatment to Bob and his family. Include a simplified diagram of the problem and your proposed solution to clarify your presentation.

Individual Accountability: What are some possible causes of a blocked AV node? Which blockage do you think is the most common? Defend your answer using correct physiological terminology in four or five sentences.

The Patient: Jim recently had a heart attack. His mother died of stroke and he is concerned about future heart attacks and stroke.

The Task: Recommend the best treatment for Jim’s condition. Prepare a physiology-based presentation that explains the condition and your treatment to Jim and his family. Include a simplified diagram of the problem and your proposed solution to clarify your presentation.

Individual Accountability: Should Jim be more concerned about another heart attack or a stroke? Defend your answer using correct physiological terminology in four or five sentences.

The Patient: Tammy has valvular stenosis of the semilunar valve. This valve is highly stiffened, which reduces blood flow through the valve. The standard treatment is valve replacement. However, Tammy cannot have surgery due to other complications.

The Task: Recommend the best treatment for Tammy’s condition. Prepare a physiology-based presentation that explains the condition and your treatment to Tammy and her family. Include a simplified diagram of the problem and your proposed solution to clarify your presentation.

Individual Accountability: Which of Tammy’s valves is the most important? Defend your answer using correct physiological terminology in four or five sentences.

The Patient: John has myocardial ischemia, a condition in which the heart oxygen demand is not met. He is increasingly experiencing chest pain.

The Task: Identify possible causes of John’s ischemia. Recommend the best treatment for this condition. Prepare a physiology-based presentation that explains the condition and your treatment to John and his family. Include a simplified diagram of the problem and your proposed solution to clarify your presentation.

Individual Accountability: What are the possible consequences of NOT treating John’s ischemia? Defend your answer using correct physiological terminology in four or five sentences.
The Patient: Nancy has an enlarged heart. She has lived with it for many years, but the problem gets worse as she ages.
The Task: Recommend the best treatment for Nancy's condition. Prepare a physiology-based presentation that explains the condition and your treatment to Nancy and her family. Include a simplified diagram of the problem and your proposed solution to clarify your presentation.
Individual Accountability: What symptoms does Nancy probably have? Defend your answer using correct physiological terminology in four or five sentences.

The Patient: Steve has been diagnosed with acute valve lesions, yet he is not experiencing any symptoms. Steve is wondering what to expect and what treatments are available.
The Task: Describe the possible symptoms Steve will experience, and recommend the best treatment for his condition. Prepare a physiology-based presentation that explains the condition and your treatment to Steve and his family. Include a simplified diagram of the problem and your proposed solution to clarify your presentation.
Individual Accountability: Which of Steve’s valves is the most important? Defend your answer using correct physiological terminology in four or five sentences.

The Patient: Andre is taking medication for high blood pressure. His current prescription is for a diuretic that causes him to use the restroom excessively. This side effect is interfering with his job, and he is interested in other medications.
The Task: Recommend the two alternative treatments for Andre’s condition. Prepare a physiology-based presentation that explains the condition and your treatments to Andre and his family. Include a simplified diagram of the problem and your proposed solution(s) to clarify your presentation.
Individual Accountability: Why are diuretics effective in reducing Andre’s blood pressure? Defend your answer using correct physiological terminology in four or five sentences.

The Patient: Chandra has familial hypercholesterolemia, meaning that she has high cholesterol levels due to too few LDL receptors. Recently she has developed xanthomas–cholesterol nodules on the skin. She is desperate for treatment.
The Task: Describe Chandra’s condition as completely as possible and recommend the best treatment for her condition. Prepare a physiology-based presentation that explains the condition and your treatment to Chandra and her family. Include a simplified diagram of the problem and your proposed solution to clarify your presentation.
Individual Accountability: Could Chandra’s high cholesterol be controlled by diet? Defend your answer using correct physiological terminology in four or five sentences.

The Patient: Sierra is a newborn diagnosed with hypertrophic cardiomyopathy (an abnormally thickened heart muscle). Her parents are concerned about how this condition will affect their baby and what possible treatments exist.
The Task: Describe this condition and recommend the best treatment for Sierra’s condition. Prepare a physiology-based presentation that explains the condition and your treatment to Sierra's family. Include a simplified diagram of the problem and your proposed solution to clarify your presentation.
Individual Accountability: What symptoms will Sierra probably experience? Defend your answer using correct physiological terminology in four or five sentences.

The Patient: Kan has been experiencing angina while playing basketball but not at other times. He is wondering if this heart pain is simply the result of aging or if it signals larger problems.
The Task: Describe the possible causes of Kan’s angina and recommend the best treatment for his condition. Prepare a physiology-based presentation that explains the condition and your treatment to Kan and his family. Include a simplified diagram of the problem and your proposed solution to clarify your presentation.
Individual Accountability: Should Kan be concerned about having a heart attack or a stroke? Defend your answer using correct physiological terminology in four or five sentences.

The Patient: Adan recently learned that his atria do not contract. Despite this malfunction, he lives a fairly normal life, although he does get tired easily. He is investigating therapies for this condition.
The Task: Explain to Adan how he survives with only partial heart function. Recommend the best treatment for Adan’s condition. Prepare a physiology-based presentation that explains the condition and your treatment to Adan and his family. Include a simplified diagram of the problem and your proposed solution to clarify your presentation.
Individual Accountability: How much of the heart must function for Adan to survive? Defend your answer using correct physiological terminology in four or five sentences.
THE PATIENT:

JANE HAS MITRAL VALVE PROLAPSE, MEANING SHE HAS A FAULTY BICUSPID VALVE. SHE HAS LIVED WITH IT FOR MANY YEARS, BUT THE PROBLEM GETS WORSE AS SHE AGES. THE STANDARD TREATMENT IS VALVE REPLACEMENT. HOWEVER, JANE IS NOT A GOOD SURGERY CANDIDATE SINCE SHE IS 80 YEARS OLD AND RECENTLY HAD COLON CANCER.

The task:

Recommend the best treatment for Jane’s condition. Prepare a physiology-based presentation that explains the condition and your treatment to Jane and her family. Include a simplified diagram of the problem and your proposed solution to clarify your presentation.
THE PATIENT:

BETH IS A VERY SUCCESSFUL LIVING MANNEQUIN. SHE STANDS STILL ALL DAY, AND HAS BEEN HAVING FAINTING SPELLS AT WORK RECENTLY. BECAUSE HER WORK IS LUCRATIVE, BETH IS RELUCTANT TO CHANGE JOBS.

The task:

Recommend the best treatment for Beth’s condition. Prepare a physiology-based presentation that explains the condition and your treatment to Beth and her family. Include a simplified diagram of the problem and your proposed solution to clarify your presentation.
THE PATIENT:
BOB HAS “HEART BLOCK”—HIS ATRIOVENTRICULAR NODE IS BLOCKED SO THE VENTRICLES DON’T RECEIVE ELECTRICAL STIMULATION. THE INTRINSIC CONTRACTION FREQUENCY OF THE VENTRICLES IS TOO LOW TO PROVIDE ADEQUATE CARDIAC OUTPUT. BOB FINDS CLIMBING STAIRS DIFFICULT AND IS OFTEN TIRED.

The task:
Recommend the best treatment for Bob’s condition. Prepare a physiology-based presentation that explains the condition and your treatment to Bob and his family. Include a simplified diagram of the problem and your proposed solution to clarify your presentation.
THE PATIENT:

JIM RECENTLY HAD A HEART ATTACK. HIS MOTHER DIED OF STROKE, AND HE IS CONCERNED ABOUT FUTURE HEART ATTACKS AND STROKE.

The task:

Recommend the best treatment for Jim’s condition. Prepare a physiology-based presentation that explains the condition and your treatment to Jim and his family. Include a simplified diagram of the problem and your proposed solution to clarify your presentation.
THE PATIENT:
TAMMY HAS VALVULAR STENOSIS OF THE SEMILUNAR VALVE. THIS VALVE IS HIGHLY STIFFENED, WHICH REDUCES BLOOD FLOW THROUGH THE VALVE. THE STANDARD TREATMENT IS VALVE REPLACEMENT. HOWEVER, TAMMY CANNOT HAVE SURGERY DUE TO OTHER COMPLICATIONS.

The task:
Recommend the best treatment for Tammy’s condition. Prepare a physiology-based presentation that explains the condition and your treatment to Tammy and her family. Include a simplified diagram of the problem and your proposed solution to clarify your presentation.
THE PATIENT:

JOHN HAS MYOCARDIAL ISCHEMIA, A CONDITION IN WHICH THE HEART OXYGEN DEMAND IS NOT MET. HE IS INCREASINGLY EXPERIENCING CHEST PAIN.

The task:

Identify possible causes of John’s ischemia. Recommend the best treatment for this condition. Prepare a physiology-based presentation that explains the condition and your treatment to John and his family. Include a simplified diagram of the problem and your proposed solution to clarify your presentation.
THE PATIENT:

NANCY HAS AN ENLARGED HEART. SHE HAS LIVED WITH IT FOR MANY YEARS, BUT THE PROBLEM GETS WORSE AS SHE AGES.

The task:

Recommend the best treatment for Nancy’s condition. Prepare a physiology-based presentation that explains the condition and your treatment to Nancy and her family. Include a simplified diagram of the problem and your proposed solution to clarify your presentation.
THE PATIENT:

STEVE HAS BEEN DIAGNOSED WITH ACUTE VALVE LESIONS, YET HE IS NOT EXPERIENCING ANY SYMPTOMS. STEVE IS WONDERING WHAT TO EXPECT AND WHAT TREATMENTS ARE AVAILABLE.

The task:

Describe the possible symptoms Steve will experience, and recommend the best treatment for his condition. Prepare a physiology-based presentation that explains the condition and your treatment to Steve and his family. Include a simplified diagram of the problem and your proposed solution to clarify your presentation.
THE PATIENT:

ANDRE IS TAKING MEDICATION FOR HIGH BLOOD PRESSURE. HIS CURRENT PRESCRIPTION IS FOR A DIURETIC THAT CAUSES HIM TO USE THE RESTROOM EXCESSIVELY. THIS SIDE EFFECT IS INTERFERING WITH HIS JOB, AND HE IS INTERESTED IN OTHER MEDICINES.

The task:

Recommend the two alternative treatments for Andre’s condition. Prepare a physiology-based presentation that explains the condition and your treatments to Andre and his family. Include a simplified diagram of the problem and your proposed solution(s) to clarify your presentation.
THE PATIENT:

CHANDRA HAS FAMILIAL HYPERCHOLESTEROLEMIA, MEANING THAT SHE HAS HIGH CHOLESTEROL LEVELS DUE TO TOO FEW LDL RECEPTORS. RECENTLY SHE HAS DEVELOPED XANTHOMAS — CHOLESTEROL NODULES ON THE SKIN. SHE IS DESPERATE FOR TREATMENT.

The task:

Describe Chandra’s condition as completely as possible and recommend the best treatment for her condition. Prepare a physiology-based presentation that explains the condition and your treatment to Chandra and her family. Include a simplified diagram of the problem and your proposed solution to clarify your presentation.
THE PATIENT:
SIERRA IS A NEWBORN DIAGNOSED WITH HYPERTROPHIC CARDIOMYOPATHY (AN ABNORMALLY THICKENED HEART MUSCLE). HER PARENTS ARE CONCERNED ABOUT HOW THIS CONDITION WILL AFFECT THEIR BABY AND WHAT POSSIBLE TREATMENTS EXIST.

The task:
Describe this condition and recommend the best treatment for Sierra’s condition. Prepare a physiology-based presentation that explains the condition and your treatment to Sierra’s family. Include a simplified diagram of the problem and your proposed solution to clarify your presentation.
THE PATIENT: KAN HAS BEEN EXPERIENCING ANGINA WHILE PLAYING BASKETBALL BUT NOT AT OTHER TIMES. HE IS WONDERING IF THIS HEART PAIN IS SIMPLY THE RESULT OF AGING OR IF IT SIGNALS LARGER PROBLEMS.

The task:
Describe the possible causes of Kan’s angina and recommend the best treatment for his condition. Prepare a physiology-based presentation that explains the condition and your treatment to Kan and his family. Include a simplified diagram of the problem and your proposed solution to clarify your presentation.
THE PATIENT:
ADAN RECENTLY LEARNED THAT HIS ATRIA DO NOT CONTRACT. DESPITE THIS MALFUNCTION, HE LIVES A FAIRLY NORMAL LIFE, ALTHOUGH HE DOES GET TIRED EASILY. HE IS INVESTIGATING THERAPIES FOR THIS CONDITION.

The task:
Explain to Adan how he survives with only partial heart function. Recommend the best treatment for Adan’s condition. Prepare a physiology-based presentation that explains the condition and your treatment to Adan and his family. Include a simplified diagram of the problem and your proposed solution to clarify your presentation.
What other heart problems might Jane experience as a result of her mitral valve prolapse? Defend your answer using correct physiological terminology in four or five sentences.

What other circulation problems might Beth experience if she continues working as a mannequin? What would be the effects of those problems? Defend your answer using correct physiological terminology in four or five sentences.
What are some possible causes of a blocked AV node? Which blockage do you think is the most common? Defend your answer using correct physiological terminology in four or five sentences.

Should Jim be more concerned about another heart attack or a stroke? Defend your answer using correct physiological terminology in four or five sentences.
Which of Tammy’s valves is the most important? Defend your answer using correct physiological terminology in four or five sentences.

What are the possible consequences of NOT treating John’s ischemia? Defend your answer using correct physiological terminology in four or five sentences.
CARDIAC CLINIC

What symptoms does Nancy probably have? Defend your answer using correct physiological terminology in four or five sentences.

CARDIAC CLINIC

Which of Steve’s valves is the most important? Defend your answer using correct physiological terminology in four or five sentences.
Why are diuretics effective in reducing Andre’s blood pressure? Defend your answer using correct physiological terminology in four or five sentences.

Could Chandra’s high cholesterol be controlled by diet? Defend your answer using correct physiological terminology in four or five sentences.
What symptoms will Sierra probably experience? Defend your answer using correct physiological terminology in four or five sentences.

Should Kan be concerned about having a heart attack or a stroke? Defend your answer using correct physiological terminology in four or five sentences.
How much of the heart must function for Adan to survive? Defend your answer using correct physiological terminology in four or five sentences.