

CASE TEACHING NOTES for “Anyone Who Had A Heart: A Case Study in Physiology”

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INTRODUCTION

This interrupted case study follows the story of an older woman who has undergone a fertility procedure and conceives and delivers twins. The baby boy appears normal, but the baby girl has a heart problem and is cyanotic. The case presents the babies’ vital signs and symptoms. Students diagnose the problem by using their knowledge of the anatomy and physiology of the heart and the changes that take place in the heart after birth.

This case is used in a one-semester animal physiology course, which is taken by sophomore and junior science majors. It could also be used in a freshman general biology course or in an anatomy and physiology course.

Objectives

- To understand the function and structure of the heart before and after birth.
- To appreciate the changes that take place in the heart and in blood circulation after birth.
- To understand heart valve function, heart sounds, and murmurs.
- To use deductive reasoning to determine a physiological problem.

CLASSROOM MANAGEMENT

Students work on the case in groups of five or six students. The case takes about 75 minutes to fully develop.

Board Management

The board is divided into four equal areas:

- The first area is used for student diagrams of the adult and fetal hearts (Part I). The diagram of the adult heart may be used to explain heart sounds (Part III).
- The second area is used to list the babies’ vital signs and symptoms.
- The third area is used for possible diagnoses.
- The fourth area lists the tests suggested by the students (Parts IV and V).

Entries are made on the two (central) areas throughout the case as information is provided. If a certain diagnosis loses favor, the original group is asked if it is reasonable to delete their entry. If they (and the class) agree, an “x” is placed next to the entry. The diagnosis is not erased because it may be reconsidered at a later date.

Case Management

Students are given each part of the case in sequence and are asked to read the passage, discuss the material, and answer the questions. Students are told how much time they have for each part. They are permitted to use books, notes, and the Internet. After the prescribed time period (10 to 15 minutes typically for each part), the class is called together to share ideas, with the questions forming the basis for discussion. Groups

take turns going first, and different members of each group are called upon for input, allowing all students to participate in the case study.

Part I

I set up the board during the first few minutes of class. I give each of the four areas a heading: Hearts; Signs & Symptoms; Diagnoses; and Tests. After about 10 minutes, I choose a group that will be responsible for the adult heart diagram and a second group that will draw the fetal heart. The other groups are told that they will be responsible for making corrections and adding labels. I find that doing it this way keeps all of the students involved.

After about 15 minutes, a student is randomly selected from each group to draw their heart (and circulation). Block diagrams are acceptable, and students are permitted to ask for help from their group members. Drawing the hearts often takes a long time, so the students often need to be encouraged to finish. The diagrams are then discussed by the groups that did not draw them and corrections are made.

Part II

The babies' signs and symptoms are listed on the second area of the board. Groups (and individuals) are encouraged to suggest diagnoses, which are written on the third area of the board.

Part III

Heart sounds and murmurs are discussed. At this point, the list of Brianna's vital signs and symptoms continues to build. Students often concentrate on valve function and the changes that take place in the heart at (or soon after) birth. Some students explain their thoughts and often argue in a circular fashion, even contradicting themselves. This allows individuals or small groups to work through their thoughts and ideas out loud. I encourage this approach to in-class, out-loud problem-solving, as it demonstrates that the students are thinking and applying their knowledge.

Each student group outlines a test or procedure to be performed on both babies, and the test is written on the fourth area of the board. In many cases it is necessary to go around the groups several times until all suggestions have been exhausted.

Part IV

This part of the case study presents some hard data for both babies as well as a diagram of the normal adult human heart. If Christopher is considered normal, or the "control," students have something with which to compare Brianna's values; students should remember that there may be sex differences. Some students become frustrated because their test is not included in the data set. Students often accept that some procedures take more time than others and that some hospitals do not have a certain piece of equipment. Students examine the data, add new vital signs or symptoms to the second area of the board, and discuss whether the new data fit their diagnosis. The class or groups often discuss and argue about how the signs or symptoms fit (or do not fit) their ideas.

Part V

In this part of the case, students learn that the valves in Brianna's heart are normal. The second question provides a big hint to the answer, which is presented in Part VI. Students should be encouraged to come up with a new diagnosis and explain the symptoms in light of their new ideas. The questions in Part VI are designed to get the students to explain the answer in terms of Brianna's symptoms.

Answer Key

Answers to the questions posed in the case study are provided in a separate answer key to the case. Those answers are password-protected. To access the answers for this case, go to [the key](#). You will be prompted for a username and password. If you have not yet registered with us, you can see whether you are eligible for an account by reviewing our [password policy](#) and then apply online or write to answerkey@sciencecases.org.

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