

What Is the Cause of This Swelling and Why Am I Short of Breath When I Exercise?: Instructor Guide

Title:

What Is the Cause of This Swelling and Why Am I Short of Breath When I Exercise?

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Discipline:

Biological Sciences

Target Audience

Intermediate, majors and nonmajors

Keywords

Anatomy, cardiovascular anatomy



Length of Time/Staging

Two in-class sessions of approximately twenty minutes plus out-of-class research time of approximately four to six hours.

Abstract

Joan is a corporate lawyer for a Fortune-500 company. She has been physically active her entire life.

Lately Joan has become increasingly short of breath upon exertion, to the point where she has had to drastically cut back on her exercise. In addition, she has noted some swelling in her lower extremities and her right upper extremity. She has decided to see her family physician several months before her regularly scheduled annual physical.

This two-step problem asks students to develop a diagnosis for the patient, as well as answer several anatomically-related questions.

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3/10/2008

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6/3/2008

Student Learning Objectives

This problem was written with the following objectives in mind:

1. Develop a three-dimensional anatomical understanding of the venous drainage of the upper limb.
2. Develop an understanding of the interrelationships between the cardiovascular and respiratory systems, both anatomically and functionally.
3. Increase overall problem solving skills, including the ability to define problems, gather and evaluate information, and develop solutions.
4. Develop effective knowledge acquisition skills.
5. Develop better team skills.
6. Increase personal communication skills among and between group members.
7. Develop better writing skills.
8. Learn proper citation methodology, utilizing CBE citation formation.
9. Learn how to evaluate resource material found on the internet.
10. Increase self-assessment skills.
11. Increase ability to assess the work of others.
12. Increase ability to identify, find and use appropriate resources.

Format of Delivery

The problem is presented in two parts. An explanation of one possible way to present this problem is explained in Teaching Notes.



Student Resources

Various Medical Dictionaries

Gray's Anatomy REF QM23.2 .G73 2005

Professional Guide to Signs and Symptoms REF RC 69 .P77 2001

Atlas of Human Anatomy REF QM 25 .N46 1997

The Merck Manual REF RC 55 .M4 1999

Magill's Medical Guide REF RC 41 .M34 2002

Instructor Resources

Various Medical Dictionaries

Gray's Anatomy REF QM23.2 .G73 2005

Professional Guide to Signs and Symptoms REF RC 69 .P77 2001

Atlas of Human Anatomy REF QM 25 .N46 1997

The Merck Manual REF RC 55 .M4 1999

Magill's Medical Guide REF RC 41 .M34 2002

Maeder, M., Ammann, P., Rickli, H. & Schoch, O.D. 2003. Fever and Night Sweats in a 22-Year-Old Man With a Mediastinal Mass Involving the Heart. *Chest* 124: 2006-2009

Martini, R., Timmons, M. & Tallitsch, R. (2006) *Human Anatomy* (5th ed.) San Francisco: Benjamin-Cummings.

McCoskey, E.H., Mehta, J.B., Krishman, K. & Roy, T.M. 2000. Right Atrial Myxoma with Extracardiac Manifestations. *Chest* 118:547-549.

Sharma, G. & Prisant, L. M. "Atrial Myxoma". eMedicine [erial online]; Available from emedicine (<http://www.emedicine.com/med/topic186.htm>). Accessed 1 May, 2006

Teaching and Assessment Notes

What follows is a copy of the handout that is given to students on the first day of class. It outlines the PBL process that students are to follow for this PBL and the others assigned throughout the term. This process, modified throughout my 15+ years of using PBL in the classroom, has proven to be very effective—both from the students' and instructor's perspective. Throughout the evolution of my utilization of PBLs in class I have found the following format to work best:

- Students meet, in class, for fifteen to twenty minutes each time a part of the



problem is handed out. Because I have chosen to utilize two-part problems, this involves the students working in groups, in class, twice (fifteen to twenty minutes at a time) for a total of approximately forty minutes.

- Student groups also meet outside of class. Over the fifteen and more years that I have been utilizing the PBL process I would say that each group meets, on average, at least twice outside of class. These meetings vary in length, but usually last between thirty to sixty minutes per meeting.

Feel free to cut and paste any or all of the information (once adapted to fit your particular institution's library layout) into your course information sheet or in the instruction utilized handed out to your students with this PBL.

1. Problem-based Learning Assignments—Possible problem management and assessment information:

PBL Work Groups: Students are randomly assigned to a PBL work group based upon the class roster. During the first week of class, each group is to meet and assign a PBL Work Group leader, and notify the professor, via e-mail, as to the name of the leader. The role of the group leader is outlined below.

The problems are designed in a format such that you will be required to seek out information beyond that provided to you in lecture.

Each PBL group must choose a leader. The PBL group leader serves several important functions. Among these functions are:

- Facilitator of group meetings. The group leader is the one member in the PBL group that is to contact other members of the group and arrange meetings to work on the PBL sets.
- Facilitator of group progress. The group leader will coordinate, in conjunction with the members in his/her group, the tasks to be completed by each member of the group. The group leader is responsible for e-mailing the names of the group members who will be accomplishing each individual task to Bob *within twenty four hours of the day that the final part of the problem is distributed*.
- Facilitator of group problems. The group leader is the individual responsible for participation of group members. If the group feels that it has a member that is not participating adequately it is the responsibility of the group leader to bring this to my attention. At this time the group leader, individual in question, and I will meet and try to facilitate the problem. If necessary a meeting with the entire PBL group will be held to facilitate the problem.
- The group leader is responsible for turning in the final written, hard copy answers to the PBL sets as well as posting the final report in the public folder.

A listing of tasks that may be accomplished by group members are:

- Researchers—These members (typically three when PBL groups are six in number) are responsible for doing research on the presented problem. (*Note: These are not the only members responsible for doing the research—rather they are the ones that will be responsible for coordinating the research and for doing the bulk of the research for the problem.*) In addition, they are responsible for getting all information to the typists in a timely fashion.
- Typist(s)—This member (or members, depending upon the size of the report) is/are responsible for typing some or all of the final report for submission. The typist is responsible for getting the final draft to the editor in a timely fashion for initial reading.
- Editor—This member works with other members of the group to determine what is, and isn't to be included in the final report. However, when a controversy develops, the editor has the final say.
- Copy editor (proofreader)—This member is responsible for proofreading the final copy and getting all necessary corrections back to the typists in a timely manner. The typists are then to make any and all necessary corrections, and get a corrected copy to the copy editor. When all corrections have been made, the copy editor is responsible for getting the final copy to the group leader for submission on the day the report is required.

No group member may do the same task two problem sets in a row!

On the day the PBL is assigned, the class should break up into PBL groups and do some preliminary work on the problem in class. By the next class session, *each PBL group member* must turn in an *individual* preliminary report, either in hard copy or via e-mail. (I have found that an electronic copy is much easier to work with, and comments can be made via the “Track Changes” editorial function of MS Word.) A suggestion as to what the preliminary report must contain, and what I have found works very well in my classes follows:

- Possible hypothesis of what is wrong with the patient (maximum of two pages in length, *not* counting bibliography).
- What you will need to find out in order to prove or disprove your preliminary hypothesis, and where you will look to find this information.
- Any terminology that is not understood must be listed and defined, and the source of the definition cited.
- In order to ensure that students use a variety of reference material I include the

following statement in the process notes for the students: Citations for any and all sources utilized, including your textbook. *All reports (both preliminary and final reports) must involve a minimum of three references. A minimum of two different text references must be used for each report* (both preliminary and final reports). Your required lecture text may be one of these text references. It is advised that your second text reference be obtained from the reference section of the library.

- Because this PBL is delivered in two parts, students will receive (a) feedback (either via e-mail, utilizing “Track Changes” in MS Word or directly on their hard copy) regarding the quality of their logic and accuracy of their diagnosis as soon as possible, and (b) the second part of the PBL in the class session immediately following delivery of all comments to the class members. (Note: I try to get feedback to the students with twenty four hours of the turn-in deadline.) When the class receives the second part of the PBL the class will again break into PBL groups and do further preliminary work on the problem in class. In this session the group will now:
 - Determine how the additional information has changed any or all of the preliminary hypothesis, *and why*.
 - Determine the course of action the group will take in order to solve the problem.
 - Divide up the work that needs to be completed in order to solve the problem. The group leader will then e-mail Bob a listing of what task is to be accomplished by what group member.
- At the next class session *each group member* will turn in an *individual* hard-copy secondary preliminary report (maximum of two pages in length, *not* counting bibliography). I tell the students, via the course information sheet, that this secondary report must contain the following:
 - If your preliminary hypothesis has changed you must state how your preliminary hypothesis has changed, *and why*. However, if your preliminary hypothesis has not changed, then you must state how the additional information has supported and clarified your preliminary hypothesis.
 - What you will need to find out in order to prove or disprove your current hypothesis, and where you will look to find this information.
 - Any new terminology that is not understood must be listed and defined, and the source of the definition cited.
 - Citations for any and all sources utilized, including your textbook. *All reports (both preliminary and final reports) must involve a minimum of three references. A minimum of two different text references must be used*

for each report (both preliminary and final reports). Your required lecture text may be one of these text references. It is advised that your second text reference be obtained from the reference section of the library.

- A division of the work that needs to be completed in order to solve the problem, and who will accomplish each task. In addition to your listing of the group's division of labor in your secondary report, the group leader will then post, in the group's Public Folder, a listing of what task is to be accomplished by which group member.
- As published in the course schedule, *each group* is then required to submit a final report (maximum of five pages in length *not* counting bibliography) at the start of the appropriate class period. This final report again may be turned in as a hard copy or via e-mail. I also tell the students that it would be advisable for the group to keep at least one backup copy on computer disc in the rare event of data loss on my computer or the loss of a hard copy that was turned in. As outlined in the course information sheet the group report is to contain *at least* the following:
 - Hypothesis of the solution to the problem.
 - Sound anatomical reasoning to substantiate your hypothesis.
 - Answers to all questions raised in parts 1 and 2 of the PBL.
 - Citations for any and all sources utilized, including your textbook. *All reports (both preliminary and final reports) must involve a minimum of three references. A minimum of two different text references must be used for each report* (both preliminary and final reports). Your required lecture text may be one of these text references. It is advised that your second text reference be obtained from the reference section of the library.
- One of the goals of my class is for student to learn how to properly cite material. Therefore I inform them of the following:

All material utilized in the construction of preliminary and final reports must be properly cited, both in the body of the PBL report as well as at the end, in a reference section, utilizing *Council of Science Editors (CSE) Style*. Student may find additional information online at:

<http://library.osu.edu/find/resources/citation-examples/cse/>

Additional information may also be obtained from A Writer's Reference at:

<http://bcs.bedfordstmartins.com/writersref6e/Player/Pages/Main.aspx> or from our library's reference librarians.

I then inform the students of the following, to facilitate their utilization of the CSE citation



style:

The CSE Manual provides models for documenting electronic journal articles and books, some of which are available on the World Wide Web and by FTP and gopher. The Council of Science Editors has established conventions for citing electronically published articles and books, and you are encouraged to follow them as outlined in the CSE Manual. When you cite other Internet sources, use the guidelines in this section. The examples shown follow the citation-sequence system, but you can easily adapt them to the name-year system by deleting the superscripts and alphabetizing the entries.

List the references at the end of your research paper but before any appendices or explanatory notes.

In order to help students in the citation process, I then list citation examples for the students, as listed below.

Listed below are a few citation examples to facilitate you in your citation process:

Book: Voet, D., Voet, J.G., and Thompson, R.T. 1990.
Biochemistry. New York: J. Wiley. p. 1223

In-Text: (Voet, Voet and Thompson, 1990)

or

(Vote et al., 1990)

Book Chapter: (or other part with different author)

Kuret JA, Murad F. 1990. Adenohypophyseal hormones and related substances. In: Gilman AG, Rall TW, Nies AS, Taylor P, editors. The pharmacological basis of therapeutics. 8th ed. New York: Pergamon. p 1334-60.

In-Text: (Kuret and Murad, 1990)

Journal Article: Johnson, D.L., Lynch, W.E., 1992. Panfish use of and angler success at evergreen tree, brush, and stake-bed structures. N. Am. J. Fish. Management. 12(1):222-229

In-Text: (Johnson and Lynch, 1992)

Conference Paper: Meyer B, Hermanns K. 1985. Formaldehyde release from pressed wood products. In: Turoski V. editor. Formaldehyde: analytical chemistry and toxicology. Proceedings of the symposium at the 187th meeting of the American Chemical Society; 1984 Apr 8-13; St. Louis, MO. Washington: American Chemical Society. p 101-6.

In-Text: (Meyer and Hermanns, 1985)

Electronic Journal: Slater, P.J.B., Jones, A.E. Timing of songs and distance call learning in zebra finches. Anim. Behav. [serial online] 1995; 49(2):123-248. Available from: OhioLINK Electronic Journal Center via the Internet (<http://journals.ohiolink.edu/etext/>)

In-Text: (Slater and Jones, 1995)

Wolf, B.B., Green, D.R. Suicidal tendencies: apoptotic cell death by caspase family proteinases. J. Biol. Chem. [serial online] 1999; 274 (20):20049-52. Available from: Journal of Biological Chemistry Website via the Internet (<http://www.jbc.org/>)

In-Text: (Wolf and Green, 1999)

When citing web pages from the internet it is important to utilize the following general rules:

Provide the following information:

- Author's name. (If not known, use professional site).
- Date of publication or latest revision
- Title of the document.
- Title of complete work.
- <URL, in angle brackets>
- Date of access.
- Provide sufficient information to allow a reader to locate the source you are citing.
- Web documents share many of the elements found in print sources. The citation for a Web document often shares a format similar to that for print sources, with some information added and some deleted.
- Cite what is available when you cannot find some elements of information about a source. For example, publication dates often are not provided.
- Include the date that you accessed the source.
- Cite the URL address accurately, and mark it in angle brackets < >. Include the access-mode (http, ftp, telnet, etc.). If it is necessary to divide the URL between two lines, break only after a slash mark and do not insert a hyphen at the break.
- Citation example: Fronck, J. First basemen with shoulder pain and weakness. In PTP: Professional Team Physicians, Cases of Interest. Retrieved 23 July, 2002 from PTP Website:
<<http://www.proteamphysicians.com/article/index.asp?showarticle=yes&articleId=613&articletype=47>>

Because some students are not familiar with the reference section of the library, I then give them the following information regarding the reference section of our institution's library. I



would recommend editing the following information to fit your particular institution's library resources.

- Reference Resources:

Science is found under Q in the reference collection on the 2nd floor. Q will also be the first letter of the LC call number for science materials you can check out on 5th floor and journals stored on first floor. There are many dictionaries and encyclopedias specific to science disciplines. Biology materials will be found from QH through QR with specific Anatomy materials found in QM. In addition, the R section (Medicine) will provide dictionaries and reference books useful in completing your PBL assignments.

A few titles (if available in your library) that you should recommend to your students are listed below. In addition, the references listed below is an excellent list to submit to your institution's library staff for purchase to facilitate student work on PBLs:

McGraw Hill Encyclopedia of Science & Technology REF Q 121 .M3 2002

Various Medical Dictionaries found at REF R 121

Gray's Anatomy REF QM 23.2 .G73 1995

Professional Guide to Signs and Symptoms REF RC 69 .P77 2001

Atlas of Human Anatomy REF QM 25 .N46 1997

The Merck Manual REF RC 55 .M4 1999

Magill's Medical Guide REF RC 41 .M34 2002

Professional Guide to Diseases REF RT 65 .P69 2001

Current Medical Diagnosis & Treatment CMDT REF RC 71 .C976 2003

Gross Anatomy in the Practice of Medicine Slaby REF ZM 23.2 .S525 1994

Atlas of Human Anatomy (Volumes 1 & 2) Sobotta REF QM 25 .S6313 2001

- Again, the following instruction to students encourages them to utilize more than just internet sources in the solution of this, and any other PBL.

All reports (both preliminary and final reports) must involve a minimum of three references. A minimum of two different text references must be used for each report (both preliminary and final reports). Your required lecture text may be one of these text references. It is advised that your second text reference be obtained from the reference section of the library.

2. Because many students do not know how to evaluate internet sources, I include the following information in my instructions to students upon distribution of the first PBL of the



term.

Evaluating Web Resources: Before including a web page as evidence for your diagnosis, make sure you can defend it as a reliable source by answering these questions:

Accuracy: Are sources listed? Is the information fact or opinion? Can the conclusions be verified independently?

Authority: Is an author cited? What are their qualifications? Does the site have a purpose, affiliation or obvious bias?

Expert Opinion: Do other experts agree? What are the links to and from this site?

Coverage: How recent is the information? Is that acceptable?

3. Monitoring group activity during class.

Immediately upon distribution of the part 1 and part 2 of the PBL, the students break up into their PBL groups in the classroom and do approximately fifteen to twenty minutes of work on the problem during class. During this time I have found that it is important to move from group to group to monitor group activity and to answer any questions that students may have about the information presented in the problem *provided* the students' questions do not (a) involve the definition of any terms within the problem or (b) point the students toward a diagnosis of the problem. Over the years I have found that the best way to ensure this is to answer a student's question with a question. If several groups ask the same question, or a similar question, I will spend as much time as needed with the *whole class* answering these and any additional questions.

4. Assessment of group functioning.

One of the most difficult tasks for an instructor utilizing PBLs is to monitor and assess the function of PBL groups. Because of the nature of my institution it is impossible to have a group facilitator working with each PBL group, as is often done in medical schools utilizing the PBL process. Therefore, I ask students to assess their meeting electronically by filling out the following form within twenty four hours of *each group meeting*. I have been using the following form for a few years now, and I have found that this assessment form has had a positive impact upon the group process. Some of these positive effects include:

- Students reflect upon the meeting and what was accomplished at the meeting
- Groups that have one or more members that are not functioning as the group would like must address that in writing, thereby providing the class instructor with an insight into what is, or isn't working with each group.
- Students tend to solve group interaction problems on their own as a result of the reflection process rather than relying on the instructor solving the problem for them.

- Students find out the importance of meeting face-to-face (rather than electronically or not at all) throughout the PBL process

Below is a copy of the assessment form that I require the students to fill out and submit electronically (via e-mail) within twenty four hours of *each group meeting*:

PBL Group Meeting Assessment Document

1. Date of group meeting:
2. Place of group meeting:
3. Time meeting began:
4. Time meeting ended:
5. Group member's roles (identify which role each team member took at this meeting):
6. Purpose of meeting:
7. Topics for discussion and key points raised about each topic:
8. Future action to be taken and by whom:
9. Outstanding issues:
10. Strengths (i.e. What were the group's major strengths in working together as a group?):
11. Improvements (i.e. What improvements are needed by the group to work together better?):
12. Insights (i.e. What insights did your group have about group/team building and cooperative learning as a result of this meeting?):

Model assessment form, showing students the type of information requested:

"Model" PBL Group Meeting Assessment Document

1. Date of group meeting: 9/17/07
2. Place of group meeting: Library
3. Time meeting began: 7:15 pm
4. Time meeting ended: 10 pm
5. Group members' roles (identify which role each team member took at this meeting)



Team leader = Bill Burns

Researchers = Sarah Thomas, Billy Roach, Tom Benson

Typist = Chuck Hall (absent from meeting)

Editor = Sarah Thomas

Copy Editor (proofreader) = Bill Burns

Reflector and Optimist = Sarah Thomas

Recorder = Tom Benson

Spokesperson and Realist = Billy Roach

6. Purpose of meeting:

We needed to work on our PBL to resolve some differences in group members' theories about a possible diagnosis, as no one in the group got either the preliminary or secondary diagnosis correct.

7. Topics for discussion and key points raised about each topic:

a. Where do we go to get supporting information about the theories that are being put forth?

The group decided to utilize the following references for research materials:

Current Medical Diagnosis and Treatment REF RC71 .C976 2007

Dorland's Illustrated Medical Dictionary REF R121 .D73 2003

e-medicine.com

Harrison's Principles of Internal Medicine REF RC46 .H333 2005

Magill's Medical Guide REF RC 41 .M34 2007

Professional Guide to Signs and Symptoms REF RC 69 .P77 2007

b. How do we as a group determine which hypothesis we are going to support?

The group decided that we would get together and discuss the various theories in two days and, following the discussion, we would take a vote as to which seemed to be the most plausible diagnosis for the patient.

8. Future action to be taken and by whom:

Everyone in the group (due to time constraints and varying opinions) would



contribute to the additional preliminary research needed in order to arrive at a diagnosis.

9. Outstanding issues:

See 7b above

One of our group members is constantly missing meetings. We have instructed our group leader to talk to Bob about this problem and possibly meet with the group and moderate the problem. If necessary, the group will vote on whether or not to expel Chuck from the group for the remainder of the PBL and, possibly, for the remainder of the term.

10. Strengths (i.e. What were the group's major strengths in working together as a group?):

The group communicates well in making it clear what our suggestions are and how the group might carry out these suggestions.

We listen better now that we have been working together for half of the term already.

We think this project is difficult, but fun.

We have different strengths and talents that we bring to the project, and as a result we have chosen our tasks for completion of the PBL based upon these strengths. (i.e. Bill is an excellent proofreader, so it makes sense for him to work on this task.)

11. Improvements (i.e. What improvements are needed by the group to work together better?)

We have to make it clear to Chuck that his attendance is essential to complete this project. This is the second group meeting he has missed on this PBL, and the 4th overall this term.

Our group leader needs to be stronger in stressing deadlines and quality (spelling errors and poor proofreading costs us *lots* of points on the last PBL. *However*, our group leader needs to do this nicely and without confrontation, as compared to the last time he needed to talk to Chuck.

12. Insights (i.e. What insights did your group have about group/team building and cooperative learning as a result of this meeting?)

We need to manage our time better.

Our meetings need to be run more effectively.

Assessment Strategies

Various assessment strategies are found in the Teaching and Assessment Notes.. In addition, should the instructor want students to assess their individual improvements in problem solving skills, or should the instructor want the students to assess the work of others within the group two possible forms are attached that can be utilized (or modified) to accomplish those assessment tasks.

Team and Self Assessment Form

Your name: _____

Please use the rating scale below to describe how you and your team members performed on each of the tasks listed associated with your PBL group's activities. The purpose of the grading is not to divide groups but to reward those making above average effort and to encourage those not giving their fair share to the group overall effort.

5 if Always 4 if Very Often 3 if Sometimes 2 if Rarely 1 if Never

PBL Group Number:

Please fill in PBL Group Members' *Last* Names (including your own)

Names _____

Completed assigned tasks _____

Contributed valuable
information to the group _____

Attended group meetings _____

Was honest in reporting
progress about his/her
assigned tasks _____

Participated in writing
final report _____

Now, ***please circle*** the rating below that you feel you would best describe your group's overall performance:

Very good Good Barely Acceptable Poor Very Poor



PBL Self Evaluation Form

This evaluation form will not be utilized in assigning any grades. However, it is beneficial to reflect on any progress that you might have made in various areas as a result of participating in a PBL course. Therefore, please evaluate yourself utilizing the following scale.

Scale:

- 5 = Strongly agree
- 4 = Agree
- 3 = Neutral
- 2 = Disagree
- 1 = Strongly disagree

Your name: _____

As a result of my participation in PBL in Human Anatomy I feel that I have improved in the areas of:

1. Effective group participation _____
2. Effective group communication _____
3. Evaluation of myself (self evaluation) _____
4. Evaluation of others (peer evaluation) _____
5. Acquiring information to solve complex problems _____
6. Evaluation of the quality of information needed
to solve complex problems _____
7. Working effectively with others _____
8. Higher-order, critical thinking skills _____



Overall improvement rating of yourself: _____

5 = excellent; 4 = good; 3 = average; 2 = needs work; 1 = poor

Solution Notes

Solution removed.