MODULE 14: ANATOMY & PHYSIOLOGY CASE STUDY #2

INSTRUCTOR'S GUIDE

Skeletal System Case Study

PLANNING NOTES: (1) Teams: 4 students; (2) **Length:** Approx. 3 classes (Day 1: Subjective & Objective & Patient Interview; Day 2: Pre-Assess questions, Research, & Assessment; Day 3: Finish Assessments (if needed) & Plan; (3) **Resources Needed:** Computers; Copies of student workbook

Mrs. Jones' Case: "Old Bones"

OVERVIEW:

Mrs. Jones, a 75-year old woman is admitted arrives at the hospital complaining of an extremely sore hip after a recent fall.

ADDITIONAL PREP: ACTOR (female, ideally) to play Mrs. Jones (instructor can do this if needed) Est. 15 m prep time to review info/script) -- "old lady" props strongly encouraged! :)

GOALS:

1. Draft hypotheses that logically explain data. (Assessment: Diff. Diagnosis)
2. Access & analyze data using aligned and appropriate tests. (Objective)
3. Propose a data-driven conclusion to a complex problem. (Plan: Diagnosis)

SOAP Note: If students have NOT done modules/case studies using the SOAP method, some prep is required (suggestion: 2-3 class periods. See SOAP resource lessons).

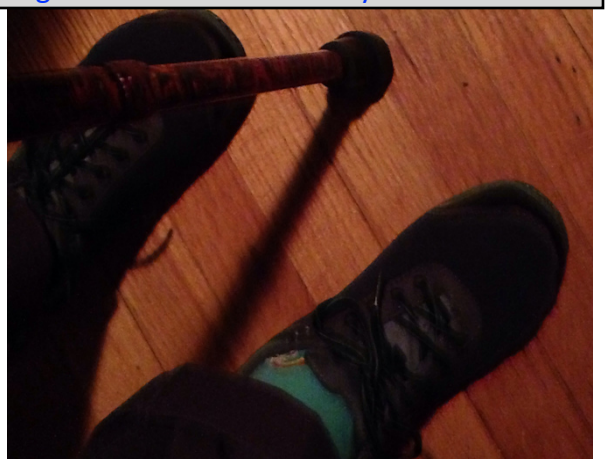
ROLES:

You are a team of health professionals composed of a **geriatrician,** specializing in the care of elderly people, and **orthopedist,** specializing in the musculoskeletal system, an **exercise physiologist,** trained to assess and recommend physical activity regimens for patients, and a **social worker**, focused on the unique needs of seniors in the healthcare system.

Groups: Switch things up by having students draw randomly for their roles.

OBJECTIVE:

Obj. 14.2: Identify the structures, functions, and pathophysiology of the skeletal system.



DELIVERABLES:

1) SOAP Note
2) Pre-Assessment Guiding Questions

ASSESSMENT CRITERIA:

Objective Section: 1) organized & recorded clearly & accurately; 2) minimum of 2 appropriate and aligned tests/labs selected, including explanation of purpose, expected results, & analysis of actual results

Assessment Section: 1) minimum of 3 possible hypothesized diseases/conditions aligned with data, with brief explanation of each disease & rationale; 2) clear conclusion (final diagnosis) based on 3+ pieces of supporting evidence (at least one must be quantitative) & logical reasoning

Note on use of case studies: These case studies are designed to be used as an introduction to a body system in an A&P course OR as a supplement &/or authentic assessment tool to the middle or end of unit. The case studies are compatible with any other A&P curricula & reference online resources so that no formal text or other curricular source is required. They can also be used in a shorter "survey"/case-based course of A&P to give students a preview of applications for A&P, while engaging & "hooking" them on A&P! :)

Connect to students' lives by asking:
-Have any of the elderly members of your family ever encountered a painful health condition? If so, what was it? How did they deal with the pain? How did this health condition affect his/her mood?
-Besides basic training in Anatomy and medical skills, how else should health professionals be trained to help elderly patients?

Health Care Provider Roles:

Determine the role of each team member. Then write down at least two questions that each healthcare provider might be interested in asking the patient, based on his or her focus area or specialty.

Team Member	Role	Focus Area	Questions for Mrs. Jones:
	Geriatrician	medical care for the elderly	
	Orthopedist	musculo-skeletal system	
	Exercise Physiologist	exercise & physical activity	
	Social Worker	holistic needs of elderly people	

Career Connection:
Ask students: "What do you think a Radiologic Technologist is?" Give them time to research, share the answer, or go online and do a google search for information . (Side Note: Modeling google searching is a GREAT way to also show students how to be smart internet information consumers. Think aloud as you click and type—explain why you type in certain search words, why you choose to click or not click on certain sources in the google search results, etc. These instinctual habits we use to find credible sources are still developing in students!)

Roles: If a 5th team member is present, challenge students to come up with an additional role based on what types of other they would expect to be present in this scenario.

Steps: This checklist will help orient students, encourage them to manage their time and tasks, and help them process the flow of the case.

Case Study Steps:

_____ 1. Review the coversheet & ask questions for clarification.

_____ 2. Assign team roles. Discuss what how you will carry out these roles to make an effective team.

_____ 3. Document information from the nurse's note in the SOAP note. Prepare 10 questions (write them out) to interview the patient. Prioritize your top 3 to ask.

_____ 4. Document patient information during interview in the SOAP.

_____ 5. Complete the *Pre-Assessment Guiding Questions.*

_____ 6. Research possible diagnoses and labs/tests to run in order to develop a differential diagnosis list.

_____ 7. Write out your SOAP **Assessment** for Mrs. Jones, including differential diagnosis, labs and tests, and final diagnosis. You may request ONE lab test result by submitting it to the Lab Tech (your instructor).

_____ 8. Research information on the care and treatment of the diagnosed illness, condition, or disease.

_____ 9. Create a brief **Plan** for Mrs. Jones, addressing the 3 most important components of her treatment plan.

Nurse Notes:

Steps: Ensure students have a chart or website to compare vitals. A Vitals primer is located in Lesson 2.9 (see SOAP resources).

"Ms. Thelma Jones is a 75-year-old widow, complaining of severe right hip pain following a fall this morning. She reports moderate back pain for the past year. She measures at 5'3" and weighs 102 pounds. Her temp is 98.6, pulse 84, and blood pressure 130/80, and her respiratory rate is 18. Ms. Jones' pain description indicates that the pain appears to originate in her sacral and lumbar regions and migrate upward toward the cervical region and throughout her pelvis. A black and blue contusion is visible on her upper right hip.

Vitals & Measurements from Ms. Jones physical 11 months ago:

Height: 5'4
Weight: 108 lb.
HR: 65 bpm
RR: 15 breaths/min
BP: 120/90
Temp: 98.2 degrees F

Ask students: "Why might it be important to refer to the numbers from her last visit, 11 months ago. (Any changes in height & weight & other vitals might be relevant!)

Questions:

Fill in the table below with 10+ questions that your team should ask Mrs. Jones:

Category of Subjective or Objective Section of SOAP Note	Question

Mrs. Jones Script (suggestion):
Doctors, I am in SO much pain. I fell getting out of the bathtub this morning, and now my hip is absolutely killing me. I can't put any weight on it…I mean, seriously, I can barely walk. My back has been hurting for the past year, but I've just been dealing with the pain and avoiding coming in to the doctor. What do you think?

Students will ask their questions. The actress will answer the questions as students fill in their notes. Consider having a student record the answers on an overhead, whiteboard, or project the computer notes while Mrs. Jones answers questions, especially if this is one of the first few times students have filled in a SOAP note.

Now you will interview Mrs. Jones. Use these, along with any others that are important or become necessary in the course of the interview. As she responds, take notes in the SOAP note on the follow page.

SOAP KEY
(Script notes for live interview)

THOROUGHNESS: Remind students to be thorough when documenting the details in the SOAP note. Even if a detail seems irrelevant, it may be important later. Simultaneously, encourage them to be succinct & concise in their notes.

Associated Symptoms	*Noticed she shrank an inch at her last check-up.*
Frequency	*The pain occurs when patient moves from sitting to standing and whenever she's moving. It occurs multiple times/day.*
Radiation	*The pain in the **Sacral and Lumbar** regions migrate upward toward the **Cervical** region on the **Posterior/Dorsal** region of the body; intense **lateral** pain in the right **coxal region.***
Character	*The pain feels like a terrible bruise or like I broke my arm. On a scale of 1-10, the pain is a 6/10. Pain in **coxal** region is 10/10.*
Onset	*This started about a year ago. Coxal pain began one week ago.*
Location	***Sacral, Lumbar, and Cervical** regions on the **Posterior/Dorsal** side. **Lateral coxal** area.*
Duration	*Pain occurs when the patient moves. Pain occurs when patient is sitting still (occasionally) but mostly when the patient is moving.*
Exacerbating Factors	*Moving around makes it hurt worse. Lifting anything remotely heavy greatly increases the pain. Twisting or making quick, jerky movements also increases the pain.*
Relieving Factors	*Patient tried taking Ibuprofen, which provided relief for about an hour. Applying a cold pack to the back also helped a little.*
Past Medical History (Social, Family, Medications, Allergies)	***Past medical history** (when was the last time the patient went to the doctor, have they had any surgeries, do they have any conditions like diabetes, etc)* *-Last visited the doctor a year ago, hasn't had any major surgeries, had Amenorrhea as a teenager* *-Had Breast Cancer 10 years ago* ***Social History** (does the patient drink, smoke, or use any drugs [your students SHOULD ask these questions], marital status, children, occupation [does the patient work at a job where they sit at a desk all day or somewhere they are exposed to harmful chemicals, etc], sexual history, live alone or with others, etc* *-Smoked for 30 years but quit 5 years ago* *-Is married and has one child* *-Is a teacher and on her feet most of the day* ***Family History** (any conditions/diseases run in the family?)* *-No major conditions run in the family* ***List of Medications** (patient might say "I'm currently using Nicoderm because I recently quit smoking* *-Used to use birth control pills but stopped around Age 48 when she went through Menopause.* *-Took hormone therapy for breast cancer 10 years ago.* ***List of Allergies*** *None*

Objective:	
Vital Signs	*Standard in blue (Body Temperature 98.6F, 38.5F, Pulse 50-80 beats/min, Blood Pressure 120/80, Respiratory Rate 12-20 breaths/min) Suppose this patient has vital signs all within the normal range*
Physical Exam Results	*Major curvature of the **superior vertebral region.** Students could request this information.*
Results from labs	*DEXA Scan T-Score =-3, X-Ray=Fractured hip Students would be given the results of a "DEXA Scan" and have to look up what a DEXA scan is and what the results mean.*
Measurements	*65 years old, 120 pounds, 5'6"*

DIFFERENTIAL DIAGNOSIS: Before students complete this section, remind them to go to page 8 (research graphic organizer table) and split up to do background research so that their differential diagnosis is evidence-based, well-researched, & understood by all team members.

Remind students to refer to the COVERSHEET where the Assessment Criteria are listed so that they can confirm they are meeting expectations.

SOAP KEY:
Assessment & Plan

Assessment:	
Diagnosis Differential Diagnosis List	*Patient is a 75 year old, post-menopausal female suffering the beginning stages of Osteoporosis and a fractured hip.* ***Differential Diagnosis:*** *Osteopenia*
Plan:	
Plan steps	*Medication: Alendronate (Fosamax), ibandronate (Boniva), or risedronate (Actonel) taken orally once/week.* *Exercise: Once hip is healed, (Any of the below are acceptable, but rationale should be explained)* *Weight-bearing exercises -- walking, jogging, playing tennis, dancing* • *Resistance exercises -- free weights, weight machines, stretch bands* • *Balance exercises -- tai chi, yoga* • *Riding a stationary bicycle* • *Using rowing machines* *Avoid any exercise that presents a risk of falling, or high-impact exercises that may cause fractures.* *Diet:* *Get at least 1,200 milligrams per day of calcium and 800 - 1,000 international units of vitamin D3. Vitamin D helps your body absorb*

PURPOSE: These questions will help learners connect the case study patient scenario with the structure, function & pathophysiology of the skeletal system.

USE OF THESE QUESTIONS: The amount of time students need to research answers to these questions will depend on the concurrent or previous level of instruction/pre-reading about the skeletal system.

Pre-Assessment Guiding Questions:

1. Which bones are the source of the pain, based on Mrs. Jones' description of her pain? Refer to terminology from the nurses note to describe where the regions are located as well.

A great online resource for skeletal anatomy terms is this quiz:
http://www.klbict.co.uk/interactive/science/skeleton.htm

2. What are the functions of the skeletal system? Which functions are related to Mrs. Jones condition?

The skeletal system provides an internal framework for the body, protects organs by enclosure, and anchors skeletal muscles so that muscle contraction can cause movement. The skeletal system includes bones, joints, cartilages, and ligaments and is perfectly adapted for its functions of body protection and motion.

3. What changes in the skeletal system occur as a person ages?

Osteoporosis is one of many diseases that affects the skeletal system and can lead to more acute injuries such as fractures. Osteoporosis is the thinning of bone tissue and the loss of bone density over time. It is common in women over the age of 50 and occurs when the body fails to form enough new bone, when too much old bone is reabsorbed by the body, or both. Calcium and phosphate are minerals that are essential for normal bone formation and may not be absorbed back into the body as one ages. This can lead to osteoporosis.

4. How are exercise and diet related to bone health? What recommendations would you give Mrs. Jones in relation to exercise and diet?

5. Name & describe some common diseases, conditions, or disorders of the skeletal system.

Source: http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0001400/)

Consider assigning research of diseases as part of homework.

Research on Differential Diagnoses:

Possible conditions: http://www.ncbi.nlm.nih.gov/pubmedhealth/s/diseases_and_conditions/a/.

Team Member	Differential Diagnosis to Research	**Notes:** Explanation of disease, labs/tests to confirm/ rule out diagnosis, etc.

RESEARCH: Before students decide what they will focus on for research, encourage them to do an initial web search for possibilities. Then they can divide and conquer in order to dig more deeply into each possibility. Once research is complete have them return to teams and share information before coming to a conclusion together.

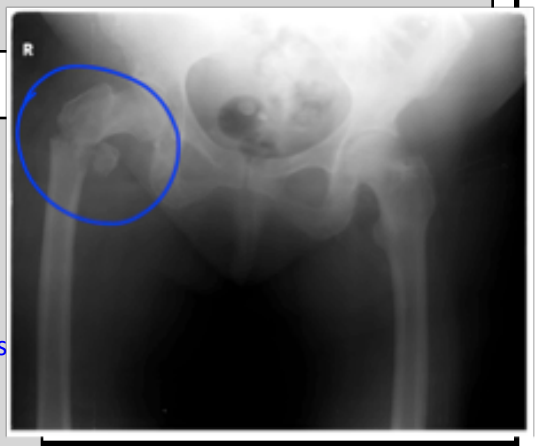
"ORDERING" LABS/TESTS:

Students should be generating questions about the DEXA scan, X-Ray, measurements, etc. In order to complete this part, along with this part during other cases, students can be given a list of common tests that might be run. (This could be held onto for all future case studies--some of these tests will be applicable and others will be necessary for other cases.) Students will have to determine which tests to run. When they've arrived at the appropriate test, they can ask the circulating teacher for the test, and the teacher will provide the results if it is deemed the test is relevant. If the test makes no sense or cannot be justified, the instructor can deny the request. Instructor can put a sign around her that says, "Lab Technician".

SHARE THIS INFO WITH STUDENTS:

Lab Tests that *can* be run:
Reference the "Diagnostic Tests" section from:
http://www.merckmanuals.com/home/appendixes/ap2/ap2a.html

**Be careful! Diagnostic tests can be VERY expensive and ordering excessive tests costs the patient, the hospital, and the taxpayers extra money. Be sure to *only* order the tests that seem to relate to this problem.



Materials to prepare for when requested:

-Bone mineral density (BMD):
Ex: **Dexa scan test** (most common osteoporosis test) result sheet along with how to read the results of a Dexa Scan (Suggested result: **DEXA = -2.2**)

-X-ray: Print copies of x-ray image on the right (larger image located in resource file) or prepare to project it for the whole class

OTHERS:
-Bone densitrometry
-Blood or urine test to see the metabolism of bone

Research on Treatment Plan:

As a team, decide how to best conduct research, share information, and make decisions on the treatment plan for Mrs. Jones. Use the box below and any additional paper for your notes.

Research Notes:

Consider asking students to submit (at least verbally report out) their assessments before moving on to the Plan section. Once all teams have reported out, the instructor can reveal the true diagnosis (Note: The big reveal can be fun! Build up the anticipation & drama. It is much more fun for students if getting it right becomes a big deal. The big reveal might even cause cheers OR tears—or at least frowns—among different students, who seem to value being "right" quite a bit at this age! That being said, keep an emphasis on learning from mistakes and the importance of the process rather than the right vs. wrong outcome, at this stage of their careers. It may even be interesting for students to find out that doctors get the diagnosis wrong for a many YEARS in their training. They always have more experienced doctors checking their work and teaching them where their mistakes were, and eventually lots of practice & experience help them improve their accuracy.

Consider adding a final project, if time permits:
Mrs. Jones and her husband come back for a follow-up visit. They are very concerned about her condition and want to fully understand her diagnosis and treatment plan. In your groups, you will have 15 minutes to prepare a video response (**Max: 2 minutes)** to Mr. and Mrs. Jones. It is ***up to you*** to decide which of the information you have gathered is the **most important** information for them to hear and understand. Before recording, you must:

1. Decide which information is the most important information for them to hear.
2. Decide which parts of the treatment plan Mrs. Jones will have to do on her own. Figure out how you can **motivate** her to follow through on those plans when you're not there.
3. Determine which words you will need to translate for her. (ie: If you mention the posterior side of her sacral region, make sure you ALSO translate that into: the back side of her lower back.)