

# Muscular System

## Case Study

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

### Jack's Case: "Is This Normal?"

**DIAGNOSIS:** Becker's Muscular Dystrophy

#### OVERVIEW:

Jack Jones, a 4-year old male, was brought into the clinic by his parents because of his shortness of breath and weakness in his arms and legs. What could be wrong with Jack?

#### GOALS:

**ADDITIONAL PREP:** ACTORS (Jack, Mother, Father, Doctor) to act out script (optional); Instructor can pose as Jack's mother or father to circulate to teams to answer ?s (see Step 4)

1. Evaluate subjective and objective information to determine a precise & accurate diagnosis.
2. Develop an aligned, evidence-based, and thorough plan/solution.

#### ROLE:

**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).

You are the staff of a pediatrics group practice which covers both primary and specialty care for children and adolescents from infancy through age 21. You will each decide upon a role, but no roles should be duplicated.

#### OBJECTIVE:

**Obj. 14.3:** Identify the structures, functions, and pathophysiology of the muscular system.

#### DELIVERABLES:

- 1) SOAP Note
- 2) Pre-Assessment Guiding Questions

#### ASSESSMENT CRITERIA:

**Assessment Sections:** 1) clearly summarized S & O information; 2) 2+ differential diagnoses aligned with evidence of case; 3) accurate final diagnosis & reasoning

**Plan Sections:** 1) comprehensive (includes physical, social & mental health); 2) aligned to facts of the case; 3) evidence-based; 4) addresses short- & long-term; 5) provides detail & specificity (e.g., "walk at least 1 mile every day" rather than "exercise")



**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! :)

### Health Care Provider Roles:

Determine the role of each team member. Then share one strength or skill each team member brings.

#### Connect to students' lives by asking:

- Has a younger sibling, relative, or friend ever been in serious health trouble? How do serious health issues early in life impact both the child-patient and his/her family?
- What challenges do you think a pediatrician (children's doctor) faces when trying to diagnose and treat babies & kids?

Team Member	Role	Strength/Skill

#### Career Connection:

Students might struggle to try to figure out what roles would exist at a pediatric clinic, beyond doctor and nurse (e.g., medical assistant). Encourage them to think of this challenge as their VISION of what additional roles SHOULD exist in a pediatrics practice so that patients get the best possible care. Perhaps social workers, physical therapists, dentists, and nutritionists are not usually present in these settings, but what might healthcare look like if they were integrated?

### Case Study Steps:

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

- \_\_\_\_\_ 1. Review the coversheet & preview the case.
- \_\_\_\_\_ 2. Assign team roles. Share strengths & skills each team member can contribute. Determine team norms everyone can agree upon.
- \_\_\_\_\_ 3. Document information from nurse's note into the SOAP note.
- \_\_\_\_\_ 4. Prepare **5 questions** for Jack's mother or father. When they visits your team, ask your questions!
- \_\_\_\_\_ 5. Read transcript of a portion of the patient interview at Jack's visit. Add new information to SOAP note.
- \_\_\_\_\_ 6. Complete the *Pre-Assessment Guiding Questions*.
- \_\_\_\_\_ 7. Research FOUR (or more) possible diseases or conditions Jack might have. Determine 1-3 tests or labs to run to help determine the diagnosis. Submit **Test/Lab Request** to Pathologist and receive results.
- \_\_\_\_\_ 8. Finalize the SOAP **Assessment** section. Begin investigating your treatment options (**Plan**). Share information and determine the final Plan.

### Nurse Notes:

Jack Jones, a 4-year old male, was brought in for shortness of breath and weakness in arms and legs. On initial examination, Jack appeared only mildly fatigued. His mother reported he had been crawling around the waiting room playing aggressively with the train set. According to past medical records, Jack achieved his gross motor skill milestones (e.g., holding head up, sitting, rolling, & standing) on pace with other children. However, he didn't begin walking until 17 months. At 2.5 years old, he began to display a lordotic posture.

Jack is 35 pounds and 2'2" and his vital signs are (1) heart rate = 108 beats per minute, (2) respiratory rate = 25 breaths per minute, (3) temperature = 101.3 deg F, and (4) blood pressure = 118 / 70. In the physical exam, pupils were normal and reactive to light. Mother notes that development of speech was slightly delayed. No facial muscle weakness was noted. Breath sounds were reduced and cough was very weak. Heart sounds were normal (no murmur). Shoulder, arm, and thigh muscles appear slightly atrophied. Calf muscles appeared slightly enlarged. Muscle strength reduced in the biceps & triceps muscles (+4 on a scale from 0 to +5, +5 being normal).

**Ask students:** "What information here seems normal or abnormal? How do you know?"

**SOAP KEY:**

**PURPLE** = Info given in case  
**GREEN** = new Info that can be provided as responses to student questions  
**ORANGE** = possible lab results

**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.

**SOAP Note****Subjective:**

Signs & Symptoms	Weakness in arms/legs; Shortness of breath
Allergies	None known
Medications	None except children's daily multivitamin
Past medical history	Achieved gross motor skill milestones on target, except walking (17 months) 2.5 years: lordotic posture began; Development of speech slightly delayed Family history of T1 diabetes, breast cancer, & heart disease (maternal g-father unknown)
Last oral intake	Breakfast: Kix cereal & orange juice
Events leading to injury or illness	Actively playing in waiting room (in sitting/crawling position) Complaining of pain 1-2 times per day for past few weeks
Frequency	1-2 times/day (may be constant)
Associated Symptoms	shortness of breath and exhaustion upon normal exercise (1 week ago)
Radiation	n/a
Character	seems to be aching type of pain; 6-7 on 1-10 scale
Onset	3 weeks ago
Location	legs (& possibly lower back)
Duration	Uncertain; pain seems to always be bothering him at a low-level, but only reports a few times per day
Exacerbating Factors	Standing or engaging in walking/exercise for more than a few minutes at a time
Relieving Factors	prefers to sit or lie while playing

**Objective:**

Measurements	4 yrs old; 35 lbs; 2'2"
Vital Signs	HR: 108; RR: 25; Temp: 101.3 deg F; BP: 118/70;
Exam Results	Appearance: mildly fatigued; hunched while sitting; Pupils normal/reactive; Breath sounds reduced; weak cough; No facial muscle weakness; Normal heart sounds; Slight atrophy of shoulder, arm, thigh muscles; Slight hypertrophy of calf muscles; Bicep/tricep brachii strength reduced (+4)
Lab Results	

Gower's Sign: positive; Muscle biopsy: histologic changes suggest muscular dystrophy (specifically: Becker's); Serum creatine kinase (CK): levels elevated; Other test results may vary (instructor can add additional data that fits diagnosis of Becker's Muscular Dystrophy)

### Questions:

Prepare 5 important (unanswered) questions for Jack's mother. She will visit your team shortly, so be prepared to ask, listen, and record.

SOAP Section	Question

### Transcript of Patient Interview:

Read the transcript of the patient interview between the physician, Jack, and his parents. Add all new relevant information to the SOAP note.

**Doctor:** Hi Jack, how are you feeling today?

**Jack:** Good. I play with trains. Do you like trains?

**Doctor:** I do like trains. Jack, can you tell me how your legs feel?

**Jack:** They hurt, like OUCH.

**Mother:** He usually complains of the pain once or twice a day, but it seems to be pretty constant. It seems that most of the time he is just too distracted.

**Father:** This has been going on for about three weeks now. At first we didn't really think much of it...you know, kids say all kinds of things. But when it kept happening, we got worried

**Doctor:** Jack, does the pain feel like more of a belly ache or a scrape?

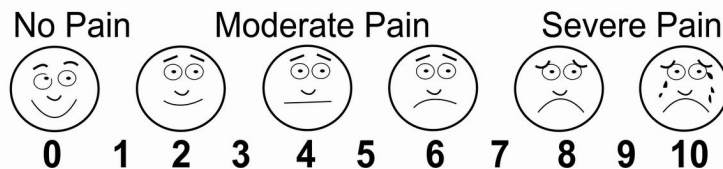
**Jack:** Ummm. Do you watch Thomas the Tank Engine?

**Father:** We think it's more of an ache feeling, because he usually keeps on playing. But sometimes he lies down to play or seems to slow down with whatever he is doing.

**Doctor:** I notice that he looks a bit hunched over when he is sitting. Is this his usual position?

**Mother:** Yes. We have always felt that he has poor posture compared to other kids at preschool. And his teachers say that at recess he usually prefers sitting to play rather than running around with the other children.

**Doctor:** Jack, can you show me which of these faces is like you when your legs hurt?



**Jack:** {Points to the spot between 6 and 7, distractedly, while playing with his train.}

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**Mother:** It is so hard for us to tell what he is really feeling. Sometimes I just think he is having growing pains. But what really started to worry us is when he started getting short of breath about a week ago.

**Father:** We took him to the playground and tried to play a game of tag. Jack would get just a few steps in and plop down heaving. We also noticed that he started to stop to take a break when he was going up the stairs to his bedroom in our home. He just seemed to always be breathing harder than usual.

**Doctor:** Thank you, that is important to know. Jack, can you point to where it hurts right now.

**Jack:** *{Points to his lower back}*

**Doctor:** Jack, does your back hurt a lot?

**Jack:** No

**Doctor:** (To parents): Do either of you have any musculoskeletal conditions or other major health problems?

**Father:** I have Type I diabetes, but other than that my wife and I are healthy.

**Doctor:** What about your family? Do Jack's grandparents or any aunts or uncles have health conditions?

**Mother:** My mother died of breast cancer at age 55 and my father was never in the picture so I have no idea what health issues he might have had.

**Father:** My family has been in great health, except for my father who suffered a mild heart attack. He is 76 years old.



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

*Pre-Assessment Guiding Questions:*

**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.

1. Describe the difference between skeletal, cardiac, and smooth muscles. Which do you think are involved in Jack's disease or condition?

**Source idea:** <http://kidshealth.org/kid/htbw/muscles.html>

2. Name the functions of muscles. Which functions are problematic for Jack?

**movement, posture, joint stability & heat production**  
Jack's main issues are the first three functions

3. Which specific muscles are problematic for Jack? Where are they located?

Answers will vary; but some of the major large leg muscles including: gluteus maximus (bottom); hamstrings (back of thighs); quadriceps (thigh); gastrocnemius (calf); and arms: bicep and tricep brachii may all be weakening

4. How does a muscle contract? What are some possible reasons a muscle would fail to contract?

**Source idea:** <http://health.howstuffworks.com/human-body/systems/musculoskeletal/muscle2.htm>

5. Why might Jack be experiencing muscle weakness? Give at least two possible explanations.

Answers will vary; but may include:  
--nerve signals are weakening (nervous system problem)  
--actual muscles are deteriorating (muscular problem)  
--injury  
--skeletal system problem

Consider assigning research of diseases as part of homework.

### Research:

Determine four (or more) possible diseases/conditions Jack may have. Find key information to help confirm or refute each hypothesized disease. Then decide on 1-3 tests/labs to run in order to finalize the diagnosis.

Possible Diagnosis	Information
	Possible conditions: <a href="http://www.ncbi.nlm.nih.gov/pubmedhealth/s/diseases_and_conditions/a/">http://www.ncbi.nlm.nih.gov/pubmedhealth/s/diseases_and_conditions/a/</a> .

Lab/Test	Explanation	Possible Results

Assessment:		SOAP KEY: Assessment & Plan
Summary		
Differential Diagnoses		
Final Diagnosis	<p><i>Claim (Diagnosis):</i></p> <p><i>Evidence:</i></p> <p><i>Reasoning:</i></p> <div> <p><b>Jack has Becker's Muscular Dystrophy:</b>            -lordotic posture; Gower's sign; muscle weakness &amp; pattern of atrophy &amp; hypertrophy of calves;            preference to sit/crawl; CK levels &amp; muscle biopsy results</p> </div>	
Plan:		
<p><b>Steps of Plan</b></p> <p><i>(Consider mental, social and physical health; short- and long-term needs, and follow-up care required)</i></p>	<p>There is no known cure for Becker muscular dystrophy. The goal of treatment is to control symptoms to maximize the person's quality of life. Some doctors prescribe steroids to help keep a patient walking for as long as possible. Activity is encouraged. Inactivity (such as bed rest) can make the muscle disease worse. Physical therapy may be helpful to maintain muscle strength. Orthopedic appliances such as braces and wheelchairs may improve movement and self-care. Genetic counseling may be recommended. Daughters of a man with Becker muscular dystrophy may carry the defective gene and could pass it on to their sons.</p>	
<p>Remind students to refer to the COVERSHEET where the Assessment Criteria are listed so that they can confirm they are meeting expectations.</p>		