

# NIH Pain Consortium

Centers of Excellence in Pain Education



## Adolescent Headache Case

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## Introduction

This is a case of a fourteen-year-old girl with worsening headaches. The case covers four months, beginning with entries into her video diary ("vlog" or "video blog"). She explores several approaches to headache management in a series of encounters with health professionals.

### Case Goals and Objectives

#### *Broad Goals*

- Describe the diagnostic features of migraine in adolescent patients.
- Discuss the pathophysiology of migraine headaches in adolescents and relate to the present case.
- Discuss both pharmacologic and non-pharmacologic treatment strategies for migraine in an adolescent, using an integrative medicine approach.
- Discuss psychosocial, environmental, and lifestyle factors that may trigger or complicate treatment of migraine headaches.
- Demonstrate how to encourage active self-management in concert with ongoing provider care.

#### *Specific Objectives*

##### Neurology

- Discuss the diagnosis of migraine based on Morgan's history and differentiate migraine from other headache types.
- Recognize "red flag" findings in Morgan's exam and historical details.
- Identify common migraine triggers and how they may be minimized.
- Describe both pharmacologic and non-pharmacologic strategies for migraine treatment that would be suitable for Morgan.
- Identify confounding headache factors and barriers to treatment (e.g., medication misuse or overuse, psychosocial stressors, environmental circumstances).

## Pain Pathways

- Describe the anatomy and physiology associated with normal sensory transmission.
- Describe the pathophysiology associated with migraine.
- Describe how the physiology of migraine variants seen in children may differ from that of migraines seen in adults.

## Pharmacology

- Based on mechanisms of action, describe potential problems associated with combining the anti-histamines, cyproheptadine and diphenhydramine, to treat Morgan's migraine.
- Describe the mechanisms of action of other medications prescribed for Morgan, including ondansetron, rizatriptan, and amitriptyline.
- Discuss the consequences of Morgan's overuse of Excedrin Migraine (acetaminophen, aspirin, caffeine) based on their mechanisms of action.
- Describe the components of Migrelief and how they may contribute to alleviation of migraine symptoms.'
- Explain the important differences between the metabolism of medications in adolescents compared to adults.

## Population Health

- Describe factors affecting the use of digital technology by adolescents with migraines, including prevalence and availability.
- Describe the privacy issues related to use of web-based, wearable technologies, or apps for self-management of migraine.
- Explain the evidence supporting the use of step therapy and stopping rules for Botox insurance coverage.
- Identify at least one resource for new information about the value (relative cost and effectiveness) of migraine treatments.

## Nursing (*school nurse education*)

- Accurately assess migraine symptoms in a student.
- Discuss a number of acute treatment options in the school setting, as outlined in a student's Headache Management Plan.
- Explain when a student with migraine symptoms can remain in school and when he/she needs to be sent home.

## Pharmacy

- List evidence-based medication therapy appropriate for the acute and prophylactic treatment of child/adolescent migraines.
- Assess a patient's ability to manage self-care, recommend an appropriate course of action based on described symptoms, and advise on need for professional medical advice if self-medication is inadequate.
- Describe how to counsel an adolescent about pharmacologic treatment for migraines in keeping with her level of health literacy.

## Behavioral Health

- Identify signs and symptoms that indicate need for a referral to behavioral health.
- Explain how Morgan's avoidance may maintain her anxiety symptoms.
- Name one cognitive and one behavioral strategy from CBT used to treat Morgan.

## Biofeedback

- Define biofeedback and describe its administration.
- Describe how biofeedback might work to relieve Morgan's pain and/or stress.
- Explain changes in finger temperature induced by stress and relaxation.

## Acupuncture

- Describe the outcomes Morgan might expect from acupuncture in terms of mental health, pain and overall wellness.
- Briefly discuss the evidence for the suitability of acupuncture as an intervention for Morgan, the primary criteria for selecting interventions, and strategies for prioritizing these criteria.
- Describe a typical acupuncture assessment, including history, assessment, and physical exam.
- Describe the use of pattern diagnosis, channel theory and palpation.
- Describe how to find an acupuncture specialist, and write a referral, including rationale and typical duration of treatment.

## Study Questions for the Adolescent Headache Case

- What are special considerations for treatment of an adolescent with this condition, compared to an adult?
- What lessons about self-medication does this case teach?
- What migraine triggers should be considered in creating a management plan?
- How can the patient collaborate in managing her headaches?
- How does the patient's anxiety affect her symptoms and relate to her treatment?
- Why is non-pharmacologic treatment recommended in addition to treatment with medications?

## Introduction to Morgan

*“Hello, my name is Morgan Smith. I’m 14 years old and I’m in the 9<sup>th</sup> grade. This is a new school for me this year. I’ve been having headaches for a long time; at least 6 months. I got a mild concussion playing volleyball about 6 months ago and my headaches started getting worse after that. My mother has migraines and she thinks that’s what I have, too. We went to see my regular doctor a week ago and she’s sending me to the headache clinic. I’m going there today. The worst part about the headaches is that sometimes I feel so bad that I can’t go to school or I*

*might go late or leave early. I'm falling behind a little. I also don't play volleyball like I used to. I was good enough to be on the travel team, so I was playing year-round. My headaches are worse on the right side especially just behind my eye. I'm not really scared about the headaches, but I wish they would just go away so I could be 'normal' again."*

## Introduction to Morgan's Mom

*"Hello, I'm Emily Smith, Morgan's mother. Morgan's a really sweet and conscientious girl who has had some medical problems off and on ever since she was in kindergarten. When she was 5 or 6 she started having what the doctor called 'cyclic vomiting.' She'd be very nauseated and then vomit 3, 4, 5 times in a day for a day or two and then get better. She didn't have a fever or any signs of the flu, just the vomiting. This happened 2 or 3 times a year for about three years and then it went away. She was pretty much okay after that until she was ready to start the ninth grade. This past summer she started having a headache now and then but after she got hit by the volleyball during a game and had to go to the emergency department, her headaches have gotten worse. She now has a headache, or is afraid she will get a headache every day. I was giving her Excedrin Migraine, which works for me, until the pharmacist that medicine taken too long or too often can actually cause a headache itself. He suggested I take Morgan to her doctor just to be sure we know what we're dealing with, and get on the right treatment."*

## Case Principals

### *Morgan*

Morgan Smith is a 14-year-old high school freshman who has had increasing headache pain for several months. She is an A student, who is a very good athlete and also enjoys being in theatricals at school. She is well-liked and has a large group of friends who are into keeping video diaries. Sasha is her best friend.

### *Morgan's Mom*

Emily Smith is the mother of three children: Morgan, aged 14, and 10-year-old twins, Brian and Sandy. She and her husband have been married for 18 years. Her husband is a bank manager and she was a third grade teacher until Morgan was born. Since then, she has been a stay-at-home mom who is very involved in her children's activities including being a volunteer school aide and a frequent chaperone for school trips.

### *School Nurse*

Karen Wilkes has been the nurse at Morgan's high school of 600 students for 2 years. Prior to that, she was a community health nurse in a nearby city for 15 years. The "Nurse's Office" consists of Ms. Wilkes' office, which has two visitor chairs as well as a refrigerator, a scale, and other equipment; a half bathroom; and a room with an exam table and a single bed separated by a curtain. An additional room, which once contained the exam table and equipment, was converted into a counseling office last year.

### *Acupuncturist*

Dr. Ergil is a prominent licensed acupuncturist (LAc), who has taught acupuncture and the principles of Chinese medicine at several institutions over the past 30 years. He recently received a doctorate in Acupuncture and Oriental Medicine (DAOM). Dr. Ergil see patients with chronic intractable pain at the local VA hospital.

### *Neurologist*

Dr. Connolly is a pediatric neurologist who has a special interest in migraine headache in children and adolescents. She has been practicing at the university medical center for 3 years since completing her fellowship training, which included an introduction to the use of complementary therapies in pain management. She and Cyndi Grayson, nurse practitioner, have developed a systematic approach to in-school management of headache.

### *Nurse Practitioner*

Cyndi Grayson has been a pediatric nurse practitioner in neurology for the past 6 years. Prior to becoming a nurse practitioner, she was an office nurse for 5 years and a school nurse for 8 years. She is particularly sensitive to the issues involved in managing headache in the school setting. Working with Dr. Connolly to develop a comprehensive but adaptable approach, she has incorporated strategies that can be individualized to meet the needs of a particular student within a given school setting.

### *Behavioral Therapist*

Dr. Hunt has a doctoral degree in clinical psychology. She has been in practice for 10 years at the university medical center. Part of her training included becoming a cognitive behavioral therapist, a skill that she has been teaching to psychology trainees since she joined the faculty. Her research is focused on how use of CBT can reduce the need for anxiolytics in the management of insomnia.

### *Biofeedback Specialist*

Dr. Sahler is an adolescent medicine specialist who has received specific training in the use of biofeedback to manage anxiety in addition to chronic pain syndromes such as headache, abdominal pain, and joint and muscle pain. She has used biofeedback with patients as young as 10, but younger patients can sometimes benefit from the approach as well. She encourages patients to use mood rings or Biodots® to practice relaxation between computer-based sessions (see the Learn More section on Biofeedback).

### *Community Pharmacist*

David Hutchinson is a community pharmacist who has worked at the pharmacy in the Smiths' neighborhood for 8 years. He has a special interest in patient counseling and has developed brief handouts about self-care of common symptoms such as headache and difficulty sleeping. The handouts include non-pharmacologic approaches (such as sleep hygiene) as well as over-the-counter remedies. He also always includes a section titled, "When to call your doctor..."

## Module Materials

The module focuses on Morgan's video blog, otherwise referred to as a "vlog." Other short video descriptions and transcripts track Morgan's mother and volleyball coach, while more in depth descriptions and transcripts feature Morgan's appointments with her healthcare professionals, including:

- Nurse Practitioner
- Pharmacist
- Neurologist
- Psychologist
- Acupuncturist
- Biofeedback Specialist



## Timeline of Symptoms

### September 2nd: Missed Party (Morgan's Vlog)

The following provides a description of the video of Morgan's vlog posted on September 2<sup>nd</sup>:

Morgan's head and shoulders can be seen on the screen. She's in her bedroom, and the camera automatically includes a border of illustrated flowers around the edges of the screen, bracketing the scene. She's clearly addressing her friends who subscribe to her vlog online.

*Morgan says, "Hey guys, sorry I didn't make it to McKenna's party on Saturday, but I was just so out of it. I don't know what's going on with me. I have these super bad headaches all the time and nothing makes them better except staying in bed with all the lights off. This is the worst. I hope you guys aren't mad at me for missing the party. I promise I'll make it up to you McKenna."*

### September 22nd: Benched (Morgan's Vlog)

The following provides a description of the video of Morgan's vlog posted on September 22<sup>nd</sup>:

Morgan's head and shoulders can be seen on the screen. She's in her bedroom, and the camera automatically includes a border of illustrated flowers around the edges of the screen, bracketing the scene. She's clearly addressing her friends who subscribe to her vlog online.

*Morgan says, "I was really awful at practice today. Sometimes I worry that I'm going to get hit again and have another concussion but today I just had the worst headache. Tough to see the ball sometimes. Sasha, you were great to cover me. Coach was right to pull me out but I felt so stupid on the bench."*

## September 28th: Math Test (Morgan's Vlog)

The following provides a description of the video of Morgan's vlog posted on September 28<sup>th</sup>:

Morgan's head and shoulders can be seen on the screen. She's in her bedroom, and the camera automatically includes a border of illustrated flowers around the edges of the screen, bracketing the scene. She's clearly addressing her friends who subscribe to her vlog online.

Morgan says, *"That math test was just too horrible. I got a headache right after the test started. I don't know if it was the problems or my head. I know I'll have another headache during the ELA exam tomorrow."* She rolls her eyes and says sarcastically, *"I can't wait."*

## October 3rd: About Math Class (Morgan's Vlog)

The following provides a description of the video of Morgan's vlog posted on October 3<sup>rd</sup>:

Morgan's head and shoulders can be seen on the screen. She's in her bedroom, and the camera automatically includes a border of illustrated flowers around the edges of the screen, bracketing the scene. She's clearly addressing her friends who subscribe to her vlog online.

Morgan says, *"I'm sure you all noticed because it was so embarrassing, but I had to go to the nurse during math today. I had my head down in class and I could feel everybody staring at me. My head just started pounding and then I thought I was going to puke. I'm so glad I got out of there before puking in front of the whole entire class. If I had I'm sure the whole school would have known about it. At least I got to go home and I didn't have to art class sixth period."*

## October 9th: No School! (Morgan's Vlog)

The following provides a description of the video of Morgan's vlog posted on October 9<sup>th</sup>:

Morgan's head and shoulders can be seen on the screen. She's in her bedroom, and the camera automatically includes a border of illustrated flowers around the edges of the screen, bracketing the scene. She's clearly addressing her friends who subscribe to her vlog online.

Morgan says, *"Hey guys, it's Columbus Day. No school! I'm feeling a bit better. Does anyone want to hang out? Oh, wait, yeah, McKenna: I owe you. Do you want to go see a movie or something?"*

## October 12th: Volleyball Boosters (Morgan's mom)

The following provides a description of the video of Morgan's mom speaking with her best friend, Beth on October 12<sup>th</sup>:

The head and shoulders of Morgan's mother, Mrs. Smith, can be seen on the screen. She's in the kitchen, speaking on her cell phone to her best friend, Beth.

Mrs. Smith says, *"Hey Beth, it's Emily. I'm calling because I can't make it to the volleyball boosters meeting tonight. Please let the coach know that I really am interested, but this is the second week in a row that Morgan's been sent home early from school at least one day. Today she's in tears because she can't practice when she's not feeling well. Ok. Thanks."*

## October 16th: Social Studies Notes (Morgan's Vlog)

The following provides a description of the video of Morgan's vlog posted on October 16<sup>th</sup>:

Morgan's head and shoulders can be seen on the screen. She's in her bedroom, and the camera automatically includes a border of illustrated flowers around the edges of the screen, bracketing the scene. She's clearly addressing her friends who subscribe to her vlog online.

Morgan says, *“Can anybody send me their notes from social studies today? I just couldn’t deal with school after my headache started during third period. That class is so easy for me but I’m just so behind. I definitely have to study more. After that quiz? Oh, that was so hard.”*

### October 27th: Coach’s Concern (Morgan’s volleyball coach)

The following provides a description of the video of Morgan’s volleyball coach speaking with her mother, Mrs. Smith, on October 27<sup>th</sup>:

The head and shoulders of Coach Phillips, Morgan’s volleyball coach, can be seen on the screen. He’s in the school gym with volleyball nets behind him while he speaks on his cell phone to Morgan’s mother, Mrs. Smith.

Coach Phillips says, *“Mrs. Smith? This is John Phillips. I’m Morgan’s volleyball coach this year. As you may remember, we met at one of the first practices. Sorry you weren’t able to make it to the last booster’s meeting. The reason I’m calling is that I’m concerned about Morgan’s health. I let her practice today, but it’s not the first time this week she hasn’t felt well. She told me she’s been having headaches. I just wanted to alert you.”*

### October 31st: Excedrin! (Morgan’s Vlog)

The following provides a description of the video of Morgan’s vlog posted on October 31<sup>st</sup>:

Morgan’s head and shoulders can be seen on the screen. She’s in her bedroom, and the camera automatically includes a border of illustrated flowers around the edges of the screen, bracketing the scene. She’s clearly addressing her friends who subscribe to her vlog online.

Morgan says, *“I finally found something that makes my headaches better. My mom started giving me Excedrin migraine. I don’t really know the difference between a headache and a migraine but it helped my headache go away. I really hope this keeps working so I can make it to more volleyball practices.”*

## November 2nd: Picking Beth's Brain (Morgan's mom)

The following provides a description of the video of Morgan's mom speaking with her best friend, Beth on November 2<sup>nd</sup>:

The head and shoulders of Morgan's mother, Mrs. Smith, can be seen on the screen. She's in the kitchen, speaking on her cell phone to her best friend, Beth.

Mrs. Smith says, *"Hi Beth. I thought I'd call to pick your brain. What are good friends for, right? We're okay but as I mentioned a couple weeks ago, I'm worried about Morgan and her headaches. Her volleyball coach called last week because he's probably going to pull Morgan from practice when she looks like she's in pain."* Sarcastically, she continues, *"Both my mom and I are lucky enough to have migraines. I've been giving Morgan Excedrin Migraine. I guess that maybe somehow, I've been thinking that Morgan has migraines too."* She shakes her head. *"Lucky Morgan."*

## November 8th: Mom's Purse (Morgan's Vlog)

The following provides a description of the video of Morgan's vlog posted on November 8<sup>th</sup>:

Morgan's head and shoulders can be seen on the screen. She's in her bedroom, and the camera automatically includes a border of illustrated flowers around the edges of the screen, bracketing the scene. She's clearly addressing her friends who subscribe to her vlog online.

Morgan says, *"Remember I told you about the Excedrin? I found some pills in my mom's purse. The label says to take one every four to six hours for pain. I decided to try one. One can't hurt, right? It really helped the pain. But I was so out of it for hours. I'm going to try another one when I have a really bad headache to see if it works again. I don't think she'll miss one or two pills. Please don't tell my mom! I don't want her to find out."*

## November 21st: Pharmacist visit (Morgan's Mom and Pharmacist)

The following describes the video of Morgan's mother, Mrs. Smith, and her pharmacist, Dave Hutchinson, as Mrs. Smith goes to buy more Excedrin Migraine:

The pharmacist and Morgan's mom, Mrs. Smith, stand at the counter of a pharmacy together. Mrs. Smith stands to the left of the pharmacist, and the shot shows their head and shoulders as they face each other.

The pharmacist begins by saying, *"Hi Mrs. Smith, how are you today?"*

*"I'm well, thanks Dave."*

*"What brings you in the pharmacy today?"*

*"I'm here to pick up some Excedrin."*

**Note that the pharmacist is aware of a patron's buying habits.**

*"Okay. I noticed that you've been coming in quite frequently to pick it up. Is it for you?"*

*"It's actually for Morgan, my daughter."*

*"What, she's having headaches?"*

*"Oh yes."*

*"What type of headaches is she having? Has she described them to you?"*

*"Uh, they throb, they're sharp."*

**Notes on what to consider in Morgan's case:**

- Number of headaches per month.
- Is she well managed on her acute, OTC therapy?
- What impact are the headaches having on Morgan's life?

*"And has she only used this over the counter medication?"* the pharmacist asks.

*“It seems to be helping her, so she likes to take it even before she gets a headache because it kind of keeps them a little more at bay as far as I can tell.”*

*“Okay. And do you know how often Morgan is using that?”*

*“Well she takes one or two pills every day.”*

*“One to two pills every day?”* the pharmacist confirms.

Mrs. Smith nods in agreement.

The pharmacist asks, *“And how long do you think she’s been doing this for?”*

*“Well, her headaches have been worse for the last six months. I would say way worse the last three months.”*

*“The last three months?”* the pharmacist confirms.

*Morgan’s mom nods.*

*“Okay,”* the pharmacist says. *“And you describe a throbbing pain? Is it on both sides or one side?”*

*“It’s on her right side,”* says Morgan’s mom. *“Right up here,”* she continues as she touches her right hand to her head, about two inches above her temple to demonstrate where Morgan feels the pain of her headaches. *“A little bit behind her eye.”*

*“Does she find that the medication is helping her?”* the pharmacist asks.

*“Well, she and I are always afraid for her not to take the medication. It may help a little bit and it seems like she can kind of nip it in the bud if she takes the pill.”*

*“Is there anything that makes it worse?”*

*“My guess is when she’s had a stressful day; she’s a busy girl. If she can’t lay down; laying down does help.”*

*“Okay. Well, Mrs. Smith, there are two things I’m really concerned about,” the pharmacist says. “One is something called medication overuse headache. And if you use this medication too much it can actually make the headaches worse.”*

### **Two notes on Medication Overuse Headache:**

- Occurs when medications used to treat acute headache are taken too frequently (>15 doses/month)
- Common cause of chronic daily headache

*“Even though it’s medication for the headache?” Morgan’s mom asks.*

*“That’s correct. Even if she’s been using it one to two times a day, if she uses it more than fifteen days in the month, that’s really a characteristic of medication overuse headache,” says the pharmacist.*

*“Wow. She may have taken up to thirty pills this past month,” Mrs. Smith says.*

*“Okay. That’s quite a bit.”*

*“That’s very worrisome,” says Mrs. Smith.*

The pharmacist continues, *“And another thing I’m concerned about: just the way you describe Morgan’s headaches itself actually might be having migraines.”*

*“Hunh,” Mrs. Smith says in amazement.*

*“What I’m going to recommend is that you contact your pediatrician, and maybe they can do some tests and delve a little deeper into the history of Morgan’s headaches and figure out if they truly are migraines,” the pharmacist tells Mrs. Smith.*

*“Well, I’ll be sure to do that. Thank you for bringing it to my attention, Dave,” Mrs. Smith says.*

*“Oh, no problem,” the pharmacist replies.*



## November 22nd: After Pharmacy Visit (Morgan's mom)

The following provides a description of the video of Morgan's mom speaking with her best friend, Beth on November 22nd:

The head and shoulders of Morgan's mother, Mrs. Smith, can be seen on the screen. She's in the kitchen, speaking on her cell phone to her best friend, Beth.

Mrs. Smith says, *"Hi Beth, it's Emily. The pharmacist told me yesterday that I could be making Morgan's headaches worse by giving her the Excedrin migraine. When I was a teenager, my headaches were awful. I feel terrible that I may have actually made her headaches worse. I called her pediatrician about seeing him but he said that it does sound like migraines and he's going to call the neurology clinic to get an appointment for Morgan. He agreed that we should stop the Excedrin. I most certainly will."*

## November 22nd: Thanksgiving and Black Friday (Morgan's Vlog)

The following provides a description of the video of Morgan's vlog posted on November 22nd:

Morgan's head and shoulders can be seen on the screen. She's in her bedroom, and the camera automatically includes a border of illustrated flowers around the edges of the screen, bracketing the scene. She's clearly addressing her friends who subscribe to her vlog online.

Morgan says, *"Hey guys, it's Thanksgiving tomorrow. I hope you guys have a great day! Oh yeah, and Friday, it's Black Friday. Does anyone want to come shopping with me? Maybe we can catch a movie after and eat popcorn. Sound like it would be really fun. Let me know if you guys wanna hang."*

## November 26th: No More Medicine (Morgan's Vlog)

The following provides a description of the video of Morgan's vlog posted on November 26<sup>th</sup>:

Morgan's head and shoulders can be seen on the screen. She's in her bedroom, and the camera automatically includes a border of illustrated flowers around the edges of the screen, bracketing the scene. She's clearly addressing her friends who subscribe to her vlog online.

*Morgan says, "I just got the worst news. Remember how I said I finally took something that helped the headaches? Well now my mom says I can't take it anymore for some stupid reason. How does she even know anything about medicines? At least I get to go see the doctor tomorrow, and maybe she'll tell my mom to let me keep taking it. I can't keep missing practices or I won't be able to stay on the JV team. My mom just doesn't understand what's important in my life. I don't think she knows I took the medicine in her purse. She'd really freak out."*

# Neurology Screening

## Learning Objective:

Describe three important elements of a headache history.

## Past Medical History

- Cyclic vomiting otherwise well except for headaches
- Vomiting treated with cyproheptadine

## Family History

Migraine and anxiety in mother and maternal grandmother

## Stressors:

- Wanting to do well in school, softball and volleyball, and drama
- After school activities up to twice a day including weekends

## Headache Characteristics

- Location
- Quality
- Exacerbating factors such as stress at home and school
- Interaction with School
- School nurse sends her home
- Misses class
- Cannot attend sports practice
- Worries about getting a headache in school so stays home

## November 27<sup>th</sup>: Neurology Headache Screening

The following provides a description of the video of Morgan's neurology headache screening with the nurse practitioner November 27<sup>th</sup>:

Morgan and her mother sit opposite the nurse practitioner in an examining room. The nurse practitioner is seated next to a table that holds a laptop, phone, and plastic life-size model of a brain. A maroon colored examining table rests in the background of the shot. All three are seated in regular chairs in front of the examining table.

The nurse practitioner introduces herself to Morgan, shaking her hand. *“Hi Morgan, I’m Cyndi Grayson. I’m one of the nurse practitioners here in child neurology,”* she says. Turning to Morgan’s mother, she says, *“You must be mom,”* shaking her hand as well.

*“I’m Emily,”* Morgan’s mother responds.

*“Hi, Emily, nice to meet you,”* Cyndi says. Addressing Morgan once again, she continues. *“So, I understand you’ve been having some headaches, and that’s why you’re here today.”*

*“Yeah,”* Morgan agrees.

*“Okay, well, we’re going to talk a lot about that, but I’m first going to gather a little bit of your medical history. Your mom will probably help me a lot with that, but you feel free to add on.”* Morgan nods in agreement.

Cyndi turns to Morgan’s mom and says, *“I’d like to know a little bit about her own medical history first. Is there anything that you would like to tell me about medical history that’s been going on for her?”*

Morgan’s mother looks at Morgan and then back at Cyndi. She replies, *“Well, I guess the first thing that really occurred was when she was about in kindergarten, maybe five years old or so, she went through a series of having some cyclic vomiting. That’s what they diagnosed her with. Maybe happened three times a year or so, but she was so dehydrated she ended up in emergency. And fortunately, she did seem to outgrow that.”* She turns to Morgan again and continues, *“So that’s what you’re known for, your cyclic vomiting days.”* Morgan nods and smiles.

*“And she was followed by a pediatric GI specialist for that?”* Cyndi asks.

*“Uh huh,”* Morgan’s mom responds.

*“Okay, and I understand that she had been taking a medication called cyprohepadine for that.” Morgan’s mom murmurs her agreement. “Okay, and is she off of that now? Is she taking that any longer, or is she done with that?”*

*“She’s been done with that for quite a while,” says Morgan’s mom as Morgan nods.*

*“All right. Anything else in her history that you can think of?”*

*“Well, her headaches now,” Morgan’s mom says, then turns to Morgan and continues, “but really, you’ve been quite the lovely girl, and the headaches are just becoming quite worse.”*

*“Okay,” says Cyndi. “How about in the family? Anybody with headaches or migraine-type headaches in the family? On your side or her dad’s side?”*

*“That would be me, and my mom,” Morgan’s mother responds.*

*“Okay. Anything else as far as mood problems or anxiety or depression or anything like that in the family?”*

*“I do get anxious on occasion, and my mom does as well. Nothing overly bad, but I do go through a bottle of Xanax maybe a year. Maybe fifteen to thirty pills a year on really bad days,” replies Morgan’s mom.*

*“And Morgan, have you had any problems with any kind of worrying or feeling anxious or anything like that?” asks Cyndi.*

*“Mhmm, yeah, I get worried about my schoolwork and getting it done, and on my sports after school,” Morgan says.*

*“She’s such a busy girl,” Morgan’s mom adds.*

*“I see that you’re in high school now, your first year,” Cyndi says, Morgan nods. “How’s that going for you so far?”*

*“It’s good.”*

*“Good grades?”*

*“Yeah.”*

*“She was just in the musical,”* Morgan’s mom adds.

*“Oh, so that’s the other thing I wanted to ask you about, your activities. It sounds like you are a busy girl. What types of activities are you involved in?”* asks Cyndi.

*“I play softball and volleyball, and I do the drama and dancing,”* Morgan responds.

*“She’s on the travel teams too,”* says Morgan’s mom.

*“Oh my goodness, that’s busy,”* Cyndi exclaims. *“How many days of the week do you think you’re doing activities after school or on the weekends, things like that?”* she asks Morgan.

*“About every day.”*

*“Sometimes twice,”* Morgan’s mom adds.

Cyndi continues, addressing Morgan, *“Where do you tend to feel pain when you get your headaches?”*

*“Sometimes behind my right eye, a throbbing sharp pain.”*

*“Okay,”* Cyndi says. She motions to her own face while she asks Morgan, *“Anywhere else in your head or is it just behind your eye?”*

*“Just behind my eye,”* Morgan responds.

*“And so you said kind of a throbbing and a sharp pain.”* Morgan nods. *“Do you ever feel it in your temples or in your forehead?”* Cyndi asks, motioned to the mentioned areas of her own face.

*“Yeah,”* Morgan says. *“My temples,”* as she touches her right temple.

*“So just that one side,”* Cyndi states.

*“Yeah.”*

*“Okay, I want to make sure she’s not feeling too much stress or anxiety,”* Cyndi says to Morgan’s mom. Turning back to Morgan, she asks, *“Do you ever feel panicky? Did you,”* and Cyndi sucks in her breath sharply, *“feel like, ‘Oh my gosh, I can’t get it all done,’ and do you worry about that a lot?”*

*“Yeah, definitely.”*

*“Does that happen at home or at school mostly?”*

*“Both,”* Morgan answers. *“I go to the nurse sometimes, but every time I go she’ll tell me just to go home because she thinks I’m just sick.”*

*“And then if she goes home, she can’t do the practice and then she can’t play, and then it just kind of snowballs,”* says Morgan’s mom while Morgan nods in agreement.

*“Okay. The nurse is sending you home it sounds like. How much school have you been missing since, say, September, since the beginning of the year?”*

Morgan looks at her mom. *“About seven to eight days,”* she says.

*“Something like that, yeah,”* Morgan’s mom agrees.

*“Do you sometimes go in late or leave early as well?”*

*“Yeah.”*

*“Again, with the nurse sending you home, things like that?”* Morgan nods yes.

*“She has to be in by a certain time so that she can practice,”* says Morgan’s mom.

Cyndi continues, *“So what might make you stay home? Headache, because the headache’s hurting you.”* Morgan nods in agreement. *“Is it that you can’t concentrate at school because of the headache pain?”*

*“Yeah,”* Morgan says emphatically.

*“Do you worry that you’re going to get a headache at school, or have that panicky feeling?”*

*“Yeah, I’m just worried that I’m just gonna have a huge headache at school,”* Morgan says.

*“Anything else you would like to ask today?”* Cyndi asks Morgan.

*“No.”*

*“You just want to get rid of these headaches,”* Cyndi says.

Morgan agrees. *“Yeah.”*

*“I’m going to go and speak with Dr. Connelly, and then let her know what’s been going on, and then she’ll come in to chat with you a little bit to try to develop a plan for you.”*

*“Okay,”* says Morgan.



# Neurologist Consultation

## Learning Objectives

- Describe the essential elements of a headache evaluation visit
- Discuss the principles of developing a management plan for a patient with migraine headache
- Multiple interviews can often uncover information such as Morgan's use of her mother's pain medication without mother's knowledge

## Characteristics of Morgan's Migraine

- Genetic component to migraine
- Nausea associated with headache
- Throbbing one-sided pain

## Cautions about caffeine

- Caffeine is in some OTC medications used to treat migraine (ex. Excedrin migraine)
- Caffeine is also common in energy drinks
- Too much caffeine can make migraines worse and disrupt sleep

## Physician Recommended Therapies

- Magnesium (supplement)
- Riboflavin (vitamin)
- Maxalt® (triptan)
  - Taken at first sign of headache/aura
- Amitriptyline (anti-depressant)
  - Preventive, taken daily, sedating
- Migrelief (magnesium, riboflavin, feverfew)
  - Preventive
- Feverfew
  - Tanacetum parthenium
    - Chrysanthemum species

- MOA: unknown
  - Conflicting data regarding efficacy
  - Several pain/inflammatory pathways have been studied without definitive results
- Avoid in pregnancy: risk of uterine contractions
- Avoid in breastfeeding: limited data
- Addressing Triggers
  - Low blood sugar: eat breakfast, snack every 2-3 hours
  - Dehydration: carry water bottle, urine should be pale color
  - Sleep deprivation: make restful sleep a priority, consider melatonin
  - Stressors: learn relaxation techniques
- Relaxation Techniques
  - Deep breathing
  - Yoga
  - Cognitive behavioral therapy (CBT)
  - Headache diary
  - Acupuncture

## November 27<sup>th</sup>: Neurological Consultation

The following provides a description of the video of Morgan's neurology consultation with the neurologist November 27<sup>th</sup>:

Morgan and her mother, Mrs. Smith, sit opposite the neurologist, Dr. Connelly, in the same examining room where they met the nurse practitioner, Cyndi Grayson. Dr. Connelly is seated next to a table that holds a laptop, phone, and plastic life-size model of a brain. A maroon colored examining table rests in the background of the shot. All three are seated in regular chairs in front of the examining table.

Dr. Connelly introduces herself, *"Hi, I'm Dr. Connelly. Cyndi and I met and we were discussing Morgan's case, and I just wanted to get a little bit more history from you. One to two times a week now, you've been using Excedrin Migraine?"* Morgan nods.

*“Is there anything else that you’ve ever tried for those headaches when you get the symptoms?”*

*“I’ve tried some of my mom’s pain medicine,”* Morgan says. Morgan’s mother looks surprised and concerned about this. *“You have?”* she asks. *“Which one?”*

*“I’m not sure. It was just in your purse,”* Morgan says.

*“I had some Tylenol with codeine a while back. I had a little bit of dental surgery. I didn’t know. And actually, she is taking that Excedrin. I’ve been giving her the Excedrin every day,”* Morgan’s mom says.

*“Oh, okay,”* says Dr. Connelly. Addressing Morgan, she asks, *“So, how many times have you tried that Tylenol with codeine?”*

*“A couple times.”*

*“Did it help with your headache at all?”*

*“Sometimes, yeah.”*

*“Okay,”* Dr. Connelly says. She looks at Morgan’s mom and asks, *“And you haven’t gotten a refill on that medication recently? It was just something that was in a bottle at home?”*

*“No,”* Mrs. Smith says. *“I dunno. I got six pills and I probably had four or five left.”*

*“And I just wanted to review a little bit about some of the things that you’re doing,”* Dr. Connelly says. *“I know it’s hard when you have headaches in terms of how you’re eating, how you’re drinking. Because what it sounded like from Cyndi’s presentation of your case is that it sounds like your mom had headaches, her mother had headaches, you’re having headaches. And you have this history of the vomiting.”* Morgan nods.

*“And the kind of headache that you’re having,” Dr. Connelly continues, “the throbbing and the one sided nature of it, associated with all the other symptoms that you get, really sounds strongly like a migraine.”*

*“I was afraid of that,” Mrs. Smith says.*

*“Well, I mean, it’s nothing to be afraid of because it’s just the type of headache that you manifest versus a tension type headache other people in the population get,” Dr. Connelly says.*

*She continues, “I also wanted to ask you, because you’re kind of tired when you wake up in the morning, do you ever drink any kind of coffee?”*

*“Yeah, I do drink iced teas sometimes,” Morgan replies.*

*“Okay, so that has a little bit of caffeine in it,” Dr. Connelly notes. “You’re a pretty active person. Are there any of those supplements or energy drinks?”*

*“Yeah,” Morgan says. “I drink energy drinks before my activities because they have vitamins in them and they’re healthy.”*

*“She says they give her a boost,” Mrs. Smith says.*

*“A lot of people feel that way,” Dr. Connelly says. “The thing about energy drinks is that a lot of them have caffeine in them, and caffeine can be a trigger for migraines in some people. And it also disrupts sleep if you drink it late in the day. So, it’s something we usually discourage. Particularly in migraine, there are a couple vitamins that we recommend in doses that are not really available in an energy drink, which is trying to cover all of its bases.”*

*“So, we usually focus on magnesium and riboflavin. Well, magnesium isn’t a vitamin, it’s an element, but it’s a supplement that we recommend because it has been shown to help prevent migraines. And riboflavin is vitamin B2. And in higher doses, that can really help.”*

*“Don’t those come in cereal bars or cereal, or granola bars or something?” Mrs. Smith asks.*

*“There are a lot of foods that are enhanced with vitamins, but typically not to the doses that we need for migraine. So that’s why we are not opposed to, or still recommend certain vitamins to my patients. But the doses that you need are targeted for migraine, and those usually are not the doses that are available in over the counter energy supplements.”*

*“Having said that, there is one medication that we can try for Morgan that she would take at the first sign of a headache. It’s in the family of triptans, and there’s one that indicated in teenagers, and that’s called Maxalt. And so we would probably do a trial of that for Morgan. And she would take it at the first sign of a headache. And so that would be something that I would think about for her.”*

*“So at the first sign of a headache, sometimes she gets a little grumpy the day before she gets a headache,” Morgan’s mom says. “But then she was telling the nurse practitioner that she gets numbness. When would she need to take that? Right before the headache?”*

*“So, to be honest with you, it’s a pattern that you’re going to have to work out a little bit. Because sometimes people get the numbness and the tingling and that sensation that they’re about to get a headache, and they’re able to sleep, or take care of themselves and they can abort the headache that way, just by resting the brain. But then other times, those symptoms go very quickly into a headache, and so if that was her pattern, I would take the Maxalt at the first sign of that aura.”*

*“With someone like Morgan who’s having headaches all the time, we usually recommend a daily medicine to help prevent headaches, alongside what we’re going to talk about in terms of lifestyle modification.”*

*“In neurology, we have several different families of medicines to pick from in terms of preventing migraines. And there’s some medications in the seizure class, there’s some medications in the anti-depressant class, and there are some medications in the blood pressure class from which to choose for prevention. None of the medicines that we have are specifically for migraine in terms of how they were discovered, but through trial we have figured out that they do help prevent migraine and they’ve been studied in migraine for several years.”*

*“So we know that they’re safe,” Dr. Connelly continues. “And the doses that we use are much lower for migraine prevention than how they’re indicated for the other things that they’re indicated for.”*

*“So, for example, the medicine I’m thinking about for Morgan, it’s called amitriptyline. It’s in the class of anti-depressants. I think it would be a good medicine for Morgan because you’re talking about the fact that she has trouble falling asleep at night. She’s a very busy girl, she needs her rest, and the side effect that I usually see most with amitriptyline is sleepiness. And so it’s very helpful for patients who are having trouble sleeping to take it at night, and it can help them fall asleep in addition to giving them the headache benefit.”*

Dr. Connelly addresses Morgan, *“It’s a medicine that I would take every single day to help prevent the headaches.”* Morgan nods. Dr. Connelly then says to Mrs. Smith, *“And we would keep it on her regimen until we had a significant amount of time without any headaches. And then we could consider taking her off of it.”*

*“So, you would recommend her taking a low daily pill to help her fall asleep and sort of prevent the headaches. And then the other one that you’re going to prescribe, if she senses that she’s going to come down with one,”* Mrs. Smith says, then turns to Morgan, *“And we have to watch it and see whether you do it the day ahead when I’m thinking you’re maybe going to get a headache or whether when it’s closer it.”* Morgan nods.

*“Exactly,”* Dr. Connelly says. *“The other thing that I was thinking of suggesting for Morgan to take every day is something called Migrelief. Remember, you were talking about the vitamins and the minerals? So, Migrelief has recently come into the market as a preventive for migraine. It combines magnesium, which we have evidence that if you supplement magnesium you can help prevent migraines. And riboflavin, which I talked about earlier. As well as an herb called feverfew, which has a little less evidence behind it, but has been used and reported to work in migraine. And this company combines the three components together. And I’ve had some patients have real success taking it every day.”*

*“The other things that are going to be very helpful for you in terms of preventing migraines, is addressing some of these other components that are known to trigger headaches. For example, the not eating breakfast in the morning, so low blood sugar, often triggers headaches in pretty much anybody, but migrainers, as we call you, are more susceptible to those low blood sugar headaches. And so we recommend having at least something in your system when you leave for school in the morning. And to make sure that you eat at least a little something every couple of hours while you’re at school. In anticipation of being very busy and maybe not always having a chance to eat a full lunch.”*

*“The other thing is, staying hydrated during the day,”* Dr. Connelly says. Mrs. Smith gives Morgan a look that says she probably isn’t too good at staying hydrated. Morgan grins sheepishly and nods.

Dr. Connelly continues, *“So, it’s very common for children and teenagers to be very busy at school, not have access to water, going to the water fountain. You know, they’re in class, they have to raise their hand to leave, so we usually request that you take a water bottle with you to school and make sure you’re drinking it throughout the day.”* Morgan nods.

*“When you’re going to the bathroom,”* Dr. Connelly says, *“you’ve got to look at your urine to make sure you’re hydrated. So I have a lot of patients telling me, ‘Oh, no, I drink enough,’ but your urine has to be a very, very pale color when you go to the bathroom in order to prove to yourself that you really are hydrated.”*

*“And then the other thing that I had begun talking about a little bit is sleep. So, making sure you’re getting a good night’s sleep. Restful sleep is very important for headache prevention. Sleep deprivation is one of the biggest triggers for migraines. And it’s hard when you’re very active.”*

*“As a teenager, it’s very hard to get enough rest. You’re going to have to really make that a priority. And you have to make sure that when you’re trying to go to sleep at night that you’re setting yourself up for success. So, making sure your routine every night is the same. Making sure that you don’t have things that can interfere with sleep during that routine, such as screen time. Screen time can suppress melatonin. And melatonin is the*

*natural hormone in your body that makes you feel sleepy. So, if you whip out your phone right before bed, it's going to tell your body that you're not ready for sleep."*

*"I'm going to talk about some of the other things that we do to treat the underlying stressors, the life stressors, that you've kind of spoken about, the schoolwork, the activities, the difficulty falling asleep, maybe a little bit of anxiety mixed in with that." Morgan nods.*

*"We often recommend that our patients do things to help them relax, and to help them address that anxiety. Some physical things that you can do are deep breathing. You can also try yoga. It's a very gentle, relaxing thing that you can do to get your body into a relaxed state. It's good for your body in general."*

*"And then we also have patients go and speak to a therapist to really address those things, to help organize their life in a way that really works. Because what you're talking about is making time to sleep. And it's really hard to carve out that time. But oftentimes, when you work with somebody on your lifestyle, you can find little ways of tweaking things so that you can get exactly what you need to happen during the day happen."*

*"The specific kind of therapist that we recommend in migraine patients is someone who does cognitive behavioral therapy, which is called CBT. Those therapists are very good at helping you problem solve. Problem solve these lifestyle issues, problem solve problems that you have in life, and also they can help you sort out your headaches."*

*"One of the things I'm going to have you fill out before you see the therapist is something called a headache diary," Dr. Connelly says, handing Morgan a piece of paper.*

*She continues, "So, we were talking about relaxing the body previously and I was mentioning that yoga and deep breathing is something that you can do. These are other things that you can try: acupuncture. We have some studies that say that acupuncture is a preventative treatment for migraine."*









Other specialists involved in Morgan's care: n/a

Past Medical History: Cyclic vomiting syndrome, anxiety, seasonal allergies

Social History: 9th grade in high school. She has excellent grades (high honor roll/high achiever). She participates in softball and volleyball (school and travel), drama, singing, dance, and plays guitar. She also goes to an after school homework program which is used to provide a structured, quiet, proctored environment in which to complete academic work and receive extra help if needed. She lives with mom, dad, and younger sister.

### **Family History:**

Migraine: mom, MGM, maternal aunt.

Fainting episodes: mom

Anxiety: mom, dad, MGM.

### **Current Medications:**

Excedrin migraine

**Allergies** (drug, environmental, food or latex): none reported

### **Review of Systems:**

A 10 point review of systems was completed and was negative except for what was mentioned in the HPI.

No reported history of seizures, incoordination, behavior change, nocturnal or morning headaches with emesis, or headache that is worse in recumbent position or with cough/strain.

### **Focal Neurological Symptoms:**

Visual: Negative for reduced vision, decreased visual fields, sudden vision loss, or diplopia.

Vestibular: Negative for loss of coordination or imbalance.

Auditory: Negative for difficulty hearing or tinnitus.

Motor: Negative for paralysis, unilateral weakness, loss of muscle control, increased muscle tone, loss of muscle tone, or involuntary movements.

Sensory: Negative for paresthesias, numbness or changes in sensation.

Mental Status: Negative for confusion, disorientation

Speech/Swallow: Negative for aphasia, dysarthria, poor enunciation, poor understanding of speech, impaired ability to read or to understand writing. No reports of swallowing difficulty, or choking.

### **Physical Exam**

General Appearance: Well-appearing, well-groomed, no acute distress

Lungs: clear to auscultation

Cardiac: regular rate and rhythm, no murmurs

Extremities: No deformities noted

Skin: No significant birthmarks noted

Neurologic Examination:

Mental Status: Awake, alert and oriented. Attention was normal. Speech was intelligible.

Language: Appropriate for age

Cranial Nerves:

II: Visual fields full to confrontation

III, IV and VI: EOMs full in all directions of gaze. No nystagmus.

V: No facial sensory loss.

VII: No weakness of facial muscles.

VIII: Hearing intact.

IX and X: Palate elevates symmetrically.

XI: Normal shoulder shrug

XII: Tongue bulk and strength normal

Motor: Normal tone and bulk throughout. 5/5 strength throughout all major muscle groups tested. Good finger to nose coordination.

Involuntary movements: None noted

Muscle stretch reflexes: 2+, symmetric throughout with flexor plantar responses

Sensation: Intact to touch in all extremities

Coordination: No appendicular or truncal ataxia.

Station/Gait: Casual gait shows normal base. Able to walk on heels and toes and perform tandem walk well forward and back without difficulty.

**Assessment:**

Morgan is a 14-year old female with a history of headaches and associated symptoms consistent with a diagnosis of Migraine with Aura, Tension Type Headache, and Medication overuse headache. Additionally, she exhibits symptoms associated with anxiety/panic. Mom seems to over or misinterpret Morgan's migraine symptoms due to her own history of migraine which often increases Morgan's anxiety level. SCARED rating scales completed and will be shared with psych provider. Mom very concerned and requesting imaging which is not indicated at this time.

**Plan:**

The exam and history make a structural brain abnormality, intracranial hypertension, or subacute bleed unlikely. Based on the history and exam, neurodiagnostic imaging is not necessary at this time.

- Begin Amitriptyline 10 mg nightly for migraine prophylaxis
- Begin Migrelief-1 tablet twice daily for migraine prophylaxis
- Use Rizatriptan 10 mg at onset of migraine for acute management
- Discontinue use of OTC analgesics for 2 weeks; counsel to expect possible withdrawal headache
- Keep track of headaches in a calendar or log to identify possible triggers or patterns.
- Maintain routine patterns of sleeping, eating, and exercise.
- Eat small, healthy meals and snacks throughout the day. Try not to allow more than 3 hours without a snack. Do not skip meals!
- Avoid over-scheduling. Consider decreasing number of extracurricular activities throughout the week to lighten the load.
- Referral to psych for Cognitive Behavioral Therapy (CBT) to promote relaxation, anxiety reduction, coping with pain.
- Educate school nurse about managing headaches at school without sending Morgan home. Provide School Headache Management plan which includes medication consent that allows Morgan to receive prn medication at school.
- Consider alternative and complementary therapies that do not involve the use of medication. They may help to relieve symptoms and prevent migraines. Possible treatment options include biofeedback, yoga, meditation, aromatherapy, cell phone apps for meditation, mood tracking, and mindfulness.
- Thank you again for involving me in the care of this patient. More than 50% of this 60 minute visit was spent on face to face discussion of the diagnosis and treatment plan, teaching, counseling and coordination of care.

Please feel free to call or email me any time with questions or concerns about the treatment plan.

Electronically signed by @ME@ @NOW@ @TD@

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## Morgan: School Headache Management Plan

### *Learning Objectives*

- Accurately assess migraine symptoms in a student.
- Discuss acute treatment options in the school setting.
- Explain when a student with migraine symptoms can remain in school and when the student may need to be sent home.

### *School Headache Management Plan*

Name of Child: Morgan Smith

School year: 9th Grade

Medical Problem: Headaches

Permission: from parent to discuss care with School Nurse ✓

### *Current School Management for Headaches*

- Student often sent home from school "right away"
- Limited resources in school nursing office
- Morgan unclear about ability to self-manage

### *Student's Symptoms of Migraine*

Headaches in this student typically include:

- Moderate to severe pain
- Photophobia, phonophobia



- Nausea, but no vomiting\*
- Aura (numbness, tingling, trouble speaking)

\*Vomiting would require being sent home by school protocol

### *Recommended Treatment*

**At the onset of a headache**, Morgan should request to go to the nurse's office and be given:

1. Medication Name: Maxalt
2. Route of Administration: PO
3. Tall glass of water/snacks

### *Recommended Treatment*

- Notify the parent if: headache does not respond within 1-2 hours.
- No Excedrin Migraine

### *Video: School Management Plan (Nurse Practitioner and School Nurse)*

The following describes the video with the nurse practitioner at Dr. Connelly's neurology office, Cyndi Grayson, and Morgan's school nurse, Karen Wilkes.

The school nurse, Karen Wilkes, and nurse practitioner, Cyndi Grayson are shown split screen, speaking on the phone to each other. Karen uses her cell phone while Cyndi uses an office phone.

*"Hello, this is Karen Wilkes, school nurse,"* Karen answers.

*"Hi Karen. This is Cyndi Grayson calling from child neurology. I'm one of the nurse practitioners in our office. I just saw Morgan Smith this morning,"* Cyndi says.

*"Oh, Morgan, yes,"* Karen says.



*toward wanting to go home, with feeling as poorly as she did. So that has been the case.”*

*“Okay,” Cyndi says.*

*“This will be helpful,” Karen continues. “I just got your fax and I’ve been looking it over and I think this is going to give us some much-needed guidelines to help manage when these do happen for her.”*

*“Okay, yeah,” Cyndi says. “So, it’s a school headache management plan that we’ve put together. And it’s custom for each child in school. So in this case, it does let you know that Morgan has been diagnosed with migraine headaches, and what some of her symptoms are. So, for Morgan, yes, she does have headache pain. She’s a little sensitive to light and sound. She does have some nausea, and to date no vomiting, but she does definitely get nauseous with her headaches.”*

*“Okay, yeah,” Karen says. “I think that’s been the part that’s been difficult, with feeling like she might get sick, that is one of our, part of the protocol where they need to go home.”*

*“She does have a little bit of an aura before some of her headaches start,” Cyndi says. “Where she can get some numbness or tingling in her lip or tongue and in her fingers. And sometimes it’s hard for her to get her words out. And that can be a little scary, when people aren’t aware of those symptoms. But for her, that’s really normal right before, maybe ten or fifteen minutes before a headache starts. So I want you to know that those are some of the symptoms that go along with her headaches.”*



*peanut butter in it, something like that. And then just to hydrate, and then let her lie down for about a half an hour. And if she's feeling better within that timeframe, then she should be encourage to go back to class and finish off her day. If for some reason she is lying down, and you know, an hour or two have gone by and she's really not feeling up to going back, or she tries to go back and then comes back to see you, that would be a good indicator to call one of her parents and run it past them. And that's the time where it's looking more like she should go home because she's not responding to her medication."*

*"The other thing I wanted to mention," Cyndi continues, "She has been using a lot of Excedrin Migraine on a daily basis for the last few months, so we're going to hold off on having that as an order for right now. It might be something that we add back in, a different type of an over the counter for her. But for right now we're asking that she stay off that. We're thinking that that might be a big contributing factor to her headaches, so we're going to have her lay off of that for a little bit."*

*"Oh, I didn't know that," Karen says.*

*"Yeah," Cyndi says.*

*"Okay," Karen replies.*

*"Does everything sound clear? Do you have any questions?" Cyndi asks.*

*"There are a few things on our end that we'll need to get in place. Namely the space and making sure we have that for her," Karen responds. "But having the protocol and the standing orders are really helpful. And if we*

*could get mom to bring in some snacks that are appropriate, I really think that we can help her out more than we have been able to.”*



















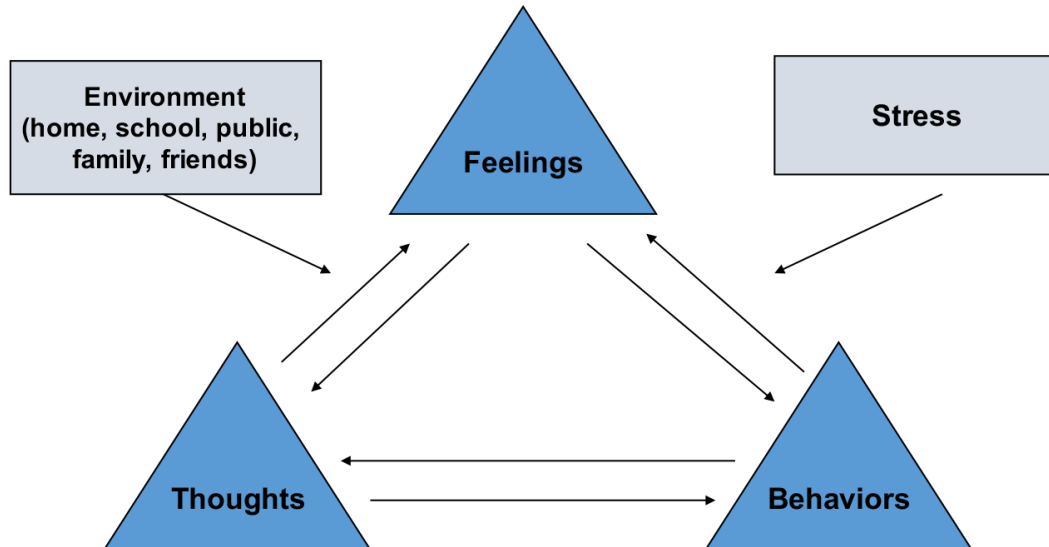








## CBT: Diagram



The above illustration shows three triangles arranged in a circle, with one at the top and two at the bottom. The top triangle says “Feelings,” the second triangle to the bottom right of the top triangle says, “Behaviors,” while the third triangle, to the bottom left of the top triangle, on the same level with the “Behaviors” triangle, says, “Thoughts.” All the triangles have arrows connecting them with each other, showing all are dependent on the others. There are two rectangles at the top of the illustration, on the same level with the top triangle. The one on the upper left hand side says, “Environment (home, school, public, family, friends),” while the other in the upper right says, “Stress.” Both rectangles have arrows pointing towards the interconnected triangles to indicate their influence on the process.

## Behavioral Techniques

- Behavioral techniques are often used in conjunction with cognitive techniques (hence the C and B in CBT)
- Behavioral interventions can help target:
  - **Avoidance**
  - Physiological symptoms
  - Mood
  - Motivation

## Cognitive Techniques

- Replace or reframe cognitive distortions or maladaptive thoughts with more balanced and realistic thoughts and beliefs about oneself, the future, and the world around us

## December 1<sup>st</sup>: Psychologist Appointment

The following describes the video with the psychologist, Dr. Hunt, Morgan, and Morgan's mother, Mrs. Smith, during their appointment:

The behavioral therapist, Dr. Hunt, sits facing Morgan and her mother in an office-like room with a small round table that holds Dr. Hunt's laptop, some medical reference books stacked behind it, and a potted plant. A blank whiteboard sits in the corner of the room, mid-screen, behind everyone.

Dr. Hunt begins, *"Hi, I'm Dr. Hunt, and I was referred to you by Dr. Connelly for some cognitive behavioral therapy. So, today we're really going to go through a little bit of history of what some of the concerns that you have. I'm going to be talking mainly to Morgan, but mom, any time you feel you have anything to add, feel free to jump in."*

*"I know headaches are a big issue for you, talking to Dr. Connelly."* Morgan nods. *"We're going to talk about some strategies that could be useful."*

*"But also, some stress relieving and some other coping skills that can be helpful with the headaches in addition to the anxiety that she mentioned."*

*"She also had you fill out a headache diary,"* Dr. Hunt continues. *"Which I have, and it looks like there are some thoughts that you have right before getting a headache. Can you tell me a little bit more about what those thoughts are?"*

Morgan replies, *"Well, I do get the tingliness in my lips and my fingers. And so that just makes me very nervous. And sometimes my speech isn't very good, and I just get really nervous and my heart starts beating really*

*fast, as if it was a panic attack, but it really hasn't actually been a panic attack."*

*"Okay," Dr. Hunt says. "And so, when you're in that state and your heart's racing and you have those sensations where you know you're going to get a headache, what are some of the thoughts that you have related to that, like some worries that you might have?"*

*"Well, I know I worry about getting all my schoolwork done," Morgan responds. "And what other kids will think about me if that ever happened during school. Or getting into a good college if I miss so many classes."*

*"Yeah, because increased stress can definitely have triggering or exacerbating effects for headaches," Dr. Hunt says. "So, I'm going to talk about CBT in general a little bit, which is cognitive behavioral therapy. And it's found to be very effective in a lot of different things, but especially when we talk about pain and some of the anxiety that can be related to pain."*

*"So, there are three parts to what we call cognitive behavioral therapy. So, cognitive: your thoughts. That's why I was asking a little bit about some of the thoughts that happened when you get a headache or after you have a headache, about all the things that are stressing you out. And then we look at behavior, so some of the behaviors that might be linked to the headaches or the anxiety. In that sense, it seems like sometimes staying home is what we call 'reinforcing' for the headaches. So, it is a little relaxing and a little fun in the moment, and although it may not be consciously reinforcing the headaches, unconsciously your body kind of learns that when you get a headache, you get this time off. So, then it can kind of exacerbate and make the headaches more frequent. That's all related to your feelings or your emotions."*

Dr. Hunt draws a triangular model on the whiteboard in the corner. At the top is the word 'feelings.' Clockwise to the bottom right, connected by a line, is the word, 'behaviors.' The third word, to the left of 'behaviors,' is 'thoughts,' connected by lines to both 'feelings' and 'behaviors.'



*little bit of trouble breathing. So, what we're going to do is some behavior, some relaxation strategies to help."* Morgan nods in understanding.

*Dr. Hunt continues, "The other one is called 'guided imagery.' So, I want both of you to think about kind of an idea of a place that you've been or a place that you think is really relaxing. So, a lot of people think of the beach. But some people think of a cabin in the woods. But, just a place you can very vividly visualize, and that is very salient for you."*

*"All right, so you can keep to yourself what it is, or you can share," Dr. Hunt says. "But I'm going to walk you through a little bit. So, it helps to close your eyes."* Morgan and her mother do so.

*"So, when you've chosen your place, try to imagine it with all of your senses. So, first, your sight. So, look all around you and try to pick out all the different things that you see. Is it a bright sunny day? Is it snowing? Are there other people there with you, or are you by yourself?"*

*"Next, I want you to use your hearing to explore the place that you're in. Can you hear animals or birds? Are the people you're with talking? Singing?"*

*"Next, I want you to think about the smells. Is it a familiar smell? Very strong? Maybe less intense? Now we take a deep breath to take in that smell."*

*"Now, we're using your sense of touch. Are you on the beach where you can feel the sand between your toes? Is it a warm day? Is the wind taking some of the heat off your skin?"*

*"Finally, is there anything to taste? Does a snowflake fall on your tongue? Can you taste the saltiness in the air?"*

*"Now, before you come back to the room, I want you to think about a word or a phrase that can help you remember this relaxing space. Because this is hopefully a place you'll be able to come back to any time you're feeling tense or anxious."*



## Timeline: Post-Psychologist

### December 12th: Home Early Again (Morgan's Vlog)

The following provides a description of the video of Morgan's vlog posted on December 12<sup>th</sup>:

Morgan's head and shoulders can be seen on the screen. She's in her bedroom, and the camera automatically includes a border of illustrated flowers around the edges of the screen, bracketing the scene. She's clearly addressing her friends who subscribe to her vlog online.

*Morgan says, "Has anyone else ever been to see a therapist? Because it was definitely not what I thought it would be. I thought she was going to ask me a lot of weird questions, but she really just asked about my headaches and what my life is like. She also had me practice thinking about a relaxing place, which at first I thought would be super lame, but it was okay. I guess she works with a lot of kids like me. It's good to know that there are other kids who get stressed about school and other stuff."*

### December 14th: After Neurology Visit (Morgan's mom)

The following provides a description of the video of Morgan's mom speaking with her best friend, Beth on December 14<sup>th</sup>:

The head and shoulders of Morgan's mother, Mrs. Smith, can be seen on the screen. She's in the kitchen, speaking on her cell phone to her best friend, Beth.

*Mrs. Smith says, "Hi Beth. Sorry, I meant to call you after we saw the neurologist, but life happens, what with the holidays and all. The neurologist seemed pretty confident that she could help Morgan, so we're trying some new medicines. Morgan was sent home from school a couple of days ago. I really thought that the nurse would let her lie down and then send her back to class, but here was a substitute nurse and she sent Morgan home."*



## December 15th: Acupuncture? (Morgan's Vlog)

The following provides a description of the video of Morgan's vlog posted on December 15<sup>th</sup>:

Morgan's head and shoulders can be seen on the screen. She's in her bedroom, and the camera automatically includes a border of illustrated flowers around the edges of the screen, bracketing the scene. She's clearly addressing her friends who subscribe to her vlog online.

Morgan says, *"What the heck does an acupuncturist do anyway? I have no idea how sticking needles all over my body will help with anything. I can't believe my mom is making me do this. What if it hurts Oh, goodness. Now I'm getting a little scared."*

















*“Near as I can tell,” Mrs. Smith says, “When we notice it, it usually starts a day before or on the first day of her menses, yes. Not all the time, but that can happen, yes.”*

*“Now, if you can tell me a little bit about your bowel movements,” Dr. Ergil continues. “How they are, things that you notice around that.”*

*“Sometimes it can be difficult to start. And sometimes they’re loose and smelly. And sometimes can relieve migraine symptoms,” Morgan replies. Dr. Ergil nods and takes notes.*

*“So, sometimes if you’re having a migraine and you actually have the bowel movement, you can get some relief from that?” he asks.*

*“Yeah,” Morgan confirms.*

*“Now that we’ve finished up the main points of the interview, I’d like to go ahead and take your pulses and look at your tongue,” Dr. Ergil tells Morgan. “And then when we’re done with that, we’ll do just a little palpation of your abdomen,” he continues, bracketing his own stomach to show where he’ll be palpating on Morgan. She nods in understanding. “We can do that on the examining table if that’s all right with you.” Morgan nods once again.*

*“So, when I take the pulses, basically, we’re just looking at behavior in your circulatory system in relation to everything that’s going on in your body,” Dr. Ergil says. “So, from a traditional Chinese medicine point of view, we look at the quality of the pulse in different positions under the fingers to kind of understand what might be going on in your body.” Morgan and her mother nod at this explanation.*

*“It’s a very old way of understanding how things are going on in the body,” Dr. Ergil continues. Looking at Mrs. Smith, he says, “And then I’ll also look at her tongue a little bit if that’s okay.” Mrs. Smith nods. “And the abdominal palpation...just because she has some issues with bowel movements, I want to palpate a few acupuncture points in this area,” Dr. Ergil says, referencing the points with his hand on his own abdomen.*

*“Okay,” says Mrs. Smith.*

Dr. Ergil gives Morgan a pillow to place on her lap, with her hands resting lightly on top. He turns her wrist and hand over so her palm faces up and says, *“Just relax. I’ll sort of wiggle your arm around a little bit.”* Using the first three fingers of his right hand, Dr. Ergil gently presses against the inside of Morgan’s left wrist for a few seconds while her hand and forearm rest on the pillow.

After checking Morgan’s pulse, Dr. Ergil retrieves the pillow from her lap. He picks up a small flashlight and says, *“So, what I’d like to do now is just take a look at your tongue. I’m just going to use this pen light. And when I ask you to put your tongue out, just put it out in a relaxed way. You don’t have to push it out really hard or anything. I’ll take a little look at it and then you can pop it back in.”* Morgan nods. *“Just before you do, I’m going to ask you to curl it up so I can look at the underside. Is that okay?”* Morgan smiles and murmurs assent.

Morgan opens her mouth and lets her tongue loll out, relaxed. Dr. Ergil shines the pen light on the top of her tongue and moves the light from side to side, and then in a circle around her tongue. *“That’s perfect,”* he tells her. *“Thank you very much.”* He repeats the process when she curls her tongue to expose the underside.

Once finished with the tongue examination, Dr. Ergil directs Morgan to lie down on her back on the examining table. Standing beside the table, he says, *“So, Morgan, what I’d like to do now is palpate, or press on areas of your abdomen, sort of from below your ribcage to right above your pelvic bones here,”* as he motions with his hands above his own abdomen to show Morgan where he’ll place his hands. *“And, if you could do me a favor and just lift your sweater up,”* he says, as he mimics pulling up a sweater to just below the ribcage. Morgan complies. Dr. Ergil continues, *“And what I’m doing is I’m looking for areas that are tender. So, I’m going to ask you a little bit about where things are sore and where they’re not sore, and so on and so forth.”* Morgan nods. *“So, I’ll be pressing all over this area,”* Dr. Ergil says, sweeping his hand in a circular motion above Morgan’s abdomen.

*“So, is this tender here?”* Dr. Ergil asks Morgan as he presses gently on her abdomen with the fingers of one hand, while directing the force of the palpation with his other hand placed on top. The area he’s palpating on Morgan’s abdomen is about two finger widths to the left of her belly button, and slightly above it. Morgan murmurs an affirmative response to signal the area feels tender.

*“Okay,”* Dr. Ergil says. He shifts his hands to the same spot on the other side of her belly button and repeats the palpation. *“Here too?”* he asks. *“Yeah,”* Morgan says.

Dr. Ergil keeps his hands about two finger widths to the right from Morgan’s belly button, but moves them to the area below and opposite the spot he examined above her belly button. *“And how about this area?”* he asks. Morgan murmurs an affirmative.

*“Okay,”* Dr. Ergil says. He shifts his hands to just above Morgan’s left hip and gently presses. *“Here?”* *“Yeah,”* Morgan says.

Finally, Dr. Ergil palpates the area that includes Morgan’s belly button. *“How about right here?”* he asks her. Morgan answers with a very confident, *“Yes.”*

*“Now, of the areas that I pressed, which feels the most tender to you?”*

*“The middle, right there,”* Morgan says, referring to the area of her belly button.

After the palpation examination is complete, everyone sits in the office chairs by the small table next to the examining table. *“So, Morgan, here’s what I think we’re seeing,”* Dr. Ergil starts. *“Well, let me talk to you a little bit about how this is organized. You have the early childhood history of the cyclic vomiting, which I understand has gone away.”*

*“Yes,”* confirms Mrs. Smith.

*“But from a Chinese medicine point of view, especially when we’re developing,”* Dr. Ergil says, *“we think the areas associated with digestion, which in Chinese medicine means spleen and stomach, can actually be*

*taxed by that. It can cause what we call a process of qi going counter flow, that is, the normal movement of the body, to be disorganized by that. That may have predisposed you a little bit to the types of headaches that you were having before you had the concussion.”*

*“The concussion is fairly consistent with what some of what we’re seeing. Your pulse has a string-like and hesitant quality. We associate that with blood stasis, which can be produced both by sort of the problems with digestion and vomiting and so forth in the past, as well as the sharp blow to the head more recently, along with changes that occur in the body as menstruation begins and continues.”*

*“What does blood stasis mean?” asks Mrs. Smith.*

*“Blood stasis basically is the idea that there are areas where blood is not moving smoothly,” Dr. Ergil replies, “where circulation is impaired. In migraine, which can frequently have a vascular component, or a circulatory component, this is one way that Chinese medicine will look at this if we see the signs associated.”*

*“All right,” says Mrs. Smith.*

*“So, it’s not necessarily serious,” continues Dr. Ergil, “but it actually can be a process that we can identify and provide treatment for. So, basically, if we look at where you are at this point, we would say that you essentially have a situation, and again, these are Chinese medicine terms; they’re very traditional ideas.” He looks at Mrs. Smith. “Feel free to ask if they sound weird, right?” She smiles and nods.*

*“We say that the liver is over acting on the spleen,” Dr. Ergil continues.*

*“There can be blood stasis in the liver and gall bladder channels. That has a lot to do with that sensation of very focal pain that you have there,” Dr. Ergil says as he motions with his fingers to the area around his eye sockets and temples, in recognition of where Morgan feels her migraine pain. He continues, “As well as the experience you have sometimes with the menses making the pain come on, and also the pain being relieved by the bowel movements. So, all of those things kind of fit together in that kind of*

*picture. And we think that there's probably a little bit of heat as well, from the appearance of your tongue, there are a few stasis signs there as well."*

*"And finally, when we examined you, there's a point," and Dr. Ergil motions to his abdomen with his left hand, "that's known as the alarm point of the stomach; it's ren 12. If you remember, we pressed there and it was a little tender. And you also had some tenderness in the side area of the flank. So, those kind of fit together in a clinical picture that suggests, basically, that we might be able to be helpful with acupuncture."*

*"Can't obviously, guarantee anything, but, generally speaking, in the range of six to eight weeks, with weekly treatment, we would probably see the beginnings of clinical changes. What we look for with managing migraine is a reduction of frequency. That's kind of our key marker. And a reduction of severity." Turning first to Morgan and then her mother, he asks, "Do you have any questions for me?"*

Morgan responds, *"So, for acupuncture, needles scare me. Does it hurt?"*

*"Well, let's look at that. Have you ever seen an acupuncture needle?"*

*"No."*

Turning to the desk by which he sits, Dr. Ergil reaches into a white plastic tub and pulls out a small paper package about one inch by two inches. *"So, one of the reasons people sometimes find acupuncture a little scary is definitely the word 'needle' because they are needles, but they're not like hypodermic needles,"* he says. *"The needles you get shots with,"* he continues as he unwraps an acupuncture needle from the paper packaging and hands it to Morgan. *"Take a look at this if you like."* Mrs. Smith cranes her head towards the needle Morgan now holds, both of them inspecting it.

Dr. Ergil continues explaining about acupuncture needles. *"They vary in length, depending on where they're going to be put. But what you can see is the tip of the needle is very, very fine. And it's not a cutting edge, like a hypodermic needle; it's tapered. So, when we insert it, mostly what it's doing is actually parting the skin rather than cutting it. It's a little bit like a sewing needle in that way."*

*“So, there can be discomfort, there can be pain on the skin surface, like a little prickly or pinching feeling,” Dr. Ergil says. “But mostly, that’s it. There’s not usually any kind of sharp, stabbing, cutting feeling or anything like that. Usually what people feel is a little bit of an ache like somebody massaging a sore muscle. That then goes away and you generally wind up with a fairly relaxed overall feeling.”*

*“Would you like me to show you what it looks like to stick an acupuncture needle into someone?” Dr. Ergil asks.*

Morgan looks a little apprehensive, but says, *“Sure.”*

*“So, before we put an acupuncture needle in,” Dr. Ergil says, “we usually clean the skin surface. We just use some alcohol. And I’m going to needle a fairly famous and commonly used point on the hand.”* He gathers up the necessary materials as he says to Morgan, *“We usually wait for the alcohol to dry, because otherwise it can be very unpleasant.”*

Dr. Ergil places his left hand that he just swabbed with the alcohol on the office table. He readies an acupuncture needle with his right hand just above it. *“So, I’m doing this one-handed,”* he says. *“Normally I might stretch the skin a little bit, so you don’t need to be too alarmed by what you see.”* He gently but firmly pushes the acupuncture needle by its plastic coating at the top into the skin between the thumb and forefinger of his left hand. *“But the needle just pops right in, and there you go.”* The needle now sticks out of the webbing between his thumb and forefinger.

*“Did you feel anything?”* Mrs. Smith asks Dr. Ergil curiously.

*“I did,”* he responds. *“Because normally I’ll stretch the skin a little bit with the other hand. That keeps the needle from pressing on the skin as much. So, it’s like the faintest pinprick feeling.”*

*“Okay,”* says Mrs. Smith.

*“But other than that, it’s not very dramatic,”* Dr. Ergil says. *“This point,”* and he motions to the placement of the needle between his thumb and forefinger, *“can be a little more reactive or sensitive. It’s one of the points we might use on you,”* he says to Morgan. *“So, you would feel maybe that*

*slightly stronger pressing feeling there. But in almost every case where we're treating somebody for the first time, we usually select points that are a little less reactive."*

*"At the same time, because we want to help you get over your headache, we've got to pick the best points that we can use for that," he says to Morgan. Removing the acupuncture needle from his left hand, Dr. Ergil asks, "Are there any other questions that you might have?"*

Mrs. Smith looks at Morgan and smiles. *"That was pretty amazing, wasn't it?"* Morgan gives a nervous laugh. *"Yeah,"* she says.

*"Well, so you think that acupuncture would help Morgan?"* Mrs. Smith asks.

*"I actually think it would. The data on acupuncture and headache, especially in adults, is pretty good. And particularly in the area of migraine. There are not a lot of studies for kids your age,"* he says to Morgan. *"But given the history that you've described and your presentation, I think it's likely to be somewhat useful for you."*

## Timeline: Post-Acupuncture

### December 18<sup>th</sup>: Acupuncturist was okay (Morgan's Vlog)

The following provides a description of the video of Morgan's vlog posted on December 18<sup>th</sup>:

Morgan's head and shoulders can be seen on the screen. She's in her bedroom, and the camera automatically includes a border of illustrated flowers around the edges of the screen, bracketing the scene. She's clearly addressing her friends who subscribe to her vlog online.

Morgan says, *"The acupuncturist was kind of interesting and it was kind of cool too to see him stick himself with a needle and it didn't really hurt. It wasn't as bad as I thought. I don't know if I want to do it though, even though I had a bad headache last week. I think the medicine is working. I had a bad headache yesterday in the morning, but it was Sunday, so it's not like I had to miss anything. Well, see you guys in school tomorrow, and I am going to practice."*

### December 27<sup>th</sup>: Morgan's doing better (Morgan's volleyball coach)

The following provides a description of the video of Morgan's volleyball coach speaking with her mother, Mrs. Smith, on December 27<sup>th</sup>:

The head and shoulders of Coach Phillips, Morgan's volleyball coach, can be seen on the screen. He's in the school gym with volleyball nets behind him while he speaks on his cell phone to Morgan's mother, Mrs. Smith.

Coach Phillips says, *"Mrs. Smith, this is Coach Phillips. I just wanted to get back to you after our call a few weeks ago. I hated to alarm you about Morgan and her headaches. She told me that she saw a headache specialist and has some new medications. Personally, I think she's doing better and wanted to let you know."*



## December 27th: Coach Called (Morgan's mom)

The following provides a description of the video of Morgan's mom speaking with her best friend, Beth on December 27<sup>th</sup>:

The head and shoulders of Morgan's mother, Mrs. Smith, can be seen on the screen. She's in the kitchen, speaking on her cell phone to her best friend, Beth.

Mrs. Smith says, *"Hi Beth. Just got a call from the volleyball coach, and he said that Morgan's doing better. I think so too. Finally. But it's really good to hear it from someone else. We have a follow-up appointment coming up with the neurologist, so that's awesome. I know we have a ways to go, but I'm feeling hopeful."*

## December 31st: Biofeedwhat? (Morgan's Vlog)

The following provides a description of the video of Morgan's vlog posted on December 31<sup>st</sup>:

Morgan's head and shoulders can be seen on the screen. She's in her bedroom, and the camera automatically includes a border of illustrated flowers around the edges of the screen, bracketing the scene. She's clearly addressing her friends who subscribe to her vlog online.

Morgan says, *"I'm kind of annoyed that I keep having to go to all these new appointments. And this next one is for biofeedback, whatever that is. My mom tried to explain it, but I don't know how it's going to help. I haven't had a headache for a week, so maybe all I need is the medicine."*

# Biofeedback Appointment

## Learning Objectives

- Define biofeedback and describe its administration
- Describe how biofeedback might work to relieve Morgan's pain and/or stress
- Explain changes in finger temperature induced by stress and relaxation

## Biofeedback and Relaxation Exercise

Perception of sensation

## Headache Intensity is Variable

- 0-1 to 10
- Able to control headache at 3-4 level to avoid escalation

## Distraction Techniques

- Read a book
- Talk to friends

## January 2<sup>nd</sup>: Biofeedback appointment

The following describes the video of the biofeedback appointment with Morgan, her mother, Mrs. Smith, and the biofeedback specialist, Dr. Sahler:

Morgan, her mother, Mrs. Smith, and Dr. Sahler all sit in an office together. Morgan sits at her mother's left hand side, next to a small table holding a laptop. Dr. Sahler sits in front of the tables, facing Morgan and her mother. A standing white board rests behind Dr. Sahler.

Dr. Sahler shakes the hands of Morgan and her mother and says, *“Morgan, Mrs. Smith, I’m Dr. Sahler. It’s so nice to meet you. I understand that Dr. Hunt has suggested that it would be useful if we had the opportunity to get together and talk a little bit about biofeedback, and how that may be able to help you with some of your relaxation exercises.”*

*“So, I have a couple of things that I want to talk with you about. One will be biofeedback itself, and the other will be about how we perceive sensations in our body. Okay?”*

Morgan nods.

Dr. Sahler continues, *“I’m sure there are times when your headache is eight, nine, ten, really severe. Are there also times in which you are headache free?”*

*“Yeah,”* Morgan replies.

*“Okay, so sometimes the headache is a zero to one, you really just don’t feel it particularly?”* Dr. Sahler asks. Morgan nods.

*“Now, I’m also going to assume that there are times when your headache is maybe a three or a four and you’re able to take care of that pain.”*

Morgan nods again.

*“And it doesn’t escalate all the way up to an eight, nine, or ten,”* Dr. Sahler says.

*“Yeah,”* says Morgan.

*“How do you do that?”* Dr. Sahler asks.

*“Well, if I have time I’ll try and read a book,”* Morgan responds. *“Or go on my phone.”*

*“So, talk to a friend, or play a game, or something like that?”* Dr. Sahler asks.

*“Yeah.”*

*“So that helps to distract you as well so that you’re not experiencing the pain?”*

*“Yeah.”*

*“I want to show you something,”* Dr. Sahler says. She stands up from her seat and moves over to the whiteboard. *“Believe or not,”* she says, *“this is the picture of a brain.”* Using a capped dry erase marker, she points to a rough sketch of a brain. It looks like an oval sitting on its side with a slight projection coming out of the bottom to represent the spinal cord.

Uncapping the dry erase marker, Dr. Sahler draws vertical lines going up into the oval of the brain through the channel the spinal cord makes. She says, *“And this right here is that hole in your head through which your spinal cord goes. There are millions and billions and quadrillions of these nerve fibers that are going up into your head. These are called afferent nerve fibers. And what that means is that they’re taking information from other places and bringing it to the brain.”*

*“Now, one of the things that you mentioned which was very interesting, was you said that your pain is oftentimes sharp. Now, ‘sharp’ and ‘burning’ are two sensations that travel to your brain at the rate of two miles per hour.”*

Dr. Sahler looks away from the white board on which she’s now written the words ‘sharp,’ ‘burning,’ and ‘2 miles/hour,’ at Morgan. *“Do you have a dog?”* she asks.

*“Yeah,”* Morgan says.

*“Do you ever walk the dog?”*

*“Yes.”*

*“Okay, and so when you walk the dog and the dog stops to sniff and all that kind of stuff, well, that’s walking at the rate of two miles per hour.”*

*“Now, something else is that ‘cold’ and ‘pressure’ travel to the brain at the rate of sixty miles per hour.”* She notes this on the white board. *“So, we’re*

*no longer walking the dog on a Sunday afternoon. We're actually driving on the freeway."*

*"Let's take the environment," Dr. Sahler says as she writes the word on the white board. "So, I'm wearing a red blouse. My computer is on the table. You have on a vest. Mom's got on a white jacket. The light's on in this room. Watching TV. Talking to your friends on the phone or texting them. 'Environment' gets to the brain at the rate of two hundred miles per hour."*

*"So, what that means is that if you're able to get engaged in watching TV, reading a book, or something like that, all of these nerve fibers are now paying attention to TV. Or, if you're in class, listening to the teacher trying to do the English class for you," and she draws more vertical lines through the spinal column of the illustration of the brain on the white board. "And the pain in your head, by the way, has not gone away. But the number of nerve fibers that are able to carry that information to your brain are very few. So few that your brain doesn't actually perceive the pain."*

*"So, you're busy watching TV and mom comes into the room and she says, 'Morgan, how's your headache?' Right? And then what do you do?"*

*"Start thinking about my headache more," Morgan says.*

*"And you stop paying attention to the TV or you say to your friend, 'Hold on, I've got to my mother,' and now suddenly all of these nerve fibers are carrying information about your headache. And what you feel is you feel the headache. So, that's why if you're able to do something else that takes your mind off your headache, you can actually get to the point where you aren't feeling it as much."*

*Dr. Sahler resumes her seat in front of the table holding her laptop. "One of the things we do with biofeedback is to help you understand what's happening in your body as you participate in different kinds of activities. So, really what we're going to do today is something called 'biofeedback enhanced relaxation.'"*

*“By finding out what the strongest strategies are, this will help you to be able to use those at times as your pain is escalating. What sort of strategies did Dr. Hunt mention to you?”*

*“Deep breaths,” Morgan says. “Counting to four, both ways. Thinking of a peaceful, quiet place.”*

*“So, a favorite place of yours?”*

*“Yes,” Morgan says.*

*“What else have you used to help distract yourself?” Dr. Sahler asks.*

*“Resting, listening to music, reading a book,” Morgan answers.*

*“The stress reaction is a very complicated reaction,” Dr. Sahler says. “I’m going to take a very small piece of it and talk about changes in blood flow when you’re stressed and when you’re relaxed. The first point I want to make is that no matter what the stressor is, the body’s reaction is the same, and it’s fight or flight.”*

*“One of the things that happens when we’re stressed is that the body says, ‘Okay, I want blood to go to the vital organs.’ So, what are the vital organs? Well, probably the most vital organ is the brain. Because if the brain’s not working, nothing’s going to work.”*

*“Another two vital organs are the heart and the lungs. And maybe you’ve noticed when you’re stressed your heart beats faster. Or you might breathe faster. That’s because the body says, ‘I want good oxygenated blood to go to all the parts of the body where it’s needed, and I want a strong heartbeat to do that.’”*

*“Then, there are two other muscle groups, if you will, that are part of that vital organ set. Those are the large muscles of the arms, for fight. And the large muscles of the legs, for flight, or running away. Because blood goes specifically to some places, there’s got to be other places where it doesn’t go quite so much. And one of the places where it doesn’t go quite so much are the small muscles of the hand. Now, our blood is ninety-eight point six degrees. That’s the normal temperature. This room, I would say, is*

*probably about seventy degrees. So, if I have less blood warmed to ninety-eight degrees going to my fingers, what's going to happen to the temperature of my fingers? It's going to go down. Now, when I relax, and bloodflow returns to normal, what will happen to the temperature of my fingers? It goes back up."*

*"So, what I'm going to use, is the temperature of your finger," Dr. Sahler says. She holds up a temperature monitor that can be attached to a finger. "I'm going to use this thermometer," she continues. "And we're going to watch the temperature of your finger as you relax. And this will be a way for you to begin to understand which of the strategies are the most strong or successful in helping you to relax."*

*"I think Dr. Hunt may have said you need more than one strategy," says Dr. Sahler. "Because sometimes a strategy may work, but other times that may not be the right one."*

Dr. Sahler turns her laptop to face Morgan and her mother. She brings up a photo of the sun as it sets above a mountaintop forest. *"Okay, now, this is the sun. Your task is going to be to keep the sun as far above the horizon as you can. You do that by relaxing. The idea is to use whatever techniques might be the most useful. You learned one, which is the very slow breathing in and very slow breathing out. A lot of people use that. That might be one thing to do. Or, think about your dog, or think about some music."*

Pointing to the screen on the computer, Dr. Sahler shows Morgan and her mother a digital thermometer on the screen that shows the current temperature of Morgan's fingertip while the physical thermometer rests on her finger. *"Now, this is a thermometer," she says. "And that's a little more useful right now than watching the sun and trying to keep it as far above the horizon as you can."*

After explaining the image on the screen and the role the thermometer plays in it, Dr. Sahler has Morgan close her eyes and work on her chosen relaxation technique. While Morgan's eyes are closed, her mother and Dr. Sahler both watch the screen to see how far above the horizon the sun stays, with the corresponding temperature of her finger displayed on the right

side of the screen. In the beginning, the thermometer reads at around ninety-four degrees. The sun in the image almost touches the top of the trees, indicating Morgan isn't very relaxed.

The image on the screen updates to show the sun much higher in the sky. Morgan's mother notices the jump and gets excited to see the change. Dr. Sahler continues to gaze calmly at the screen without a noticeable reaction.

Another few moments go by and the sun is even higher in the sky on the screen, indicating Morgan's relaxation technique appears to be working according to the temperature of her finger.

Dr. Sahler has Morgan open her eyes and explains, *“One of the goals that we have for biofeedback is to have you go into a relaxed state within about fifteen seconds and be able to sustain that relaxed state for several minutes. We like to see the increase in temperature be about a degree a minute over the period of three or four minutes. And usually that takes somewhere in the neighborhood of four to six sessions to become comfortable with the equipment, begin to build up the strategies, so that you can ultimately begin to identify between four and six strategies that work for you for relaxation pretty reliably. That would be the goal.”*



## Timeline: Post-Biofeedback

### January 13th: Neurologist again (Morgan's Vlog)

The following provides a description of the video of Morgan's vlog posted on January 13<sup>th</sup>:

Morgan's head and shoulders can be seen on the screen. She's in her bedroom, and the camera automatically includes a border of illustrated flowers around the edges of the screen, bracketing the scene. She's clearly addressing her friends who subscribe to her vlog online.

*Morgan says, "I'm going to the neurologist's again. I'm beyond sick of going to all these appointments but I'm kind of excited to let her know that I'm feeling better. My mom hasn't been all over me about my headaches, and I'm sleeping better. I had a minor headache yesterday, but I went to the nurse and she was cool with the new plan and I got to lie down. When I went to last period class I felt a ton better."*

## Neurology Follow-up

The following describes the video of Morgan, her mother, Mrs. Smith, and Dr. Connelly, at Morgan's follow-up neurology visit:

Morgan and her mother, Mrs. Smith, sit with Dr. Connelly in an examining room. Dr. Connelly sits on the left side of the screen in front of a desk with a model of a brain, some books stacked on top of each other, and an office phone. Morgan and her mother sit on the right side of the screen, with an examining table behind them.

*"So, Morgan, it's been about a month. Last time I saw you, things weren't going so well," Dr. Connelly begins. Morgan nods. "You were having lots of headaches and there was a lot of information passed, and we made some recommendations and changes at that time. You started on the amitriptyline and the Migrelief. We had you do a trial of the Maxalt when you were getting a headache. And I sent you to see a couple of people to*

*see if we could work on some relaxation techniques, saw the CBT therapist, and I think you're considering acupuncture, is that true?"*

*"We've had the first visit," says Mrs. Smith. "Morgan went, but she hasn't done it yet. So, she seems to be a little bit better. So, it's something we'll hold in reserve, perhaps, or maybe do."*

*"So, how many headaches are you getting now," asks Dr. Connelly.*

*"Well, at first I was getting them regularly and then it started going down to one or two times a week, and then the last week, the fourth week, it was one time a week," Morgan replies.*

*"Oh, that sounds good," says Dr. Connelly. "That sounds like we've made a little bit of progress. You kept the headache diary. Was there anything specific that, I had suggested in terms of eating breakfast in the morning, staying hydrated, and specific foods that may trigger migraines, is there any pattern that you identified that has gotten better?"*

*"Well, I know we're reading labels now, so we cut out the MSG and the other things you told us to watch for, but I haven't found any one particular thing other than," Mrs. Smith says. She looks at Morgan before continuing, "You've been particularly good about with having breakfast and snacks at school." Morgan nods in agreement.*

*"Excellent," says Dr. Connelly. "Now, the plan for when she gets a headache, we talked about using Maxalt. Have you tried using Maxalt," Dr. Connelly asks Morgan.*

*"Yes," Morgan says.*

*"And did it help you when you got a headache?"*

*"Yeah, it did," Morgan says, nodding.*

*"Oh, excellent," Dr. Connelly says. "And we had come up with a school plan I believe for what you should do when you get a headache in school. What is the protocol now for you?"*

*“So, if I’m getting a headache, then I’m going to take a couple deep breaths and think of something hopeful and peaceful. Or I’ll go to the nurse’s office and rest,”* Morgan responds.

*“And have you had to use that plan yet?”* asks Dr. Connelly.

*“Yeah,”* Morgan says.

*“And it was helpful?”*

*“Yeah.”*

*“She was able to get through it without the nurse sending her home the last time it happened,”* Mrs. Smith adds. *“So, we were really pleased.”*

*“That’s really good to hear. Because one of the hardest things about having migraines is how it impacts your life and we can’t eliminate every single headache, but knowing that you can sort of survive despite the headache and continue with the activities that you really want to do, that’s our goal with migraine.”*

*“The therapist told us how important it was not to avoid going to school when it hurts,”* Mrs. Smith says. She glances at Morgan and says, *“You’ve been a real trooper.”* She looks back at Dr. Connelly and says, *“So, she’s been working on it.”*

*“I’m really pleased to hear that things are going well and it doesn’t sound like there are any side effects of the medicine that we need to be concerned about,”* Dr. Connelly says. *“You’re falling asleep more easily?”*

*“Yeah,”* Morgan says.

*“That might be a side effect,”* says Mrs. Smith, laughing. *“It’s one that we welcome.”*

*“That’s our goal,”* Dr. Connelly says, smiling. *“To get the side effects to mimic what would help you in life. So, it sounds like we made a lot of progress. At this point, I would have you follow up in about six months to see how you’re doing. And if problems that arise between now and then I*

*would have you call the office and we can consider medication changes and I can trouble shoot anything that may be going on.”*

*“Do you foresee her headaches getting even less frequent as long as she keeps up her regime?” asks Mrs. Smith.*

*“So, we can’t eliminate all headaches,” Dr. Connelly replies. “But I have a lot of patients that get their headaches reduced to very infrequent. So, I have some patients who were having several headaches a week. Sometimes they have headaches sporadically throughout the year, maybe only one or two a year. And some patients settle out at one or two headaches a month. So, with Morgan we’ll have to keep an eye on things, but I’m hopeful that she would have very infrequent headaches moving forward. It sounds like things are already on the right trajectory. I’m optimistic.”*

## Timeline: Post-Neurology Follow-up

### January 21st: Neurologist was happy (Morgan's Vlog)

The following provides a description of the video of Morgan's vlog posted on January 21<sup>st</sup>:

Morgan's head and shoulders can be seen on the screen. She's in her bedroom, and the camera automatically includes a border of illustrated flowers around the edges of the screen, bracketing the scene. She's clearly addressing her friends who subscribe to her vlog online.

Morgan says, *"When I saw the neurologist last week she was pretty happy about my headaches getting better. She said I should decide about biofeedback and acupuncture. I'm not sure, but I definitely will keep doing the relaxation stuff the psychologist taught me. I guess I have to go back in a couple of months just to be checked."*

## Test Your Knowledge

### Question 1:

Which of the following people are among those likely to be most helpful in diagnosing and managing headache in an adolescent? Select all that apply.

1. [The patient](#)
2. [The school nurse](#)
3. [A pharmacist](#)
4. [The on-line community \(Facebook, bloggers, self-help sites, etc.\)](#)
5. [An acupuncturist](#)
6. [A psychologist](#)
7. [Friends](#)

### Question 2:

When obtaining a history from an adolescent patient with suspected migraine headache, which of the following should be asked?

1. [What exacerbates the symptoms?](#)
2. [Were there any anomalies when you were born?](#)
3. [When did the symptoms start?](#)
4. [What has been done so far?](#)

### Question 3:

Which of the following are possible signs and symptoms of migraine headache in adolescents? Select all that apply.

1. [Light sensitivity](#)
2. [Pain](#)
3. [Agitation/mania](#)
4. [Nasal congestion](#)
5. [Poor school performance](#)

### Question 4:

Which one of the following best describes common treatments for adolescent migraine?

1. [acupuncture](#)
2. [biofeedback](#)
3. [cognitive behavioral therapy](#)
4. [medications](#)
5. [behavioral self-care](#)
6. [all of the above](#)

### Question 5:

Which of the following medications and vitamins are used to treat adolescent migraine? Select all that apply.

1. [Botox](#)
2. [Topiramate](#)
3. [Serotonin agonists](#)
4. [Riboflavin](#)
5. [Amoxicillin](#)
6. [Albuterol](#)

### Question 6:

Which of the following risks should be addressed with adolescents experiencing migraine?

1. [Self-medication](#)
2. [Triggers \(food, sleep, etc.\)](#)
3. [Potential side-effects of treatments](#)
4. [Cost of therapies](#)
5. [Privacy risks of digital technologies for self-care](#)
6. [All of the above.](#)



### Question 7:

How quickly should an adolescent with migraine expect to experience good control of migraine headache?

1. Within hours of first visit and treatment
2. Diagnosis may take more than one visit, but treatment immediately produces a cure.
3. After diagnosis, adolescent should expect to try a variety of therapeutic options, including behavioral self-care, to find a regimen that works best for her.
4. Good control is typically rare. Adolescents should adapt their lifestyles to accommodate monthly debilitating headaches including a modified school plan.

### Question 8:

Which of the following preventive treatments for migraine is associated with weight loss?

1. Propranolol
2. Valproic acid
3. Topiramate
4. Amitripyline

### Question 9:

Which one of the following drug classes is used in the acute treatment of migraine headaches in the pediatric population?

1. [Serotonin agonists](#)
2. [Antihistamines](#)
3. [Antidepressants](#)
4. [Anticonvulsants](#)

### Question 10:

Which of the following vitamins has evidence to support efficacy in migraine prevention?

1. [Ascorbic acid](#)
2. [Riboflavin](#)
3. [Cyanocobalamin](#)
4. [Pyridoxine](#)

### Question 11:

Which of the following medications used in migraine prophylaxis is most likely associated with major congenital malformations?

1. [Topiramate](#)
2. [Cyproheptadine](#)
3. [Propranolol](#)
4. [Valproic acid](#)

## Answer Key

### Question 1:

Which of the following people are among those likely to be most helpful in diagnosing and managing headache in an adolescent? Select all that apply.

1. [The patient \(correct\)](#)
2. [The school nurse \(correct\)](#)
3. [A pharmacist \(correct\)](#)
4. [The on-line community \(Facebook, bloggers, self-help sites, etc.\) \(incorrect\)](#)
5. [An acupuncturist \(correct\)](#)
6. [A psychologist \(correct\)](#)
7. [Friends \(incorrect\)](#)

### Question 2:

When obtaining a history from an adolescent patient with suspected migraine headache, which of the following should be asked?

1. [What exacerbates the symptoms? \(correct\)](#)
2. [Were there any anomalies when you were born? \(incorrect\)](#)
3. [When did the symptoms start? \(correct\)](#)
4. [What has been done so far? \(correct\)](#)

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2. [Pain \(correct\)](#)
3. [Agitation/mania \(incorrect\)](#)
4. [Nasal congestion \(incorrect\)](#)
5. [Poor school performance \(correct\)](#)

### Question 4:

Which one of the following best describes common treatments for adolescent migraine?

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2. [Biofeedback \(incorrect\)](#)
3. [cognitive behavioral therapy \(incorrect\)](#)
4. [medications \(incorrect\)](#)
5. [behavioral self-care \(incorrect\)](#)
6. [all of the above \(correct\)](#)

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Which of the following medications and vitamins are used to treat adolescent migraine? Select all that apply.

1. [Botox \(correct\)](#)
2. [Topiramate \(correct\)](#)
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4. [Riboflavin \(correct\)](#)
5. [Amoxicillin \(incorrect\)](#)
6. [Albuterol \(incorrect\)](#)

### Question 6:

Which of the following risks should be addressed with adolescents experiencing migraine?

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2. [Triggers \(food, sleep, etc.\) \(incorrect\)](#)
3. [Potential side-effects of treatments \(incorrect\)](#)
4. [Cost of therapies \(incorrect\)](#)
5. [Privacy risks of digital technologies for self-care \(incorrect\)](#)
6. [All of the above. \(correct\)](#)

### Question 7:

How quickly should an adolescent with migraine expect to experience good control of migraine headache?

1. Within hours of first visit and treatment. (incorrect)
2. Diagnosis may take more than one visit, but treatment immediately produces a cure. (incorrect)
3. After diagnosis, adolescent should expect to try a variety of therapeutic options, including behavioral self-care, to find a regimen that works best for her. (correct)
4. Good control is typically rare. Adolescents should adapt their lifestyles to accommodate monthly debilitating headaches including a modified school plan. (incorrect)

### Question 8:

Which of the following preventive treatments for migraine is associated with weight loss?

1. Propranolol (incorrect)
2. Valproic acid (incorrect)
3. Topiramate (correct)
4. Amitripyline (incorrect)

### Question 9:

Which one of the following drug classes is used in the acute treatment of migraine headaches in the pediatric population?

1. [Serotonin agonists \(correct\)](#)
2. [Antihistamines \(incorrect\)](#)
3. [Antidepressants \(incorrect\)](#)
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Which of the following medications used in migraine prophylaxis is most likely associated with major congenital malformations?

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