Basic Physical Therapy Treatment of Constipation

Recorded June 17, 2020

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PhysicalTherapy.com Course #3760

- [Calista] Today's course is titled "Basic Physical Therapy Treatment of Constipation," and it is my privilege to welcome back to physicaltherapy.com Dr. Cindy Neville. Cindy is a board certified women's health clinical specialist, and president of her consulting and education firm, Neville Know-How. She is currently providing clinical patient care as a pelvic health physical therapist, and is also an associate professor of physical therapy at Mayo Clinic in Jacksonville, Florida. A highlight of her career was developing the first credential women's health physical therapy residency program in the state of Florida at Brooks Rehabilitation in Jacksonville. She has published several peer-reviewed research articles and textbook chapters, and Cindy has been practicing and teaching pelvic health physical therapy course for over 30 years. So we are so glad to have you back with us tonight, Cindy, at physicaltherapy.com, and at this time, I'm gonna turn the microphone over to you.

- [Cindy] Thank you so much, Calista. It's great to be here, and welcome everybody to the webinar. I would like to start off by just letting everybody know that I do receive an honorarium for presenting this course, but I have no relevant non-financial relationships to disclose, and this learning event does not focus exclusively on any specific product or service, and the course is presented by physicaltherapy.com. I'd like to review our learning outcomes, and I will go ahead and start with the first outline, or excuse me, the first outcome. At the end of this course, participants will be able to describe at least two aspects of the diagnosis and complexity of constipation, to identify at least three exercises and one manual therapy technique to improve gut motility, describe at least two important aspects of the role of the pelvic floor muscles in defecation, describe how paradoxical contraction can cause constipation, identify at least three factors in the physiologic and anatomic rationale for optimizing position and posture on the toilet during defecation, and to identify at least two behavioral factors contributing to constipation. So we have a lot to get through, and we're gonna get started right now. So, who is affected by constipation? I know that everybody has probably talked

about it with patients at some time or another or family members, but you might be surprised to learn that up to 27.2% of adults in the United States are affected by constipation, so more than one in four adults. Constipation affects women much more frequently than it does men, and one of the reasons for that is because of our anatomy. We're gonna talk about that later on. It is very impactful to individuals who reside in institutional living environments, up to 74%. People after hip fracture are, have a lot of complaints of constipation. So probably some of you are working with patients after hip fracture People with joint hypermobility.

We are, as a profession, learning much more about Ehlers-Danlos syndrome, which is the genetic variant of Hypermobility syndrome, and we know that there is a spectrum of hypermobility disorders out there that affect both our male and female patients, and they are more likely to have constipation as well. Anybody who has a neurologic condition such as Parkinson's Disease or after a stroke, and, oh my gosh, people with neck or back pain. Now certainly, physical therapists are treating these patients, and so it's quite interesting that back pain and neck pain is associated with constipation, and that is even without considering the use of opioid medications, which are often used by patients with chronic back pain.

Children are affected by constipation, almost 30% of children. I remember, and when I was learning about this, that one of the instructors who is a national, international expert, Dawn Sandalcidi, said that it can be one, only one episode of a painful experience of defecation, and a child can develop constipation after that because they don't want to have that pain experience again. Pregnant women get constipated. Oftentimes it's because of the vitamins that they're taking, and because of the changing hormones and the changing anatomy. And female athletes, I can't explain why that is, but up to 36% in one study says that female athletes, 36% of female athletes are affected by constipation. So there's a good chance that you are working with somebody who has constipation. All right, so constipation leads to changes in

quality of life, and for, the reason that, it leads to reduced physical activity. People just don't feel good when they're constipated. Their abdomen is bloated, they feel uncomfortable, they kind of feel, they can feel sick, and this leads to increased utilization of healthcare resources. So people seek medical care for constipation, and there's a lot of medications that are recommended and prescribed for patients, but a lot of times, they don't work very well. The impact on health-related quality of life is similar to people with diabetes, chronic allergies, dermatitis, osteoarthritis, even Crohn's disease and inflammatory bowel disease. So it can really have a negative impact on quality of life for sure.

So what are the risk factors for constipation? Well, the older we get, the more likely we're to have, we are to have issues with constipation, and I think that's reflected in that number of up to 74% of institutionalized older adults are suffering from this problem. We talked about, that women are more likely to be affected than men, three point times, 3.5 times more likely, and then people in lower socio-economic status, and lower educational levels.

People with higher body mass index, people who have reduced mobility and low self-reported physical activity, people who have poor diets, low consumption of fruits or vegetables, and low consumption of fiber, people who are living in densely populated communities, people who have a family history of constipation, and people who have anxiety and depression. We're gonna talk about how this impacts our digestive process, our anxiety and depression. The most important risk factors for physical therapists and physical therapists assistants to consider is, are these two things, number one, medication. So we know that opioids can cause constipation, and even though opioids cause constipation, the treatments that we'll talk about later in this session can actually be very effective for opioid induced constipation. Then, lifestyle factors, in particular, how much fluid is a person drinking? If people are not having enough water and fluids, then that can lead to constipation. Then their diet, as

we just mentioned. Are they getting fruits and vegetables? Are they getting fiber in their diet? Then their physical activity level. Of course, we work with lots of people who have limited physical activity levels, but these three factors are things that we can educate our patients about, and help to change their constipation. So when we think about what physical therapists can do for constipation, the presentation today is really addressing what any physical therapist in any environment can do for the treatment of constipation. I will discuss what pelvic physical therapists can do and what they can offer, but for the purposes of our presentation today, this, these, this information is for any physical therapist in any setting, with any age group, too.

So one of the first things you wanna think about is what's the physiology of digestion and defecation, and it may have been awhile since you were in anatomy and physiology class to think about this, but it's very helpful to think about the physiology, because that helps you to understand why the interventions that we're gonna talk about can be effective, and also can help you to explain to patients, because most of our patients really don't have any idea of how this physiology works. So the digestive system starts at the mouth, and ends at the anus, and so we're gonna kind of walk through the system and talk about what each part does.

So the first part of digestion starts with chewing our food, and the first organs of digestion are our mouths, our teeth, our tongue, and our salivary glands. These are some really kind of cool pictures from "Primal Anatomy" that, when I first saw these pictures and choose them for this presentation, I was just reminded of how many muscles are involved in chewing and swallowing, and it's funny because we don't really think about it that much, we just chew and swallow, and we kind of forget that it's really a very muscular action. So the chewing and our saliva is a really important part of digestion. So the first recommendation is, are you chewing your food? Are you making sure that you're chewing your food well enough so that it's easier to digest? The upper two thirds of the esophagus consist of both smooth and skeletal muscle fibers, and

then the skeletal muscle fibers fade out towards the bottom third of the esophagus. Rhythmic waves of peristalsis, which begin in the upper esophagus, propel the bolus of food towards the stomach, and then meanwhile, secretions from the esophageal mucosa lubricate the esophagus and the food. The next step in digestion is the stomach. The stomach participates in all digestive activities except ingestion and defecation. It vigorously churns the food, and the picture that you're seeing here are the three layers of the stomach that are separated out from each other, excuse me. The stomach secretes gastric juices that are very important for breaking down food, and the empty stomach, believe it or not, is about, only about the size of your fist, but it can stretch to hold as much as four liters of food and fluid, or more than 75 times its empty volume, and then it can return to its resting size when empty. So the excuse me, the muscularis layers vigorously churn the food, so that, so we really get that breakdown of the food in the stomach.

Okay, we have solid organs of the digestive system, the liver, which you see here, is the organ that creates bile, which digests fats and vitamins, and then underneath the liver, which you can't really see in this drawing, are the pancreas and the gallbladder. The pancreas makes digestive enzymes that break down carbohydrates, fats, and proteins, and the gallbladder stores bile between meals, and during eating, squeezes the bile through the bile duct into the small intestine. The small intestine is divided into the duodenum, the jejunum, and the ileum.

The peristalsis of this smooth muscles mixes chyme with digestive juices of, from the pancreas, liver, and the intestine, and this is where the, our main nutrient absorption occurs is in the small intestine. So the intestinal walls absorb water and nutrients into the blood stream, and then the peristalsis of these smooth muscles moves the waste into the large intestine. The large intestine absorbs, also absorbs water and converts the waste into stool. So this is where the poop machine starts, and it propagates the waste throughout the colon and into the rectum. The appendix is in the lower right

hand quadrant of the abdomen, and it's not clear what the role of the appendix is, but it is thought to harbor bacteria, to, it eliminates harm, what, supposedly harmful bacteria from the small intestine as it moves to the large intestine. However, when the appendix is removed, people generally don't have any negative side effects, so it's controversial and debatable what really the role of the appendix is. The cecum is the name of the location between the small intestine and the large intestine, and there's a valve there called the ileocecal valve. The colon is divided into an ascending colon, which rises up on, from the lower right hand corner of the body, ascends up towards the ribcage, then we have the transverse colon that goes across to the other side, to the left side, and then we have the descending colon, and the descending colon then turns into the sigmoid colon, which is a curve, and into the rectum.

So that's the large intestine or the colon. The rectosigmoid junction, where the sigmoid colon turn into the rectum, here, is approximately at the level of S3 at the sacrum. The rectum is approximately 12 centimeters long and four centimeters in diameter from the sigmoid to the anorectal line. So from the curve of the sigmoid colon here to the anorectal line here. It follows the curve of the sacrum. In the rectum are valves, that you see, the valves, one here, one here, and one here.

These are called the "Valves of Houston," or they're also called the plica transversalis, and they prevent the backward flow, or the backward propulsion of stool from the rectum back into the colon. The internal anal sphincter fuses superiorly with the circular layers of the rectal smooth muscle, and it is an inner smooth muscle which is medial to the skeletal muscles. The internal anal sphincter is not under voluntary control, and it is responsible for 80% of the resting tone of the anal sphincter complex. The external anal sphincter surrounds the inferior end of the anal canal. So I'm gonna point here, so we have the internal anal sphincter here, and the external anal sphincter here. The external anal sphincter is responsible for 20% of the resting tone. It's two to three centimeters wide on each side of the anal canal. It has three components, the deep

component, which joins with the transverse perineal muscle, and the perineal body, and the puborectalis muscle. It has a superficial component which connects to the tip of the coccyx to the perineal body, and it has a subcutaneous component which is just underneath the skin. So the sphincter complex can be thought of as a tube within a tube. The inner tube is the internal sphincter smooth muscle, and we see that right here, in this portion down here and here, and the outer tube is the external anal sphincter which you see here. So this is more of a close up picture than the last picture. The levator ani muscle of the pelvic floor inserts in between the internal and external anal sphincter. The external anal sphincter, as I mentioned, is responsible for 20% of the resting tone, and again, attaches the perineal body to the anococcygeal ligament, so it is affected by movement of the coccyx.

The levator ani muscles are the pelvic floor muscles, and we're gonna talk more about those in just a minute, but we do need to consider that one particular muscle of the levator ani muscles complex is the puborectalis muscle, move my little arrow there. The deep and medial portions of the puborectalis muscle contain both smooth and skeletal muscle fibers. So that's kind of unusual for a skeletal muscle to be combined with smooth muscle.

So that puborectalis maintains the anorectal angle. So when we look at this from a sagittal perspective, this picture might be a little confusing. We have the pubic symphysis in the front, the sacrum is in the back, here's the bladder and the urethra, here's the uterus and the vagina, and here's the rectum and the anus. The red lines represent the pelvic floor muscles. So the anorectal angle is the angle between the rectum and the anus. The puborectalis is that muscle that is the major insertion sight for the, in between the internal and external anal sphincters. So the integrity of the anal sphincter can affect the muscle of the levator ani muscle. Okay, so next we're gonna talk about the central nervous system control of digestion. The central nervous system control of digestion is divided into four parts. There's the enteric system, the

sympathetic system, the parasympathetic system, and the somatic system. The enteric nervous system is often referred to as the brain in your gut. Neurons with cell bodies and plexuses within the wall of the gut, between the longitudinal and circular muscle smooth layers are, directly control most aspects of colorectal motility, and this system is very complex. Motor neurons are both inhibitory and excitatory, so they can either fire up digestion and movement through the colon, or they can slow it down. Sensory neurons respond to mechanical and chemical stimulation, and they can activate reflex circuits controlling motility, and reflexes are really important in digestion. We're gonna talk about those in just a minute.

Then there are interneurons. The interneurons are long projections that propagate reflexes over long distances to motor neurons. So there's communication through long distances in the system. The viscerofugal neurons project out of the gut wall to communicate with sympathetic and parasympathetic nervous system in the body. So this is really important to remember. These viscerofugal neurons know what is going on with the body. So if you are in a fight or flight situation where your sympathetic nervous system is activated, your gut is going to know it.

Conversely, if you're relaxed and resting, and the parasympathetic nervous system is dominating, then your gut is gonna know it, too, and that's gonna be the best time to have a bowel movement. So we talk about rest and digest with the parasympathetic nervous system. So as I just mentioned, sympathetic nervous system releases noradrenaline, causes presynaptic damping down of enteric motor reflexes. So the sympathetic nervous system slows down digestion. So it's not a good time to try to have a bowel movement when you're all stressed out, or when you're in a hurry, or when you're afraid, or when you're worried, or when that sympathetic nervous system is ramped up. The paravertebral sympathetic neurons control blood flow, and they will stop the blood flow to the digestive system. Prevertebral sympathetic neurons control the blood flow and cause vasoconstriction. So if we have vasoconstriction and a

decrease in secretory activity and smooth muscle activity, then digestion slows down. On the other side of the coin is the parasympathetic nervous system. The parasympathetic nervous system provides powerful vagal efferent input to the upper GI tract and the proximal colon, and it dominates digestive function. The distal regions of the colon and the rectum receive input from the sacral parasympathetic nucleus. This projects via the pelvic nerve, which is S2, S3, and S4, to the pelvic plexus ganglia. So what other anatomical organs and muscles are innervated by S2, 3, and 4? The bladder and the pelvic floor. So the pelvic nerve is mixed sympathetic and parasympathetic in this distal region of the colon and the rectum. The colon is innervated by the vagal nerve, proximally, which is the parasympathetic nervous system, and distally by spinal somatic nerves, and they have high threshold mechanoreceptors. So in other words, they are not very sensitive to mechanical simulation.

The rectum, however, has low threshold mechanoreceptors, so it's highly sensitive, and we have a lot of conscious awareness of what's going on in the rectum. This is, for the reason that the rectum really activates propulsion of stool out of the body. Okay, so now we know about the digestive organs and we know about the digestive nervous system, so now let's talk about the reflexes that are responsible for colonic transit, which is moving fecal matter through the digestive system. The most important one that I hope you remember from this talk that we can really impact is called the gastrocolic reflex. So the gastrocolic reflex is initiated when there is distension of the stomach. So this happens after eating, or oftentimes, after drinking hot liquid. We can also stimulate the gastrocolic reflex with physical activity and walking. So the gastrocolic reflex results in increased peristalsis in all areas of the colon or the large intestine. So this results in, oftentimes, in a bowel movement. So it's very common for people to have bowel movements after the morning meal, or after their morning coffee, or a hot drink. The intrinsic defecation reflex is initiated by fecal matter entering the rectum. So this is only in the rectum. So the, I'm gonna just go back for a second. The

gastrocolic reflex involves both the stomach and the rectum. The intrinsic defecation reflex is really only in the rectum. When fecal matter enters the rectum, it leads to distension of the rectal wall. We talked about that rectal wall is highly sensitive. So then the rectum begins to have peristalsis, and these waves of peristalsis move the fecal matter into the anal canal. The internal and external anal sphincter relax and evacuation occurs. So that is the most primary mechanism of defecation occurring in infants, and it exists with us through our whole lives, but it's easily suppressed by cortical inhibition in adults. So this is when you feel, oh, I have to go to the bathroom, I feel the need to go, because that sensitivity of the rectum starts having peristalsis, and that's what gives you the urge to go to the bathroom.

The parasympathetic defecation reflex is also stimulated by stretch of the rectum, and it stimulates afferent fibers. So this results in activation of the parasympathetic nerves, and intensification of peristaltic activity in the descending colon, sigmoid colon, rectum, and anus. It is very effective in stimulating total evacuation of the bowels or the colon. But this reflex can be suppressed by voluntary contraction of the external anal sphincter. So frequent suppression of this parasympathetic reflex can lead to constipation. So we like to tell people that if they feel the urge to go, to try not to suppress it if they are able to go ahead and go to the bathroom.

This also, suppression of the parasympathetic defecation reflex can contribute to constipation during stressful events. So when people are really under a lot of stress and they can't, their parasympathetic system can't become dominating, then it leads to a decrease in the peristalsis in the rectum, and in the entire colon. Mass movements are initiated by the gastrocolic reflex, by colon distension, or by parasympathetic stimulation. So these mass movements are strong peristaltic waves. They call them HPA, HAPC, high amplitude propagated contractions, and they propel large volumes of colonic content the entire length of the colon in a very short time. So you can think of it like squeezing out the toothpaste from a toothpaste tube. That muscular peristalsis is

just squeezing and pushing that fecal matter through the colon really rapidly, and it occurs up to five times a day. It's most abundant in the hour after eating breakfast, and so we can think about using this, these mass movements to help people to time when they can try to have a bowel movement, even if they don't have an urge, because there's a good chance they're having a mass movement, and they may be able to capitalize on that. I see somebody has a question, and when I get to the end of this section, I will answer your question. So not all mass movements result in defecation, but they are, these mass movements are what to helps to move the matter through the colon so that we can have regular bowel movements, and excessive mass movements can occur with irritable bowel syndrome or with Crohn's disease. So how long does it take the matter to move through the colon?

Well, normally, it takes one to four days to travel the entire gastrointestinal tract. So this is a picture of the colon all by itself, hangin' out there. The ascending colon on the right, the transverse colon, ascending colon on the right here, transverse colon goin' across, descending colon, and then sigmoid and rectum. So the small intestine, it moves pretty quickly. The small intestine pulls out the nutrients from the food, and then moves it on to the colon. In the colon it slows down. It takes 24 to 72 hours to move through the large intestine, and the average is 40 hours.

So sometimes just knowing this can be really helpful for a patient to understand that, you know, what you eat today might not be fully digested for a couple more days, and this colonic transit time starts, is normal for everybody starting at age three and on. So children after the age of three are expected to have the same colonic transit time as an adult. It does depend on fecal consistency, and that's why fluid intake is very important. The normal output of fecal matter is 300 to 400 grams a day, or 10 to 14 ounces, so approaching a pound a day of poop. Sounds like a lot but it's, that's what we do. So normal bowel frequency is one to three times per day, so it's normal to go up to three times a day, and it's also considered normal to go one time every three

days. If somebody has really slow colonic transit, this actually can be normal, but it's not usual. Usually we like to have people going to the bathroom at least once a day, and okay, maybe once every other day, as long as they're not feeling badly because they haven't had a bowel movement. Once a day is ideal. The Bristol Stool Chart is a stool chart that we can use to describe the consistency of fecal matter, and I like to say it with an English accent since it's Bristol, Bristol Stool Chart, and Type 1 are hard stools. We call 'em rabbit pellets, and these are, this is somebody who's very constipated. Type 2 is lumpy and sausage-like, Type 3 and 4 is, are more normal types. Type 3 is sausage-shaped with cracks in the surface, Type 4 is like a smooth, soft sausage, or a snake, and those are our normal types. Then we get into 5, 6, and 7, and this is where we're getting towards diarrhea.

Type 5 is soft blobs without, or with clear-cut edges, and it, that's indicating that there's a lack of fiber in this stool, and Type 6 and Type 7 are very liquidy, and may be indicative of inflammation. So there's a number of factors that affect the motility of the intestines and the colon, number one, the amount of feces, number two, what is the fecal matter composed of, is it fats versus carbohydrates, and what is the consistency? We just showed you the stool chart.

The hormone milieu in the intestines can affect the motility of the system, and clearly, the nervous system input to the system. Is it the sympathetic or is it the parasympathetic, which is dominating? Female hormones, so this is one of the reasons, another reason why women have more problems with constipation, because of the hormone cycle, and then our emotions. Visual input, what does the food look like, what does, what am I seeing at the time, and olfactory input. The timing of eating, and the schedule. What kind of a schedule a person has if they're working, what kind of sleep schedule they have, systemic diseases certainly can affect intestinal motility, such, like anorexia or diabetes or hypothyroidism, and their physical activity level. So it's, some of these are factors that we can't control, like the intestinal hormones or

female hormones or systemic diseases, but many of these other factors are things that we can control, and we can impact. Let's see. Somebody asked, Ms. Fry asked, "Is there anything special with the coffee "or just the fact that it's hot?" So that's a good question. The hotness is important, but coffee and the caffeine in the coffee is also a digestive stimulant, so it's both. However, if people do not drink coffee, just a cup of hot water can do the trick as well. But it makes for the fact that coffee is often a very good stimulant of the digestive system because of the caffeine, and because of the tannic acid as well. Good question, thank you. All right, so now we're gonna talk about pooping, and it's funny because as a pelvic therapist, I talk about pooping all the time, so we just laugh, we just talk about it, and it's just a part of what everybody does, and everybody has a pelvis and everybody has to poop.

So normal defecation involves the rapid, semi-voluntary emptying of the rectum and the distal colon. So the distension of the rectum and the stretch of the levator ani due to the fecal matter stimulates the stretch receptors. Remember that the levator ani, the puborectalis muscle, does have smooth muscle fibers so that it combines with the anal sphincter, the internal anal sphincter, and is a part of this reflexive system. So the recto-anal inhibitory reflex, also known as the RAIR, R-A-I-R, or the Sampling reflex, and then the Accommodation reflex are the reflexes that help to, at the end of the process, make defecation happen.

So the RAIR reflex is initiated by those stretch receptors in the rectum, and it results in a relaxation of the internal sphincter, but a partial contraction of the external sphincter. So the door is not all the way open yet. The door is starting to open. So this reflex allows a small amount of fecal matter to partially enter the anal canal, about 30 milliliters, and then the highly sensitive rectal lining assesses the consistency of the bowels and decides, is it solid, liquid, or gas? So we're hopin' that rectal sensation is correct. So if liquid is sensed, the external tone increases. If gas is sensed, it is selectively released. So we can hold that gas and let it out, but if anal sensation is lost,

patients may run to the bathroom frequently just to release gas, or they think they're releasing gas but they actually release stool. So this RAIR or Sampling reflex is really important for us to make sure that we don't accidental poop in our pants when we think we're just letting out some gas. The accommodation reflex is initiated by the increase in external anal sphincter tone. So the anal pressure is higher than rectal pressure. This picture is a sagittal view of the rectum, and here is the rectal canal. The, interesting in this particular section from, this is from westnorman.com, where he has done anatomical dissections, and so these are actual cadaver pictures, and then he has colored them for illustration.

You can see that that, it's very large in that rectum, so this rectum in this cadaver is highly accommodating right now. So the Accommodation reflex results in rectal relaxation, and accommodation of those stretch receptors, and suppression of the urge to defecate, and peristalsis stops and continence is maintained. So that accommodation just allows the rectum to store the fecal matter until the person is ready to defecate. So storing of feces requires cortical inhibition, external anal sphincter strength, and rectal distensibility. So of course, all of these can be compromised.

Cortical inhibition can be compromised in brain injury or stroke, anal sphincter strength can be compromised by trauma to the pelvic floor such as an anal sphincter tear during child birth, or fissures in the anal sphincter that are caused from excessive straining and constipation, and rectal distensibility can be negatively impacted by say for example, pelvic radiation. So we need the external sphincter to be able to contract for 30 to 60 seconds, and, until peristalsis is such off. That's a pretty long time to be able to hold that squeeze. If peristaltic action is fast, a large volume of feces can rapidly enter the rectum, and the accommodation reflex can be overcome and that urgency is felt, and this depends on the nature and volume of the fecal matter and the strength of the pelvic floor muscles and the external anal sphincter. So in summary,

when we poop, we first get rectal distension which elicits the RAIR, the Rectoanal Inhibitory reflex, and the external anal sphincter contracts. The Sampling reflex determines if there's liquid, solid, or gas, and then there's a decision. Are we gonna selectively gonna let gas pass, are we gonna poop, or are we gonna hold it and wait? So if we decide to poop, then the external anal sphincter and the internal anal sphincter relax, and rectal peristalsis expels the fecal matter. Then when it's all done, the, a reflex closes the external anal sphincter and stops the whole process. So that's the summary of our pooping reflex.

All right, so now we're up to speed with all the anatomy and the physiology of digestion and defecation. So how is constipation diagnosed? So the term for constipation, constipation in the past, the term is that it has, falls into a functional gastrointestinal disorder. However, this term has changed recently, and now, these disorders are called disorders of gut brain interaction. Isn't that interesting? Our knowledge of our nervous system and how it interacts in our body in relation to defecation and, as well as in relation to pain, has greatly changed in the last 10 to 15 years, and now there is a very important understanding that the brain has a lot to do with our gut function as well as pain.

So there's kind of an analogy between what we know about the neuroscience of pain and what we know about the neuroscience of digestion. The leading authority on terminology and diagnosis and treatment of disorders of gut brain interaction are defined by the Rome IV criteria. The Rome diagnostic criteria are expert consensus criterias for diagnosing these functional gastrointestinal disorders. Rome IV was released in 2016 after Rome III had been in effect for an entire decade. So they didn't change the thinking or the terminologies of the, the standard terminologies for 10 years. In May of 2006, the new diagnostic criteria for these disorders were published, and it, representing a philosophical change in the conceptualization of the family of gastrointestinal disorders they cover through a reduced emphasis on the term

functional in the nomenclature. So as I mentioned, in recent years, there's been growing recognition that multiple, specific, pathophysiologic processes play a role in these disorders, including imbalance between different types of gut bacteria, increased gut permeability, altered immune function, and furthermore, the importance of the neural and hormonal interactions between the brain and the gut in producing and modulating the symptoms of these disorders has been recognized. So the Rome IV Criteria for constipation, even though we now are recognizing that the brain and the nervous system and the hormones and the bacteria are all critical to understand, the actual criteria for diagnosis of constipation did not change substantially from Rome III to Rome IV. So constipation is a symptom and not a disease, and the definition is that the, the person must have at least two of the following criterias, and in it, so this is in a patient who does not take laxatives or have irritable bowel syndrome.

The patient has at least two of the following in any 12 weeks of the last six months, and they say that there are rarely loose stools, so the only time they have loose stools is if they use laxatives, and the criteria for irritable bowel syndrome are not fulfilled. So two of these criteria, straining during at least 25% of defecations, hard or lumpy stools in at least 25% of defecations, the sensation of incomplete evacuation in at least 25% of defecations, the sensation of ano-rectal obstruction in at least 25% of defecations, maneuvers, manual maneuvers to facilitate defecation, and less than three bowel movements per week.

So in the second column here, any two of these criteria in the, in any 12 weeks of the last six months. So that's the formal international definition of constipation. So normal bowel movements can be one to three times a day. It says two to three times a day, but even just one a day is considered normal, and it can be one time a day, three times a week, and that's still considered normal. So it's pretty wide-range. The consistency should be firm, the color should be brown, the stool chart should be Type 3 or 4, and it should be not be the abnormal types which are 1 and 2 and 5 through 7 on the Bristol

Stool Chart. If the color is black, that may indicate blood in the stool, and that's a referral to the physician. So there can be primary constipation, and this is a functional impairment of the colon and ano-rectal structures. Then there's secondary constipation, and this is related to organic or structural disease, systemic disease, or medication. With severe constipation, these are people who have less than one bowel movement per week, and this affects women more often than men by 3.5 times. In most cases, there is no underlying organic cause, and these terms, chronic idiopathic constipation indicates there's no underlying organic cause, where chronic functional constipation, again, means there's no organic cause. So you may hear, or see either of these terms in the literature or in medical records.

There's always red flags to consider, and a sudden change in persistent bowel rhythm in patients over 50 years old, so somebody who's been pooping regularly, once a day, every other day, and suddenly this changes, in anybody over 50 years old, and the reason why is 50 is the magic number for any type of increased risk of any disease, any disease process at all. It could be constipation, I mean, excuse me, it could be diabetes, it could be cancer, any type of disease or pathology is more prevalent in anybody over 50, so that's why that number.

Red flags also are rectal bleeding or bloody stools, which can look black, iron deficiency, anemia, rapid weight loss, significant abdominal pain, a family or personal history of colon cancer, any type of inflammatory bowel disease or a palpable mass. So any of these red flags would warrant a referral directly to the physician. The physicians would then rule out any of those pathologic processes or diseases. When patients do see a gastroenterologist with the complaint of constipation, there are some tests that are quite commonly performed, and we're gonna talk about these so that you understand what the patient might go through if they go to the GI and undergo testing. So anal-rectal manometry is a three balloon system, and there are many different types on the market, and the three balloon system measures pressure and reactions in three

different areas. So the deepest balloon is a rectal balloon, and then, and so this is the rectum that we're looking at, this space here, this is the rectal balloon, and then there is a middle balloon that is at the anal canal which measures the internal anal sphincter, so here's that internal anal sphincter represented, and then there's a superficial balloon, and that's in the distal anal canal, right here, and here's the external anal sphincter, and then here's the puborectalis muscle that inserts in between the internal and external anal sphincter. This manometry leads to a gauge, and this measures the pressure as the person is simulating a bowel movement. One of the challenges with this test and some of the other tests is that the patient is typically in a horizontal position for the test, and most people don't try to poop when they're lying down. So it's not a very practical or truly functional position for testing the ability, or even looking, measuring these pressures.

So anal resting pressures are measured while the transducer is withdrawn and measures internal anal sphincter function, which is 80% of the resting tone. Anal squeeze pressures are measured during slow withdrawal of the transducer, and the patient is asked to keep the anal sphincter contracted during the pull, so to try to resist the balloons being pulled out.

Then calculations are made regarding the maximum average squeeze pressure, the squeeze sphincter length, and the cross sectional symmetry or assymetry. Another test is the balloon expulsion test, and this is fairly easy to perform and widely available. It involves inserting a balloon into the rectum which is inflated with air or fluid, and then the patient is simply asked to evacuate it. Ideally, the balloon is inflated with a volume that produces the desire to defecate, so it stimulates that rectal sensitivity and that rectal peristalsis. Then the patient will expel it in the bathroom in private. The methodology of this test is not standard, but the idea is to quantify the time needed to expel the balloon in the seated position. So that's a test that helps to determine if the patient is actually able to push out the balloon or push out, in theory it simulates

pushing out the fecal matter. Colonic transit time is, as we mentioned, defined as the time taken by the feces to pass through the colon, and it's determined, it's measured through different ways of timing as small markers move through the digestive system. So in this picture, you see these little round dots, and they represent these markers. The markers are small plastic radiopaque markers, and so the person ingests them, and as they move through the system, then there are a series of abdominal X-rays that are taken that show the markers moving through the colon, and they usually take, the most widely used protocol is to take X-rays on day four and seven, and some even on the 10th day. This, colonic transit time testing is indicated in patients who haven't responded to other treatments like lifestyle changes, bulk-forming agents and fiber, and so this just really is the test that allows for identification of patients who are constipated because of a slow transit in their colon. Usually other treatments are tried first before somebody would undergo this.

Then two techniques are used to identify anatomical alteration in the digestive system. The anatomical alterations include a rectocele, which is a prolapse of the rectum into the vagina, or an enterocele, which is a prolapse of the small intestine down in towards the vaginal opening, or intussusception, which is a rectal prolapse out of the anus. So fluoroscopy is used for defecography.

So fluoroscopic X-ray images of a barium paste enema are taken. So the enema made with barium paste is inserted into the rectum, and the subject sits on the toilet and is asked to squeeze, cough, and then expel the contrast. It's a pretty accessible and fast technique, but it does expose the patient to radiation, so that's the one downside there. Then dynamic MRI, in dynamic MRI, 120 to 150 milliliters of contrast, like ultrasound gel, is placed into the rectum, and then the person is asked to again, squeeze, cough, or expel, and to watch to see what the person, what happens when the person does those things. The challenge with the dynamic MRI is it may not be able to be done in that sitting position. With both of these tests, the colonic reflexes are

not evoked, so this is not physiologic defecation. It's a test of voluntary rectal evacuation, and a test to look at the anatomy of the rectum and the pelvic floor, which brings us to the pelvic floor. So now we're gonna talk about the pelvic floor muscle function and dysfunction and how that relates to constipation. So let's take a minute and review the anatomy of the pelvic floor. The pelvic floor, when we talk about the pelvic floor, we're talkin' about the whole kit and caboodle. We're talkin' about everything including the pelvis, the pelvic girdle, the skin, the skin, the perineal skin, the pelvic floor muscles, the fascia and the ligaments, the vascular and nervous system components, and the viscera.

So everything that is contained in the, in the pelvis here. I like to think of it as the center of the universe. We got our bowel movements, we have urination, we have sex, and we have procreation and babies. So all this important stuff is happening in here, in the pelvic floor. The back wall of the pelvis is formed by the sacrum and the piriformis muscles, so here's your sacrum and your piriformis muscles, and then the front wall is the pubic symphysis and the pubic bones. The floor is formed by the levator ani muscles.

The side walls are composed of the obturator internus muscles, which are here and here, or here and here, and this is just another great picture of looking down into the pelvis on a cadaver that has been then graphically enhanced by wesnorman.com. The pubic bone and the obturator fascia along the arcus tendineus levator to the coccyx, these are the insertion points of the levator ani, so it goes all the way from the pubic bone, here is the arcus tendineus levator ani. That is the fascial connection of the levator ani muscle onto the obturator internus muscle here, and all the way to the coccyx. So that's the attachments of the levator ani. The levator ani closes the pelvic floor, so it really holds in the bottom. It carries the weight of the abdomen, abdominal, and pelvic organs, and prevents constant strain on the visceral ligaments. The pelvic floor is innervated by the pudendal nerve, which is S2, 3, and 4, and you can always

remember it by S2, 3, and 4 keeps the pee and poop off the floor, and the sciatic nerve has kind of a tortuous route. It is composed of these sacral nerves, S2, 3, and 4, it goes out of the sacrum, out the greater sciatic notch between the piriformis and the coccygeus, and then it hooks around underneath the sacrospinous ligament, and goes back into the pelvis through the lesser sciatic notch over the sacrotuberous ligament, and then runs through a fascial canal along the ischial pubic ramus, which is called the pudendal canal, or Alcock's canal, and then from there, it splits out into three branches. It's the, either the dorsal nerve or the penis or the clitoral nerve, the perineal nerve, and then the nerve to the anal sphincter.

Here we're looking at the female pelvic floor and the male pelvic floor on the left from the pelvic inlet. So we're looking down into the pelvis from the abdomen, and as we look down, they don't look too different. The main differences are that in the female, there's a vagina, so there's a vagina that's been in size there, and the vagina is really kind of a collapsing tube. It doesn't really maintain a tubular structure. It collapses on itself when there's nothing in there.

So if there was a tampon in there, then it would take the shape of a tampon, but when it's, there's nothing in there, it collapses upon itself. So it really doesn't take up a lot of space coming in through the pelvic floor. In the male, we have the prostate, and the prostate gland sits between the external urethra and the levator ani pelvic floor. So the prostate in men actually provides additional structure and support to the whole system. But when you look from this view, they really don't look too different. You can see that the levator ani fills that whole pelvic outlet, and is really taking up all of that space. When we look from the other direction, though, we can see the urogenital hiatus in the female pelvic floor, and so this is the main structural difference that ends up giving women more trouble with constipation and other pelvic floor issues like urinary incontinence. The urogenital hiatus is the opening within the levator ani through which both the urethra and the vagina pass, and during vaginal childbirth, the fetal head

passes through this urogenital hiatus. When that happens, the anatomy is often altered. The anatomical structures that support the bladder and the pelvic floor muscles can be altered or damaged during childbirth. Then pelvic organ prolapse can occur through this urogenital hiatus. The most concerning pelvic organ prolapse for constipation is rectocele, and rectocele is when the rectal wall bulges into the vagina. So here is the uterus and the vagina. Here's the bladder and the urethra, and here's the rectum. So what we're seeing in this picture is the rectal wall is pushing into the vaginal wall. So the rectovaginal septum that separates the vagina and the rectum has been altered anatomically, and now this rectum is bulging more into the vagina, and so it's created, it can create a pouch.

So a rectocele can not only alter defecation mechanics, but fecal matter can get stuck in the rectocele, and so one of the criteria for constipation was, does a person have to manually facilitate defecation? What happens with women with a rectocele is sometimes they'll have to put a finger into the vagina to splint this wall so that the fecal matter will come out. Now a rectocele is different than the rectal prolapse. Rectal prolapse occurs when the rectum actually comes out of its own opening, so that's not what we're seeing here. We're seeing it's a rectocele, where the rectum is pushing into the vaginal wall.

So now let's talk about pelvic floor muscle function. When we think about the pelvic floor, we think about voluntary muscle function and involuntary muscle function. So voluntary muscle function of the pelvic floor is a muscle contraction, the muscle shortens, and, but it's interesting because we have two components of the active contraction of the pelvic floor. It's not just a shortening of the muscle, because we have a squeeze, so we squeeze around the openings, especially the anus. The muscle is called the levator ani because it elevates the anus, and that's the lift part. So we squeeze the anal sphincter, and women, the vagina, and the urethral sphincter, and then we have a lift that occurs, and it lifts cranially. Then after that squeeze and lift, if

we let go, then that's voluntary relaxation, and that's just letting go of that squeeze and lift voluntarily. So now we have a video of the pelvic floor muscle contraction to take a look at. All right, so let me get you oriented here and we'll play it again. So here is the pubic symphysis in the front, let me get my arrow. I guess I can't use, oh there it is. Okay, so there's the pubic symphysis in the front, so here's all those pelvic floor muscles attaching in the front, and here's the coccyx in the back, and here is the arcus tendineus levator ani that all these muscles attach into along that lateral wall, and here's the ischial tuberosity. So here is the external anal sphincter. So now when I play this again, you're going to see the muscles squeeze and lift. So you'll see the squeeze here and the lift here. I'm gonna play it one more time, squeeze and lift, squeeze and lift, squeeze and lift.

Good, okay, so we'll go to the next slide. So that, that little graphic does a really nice job of showing both those components of the squeeze and lift, and as a pelvic therapist, I'll tell you that some people, that's a really hard thing for them to understand, it's both these concepts of the squeeze and the lift. Maybe they can't feel it or their muscles are really weak, or they think the lift is like lifting their hips up off of the bed like a bridge position.

Then, in normal pelvic floor function, we also have involuntary contraction and relaxation. Involuntary contraction should happen when there is an increase in intraabdominal pressure. So the pelvic floor muscles should contract during any kind of increase in intraabdominal pressure, so for example, a cough . So my muscles should have, even before I coughed, they should have already pre-contracted to close the urinary sphincter, and the anal sphincter is part of that. Then, our pelvic floor muscles also involuntarily relax when we urinate. When we have a bowel movement, our pelvic floor muscles involuntarily relax to allow the expelation of the fecal matter or to empty the bladder. This involuntary relaxation also occurs during childbirth. So let's take a look at the video graphic for pelvic floor muscle relaxation. So in green is when the

muscles are contracting, and that should happen involuntarily when we have an increase in intraabdominal pressure. So now we're looking at the picture from below, so we're looking at the pubic symphysis here, we're looking at the urethra here, and this is a female 'cause there's a big urogenital hiatus, I'm sorry, the urethra is here, and then we have the, the lateral walls of the pelvis here, and then these are the ilia on the sides, and here is the external anal sphincter, the perineal body in the middle. So when we play the graphic, that contraction should happen involuntarily when there is an increase in intraabdominal pressure. Oops, there we go. It closes that sphincter before that pressure happens so that we don't leak urine or we don't leak stool. Now, involuntary relaxation is the opposite.

That's the dropping and opening part. So here's the relaxation part. Notice how this opening gets bigger and the anal sphincter releases. So you're gonna watch the opening here, and you're watch the sphincter here. So this is what should happen involuntarily when we, there's the contraction, now here's the relaxation. That should happen when we are going to have a bowel movement, this involuntary relaxation opening and dropping of the sphincter. Okay, let's go back to the slides. We test involuntary relaxation with a person pushing out, so even though that's a voluntary action, it helps us get an idea of if the patient does actually allow that dropping and opening.

So when we have pelvic floor dysfunction, we can either have an underactive pelvic floor, so an underactive pelvic floor does not, is not able to contract when it needs to, we can have an overactive pelvic floor that's contracting too much, or we can have a non-functioning, or it's also called a non-contracting, non-relaxing, where we, the person really cannot voluntarily, or involuntary, make their pelvic floor work. So I have a little table here that describes these. We'll just go through it. So a normal pelvic floor is able to contract and relax on command, and in response to an increase in intraabdominal pressure as appropriate. There are normal urinary, bowel, and sexual

functions, and the patient when examined has a strong or normal voluntary and involuntary contraction, and is able to completely relax, that drop and open, they can completely relax. With an underactive pelvic floor, the pelvic floor is unable to contract when it's needed to. Patients might complain of urinary or fecal incontinence, or they may have pelvic organ prolapse. Examination findings would include absent or weak, voluntary and involuntary, pelvic floor muscle contraction, or a non-contracting pelvic floor. This is also known in physical therapy as a supportive dysfunction. An overactive pelvic floor is the opposite problem.

The pelvic floor muscles are unable to relax and may contract during functions such as defecation or micturition, and this leads to obstructed voiding or defecation, dyspareunia, which is painful intercourse, or pelvic pain. These patients have an absent or a partial voluntary relaxation, or a non-relaxing pelvic floor. This is also termed hypertonus dysfunction. With a non-contracting, excuse me, a non-functioning pelvic floor, there's no action palpable in the pelvic floor. So this, it requires a pelvic exam to determine this, to determine all of these functions, and any symptom can be present when there's a non-functioning pelvic floor.

All right, so now we have this theory, this flap-valve theory of anorectal continence that helps us to explain how these actions of the pelvic floor help to control our bowel movements. So the puborectalis muscle of the pelvic floor maintains the anorectal angle. So here's the rectum, here's the anus, and that's the angle, as I just said, formed between the axis of the rectum and the anal canal, and normally, this angle is 80 to 100 degrees. You can see I drew in that little angle there. The angle will increase when there is intraabdominal pressure, and so that pressure will be transferred to the anterior aspect of the rectum, and this will keep this whole system closed, and that will maintain continence. When we are upright, this is the configuration of the anorectal angle. So when we're upright, this valve is closed. So the anorectal angle can be changed. So if the anorectal angle is increased, then this will open the valve, and this

will allow the contents of the rectum to be pushed into the anal sphincter, and this is when we're ready for evacuation. So this angle is closed, and this angle is open. When the angle is closed, increased intraabdominal pressure will close the valve, as I mentioned, and that can lead to obstructed defecation. That can be intentional, if somebody wants to avoid having a bowel movement, or it can be pathological, where the person isn't meaning to do this, but it's happening anyway, and when that happens anyway, when the anorectal angle increases because the pelvic floor muscles are contracting, we call that a paradoxical contraction of the puborectalis, and we'll talk more about it. So let's talk about some physical therapy treatment then. So what can we do about all of this? Well, the low-hanging fruit are the first three things to do for constipation.

Number one, increase water intake. Make sure that stool is not hard. Number two, increase fiber. Again, make sure that stool can move through the system. Number three, increase physical activity. So what are recommended fluid intake recommendations? In general, six to eight eight ounce portions of total fluids a day. So that's 48 to 64 ounces of total fluids a day. So for some people, that seems like a lot, for some people it doesn't seem like a lot, but it's the minimum that we need to keep our stools moving. People with bowel control problems should try to have 50% of that total be water, not be anything else, not coffee, not alcohol, not sodas, not juice, just water, in order to hydrate the system.

Another formula for fluid intake is .5 ounces of fluid per pound of body weight, and this is used in pediatrics and geriatrics, and especially with underweight people. So you can use that formula as well, but in general, this six to eight eight ounce glasses a day works for most, almost everybody, and it's very easy to remember, so 48 to 64 ounces a day. There is not great evidence surrounding this, and there's some conflicting evidence, but from an expert opinion and practical perspective, you can stick with that 48 to 64. Physical activity, so physical activity can include general body conditioning

and anything that will get a person moving. So the second edition of "Physical Activity Guidelines "for Americans" is available from the Office of Disease Prevention and Health Promotion, and they have an excellent PDF that you can download that talks about, what's your move, so it's really like, whatever movement that you like to do, do it, and make sure you do it enough. That's 150 minutes of movement per week. So that could be walking, it could be swimming, it could be biking, and what we think, also, in terms of constipation, is that alternating rhythmical movements such as walking and biking, uses the hip flexors, and the hip flexors are surrounding the digestive system, and bring, help to bring blood flow to the whole region. So doing some general body conditioning is important, and many of our patients don't have enough physical activity, so just giving them these general guidelines and encouraging them to be more active.

There is evidence, good evidence, that exercise therapy has significant benefits as a means of improving constipation, and I believe that the strongest evidence is with aerobic, just general aerobic exercise. You can take a look at these guidelines for physical activity on the, on the health.gov website. Fiber, so dietary fiber is important, and we get fiber from a wide range of foods.

That's the good thing to do, to have the best outcomes for constipation, is eat fruits and vegetables, and beans and nuts, and there's a lot of great resources on the internet for understanding fiber, soluble fiber, insoluble fiber, and what the differences are, and how they can affect your digestion. We should encourage our patients to spread fiber all throughout the day, and eat smaller amounts throughout the day. The number one food that has fiber and helps with digestion is, you won't be surprised to hear it, prunes. Prunes are dehydrated pears, and they have a lot of fiber, and they also have a chemical called sorbitol that is thought to be what helps people with digestion. So if people like prunes, that is one of the easiest things they can eat to stimulate digestion and decrease constipation. We wanna tell people to be careful of oils,

different oils in foods, lots of oil can disrupt normal digestion. Fluid intake we talked about, and if people are really not eating much fiber and they're going to start, they should add it slowly and not overload on unprocessed or insoluble fiber. The FDA recommendations are 27 to 40 grams of fiber a day, which is quite a bit, and so fiber supplements can be very helpful as well, things like Benefiber or Metamucil, which add fiber to the system. So really, those three things we just talked about, fluid intake, physical activity, and fiber, those are easy recommendations that you could make to your patients just right off the top of your head in a general conversation, and that is patient education, and if you are helping them to look for information on the internet or you are having them track their food and fluids, then you can bill that as a kinetic activity as well.

Now, the posture that people use when they have a bowel movement makes, can make a huge difference for many people. So you may have heard of a product called the Squatty Potty, and I am, just amazed at how much putting your feet on a stool really helps people. I have people who have had, struggled with constipation, and just getting this stool for them makes all the difference in the world. So we want them to sit fully on the toilet, not hovering. So that can be a problem for some people who won't, you know, won't poop in a public restaraunt or a public place. We want them to lean forward to increase their hip flexion, and the reason we want them to increase their hip flexion is because that's going to decrease the anorectal angle.

We want them to rest their forearms on their legs and put their heels off of the floor or on the stepstool, and that increases the hip flexion. So for some people, even really getting into a full squat can make a big difference. This is one of the interesting things about different cultures who don't use toilets for defecation. So cultures who have a hole in the ground have very little incidence of constipation, because their population squats, and that squatting increases the anorectal angle, so it opens up that angle, opens up that tube, stops the valve from blocking, and it helps the fecal matter,

material empty easily. The puborectalis voluntarily relax, and this is for squatting and hip flexion greater 90 degrees. So you could just say, "Hey, can your patient even do this squatting? "Do they have the ability to get their hips "and knees in this much of a position?" That may be something to work on from a physical therapy perspective, and educating patients about using a stepstool and practicing getting in this position can be billed as a therapeutic activity, as well as working on the squat in order to have better mechanics for defecation. For people who can't have increased hip flexion, then they can put one foot on the stool, and, for example, somebody who had a total hip replacement, and, or if they have limited hip flexion 'cause they're obese or they have rigidity, they could just put one foot up on the stool.

We need to also maybe be careful with our patients with low pain or disc herniations and try to keep that lumbar spine in a more extended position versus leading to excessive trunk flexion, which then might aggravate that low back pain or that disc herniation. One of our participants has commented that this is very, especially important with bedside commodes, because it's very difficult to poop on a bedside commode 'cause they're so high, and nurses don't know that that decrease in hip flexion actually stops, closes the flap valve, and increases the anorectal angle, and may make it much more difficult to have a bowel movement on a bedside commode.

There's a great handout for opening your bowels, and this is the handout that I use in my clinic for my patients, and it's very, it's free to download off the internet, and it's got, I didn't, I was unable to obtain permission to show it to you, but it has, it's a PDF and it has four quadrants, and it shows, step by step, what somebody need to do to have a bowel movement. So you can look that up yourself. It helps to work on blowing as well, so keeping the lips, jaw, and mouth open to facilitate the relaxation of the pelvic floor, and to increase intraabdominal pressure with an open glottis, or a grunt, or a blow into the balloon, so . When blowing, wanting to keep that belly big. So oftentimes what happens is people, when they're straining, they start pulling their

abdomen in, and they tighten and they close in their transversus, and they sink in their abdominal muscles, and then what happens is the pelvic floor muscles automatically start contracting, because that's what the core is supposed to do as a team. When the transverse abdominis shortens and the belly sinks in, the pelvic floor is supposed to contract, the lumbar multifidi are supposed to contract. So we have to change that pattern for defecation when people are having trouble. Now, lots of people can push and tighten their abdominals and they don't have any problem pooping. So if they're not having any problem, it's not big deal, but if they are having a problem, we can teach them to first make their belly big. So, if you want to, right now as you're sitting here, push your belly big like you're sticking out your stomach. That's belly big. Now, keep it there and keep your belly hard.

Next, you wanna blow out, and third, you wanna push gently from your bottom to drop and open the pelvic floor. What this one, two, three step-wise procedure does is it helps the person to separate out what their abdomen is doing from what their pelvic floor is doing, because if they just go to push hard and they tighten that core, the pelvic floor is gonna contract. What's gonna happen if the pelvic floor contracts? The external anal sphincter's gonna contract, then the external anal sphincter is going to stop the peristalsis from happening.

Many people are not aware of their pelvic floor muscles, so you can teach your patient the elevator exercise. The elevator exercise uses the analogy of the squeeze, as the door is closing, and the lift as the elevator going up. So squeeze like you're closing the anus, and then lift pulling the elevator up, pulling the muscles up and in towards the head. Many people, this is simple for them to do. They can feel that squeeze and lift, but now they have to also be able to do the drop and open. So with the drop and open, they release the muscles away from the head, the elevator goes down, and now the door is open and the anus relaxes. So this is actually the first exercise that I do with many, many, many of my patients, because coordination of pelvic floor contraction and

relaxation has to occur before you can do anything else. So increasing the awareness of these muscles could be very beneficial for your patients with constipation. So let's look at the video again here. So we're looking at the sagittal view, and, here we go. Okay, I don't see it. Well, maybe we didn't get it into the second one. Okay, so, oh, it's playing? Oh, that's funny, I can't see it on my screen. Interesting, all right. So hopefully, if you could see it, for some reason I can't see it on my screen, but hopefully you could see that the anal sphincter is squeezing, so that's the doors closing, and then the elevator is lifting and moving up, and then, oop, here it is. Suddenly it just appeared, okay. So hopefully you can see that, that squeeze and lift, all right. Doors close, elevator up, elevator down, doors open.

Okay, good, all right, so let's go to the next slide. We're just waitin' for that to queue up, there it is, okay. So excessive straining leads to the paradoxical puborectalis contraction that I have mentioned. In a paradoxical puborectalis contraction, the pelvic floor muscles contract instead of staying relaxed, and so the elevator doors stay closed, and this stops the peristalsis of the rectum. So it's very frustrating because a person has the urge to urinate, they go sit on the toilet, and they start to try to push and they wanna get that bowel movement out so badly, and the stronger they push, the more they're stopping the bowel movement.

So not only is it paradoxical of the muscles, it's a paradox of the effort of defecation as well that shuts everything down. So the elevator exercise is a great exercise, and I recommend that we tell them to contract two to three seconds, doors close, elevator up, but I say, "Don't go to the penthouse, "because we don't want you to go as strong as you can." We're working on coordination here. We're not working on power, we're not working on endurance, we're working on coordination. So close the doors, elevator up, squeeze and lift about 50%, and then elevator down, doors open. Many of my patients will say, "I cannot feel that." So I say, "Well, just let go and then let it relax." This is where they need to wait. They need to wait six to 10 seconds and really just let

the pelvic floor relax. By six to 10 seconds, it's gonna fully relax typically. So this makes for a kind of slow and boring exercise, but as anything else with motor control, a person has to attend to what they're doing. This is not something that we want them to do while they're driving or watching TV. We want them to be thinking about their muscles and how it feels. Can they feel the squeeze, can they feel the lift, can they feel the drop, can they feel the open? Are they sure they're fully relaxed before they start the next repetition? And, because it's a motor control exercise, you have to have motor control dosing, which means you need about 60 repetitions per day, and I would typically divide that up in two sets of 10 three times a day. They can do it in any position, but they have to be paying attention. I would not like them to do this in the defecation posture. When they're in defecation posture, we want the pelvic floor to be relaxed. We don't wanna be practicing contracting the muscles in the defecation posture.

They could certainly sit upright, but don't lean forward with feet on a stool while they're practicing the pelvic floor coordination exercise. So let's see the video again for the elevator exercise. I don't know if it's playing again. Op, here we go, all right. So there's the drop and open. So let's pretend like the green is actually their start position, no, and so, when we see the green is when the elevator is going up, okay, doors are closing, elevator up, elevator down, doors open. Doors close, elevator up, elevator down, doors open. Okay, back to the slides. All right, so the elevator exercise is great, and people will say, "Oh, is that Kegel exercise?" You can say, "Well, kind of." Kegel was a brilliant doctor who recognized the importance of the pelvic floor muscles in bowel and bladder and sexual function, but the elevator exercise is not a Kegel exercise 'cause Kegel exercise is when you squeeze as hard as you can, and you do it quickly. So this is a coordination exercise for the pelvic floor. Now, if a person has poor awareness, you can have them sit on an exercise ball or a small child's ball, and feel the perineum, which is the vagina and the perineal body, move away from the ball as you contract the muscles, and feel the perineum drop into the ball as you relax. So I

have a lot of positive feedback on using a ball. You could also roll up a towel roll and put it, longways, in between the legs, and have the person sit on the towel roll and feel their muscles move up and away as the elevator goes up, and feel them drop down as the elevator moves down. So we talked about diet. Increasing fiber intake does improve constipation and associated symptoms, so that's easy, add some, apple a day, add some prunes. Just increase that fiber by a little bit, and add some, extra glass of water a day, extra couple, people usually say five to six prunes, and that could make all the difference for them, and then exercise. Now, even if you have patients who can't do aerobic exercise, there are exercises that we prescribe specifically to improve blood flow to the torso and the mobility of the organs so that the organs slide and glide across each other.

These are exercises, so I'm calling them trunk vascularization exercises. You might call them lumbar and thoracic spine range of motion exercises. They're all the same, it depends on your purpose. So lower trunk rotation, just going right to left. I like to think of this as wringing out the washcloth of the colon and the intestines. If you imagine me just wringing out, back and forth, one side to the other, we're moving those organs, we're rotating them and twisting the body 10 to 20 times. This is a great exercise for people with low back pain to start their day off with, it's a great exercise for people with constipation to start their day off with. Alternating knee to chest, now we're using the hip flexors.

If the patient is able to, I like for them to lift their head up as they bring that knee up. Also if they're able to, they can stretch the other leg out, doesn't really matter. What we're trying to do is flex and extend the hip flexors, bring blood flow to those, that iliopsoas muscles that's so massive throughout the lower half of our body, and, by the way, this helps with low back pain as well. Side lying thoracic rotation, now we're looking at getting more of the transverse colon and the upper digestive system, laying on the side and turning the upper body one way and then the other. This is a great

exercise for people with upper back pain. Favorite, one of my favorites. Then prone on elbows, also known as the sphinx. I like to tell my patients that this exercise is to your back what flossing is to your teeth. Everybody should be able to do prone on elbows 10 times with no pain and no limitation for their back, but it also stretches the digestive system in the front. So those are therapeutic exercises you can prescribe for your patient with constipation. Then abdominal massage, the purpose of abdominal massage is to stimulate colonic motility, and that is the peristalsis that we've been talking about. This is a cool picture from wesnorman.com and it shows the digestive system drawn onto the actual human body so you can see the ascending colon here, the transverse colon there, underneath the ribcage, descending colon, sigmoid, and rectum.

So with abdominal massage, what we're trying to do is just to massage along that system. So here is the instructions, and I'm going to show you a video of the massage. So I'm not gonna read through this just at the moment, but I do wanna mention I, L, and U. So if we look at our, the colon on the body, we think of the letter I as the descending colon. So we start by opening up the descending colon. Then we do the letter L, transverse and descending colon, transverse and descending colon. Then we do the letter U, ascending, transverse, and descending, ascending, transverse, and descending. So that ILU massage theoretically opens up the whole system. Then we do little massages, little circles around the colon, about five each, clockwise and counterclockwise, and then we end the whole massage with the U again. So there's the instructions, and then let's take a look, I have two videos. One is a video of me providing education to my patient, and then one is the massage technique, so let's go ahead to the first video. All right, so when we think about digestion, the first thing we wanna think about is how does it happen in the body? So we eat food, and saliva in the food is the first thing that starts our digestive process. So it's really important when you eat to make sure you chew your food really well and slowly, and take your time swallowing it. A lot of people don't think about that, but that's the first step in

digestion. Then, when you swallow the food, it goes down the esophagus and it goes to your stomach, and in your stomach is where most of the juices of digestion are added into the food, and the stomach also stimulates a reflex that's called the gastrocolic reflex. So gastro, it stands for stomach, and colon stands for colon. So when you eat something and it gets to the stomach, it stimulates a whole reflex to move stuff through the system, right. To get food coming in, you want food to come out. So timing your bowel movements within about 20 or 30 minutes after you eat could be really helpful. Even if you're not getting an urge, it might be, especially in the morning when you're feeling good, a good time to plan to go sit on the toilet and see if you can have some success. After it goes to the stomach, it goes to the small intestine. Now, the small intestine is not organized. It's just a bunch of tubes connected. It's one big tube that's connected from the stomach to the colon, so it goes.

- [Patient] Does mine even go through that one with the gastric bypass?

- [Cindy] Well, it depends on where your bypass so. So if your bypass anastomosis is from your stomach to almost to the colon, right.

- I think so.

- Yeah, mm-hm, so then it goes from that anastomosis, or from the small intestine to your colon at the ileocecal valve, which is down here in the bottom of the right. Just stopping the video for a moment because I was incorrect, I just wanted to correct that. The anastomosis in a gastric bypass goes from the stomach to the small intestine, so just keep that in mind, but the food does still hit the stomach, and there is some food in a stomach. So even in someone with a gastric bypass, they have a gastrocolic reflex. Part of the abdomen, okay, then the colon goes, ascending colon on the right, transverse colon across, and descending colon on the left, and it always is like that. So small intestine, we can't predict, but the colon is ascending, transverse, and

descending, and then from the descending colon, it goes into the rectum, and the anus, and then we poop it out. So this massage is designed to open up the colon and help stimulate movement through the colon and also to settle down things that are irritated in there, okay. So what we do is we start with opening up the descending colon, and you just do a light stroke from the bottom of the ribcage down to the pelvis here. Now, the pressure can be light and comfortable, because what we're doing is we're stimulating a smooth movement, or smooth muscle. We're not trying to stimulate skeletal muscle. The skeletal muscle, if you're massaging, you know, you might wanna kind of really get in there, but with smooth muscle, it's just a light stroke. You can push it a little harder if you want to, if it feels better, but otherwise, just a nice, light stroke. How many do you do? We say about 10, you know, 10 to 15 strokes. We don't know exactly the magic number, but probably more than eight. So you do eight to 15 strokes down, and then that's like the letter I, okay. Then we're gonna do transverse colon, and. Okay, so my video stopped randomly, and then let's go ahead and go to the next video. So now I have her doing it for herself. So first we're doing the I, which is the descending colon. I'm doing nice slow strokes, go down from the ribcage to the pelvis. Good, now we're gonna do L, underneath the ribcage, and that's the transverse colon and the descending colon.

- [Patient] Start on the U?

- [Cindy] Then you can do the U, yes. Ascending colon, transverse colon, and descending colon, good. Ascending, transverse, and descending, and that's like the letter U. Ascending, transverse, and descending. Good, the main purpose of this massage is to stimulate the motility of the colon, to move, help to move things through. So the colon has smooth muscle, and as we're stimulating it by touching it, we're hoping that it contracts and does its job moving the fecal matter through the colon for digestion and eventually elimination. So ascending, transverse, and descending. Now we're gonna do little circles starting at the lower right hand quadrant, and a little

slower, a little slower, start with, yep, one direction, three, four, five, and then go in the other direction, two, three, four, five, good. Then you're gonna come up, make sure you go underneath the ribcage, don't be on the bone. Maybe like right here, yeah, one, two, three, four, five, one, two, three, four, five, good. Then how about maybe one right above the belly button, right here on the transverse colon, one, two, three, four, five, good. Good, and then under that left ribcage. Good, yup. Good, and then the last thing you're gonna do is another set of the Us, mm-hm. So ascending, transverse, and descending, good. Okay, so, and then, so we can go ahead and go back to the slides, and so then to finish up, she would do another 10 of the U massage.

I will tell you, whenever I teach this in a class, I always get somebody to practice on me, because it's so soothing and relaxing, and it feels good when you do it to yourself, but when somebody else does it to you, it feels really, really relaxing, and so you can do that massage to your patients and you can bill manual therapy for that. Okay, so we've talked about the basic dietary advice, the water, 48 to 64 ounces a day, increasing fiber, and then also, here's some low hanging fruit, no pun intended. Avoid foods that thicken stools. So any of you who are parents to small children will know the BRAT diet, and that stands for bananas, rice, apples, and toast, and that's when people have loose stools, these are foods that thicken them. So if your patient is eating a banana or two a day and complaining of constipation, cut out the bananas. Creamy peanut butter and cheese also thicken stool, and then some foods loosen stools, prunes as I mentioned, yogurt, fish oil, and kombucha, which is a new rage of a beverage that is fermented black tea, and that can help. Some people just start drinking kombucha and they start poopin' and they're feelin' happy, easy, easy. Another thing you can encourage your patients to do is to develop a routine. Control your fecal consistency with a diet, avoid the BRAT diet, add fiber slowly, and then encourage this regular evacuation by eating meals at a similar time each day, making sure that you're hydrating throughout the day to keep that colon and that small intestine hydrated, and sit on the toilet for 10 to 20 minutes, not 20, probably 10

minutes, about 20 to 30 minutes after breakfast, using the potty posture and relaxing, and not straining. Even if there's no urge to defecate, just go sit on the toilet, 20, 30 minutes after breakfast, and see what happens, and develop a routine. Our bladders and our bowels work best when we have a routine. So here's the sad face. Not working? Your patient's still constipated? Well, find a pelvic therapist. You can find a pelvic therapist in lots of different places, I guess that's the next slide. What we do is we do a pelvic floor exam.

That means a vaginal and a rectal examination of the pelvic floor muscles to determine how they're functioning, and based on our function, which we, I shared with you how pelvic floor muscles function and dysfunction, then we can determine what treatment. We have lots of different treatments that are very effective. We can retrain the pelvic floor, education and awareness, have the patient do a bowel and bladder log and analyze it, giving advice regarding medication management, we can do surface EMG, we can do ultrasound imaging biofeedback, we can do internal rectal balloon sensitivity training, we can do neuromuscular reeducation with electric stimulation, myofascial release, visceral mobilization, coccyx mobilization.

Lots of options we pelvic physical therapists have that therapists who don't examine the pelvic floor don't really have these options, biofeedback training, this is a picture of a biofeedback computer screen, and on the top, you see the pelvic floor muscles contracting and relaxing. Oh, let me get my pointer. So here's pelvic floor muscles contracting and relaxing, contracting and relaxing. So this is pelvic floor muscles training, and then with, for biofeedback for constipation one of the things we do is ask the patient to bulge or elevator down, doors open, or push out, and during that activity, the EMG readings of the patient's pelvic floor should show no activity or decreased activity. You can find a therapist at the American Physical Therapy Association, Section on Women's Health, it's now called the Pelvic, the Academy of Pelvic Health, and they have a PT locator, and then there's another website that is called the Pelvic Guru, and

that combines the Herman-Wallace pelvic floor training, and you can find therapists by zip code on either one of these websites, and that is the end of the presentation. I see several questions, so I'm going to start with the questions that I see here. So the first question, I was talking about the pelvic floor relaxation, and Shelly asked, "Is this similar to vaginal delivery?" So yes, we can train women when they are preparing for vaginal delivery to correctly drop and open their pelvic floor muscles so that when they're pushing, their pelvic floor muscles are relaxed. So that's exactly what happens in that situation. Richard asked, "Does the direction "of the small circular movements matter?" You know, that's a great question, and what I tell my patients is that there have been studies on abdominal massage that have shown that people get positive results with a massage.

The exact specific technique of massage has not been studied. So the answer is probably not, the direction of the small circular motion, movements, probably doesn't. We don't even know if the ILU direction is the best, but expert opinion and expert consensus and experience tells us that that massage is very effective. Many therapists just do the U massage.

They start at the right, come up and across, and go down on the left. If I have a patient who I know is not going to enjoy or tolerate me taking me through that education session and they don't wanna spend a lot of time, I just tell them to rub their tummy. Just rub your tummy and be nice to it and love it, and hopefully that will stimulate the peristalsis. Rudell asks, "I had a computer malfunction, "question, exam," let me scroll down here, "question, exam, optimal defecation posture." Okay, so that's potty posture, and so that is where you're sitting with full, you're sitting fully, potty posture is when you're sitting fully on the toilet and you have, you're leaning forward so you increase your hip and your knee flexion. Your elbows are on your knees, and you're relaxing your pelvic floor. Now, sometimes you can improve your hip and knee flexion by putting a stepstool underneath your feet, so, and that, there is a picture in the

handout that shows exactly what you're asking about. I think that's all the questions. Are there any more questions that people have? I did give you a list of references, and we'll give you another minute. If nobody has any more questions, then we'll wrap things up in just another minute.

- [Calista] All right, well I don't see any other questions in the Classroom, so we're gonna go ahead and close out this evening's course, and I do wanna remind everybody we'll be out of the.

- Can I just say thank you?

- [Calista] Yeah.

- [Cindy] Sorry, I just wanna say thank you for everybody for your attention, and I wish you good luck in working with your patients. I tell you what, if you can help your patients poop better, they're gonna love you and they're gonna feel better, too. So good luck and thank you for your attention, thanks Calista.

- [Calista] All right, and before we close out today's course I do wanna remind everybody, if you did like this later time, we do have one coming up in July, and Dr. Cindy Neville is coming back to present another course related to pelvic health. So have a great evening everyone, and thank you all for attending.