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## Understanding the Geriatric Population: Risks Associated with Prolonged Sitting and Goals of a Therapist, in Partnership with The Permobil Academy

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- [Fawn] Today's topic is Understanding the Geriatric Population: Risks Associated with Prolonged Sitting and Goals of a Therapist, in Partnership with The Permobil Academy. Our presenter today is Ana Endsjo. She is an occupational therapist that has worked as an occupational therapist since 2001 in a variety of treatment settings including acute care, sub-acute care, outpatient, acute rehab, long term care, and as a lymphoedema certified therapist. She has worked mostly with the geriatric population focused on seating and positioning and contracture management of the nursing home resident. In January of 2016 she started a new role with Comfort Company as the clinical education manager for the long term care division, and then joined the Permobil family in October 2017 as clinical marketing manager. In this role she developed an education program for long term care sittings with the hope to guide other therapists, rehab directors, nurses, and administrators to understand the critical role proper wheelchair positioning plays in the prevention and treatment of serious health complications within long term care centers. Welcome back Ana, we are so happy to have you.

- [Ana] Hello everyone, I'm just gonna put my screen up really quickly. Okay, thank you so much Fawn for introducing me and thank you everyone for attending today. As she mentioned, my name is Ana Endsjo and I am the national education manager for Permobil, so full disclosure. Excuse me, I'm struggling with a cold today, so. Today's objectives are that I would like for you to number one, be able to name three health risks associated with prolonged sitting in an abnormal posture. Number two, there's two key questions to ask yourself during a wheelchair seating evaluation that will lead you to achieve an optimal seating system to reduce risks with prolonged sitting in the abnormal postures, and lastly, name two wheelchair positioning goals related to preventing medical complications associated again with prolonged sitting in an abnormal posture.

So I think the first question that we can ask ourselves is why do we slide into abnormal postures? And abnormal postures in and of themselves are not bad things, we as young adults without serious physical compromise, we slide in and out of these postures constantly with ease to alleviate things like pain, pressure from fatigue, and simply because we're bored out of our minds. So the problem arises when our elderly client or clients with progressive diseases slide into these postures and then get stuck in them for long periods of time or in some cases, it's impossible to shift out of those postures without assistance. And this happens usually because of some type of structural change, and some of the structural changes that we might see within our clientele are tighter muscles, and then things like decreased flexibility leading to flexion or extension contractures especially at the hips, the knees, and the ankle joints. And together those tightened contracted muscles pull at bony prominences at the origin and their attachment, forcing them into one of the five abnormal postures.

The example I often use is that case of the shortened hamstring muscle which is probably the most shortened muscle in the seated posture and that does is it pulls on the ITs of the pelvis, forcing that client to shift into a posterior pelvic tilt. And then due to strength and endurance issues seen with many of our clients, they are then unable to bring that pelvis back to a neutral midline. Like you and I can when pain or pressure builds up under those bony prominences. As well, the spine becomes more curved versus linear, and a more curved spine just can't fit into a wheelchair that's set with a tight fixed 90 degree angle. Next you're gonna see things like just pain. As we get older, we just experience more pain in all of our joints. Our bodies have been put through the tests throughout our lifetime. We've been in car accidents, we've played sports, we've been in a war, we've had definite life experiences that place strain and stress on our joints and we just simply hurt. And so pain leads us to slide into an abnormal posture whether we're conscious of it or not, to try to alleviate pain off of that site. And then you couple all those things with he decreased strength and endurance and mobility factor, and you now have a client that cannot pull themself out of the

posture back to their optimal. And all of these changes make our elderly client more prone to prolonged sitting in an abnormal posture that is going to lead to some very serious health complications that we'll talk about today.

So let's quickly review what the abnormal postures that we typically see with prolonged sitting are. And it's important that we can recognize these postures and how they place our clients at risk for health complications and we need to fully understand these postures and how they impact our body systems, like our circulatory system, like our respiratory system, our digestive system, and our skeletal system just to name a couple. So the first abnormal posture is that posterior pelvic tilt. And I'm talking about this one first because it is probably the most commonly seen abnormal posture in many settings, but especially in our nursing home setting. With the overuse of manual wheelchairs like the K1 through K3 wheelchair model that have very fixed tight 90 degrees at the seat's back angle.

So what's happening with the client sitting in a posterior pelvic tilt? If you were to actually palpate the pelvis, you would see that their Anterior Superior Iliac Spine or ASIS for short, is higher than their Posterior Superior Iliac Spine, PSIS. And since the ASIS is higher than the PSIS, the posterior pelvic tilt results, and all of the pressure is going straight onto the sacrum and the coccyx and usually through the ITs. And another term used to describe this posture is sacral sitting. So at the spine you're gonna see that very excessive kyphosis here at the thoracic region. And this produces that forward, that C shape. And that C shape curvature is really to me the biggest identifier that helps me to recognize that a client is sitting with a posterior pelvic tilt. And what's interesting about these abnormal postures is that the head may or may not be affected. But usually with a posterior pelvic tilt and an excessive kyphosis like you see on the screen, the client's head and neck will usually go into an excessive forward flexion. And sometimes you can see it being exaggerated so much that their chin will actually touch the chest, and I've actually treated a couple of residents that I found that

had a wound there because they were making contact. And eye gaze is definitely affected going from outward at midline where they can see and interact really well with the environment, to downward towards their lap or towards the ground. That really then shuts off their communication, respiration, and definitely affects a safe swallow. The next abnormal posture is anterior pelvic tilt. And anterior pelvic tilt occurs a lot in clients with things like spina bifida, muscular dystrophy, where clients really have to try to do something that we call stack the spine. And they do this to search out stability that their body lacks to be able to function better. And in the nursing home setting, you will commonly see this with very obese patients, and they have, if you see down here in my little elderly patient at the bottom right hand corner of the screen, they have what we call a gluteal shelf, and that's this excess tissue in their pelvic area that really pushes their pelvis forward into an anterior pelvic tilt when it makes contact with the back support. So when you palpate the pelvis, you'll find that this time the PSIS is higher than the ASIS producing that anterior pelvic tilt. And since that pelvis is being pushed forward, we'll see an excessive lumbar lordosis, which in laymen's terms is usually known as a swayback.

And in this picture of the girl up here on the top right hand corner of the screen with the green shirt, she's really demonstrating excessive lumbar lordosis quite well as she's placing her hand right in that lumbar spine perfectly for us to see her swayback. And the head and the neck oftentimes hyper extend, causing eye gaze to go from midline to upward towards the ceiling, as seen the picture right there with the lady with the pink shirt. The next abnormal posture is the pelvic rotation. And you palpate for a rotate by comparing not the PSIS in relation to the ASIS, but rather comparing both your ASISs. Usually what you do is you come in front of the client, and you're gonna palpate both ASISs which are those hip bones where you kind of put your hands on your hip and you're gonna see if one is more forward than the other side. And a tip that I have that kind of clues me in that I'm dealing with a rotation is that the leg on the side that is more forwardly rotated seems as it's longer, so it's extending out past the edge of the

seat further than the other leg. And the spine will just follow, so whatever side is more forwardly rotated, the trunk will rotate in that direction as well. And you can see that really well in this picture of the gentleman down here. This gentleman presents with a rotation where the right hip is coming more forward to us, and his right leg really appears longer than his left. And you can notice that there's a gap between his pelvis and the lumbar spine and the back support.

Now if you focus on his chest area, you'll see that the right shoulder is really jutting out closer to us, whereas the left shoulder is really pushing into the back rest. And I chose this picture for a reason, not only because you can see the rotation quite well, but also because as I said earlier, within an abnormal posture, sometimes the head and the neck may or may not be affected. And this is just a good case where he has good head control and it's not being affected. However, if the head were being affected by this rotation, we would see a lateral rotation where the ear is coming down towards the shoulder almost as if to hear what the shoulder has to say. And also you might see a rotation of the head and some forward flexion as well. And the next abnormality is the pelvic obliquity. And this is also a very commonly seen abnormality. And I often described it just as a hip hike where the client is pushed over towards the left or to the right. And when we lean to one side, we have created now an imbalance where the lower side is really digging into the seat surface and the higher side is barely or not making contact at all with the seat surface.

So you can palpate for an obliquity by comparing either both ASISs or comparing both PSISs. And if you were to palpate the pelvis at the PSISs, where I find it a little bit easier, then you're going to see that one PSIS is going to be higher than the other, causing the raising up of the hip with the lower IT really digging into the seat surface. So when you have the obliquity, the trunk on the opposite side is being pushed over. So you raise up one side of the hip, the trunk falls towards the other side. But due to our righting reactions, our spine always wants to try to correct itself and come back to

midline, so as that trunk is being pushed over, the brain always says wait, nope, come back to midline, and you start to see kind of the head and the upper thoracic and cervical and the head try to come back to midline. And you see that very production of that S shaped scoliotic curvature of the spine. The head presents usually with a lateral flexion as well, again, that's where the ear is going down towards the shoulder almost as if it's listening to what your shoulder has to say, and it may be accompanied again by a neck rotation and or forward flexion. And here in this picture down to the bottom right hand corner, you can see this resident sitting in obliquity where the right side is lower, really jutting into the seat surface, causing him to lean towards the lower side, and his neck has fallen into a lateral flexion towards the lower side as well. And the last abnormality is the windswept deformity. And this is not so much what is going on at the pelvis, but it's really discussing what is going on at the lower extremities as a result of the poorly aligned pelvis. And the underlining cause of a windswept deformity is either a rotation or an obliquity or a combination of the two. And as a result the client is sitting with the pelvis in that posture for long periods of time.

The lower extremities are definitely affected. So one of the legs at the hips is going to internally rotate and adduct towards midline, and the other hip is going to externally rotate and abduct away from midline. So it's almost as if a big gush of wind has come in and taken those legs over to one side of the wheelchair, hence the term windswept deformity. And the spine is really gonna follow whatever the pelvis is doing, so if the underlining cause is a rotation, the spine will be rotated in that same direction as the pelvis. If it's an obliquity, then you're gonna see more of a scoliosis at the spine. And the head will present with a lateral flexion, again, maybe accompanies by some rotation and forward flexion as well. So prolong sitting in one of these abnormal postures really place our clients at a risk for a multitude of health complications. And the issue is when a medically compromised client falls into one of the postures without the ability to pull themselves out independently. And most of our clients already have a compromised body system, and a poor seated posture just amplifies the risk of relapse

or increased hospitalizations. So our goal with seating and positioning is to stop health complications of the body systems such as the respiratory system, the digestive system, excretory, skeletal, endocrine immune systems, and as well as some psychosocial issues.

So what I'm gonna do now is we're gonna take a deeper look into how poor seated posture really increases health complications within those body systems. And in this picture, my client is presenting with that C curvature of the spine and a very significant forward neck flexion. Both legs are hanging off of the front of the chair, and if we remember, that C shape kyphotic posture and forward head flexion are a dead giveaway. That we're dealing with a posterior pelvic tilt. And this particular resident, this is a case where she was positioned in a chair at 90 degrees and she was forced to try and sit up against gravity and she just couldn't tolerate that for long periods of time, so he fatigued very quickly. And so she was unable to maintain that posture, and she slid down into a posterior pelvic tilt.

So now we have a scenario of someone that has slid down into a posterior pelvic tilt, she can't get out of it independently, and when we allow our clients to fatigue and slide into one of these postures, such as the posterior pelvic tilt that we're seeing, there is going to be a constriction at the chest and the abdomen. And as that client collapsed forward, everything housed within the chest and abdomen was constricted. In her case, her diaphragm just could not contract properly and when the diaphragm can't contract properly, less air is filling up the lungs. So the client then was unable to keep her chest up, she was unable to take a deep adequate breath causing less oxygen to be delivered throughout her body. Her body was then forced to compensate with shorter, faster, more shallow breaths that really exhausted her. Her breathing with that shorter more shallow breath fatigued her quickly and then she was just more prone to slide even deeper into that posterior pelvic tilt and the whole cycle began again. And we know that when the lungs are not fully inflated, the fluid that's naturally in our lungs

is just not able to be circulated correctly, and you see pooling in the lungs, which really just set up the client for an increased risk of pneumonia. So again, it's a cyclic reaction. The longer one sits in that posture, the more they fatigue, the worse the posture becomes, and the higher risk of pneumonia they have. But we can change the cycle, and the proper upright midline posture through wheelchair, the appropriate wheelchair configuration will do the trick, and how much will your nursing staff love you if we can come in and fix their posture and decrease their risk of pneumonia?

All right, the next medical complication that I'm gonna talk about arising from poor posture has to do with the digestive system. And again here we have a client that's sitting in an abnormal posture causing her to slump forward constricting her chest and her abdomen. And as a result of that abdominal constriction, food just cannot travel through her GI tract adequately. And the food then slows down its movement and can become immobile causing a multitude of digestive issues such as gastritis, reflux, constipation, and or impacted bowels. And bowel issues can cause not only the physical pain, but psychological side effects as well. And this resident, again, another one of my case studies, was so fixated on the fact that she could not go to the bathroom that she stopped wanting to leave her room, instead, she asked to be parked right next to her bathroom. And if you can actually see this brown sliver on the screen, this is her bathroom door, and she stopped going to bingo, she stopped participating in church, and no longer would eat with the dining hall with her friends. She didn't want to go any further than that door. So that whenever she had the slightest urge to go to the bathroom, she was close enough to increase her chance of success. And as soon as she felt the sensation that she had to have a bowel movement, she would ring her bell, immediately wanted to be put on the toilet, and would not get off until something happened. And that didn't matter if it was 10 minutes later or two hours later. She absolutely refused to allow CNAs or family to remove her from her commode until something happened. And as a result, this poor woman actually started having severe issues with hemorrhoids, bleeding, abdominal pain, and she suffered a rectal prolapse.

So one thing that seems so trivial as constipation actually lead to a slew of other health issues and definitely affected this woman's quality of life, as she wouldn't even leave her room. And as I mentioned before, the head and the neck can be affected as well by poor posture. And as they sit in complete forward flexion or lateral flexion or hyperextension of rotation, muscles shorten on one side and they're overstretched on the other side, making it really difficult to bring the head and neck back up against gravity, and a lot of times contractures can result. So an increase of choking an aspiration arises, and now we need to ask for a speech referral to co-treat, work together to find at what point does the client have a safe swallow? And then it's our job to look for the proper equipment to position that client to promote that posture that you both deem necessary for the longest period of time for that safe swallow.

So we need to choose the appropriate wheelchair configuration coupled with the back support where maybe a lateral support or a head support can be added to keep the trunk and head in optimal neutral midline as long as possible to make sure that we can perform the safe swallow over and over with the proper seated posture. So decreased communication is an area that we don't consider enough when we think about abnormal postures, and I can honestly say that I'm guilty as charged. Our brains have a tendency to jump right away to the risk of a fall or the risk of a wound when a client is positioned incorrectly. But what is more important to us as humans than the ability to communicate? Really nothing. We are social by nature and we want to interact with our environment. So again, when we allow our clients to sit in an abnormal posture for long periods of time, it's going to affect the neck muscles causing them to tighten and shorten, and increase the risk of neck contractures. The client then has the inability to bring their head back to midline or to maintain it in midline for long periods of time to communicate.

So this client for example was stuck in this significant lateral flexion and rotation, and even slight forward flexion and she required so much energy to bring her head back to

midline to be able to see her environment, that she fatigued very quickly and got to a point where she couldn't even fight against gravity any longer and then wasn't able to bring her head up against midline at all. Her voice quality and voice projection were affected, and you would literally have to put your ear to her mouth to understand the faintest sound that she was making. And her number one goal was I don't want people putting their ear on my mouth any longer just to be heard, and I don't want to be so incredibly tired from trying to make my voice heard. And she even reported it to me, I am ready to go to bed for the rest of the day after saying just three words to make one of my needs met. So she wanted a seating system that allowed her to interact with her environment, talk, be heard, without being exhausted, and definitely didn't want anyone in her personal space placing their ear on her mouth because that was disgusting to her, that would be disgusting to me.

So when we allow this client to sit in this posture with her eye gaze falling to midline to down staring to straight at her lap, we have to start considering how that deviated eye gaze affected the non-verbal part of her communication. And with speaking with someone, we really do understand conversation not only through the spoken words, but also through making eye contact, reading body language, and just looking at someone's gestures. I move my hands and I express myself through my face all the time, and so when we lose that midline gaze the ability to see the environment around us, that piece of nonverbal communication is completely lost. And as our clients sit in these postures for long periods of time and they fatigue and it interferes with their ability to make their sounds and to be heard. And a loss of voice quality and projection negatively affect that client's ability to communicate with the people around them and their quality of life then is significantly diminished. All right, bladder issues. The constriction of that abdomen and chest cavities again are gonna affect any system that's housed within, which definitely include our urinary system. And in this example, she is sitting with a significant posterior public tilt, you can see the C curvature of her spine, forward neck flexion rotated to the right as well, and her hips and her knees are

contracted in flexion, right? And this client battles chronic severe issues with her urinary system. And so due to this posture constricting her bladder, she struggles to empty her bladder adequately which results in urine constantly being left in the bladder, and since it's never fully empty, she feels the need to urinate all the time, causing her to suffer from urge incontinence. And she repeats over and over to the nursing staff, I need to go to the bathroom, I need to go to the bathroom, I need to go to the bathroom, and it can literally be right after they just took her or they have just changed a soiled garment. And she also suffers with multiple urinary tract infections month after month causing her to be on various antibiotics, which we know could potentially then lead to resistance after repeated use, right? And as a result she also has had multiple hospitalizations due to severe kidney and bladder infections.

All right, so this is a topic where I think we're all just a tad more familiar with, because it's that dreaded wound, and we always think about the wound risk because it is so prominent in our society. And we know what a wound is, but we as therapists need to start fully understanding exactly how a wound occurs to really protect our clients better. So I've made a little recipe card for you. So you can remember all the ingredients shall I say, and if you add the ingredient of time. Remember that sitting in an abnormal posture for maybe a few minutes and then shifting out of it isn't so detrimental. But allowing someone to sit in that abnormal posture for long periods of time can be quite dangerous. So it allows for pressure to build up right under the bony prominence where the skin and tissue it at risk for break down. And then add in a little bit of the fact that the skin changes due to natural aging or sometimes with a disease process like diabetes, and as we age or the health issue that they're dealing with causes our skin to thin, it cases it to become dryer and more brittle, then it makes it easier to break open. Then add in some of the fact that they have decreased sensation, you know it only takes about 15 minutes for reddening to happen. And with many of our clients, it takes way longer than 15 minutes to even feel peak pressures, allowing the breakdown to happen and become more advanced before the client even has a

chance to realize that they were in pain or had pressure in the first place. Then sprinkle in the fact that they've had decreased mobility and strength and endurance and balance, and can't independently shift out of that abnormal posture once they slide into it, and now you're ready to begin cooking. And you mix all those factors together and absolutely a wound will be yielded.

So we have a tendency to focus on the physical aspect of what's happening to our client. But a lot of times we don't think about the mental health issues as well. And I know that in our society right now, we're trying really hard to increase the impact of mental health issues on physical health and rightly so. And imagine if you could decrease the incidence of isolation and depression by just having a proper wheelchair system. And the good news is that you absolutely can. So if we allow the physical issues that we just discussed to occur, eventually they're going to lead to mental health complications as well. So if we allow the client to be in pain all day in their wheelchair, they're no longer going to want to get out of bed, get into the wheelchair to interact with the people around them. If we allow the wheelchair system to cut their visual field, and the client has no ability to communicate, they won't want to participate in activities any longer. If they are drooling and choking and coughing while they're eating, they're not gonna want to eat in front of their friends any longer. And if we allow them to soil themselves and they feel like they stink or are uncomfortable because they're constantly wet, then they'll be too embarrassed to leave their rooms. And as their desire to interact with their friends decreases due to the physical issues that arise from poor wheelchair posture, the more likely our clients will withdraw and isolate themselves.

And think about how many times an activity director has come to you and said something like I can't get Mrs. Smith to come to activities any more. She used to love bingo, she couldn't wait until it was time to get her hair done, she used to love to eat in the dining hall and now I can't even get her out of the room. And these clients will

become isolated which often time leads to depression. So what is your job as a therapist? We need to go up and down those halls of the nursing home or maybe go from house to house if you're a home health therapist, and recognize clients that are sitting in abnormal postures. We need to talk to them, to the family, to the nursing staff and see how prolonged sitting in these postures are affecting their quality of life. And then we need to try to maximize their pelvic and trunk alignment and stability to limit the negative effects of those abnormal postures. And when we do that by using the simple equation, and remembering that a cushion plus a back support plus the appropriate wheelchair model and then by adding any needed accessories that will help to optimize the alignment and stability, then we will be able to decrease the risk of medical complications.

So what I've done for you is I've come up with some key questions that you should ask yourselves during evaluations to really get your wheels turning so that we can obtain the appropriate information to then translate that to the seated posture. And these questions will help us to look at each client as an individual with very individualistic needs so that we can choose the equipment that meets their demands. So seating is not a cookie cutter area of therapy. And we should not be pushing equipment out on an assembly line. No two people are alike, so everyone should not be prescribed the same equipment. And I have a really really good friend that always says there's a cushion for every bottom and a bottom for every cushion. And that's just so true, everyone is constructed so differently there's no way that we can just purchase the same thing and think it's going to do it's magic on every single person.

So the first question to ask yourself is what is their current system? And things to consider when asking yourself what is the current system are things like has the resident been on case load before with a positioning issue? Or maybe they've never required a seating intervention and it was fine just to give them a standard general use cushion, but maybe now that's not okay. And if they have been on case load before,

what have they used in the past? Did it work? Now maybe something medically has changed causing them to present quite differently with reddening or pain or maybe now they're falling from the chair or sitting in a significant posture abnormality. So figure out what has changed so that you can prescribe the appropriate cushion or the appropriate back support and set up the wheelchair correctly with the appropriate configuration. And always consider, what do I need to change from the status quo to make them safer and function optimally? Ask yourself maybe what did I forget from that simple equation that caused them to be on my case load again? And often times those what I like to call repeat offenders that keep coming back to us month after month isn't because the cushion failed, but it's because we were focusing on the cushion alone, forgetting about that integral interplay with the wheelchair model and the back support to really create an optimal seating system. So that wonderful cushion couldn't even do its job because we didn't align the pelvis to sit on the cushion correctly without thinking of the back support and without configuring the chair correctly.

So what insight do you gain by asking this question? And the first thing that you gain is a reminder that we really need to start taking relevant measurements to match our client's range of motion limitations. So you and I both might be the same height, we might weigh the same, but we're constructed completely differently. And I may have a very long torso with shorter legs and you may have a very short torso with longer legs. So I need a longer back support and a shorter seat depth where you're gonna need a longer seat depth and a shorter back support. So we can't keep placing all clients in the same size chair and expecting it to meet the needs when we ourselves are constructed so drastically differently. So the second thing that asking this question helps us gain is the ability to understand cushion style and construction, and decide now which style is best for my client. And many companies out there have algorithms, whether it's flow chart or a decision tree or just simply lists of criteria to check off to determine what category of cushion you should be looking for with your client. And in

settings with insurance funding, a lot of manufacturers or dealers on their website have diagnostic searches where you literally go on the website, you type in what code they have, and then poof, up pops all the diagnostic codes of the categories that they would be able to qualify for. But one thing for sure is that those big bulky catalogs that we receive can be extremely overwhelming, and there are hundreds and hundreds of cushions and back supports with very minimal description of what the product actually does and it's then expected to assist us in deciding right there on the spot, what's the best thing for my client? And that's a pretty big ask even of the best seating therapist.

So make it easy for yourselves, manufacturers know their product line best. If they have developed some type of cheat sheet or flow chart or algorithms and narrow down your search and figured out what cushion or back support would best suit your client, then perfect. Use them as a starting point to really narrow down your search. More insight gained by asking yourself this question is to remember to think beyond the cushion. Novice therapists in the seating world oftentimes focus again on that cushion alone and don't switch out the slingback or standard upholstery for some type of specialized back support. And I can promise you all, if your clients are presenting with prolonged sitting in one of the abnormal postures, the slingback that comes standard on the wheelchair isn't going to cut it. You're never going to be able to create maximum contact or even pressure distribution or optimal stability with the sling back. And the client will slide into a posture that's going to create those health and psychosocial issues that we just talked about. So it's also gonna lead you to think about the addition of needed accessories. Did changing out the cushion and the back support get you to a good place but not an optimal place? So maybe we need to take the equipment on step further and add an accessory, or also known as a postural support.

So let's see if by adding a lateral support that gives me the needed counter pressure to now be able to create a more midline upright posture. Or maybe by adding a head

support, now I can maintain the head in a line so that I can allow for an adequate swallow or an eye gaze to communicate with the environment around me. And by asking yourself what is the current seating system, it's going to be a great reminder to think of that simple equation and always consider the wheelchair model plus the back support plus the appropriate cushion and then any needed accessories. The second question you should ask yourself is what activities must a client be able to perform? And all seating goals must be function related. So we will never be able to allow for maximum function from the wheelchair level if we don't consider things like how much trunk stability is needed to perform the ADLs independently or even if they need assistance. Do they self-propel, and if they do, do they use their upper extremities, their lower extremities, or maybe both? And how do they transfer, are they independent? Do they require assistance? Or do they use a side board? And it really is our job to figure out what configuration and what equipment we need to provide to allow for maximum function. And part of figuring that out is ensuring that the equipment is the right size. So by considering the things like the client's stability, their balance, their strength, endurance, and seeing how much assistance they need to sit up against gravity, really guides us as to what back support height to prescribe to be able to achieve that function.

So for example, if your client is someone who is max assist to dependent to sit up unsupported against gravity, then you're going to need a longer back support that really provides contact over the entire trunk so that stability can be achieved. So as the therapist, you're probably going to need to take measurement G which is from the top of the seat surface to the top of the shoulder in order to then have maximum contact throughout the trunk for stabilization. However, on the other hand, if your client is more of an active user with better balance and good strength and they can perform tasks such as bend down to their shoes and reach up into the closet or reach the wheels and propel with their arms, then the goals of the back support are gonna change and we must measure accordingly. So now instead of measurement G, you're gonna measure

measurement H and you're gonna go from the top of the seat surface up to the inferior border of the scapula. And sometimes I even take away maybe a half an inch more to really give the shoulder girdle a little bit more freedom of movement. And you take that so that you're freeing the scapula so that the client can perform their MRADLs and IADLs as independently as possible without any type of interference from the back support. Another key measurement to consider is what is the seat to floor height? Does your client propel with their lower extremities? And if so, we need to measure seat to floor height taking into account the thickness of the cushion. It can be a two inch cushion, a four inch cushion, it doesn't matter, we need to take that into consideration. And we need to use a wheelchair model that has the ability to lower seat to floor eight enough so that our client can touch the ground with their heel to get a good heel strike without having to compromise their pelvic positioning by sliding forward to reach the ground.

The next key measurement that we would consider would be the arm rest height. And arm rest height I think is one of the measurements that's really overlooked, but improper armrest height could throw off someone's balance and push them into a posture abnormality for sure. So if an arm rest height for example is too high, it really would decrease the patient's ability to maneuver around the arm rest to reach items in their environment or even to self-propel. So the client would probably have to then excessively elevate and adduct at the shoulders that might cause things like pain and nerve impingement, definitely increase the risk of repetitive strain injuries. And then if the arm rests are too low and the client has poor balance, then the client's gonna have to compensate by either sliding down so that he can reach the armrest or maybe leaning over to make contact with one of the lower armrests to gain the stability that is body lacks. But whatever the case may be in either case, by being forced into an abnormal posture, the less independent they will be with their functional tasks. So another thing that by asking this question, what activities must my client be able to perform, it also leads us to the best styled cushion for my client and how they transfer.

And if your client is someone who is transferring very independently, then you might want to think more of a linear cushion. There's no hills or mountains or valleys built into it that they have to get up and over. Being that it's a flatter surface, it's just by nature easier to get up and out of. Whereas a pre-contoured cushion by nature is designed to add stability and alignment and really lock the client in. And that may make it more difficult for a client with strength and balance issues seeks to transfers independently.

You also have to think about our clients that use a slide board. Whether they're independent with that slide board transfer or they need assistance, think about what's the medium of the cushion that I'm using. Is it easily damaged by my slide board that might then cause the beneficial properties of that cushion to break down? So you really have to think about what that cushion is made of. All right, the next question to ask yourself during the evaluation is why do they sit in that abnormal posture? And this is a very important question, and the reason why they are sliding or leaning or slouching really is gonna help us tremendously in choosing the appropriate wheelchair configuration, cushion, and back choice. So when are they sliding? And you have to ask yourself is it because they're in pain? Are they trying to alleviate pain off of a particular site? Or maybe it's because they lack stability and they don't have the strength and the endurance to sit up unsupported so they're seeking the stability out through the back support or through the arm rest. Or do they slide down to feel more secure in their chair? And when our clients lack the stability in their own bodies, they will compensate by sliding down or leaning or stacking the spine to find the stability they lack and feel more secure in their wheelchair. Or are they sitting in that abnormal posture simply due to a range of motion limitation? Maybe a contracture? And when you answer the question of why, it gives you hints to the properties of what to focus on when choosing the seating and positioning equipment.

So let's look at my little blue man in the illustration in the left, and here we can see that he is forced to sit at a 90 degree angle, okay? And that is causing him to have pain at

the apex of his curvature in the thoracic spine, right under his ITs and behind his knee. So to compensate and relieve pain off of these sites, he slides down into the posterior pelvic tilt to shift the weight off of those sites. But the problem is that he hasn't solved the pain problem, he's still stuck in a 90 degree angle that he can't tolerate. He simply slid into an abnormal posture and only shifted the peak pressures onto another bony prominence that will eventually become painful as well. So instead of allowing our clients to slide into an abnormal posture to alleviate pain, we should focus on skin protection properties that are built into a cushion and the back support that can create pressure redistribution to really alleviate pain without having to compromise an optimal posture for the client.

So keywords that you should be looking for in the product description are things like immersion and envelopment and or offloading. And by immersing and enveloping the body, we can take pressure away from the painful site and sink it in and conform to the entire gluteal surface to have that cushion fit that person's body like a glove. And that will in turn protect those bony prominences. The other method of offloading, what you do is you're taking pressure from a small surface area to a greater surface area that can withstand that sustained pressure more effectively. So either way, we have now fixed the problem and relieved the pain and pressure felt directly under a small surface area by distributing the pressure over a greater surface area, decreasing that client's need to slide into an abnormal posture. So in the illustration in the middle, we see a client that can stabilize himself in midline. Okay, fantastic, right? But maybe due to strength, balance, and endurance issues, he can't stabilize himself for long periods of time and will begin to slide to the left or to the right to find an area where he finds more stable and secure. And in this illustration, you can see him leaning to the left or to the right seeking out the stability from the arm rest. And our goal with this kind of client is to look for equipment that really immerses the body and then through the contour of the cushion locks in the pelvis, creates leg drops that align the lower extremities and align the pelvis to really help stabilize the person in the posture that you were trying to

create for them. So key words and product descriptors might be alignment, stability, pre-contoured, leg troughs, this will all key you in that this cushion has what we're looking for. It has the built in structure that will make up for the lack of stability that the person has due to his or her strength, balance, and endurance issues. If the issue is pain plus a stability issue, so they have pain at specific sites and they have to seek out stability from something else because their body lacks it, then you might want to look for equipment, especially cushions that have built in contour again and may partially off-load a high risk area. But then through the medium, which is what the cushion is made of, really allows for immersion and envelopment to protect the bony prominence and still make contact with the seat surface.

So for example, with this cushion here, you can see that it has built in contour, you can see it still has some leg troughs, it has a medial abductor, it has some linear contour as well, so it has those hills and the valleys as I like to say that align and stabilize the lower extremities and the pelvis to minimize unwanted movement. And since it's made of air, it also sinks the body in and conforms to the entire gluteal and femoral surface. So this person's gonna be protected against both pain and instability to really reduce the risk of sliding into that abnormal posture. And then if we're sitting in that posture due to a lack of range of motion, then adjustability is the key. You need a cushion that can be adjusted to compensate and make up for the lack of motion due to any contracture they may have. So you need a cushion that can be built up or minimized to accommodate for that contracture. So in this case, with this gentleman right here, you can see that he has a range of motion limitation and he has a fixed flexion contracture. So if I put him on a cushion without any adjustability, his femur is not making any contact with the seat surface. So all of the pressure is going straight backwards onto his IT making that area at a very high risk of pain and pressure and he will try to slide off of it.

So what I need to do is I need to use a cushion that has compartments or some type of ability to be built up or minimized, and with this particular cushion, you can actually take air cells out from one compartment and add them to the compartment that you're trying to build up. So in his case, I would take air cells out and build up these two front compartments where his femur is not making any contact. So by making this part of the cushion higher and I seat him on this cushion, now the femur will make contact with that built up portion of the cushion, and there will be even distribution throughout his entire femur and his ischial tuberosity so that the ischial tuberosity is no longer taking the brunt of the pressure, but his femur can take some of that pressure as well. All right, so the next question that you want to ask yourself is what are the pelvis and the trunk and the head doing when a client is sitting unsupported? And things to look at are when you take away that client's ability, does he slide into an abnormal posture, and which one? When you change seat to back angle, did this make the posture better or did this make it worse? And then after changing the cushion and the back support, did they look great or did they just look okay and maybe I needed to take a step further by adding the accessory.

So by understanding those posture abnormalities and recognizing what abnormality the client has slid into when stability is lost really helps us to understand what areas are at high risk for pressure injury so that we can then configure the chair correctly to choose equipment that will target that specific area. Also when we know exactly what postural abnormality they are sitting in, then we can understand what body system might be affected to guide us in our equipment choices, to again provide support and counter pressure to promote the body to be more upright. So for example, if someone is sitting in a posterior pelvic tilt, then I know I'm gonna have to open seat to back angle because I know that that chest cavity and that abdominal cavity and that abdominal cavity are gonna be compressed if I don't try to open them up. And by being in tune with what the body is doing when stability is lost, we can better identify where there are gaps. What muscles are probably being shortened and what joints will

present with some type of range of motion limitation that will then lead me to take measurements, change angles like seat to back angle to really match that client's limitations to promote optimal stability and alignment in their chair. And remember, correct seat to back angle can be attained by using either the correct model of wheelchair that has that ability through the backings to either open, which would be this way, or closed, which would be this way, the seat to back angle. Or, or and, so you could actually do it through the backing and through the back support. And the back support through its hardware actually allows you to open or close seat to back angles to accommodate for someone who has a range of motion limitation.

So if we took this client right here, she is stuck at let's say at a 75 degree angle of extension at her hips, so there's no way she would fit in a 90 degree angle chair without sliding forward, like you'll see right here, so I need to place her in a chair with a back support that I'm able to open seat to back angle to about 110 degrees that would then accommodate for the range of motion that she is stuck in. All right, the other insight gained is the understanding that sometimes there's just a need to take it a step further and add some type of postural support or accessory. So I showed this resident through many of my webinar series and I always show kind of the before when she's off to a rough start and I kind of show the after when I show you the complete seating system. But what I don't show oftentimes is the middle step, what I like to call the getting closer. And when I first put her into her wheelchair system, I immediately changed out her wheelchair model, I changed out her back support, I took off the elevating leg rest and put on standard leg rests. But, I didn't put on the head support and I didn't put on the lateral support right away. And at first she looked pretty good, but then as I was trialing this for a couple days and I would go in a couple times of day to check on her, I started noticing that as she fatigued, her head went into again that posture that she was in during the rough start, right? Her body would start to lean because she would fatigue. And it really just honed me in on the fact that okay Ana, I need to take this one step further. I need to add a mounted lateral to really give her the

counter pressure in the exact spot that I need it to keep that midline upright posture. And I also needed to add a head support so that as she fatigued, her head and her neck would still be in an optimal position to allow her to talk, project her voice, and allow for a safe swallow.

All right, the last question you need to ask yourself is can the client move in and out of the abnormal posture or is that posture fixed? So this entails you actually touching the client, getting your hands on their pelvis and seeing if you can move them in and out of that abnormal posture towards a more neutral midline pelvis. And if you can, then their abnormality is what we consider flexible or reducible, because that client can now move in and out of that abnormal posture back towards a more optimal midline. If you palpate the pelvis or the trunk and you cannot bring them back towards a more optimal midline, then their abnormal posture is considered fixed or non-reducible, which is more, the reducible, non-reducible is what we're actually using today. Fixed and flexible is what I was taught back in the day. But this means that if you try to force them into an abnormal posture, you're going to cause them pain or more unwanted pressure. And however if we do nothing, that abnormal posture will get worse, right? So we need to do something. And if we do nothing it will become more significant. They will go deeper into their abnormal posture, further away from midline, putting them at a higher risk for contractures and all those serious health complications that we talked about.

So what does this tell us by asking this question? And what it does is it really defines our goals of the cushion and the back support that we're choosing. And if you find that their posture abnormality is reducible or maybe what you knew as flexible, then the goal is to correct the abnormality and try to bring that client back to neutral midline, fix the issue to prevent the reoccurrence of it happening again. If they are non-reducible or probably what we knew as fixed and they cannot move back toward a neutral midline posture, then what you want to do now is accommodate for the posture. So

you're gonna switch gears from correcting to protect it, provide optimal support and create even pressure distribution to minimize the risk of that deformity from progressing. And I'm going to be giving you an example of what you would do differently in your goals between an abnormal posture that is flexible or fixed or reducible, non-reducible, if we're gonna use the more up to date terms, in relation to a pelvic obliquity. So here we have a client that is obviously sitting in a pelvic obliquity where the right PSIS is lower than the left and we're gonna say for this example that it is reducible or flexible. And so my goal is to correct it.

So what I'm gonna do is I'm gonna want to use a cushion that I'm gonna be able to build up under the lower side so that I can bring the pelvis back to even. So I've built up the cushion and I've made the pelvis even so that both of the ITs are evenly carrying the brunt of the pressure that is going through that person's pelvis. So I had just corrected that abnormal posture of obliquity. If my obliquity was non-reducible, then I'm not gonna try to fix it because I'm gonna cause more harm, I'm gonna cause more pressure because I'm trying to force something that just can't move. So now my goal is to accommodate. And what I'm gonna do with this abnormal posture since it's non-reducible is I'm going to accommodate by filling in the gap under the higher side. So with both of these instances, what I'm trying to do is create even pressure distribution so both of the ITs are having pressure enter evenly. When it's reducible, I'm gonna build it up the lower side and when it's non-reducible I'm gonna fill in the gap on the higher side so now the higher side is also making contact with the seat support surface. So by accommodating for it, I'm supporting the higher IT, I'm allowing pressure to enter, I'm supporting it from not being able to move further into the progression, and that person now has even pressure distribution through both ITs and we've supported both sides to not allow the progression of the non-reducible obliquity.

So now that we've discussed some key questions to ask yourself during the evaluation, and the insight gained by asking those questions, to make sure that we

consider all pertinent information, we're gonna just quickly recap some of the goals that we should be striving for with the equipment choice to promote that maximum function. And prevent those health complications that we talked about that are associated with prolonged sitting in the abnormal postures. And the first thing is we need to provide pelvic and trunk stability to really prevent movement into any type of abnormal posture. And then secondly we need to use cushions and back supports with skin protection properties that either will immerse and envelop and or offload so that we can maximize pressure redistribution and prevent wounds from developing and maybe even heal any existing ones. We need to remember that adjustability is the key when looking for the correct model wheelchair, the correct cushion or back support that can change angle configuration, that can be built up or minimized to correct or accommodate for whatever posture abnormality we're seeing for those people with range of motion limitations. And we need to add accessories or postural supports.

So think about that picture where I showed you the before, the getting closer, and the after, to help us think that is our wheelchair system just okay or can we take it one step further with an accessory to make it fantastic. And remember that all these goals together help to create a very individualized, optimal seating system to really promote maximum stability, alignment, function, safety, and comfort for prolonged periods of time. And I promise you, if you continue to remember and utilize the simple equation with every single client and never forget that it's the interplay between the appropriate style of cushion plus the appropriate back support plus the correct wheelchair model that then provides you the postural stability, allows for pressure redistribution, and attains and maintains postural alignment for hours on end, then you will be successful with every seating referral that comes across your desk. So I think you for the participation in today's course and now we're gonna open it up to the questions and answers session.

- [Fawn] Hi Ana, while we wait to see if any questions come in, do you mind giving us a taste of maybe some frequently asked questions that you get with this population?

- [Ana] Absolutely, it's funny 'cause you know, I do a lot of these courses and I teach a lot of therapists and I'll go through and I'm always, I use the word harping, I'm a mother of four so I've definitely got nagging down to a tee, right? But I'm always harping on, in my courses, about the importance of always thinking about that equation and not just thinking about a cushion. And a lot of times even after I say this over and over I'll have someone ask me things like well, I have this patient and I've just switched out their cushion but I think I've made the wrong choice because they're still sliding down. And I think that that is a question that I get asked a lot, I get a lot of direct questions about certain mediums of cushions or cushion construction, but I never get asked then what about a back support or what about the wheelchair configuration? So I think the best answer to that question is please just remember, it is so much more than a cushion. So if you really have gone out and purchased a fantastic cushion and you think that's the right one, start looking beyond that and say is this wheelchair configuration right, because even if you have the best cushion but you have the wheelchair at 90 degrees and that person can't tolerate it, then that pelvis will never be able to be on that cushion in the correct spot for it to do its job. So I think that's probably a really common question that I get.

- [Fawn] Okay, so we do have some questions coming in, the first is in a skilled nursing facility, who pays for the seating system?

- [Ana] So that's a loaded question right there. There are small pockets of the country, so if you're in a state like Ohio, I believe Washington state, Texas, some areas of California, Arizona, probably missing some, but there's like six states maybe that have Medicare and Medicaid funding so you can actually reach out to a dealer to come in and help you with that whole evaluation process and you can go through insurance.

But honestly, for the rest of the country that does not have insurance, whether Medicaid or Medicaid funding, it truly falls on the shoulders of, depending on how your facility is set up. Because I work with so many different facilities that kind of set things up differently. But it's either gonna fall usually on the shoulders of the facility itself, or sometimes they'll ask family to come in and pay for things. But that is why it's really really important for us to be able to trial equipment when we are asking for something pretty pricey. So even if you are not in a state with funding, it might not be a bad idea to reach out to a manufacturer and ask do you have any samples? So I know some manufacturers sell trial kits with cushions and back supports that might be a good investment for you guys to have in your facility to be able to trial things, because I know first hand, I live in North Carolina, and that falls on the facility. And it can be costly, but it's nowhere near the cost of allowing our patients to sit in these postures that add all those health complications. So it is worth the payment, you just sometimes have to prove it.

- [Fawn] Another question is how do you like to incorporate tilt and space and or reclining models with the seating deformities mentioned?

- [Ana] So one thing I will say, I talked about, I did a course for you all a couple weeks ago and one thing I will say is I believe that reclining by itself is not the best option. A lot of times what happens when we use, especially those tall recline back chairs is that you tend to open the seat to back angle and recline that person back too far. And that can be just as detrimental as not opening the seat to back angle at all to match that person's range of motion limitations. Now tilt and space and recline chairs are fantastic. Where you can actually set the recline by using hardware, by using the, the back canes of the wheelchair itself, so having a recline that you can set to match that person perfectly where someone can't open it too much and then close it too much, is better than having a tall recline back chair. Again, tilt is a great way, when you can tilt

and recline together, that's definitely proven to help with all of the issues, so if your facility can afford it, go for it, if that's gonna help the patient for sure.

- [Fawn] Do you have any recommended products for geriatrics that you particularly?

- [Ana] So again, this is one of those areas where therapy is just, seating positioning is just so not cookie cutter, right? Because it's kind of a double edged sword when it comes to our geriatric population. So we're dealing with people who because their skin has thinned, because they're having sensation issues, a lot of times an immersion and envelopment cushion might feel better to them, but then you start thinking to the fact that usually our geriatric population is weaker, so they are definitely gonna start having some type of stability issue or endurance issues, and sometimes true immersion and envelopment cushions can be a little bit more unstable and really require someone to use some of their own strength to maintain themselves upright for longer periods of time. So if they don't have that stability and they don't have that strength it can actually decrease sitting tolerance. So my answer to that is you really just have to look at that specific person and you have to know what that person's strengths and weaknesses are. So that's kind of where I talked about, what is the reason that they're going into the abnormal posture. If it's more pain and they have really good stability, I might go more towards an immersion and envelopment style cushion, and that really can be like a Roho or that can be a cushion that has a phenomenal foam that allows you to immerse and envelope somebody.

That might be, I mean there's so many different manufacturers out there. But if my person is dealing with pain and stability, then you might want to use something we call a combination cushion where the medium, so it might be air, immerses and envelopes them, but it has those hills and those valleys, the contours built in that's gonna stabilize that person's pelvis as well. So I would go back to the slides of why are they falling into the abnormal posture and really look at that. But there is a cushion actually that I think

is one of my absolute favorites out there when it comes to a contour cushion, it's called The Shield. The Shield is a contoured foam cushion that is phenomenal for offloading and creating stability. So that is truly one of my absolute favorite cushions that I have had a lot of success with in the market. Is there any other question? Okay, and I think that wrapped up today. And that's it.

- [Fawn] Thanks so much Ana for a great talk. I hope everyone has a great rest of the day, and you join us on Continued and OccupationalTherapy.com. Thank you.