Therapeutic Office Ergonomics for Computer Use for Intensive Rehab Patients

Recorded July 16, 2019

Presenter: Jeannie Koulizakis, PT, MPT, CEES

OccupationalTherapy.com Course #4344

- [Fawn] Today's course is Therapeutic Office, Ergonomics for Computer Use-Intensive Rehab Patients. Our presenter today is Jeannie Koulizakis. She is the founder and CEO at ErgoRX.com and the lead physical therapist at Nova Pain and Rehab an Outpatient Rehabilitation and Chiropractic Center, located in Arlington, Virginia. Her expertise is in the treatment and prevention of repetitive stress, related MSDs or musculoskeletal disorders as well as work related MSDs stemming from poor posture and inactivity habits during human computer interaction. Welcome Jeannie, we are so happy to have you.

- [Jeannie] I just wanted to welcome everyone and to just tell you a little bit about myself, before we get started just to give you an idea of how it came to be that I have become a subject matter expert on, Office Ergonomics for patients. About eight years ago I started having, atrocious back pain myself when I went from the clinic to a primarily desk job, I became a teacher, I directed a physical therapist assistant program and it was the first time in my life that I'd ever had a desk job. And I started to have very bad back pain and I just couldn't figure out what the problem was. And then about three months into me trying to self treat, going to other clinicians trying to understand what my problem was. One day I was sitting at my kitchen counter just like so many of us who come home and we work on our laptops. And just happenstancelly happened to look to my side and I saw my reflection in a reflective, in a sliding door that reflects at night and I saw my posture while sitting and typing on my laptop and that was the epiphany eight years ago that led me to where I am today. It was in that moment that I realized so many of our neck, back and chronic pain issues are coming from our interaction with electronics and it was in that moment that I decided that that was going to be sort of my mission with patient care. So I'm back in the clinic and that is what I've been teaching ever since and there could not have been eight more

relevant years, for this to be my focus because people have only been using electronics more and more since.

So the learning outcomes in this course today, you will be able to identify the need and role of computer work ergonomics in today's spine and joint rehab healthcare. And computer work ergonomics some people call it, work related MSDs what we're gonna talk about today. Some people call it screen time related ergonomics, right now there is such a mesh between work and home life and ADLs because we are interacting with electronics. So I want it to be clear that really it's about the interaction with electronics, it's not necessarily home or work or where you're it. It's if you're interacting with a screen, then this information is applicable to yourselves and your patients. After this course, participants will be able to describe basic research about office ergonomics on which to base evidence-based therapeutic ADL training and lastly, participants will be able to list the risk factors in order to make evidence-based, workplace accommodation recommendations.

So you first have to say what the problem is before you actually, make those recommendations and we'll be touching on those things. So first outcome, able to identify the need and role of computer work ergonomics in today's spine and joint rehab healthcare. And this is the crux of it. Adults spend more than 11 hours per day watching, reading, listening to or simply interacting with media. Now media includes computers, tablets and smartphones so just four years ago, when they did the same study, it was nine and a half hours. So in less than four years or in four years, it has upped an hour and a half. And of course, the question remains at this rate what will happen from four years from now? What will happen eight years from now? There doesn't seem to be a slowing down of computer use at all. Right here is a spreadsheet that shows us the age groups and how much time they are interacting with various devices, smartphones, whether they're watching television, TV connected devices. I mean, most people, of course nowadays, they're Netflixing on their cell phones and

their tablets as well as their smart TVs at home. So there's a real meshing but what's interesting to see is that also the older populations as time goes on of course are increasing their time with devices. And of course, we're going to learn now about children, teens and screen time. So as of right now, there is a cohort of human beings called digital natives and digital natives are people who have never known a life without electronic devices. They have had their mom cell phone in their hands, since they were being pushed around in a stroller at the mall, they are interacting with electronics at school by the time they were in second grade. The youngest of or excuse me, the oldest of this cohort of human beings is approximately 28 or 29 years old. If you are 28 and younger, you do not know a life without a handheld device or electronics, you are what we call the digital native. And that really does play into how you treat patients because if you have a digital native in your hands that is having any sort of chronic conditions or issues or repetitive stress injuries, even if they're athlete related, even if their athletics related, you have to take into consideration what their hours a day of posturing affects your outcomes as a clinician and for their health care. As of right now, because they're so young, there is no evidence of the link, between their increased screen time and cardiovascular, diabetes and high cholesterol.

Ages eight to 18 are spending seven plus hours, on a screen per day. And I can tell you as the mother of an eight year old and a four year old that with a lot of exposure to this cohort of human beings, that's probably a generous, that's probably I would question about that seven plus hours especially as you get into the teenage years, it's probably more like the adult usage. There is absolutely an evidence of a link to obesity with this cohort because kids start snacking, they ignore cues that they're full, they're exposed to food advertising, they are exposed to the blue light known to disturb sleep and that disturbed sleep there is absolutely a link to the obesity. And as I described earlier, screen time can be on a multiple set of screens. And for adults, screen time is often work time. So when we talk about work related MSDs, we're really talking about screen time related MSDs and there is absolutely an evidence of the link between technology

use and cardiovascular disease, diabetes, high cholesterol and what we call WMSDS, Work Related Musculoskeletal Devices with interacting with computers. The primary WMSD risk factors are poor postures, poor movement patterns during work. That is the crux of the problem, how we are oriented towards gravity and how much we move when we are doing that. Those are the primary risk factors and of course, there's global risk factors, such as an inactive lifestyle and other issues, poor eating habits and whatnot. But when it comes to computer use, it really is about poor postures and not enough movement during work time.

And these are just pictures from the community. These are things that we see out in the workplace, out in the clinic. Children are extremely susceptible to spinal modeling particularly at this age. They may not be in pain yet but they are definitely affecting the orientation of their spines, the curvature of their spines and therefore the efficiencies of the limbs connected to that spine as a result of this screen time overload that they are being subjected to. So it's particularly important that we continue to really understand the importance of ergonomics in today's healthcare. So common WMSDs, neck and upper back pain, muscle strains and low back injuries, carpal tunnel syndrome, tendinitis, rotator cuff injuries that affect the shoulder and epicondylitis. Body parts most affected by WMSDs. We have low back, neck, shoulder and wrist and you see the percentages associated with those. I can tell you that with the advent of standing desks now we are seeing a huge increase, in people with standing desks that have low back hip, neck and foot problems. So what has happened with the advent of the standing desk is that a lot of people are just choosing to stand as opposed to sit and the problem with that is we are moving out of the fire and into the frying pan 'cause all it does is it changes the location, the body part location of the WMSD. It doesn't necessarily remove us from having them, it just changes what body part it actually hurts.

So work related MSDs are among the most frequently reported, causes of lost or restricted work time and according to the Bureau of Labor Statistics in 2013 which is the latest statistics that we could get MSD cases accounted for one third of all worker injury and illness cases. So we are treating a lot of people who's injured are stemming from work whether they realize it or they don't. What's the human cost of musculoskeletal disease injuries? First of all the employee, the employee suffers. The suffering, the physical pain, the discomfort, not to mention the financial well being, is absolutely affected. MSDs is can be the catalyst for financial demise and even divorce and separation. It can cause as we say in my clinic hurt people hurt people. So this is, it's a slippery slope here as well. It can cost the workers, your co-workers, if you're constantly gone that is or if you're not really approachable or in pain it's just distracting for not only yourself but for your co-workers. Morale, absolutely kills morale, your attitude changes, especially it's like death by 1000 paper cuts. It just slow burner and it hurts. Of course it kills productivity and of course it kills the culture as well. So there is a lot of human costs. Lastly, absenteeism and presenteeism. Now absenteeism is self explanatory. There is a tremendous loss of workdays due to MSDs injuries every year but now there is a new phenomenon that they are observing and tracking and it's called presenteeism. Presenteeism is when you show up to work because you don't have any time off or you can't afford to take time off or you just gotta push through the pain. Presenteeism and it is extremely expensive for employers that have to deal with it. Presenteeism may cause, more aggregate productivity loss than absenteeism. With MSDs presenteeism is often a substantial, hidden cost. A recent study in one company showed that 70% of employees experiencing fatigue, discomfort or pain on a daily basis.

So I have an interesting story about this particular issue and I am a corporate ergonomist so oftentimes I'm called to go into people's offices and to do ergonomic evaluations or also, I do wellness in services or ergonomics in services of corporations when I have like a watch and learn. And so I went to this one office, it was an

architecture and design office whose job it is to design offices. So the irony in this story is abundant. But I went to this office, I did my lecture and many people were very interested in the process and the products and the things that I presented to them. And when I said, well, you have to tell your employer that you are having discomfort and whatever else. Everyone was like, nope, not telling the boss, can't let them know I'm in pain, they don't need to know. I don't wanna share that much. I'm gonna be leaving soon. I just got here. It was so interesting to see the conflict between having pain but then having to report it in order to change any of the conditions, there was a real disconnect and that sort of a psychosocial component that is outside the scope of this discussion but it is something you will absolutely see, in your practice as well as if you ever, do ergonomic onsite evaluations of this variety. You will see that a lot of people are very afraid and that makes sense, right? That they're very afraid to tell their bosses or whatever but this was a study that was done in confidence and 70% of the people were experiencing fatigue, discomfort or pain on a daily basis to a C-suite that had absolutely no idea that was going on. So very interesting about how that goes down.

As far as financial burdens of WMSDs, that's where do you even begin and when do you stop counting the cost? But these are some OSHA statistics. The average direct cost of a WMSD injuries is between 12,000 to 100,000 of surgeries involved between direct and indirect cost. OSHA statistics indicate that WMSD related expenses costs a staggering 20 to $50 billion a year, I would argue it's probably more. It costs just in the US alone. Now remember, we're not the only country that's interacting with screens, of course but it costs the United States alone $88 billion a year, just for low back and neck pain. That does not include repetitive stress injuries of the shoulder, of the elbow, of the wrist, of the hips of the knees, of the ankles. None of that is incorporated into this cost and none of the other countries, are incorporated in this cost. So you can see what a tremendous financial stress it is, for companies, for individuals, for companies, for countries, but also for us as healthcare practitioners. It's just people, the reactivation rate, the chronicity of their pain, the inability to actually reduce the pain.

You get someone it's always two steps forward, one step back, two steps forward, three steps back. Oh, you have an accountant who before taxes and they're spending 14 and 16 hours a day at their office, they're just going crazy. And it doesn't matter how much and it doesn't matter what you do for them, it doesn't matter how many times they come in, there is just this, your hope is that they just stay constant that they don't actually regress. So making progress is difficult for people and extremely expensive in terms of all the sorts of resources that go out for it.

So what is office ergonomics? Office ergonomics is a process for protecting screen users, from WMSD risks. I would also argue that it's also a process, for protecting screen users from cardio metabolic risks that are associated with screen time. So it's not just WMSDs, it's also a cardiovascular and immunological issue as well. But first and foremost, for the scope of this discussion, it's about WMSD prevention. Office ergonomics involves optimizing human performance by designing a computer workspace environment to safely minimize effort. This is how you reduce repetitive stress injuries is by safely minimizing effort. And like I tell my patients a safe work environment, does not eat salads and go to the gym for you. That's a different discussion but what we wanna do in the computer workspace, is we wanna minimize effort so that their bodies are not subjected to the repetitive stresses that cause WMSDs. So to reduce WMSD risk best practices includes, using ideal postures and movement patterns which we are gonna get to in this presentation.

And for whom is office ergonomics? Well, employers are traditionally responsible, for providing a safe and healthful workplace for their workers, including ergonomic furnishings and ergonomics training. However people don't always acknowledge their pain and people don't always work for others. For the gig economy, how many of us are treating patients that are self employed? How many of us are treating patients that are maybe employed but they've got a side hustle? How many of us are ourselves part of that cohort of people? So for the gig economy, remote workers and the self

employed, most of us need to provide a safe work environment for ourselves. It's not, we can't rely on employers because we may or may not have them and that doesn't matter because that's not our total exposure to screen time. How much we interact with our computers and our cell phones at work is outside of how much we're doing it at home and at school and in other environments. So it's very important for us to be able to educate our patients whether they have the benefit of an employer or not. Spine and Joint healthcare practitioners should consider, including evidence-based therapeutic ADL instruction, for patients across the lifespan, interacting with screens for more than four hours per day.

So in a discussion that I had with Dr. Alan Hedge who was the chief economist at Cornell University, one of the leading premier research facilities, on this subject. And he said the absolute number one predictor of WMSD, getting at WMSD is one in one alone and that is total exposure. That means if a person is spending 11 plus hours per day as cited in the statistics earlier in this presentation, the probability of them getting an MSD that is either caused by or at minimum exacerbated by screen time is extremely high. That is the number one risk factor so for any of us that are treating patients of non-acute care, even acute care, it's sort of teaching. It's like, when you go to the dentist, if you have a cavity, yes, they're gonna fill the cavity but they're also gonna teach you about, brushing and flossing. This is our job in the clinic. Our job is to teach hygienic, occupational hygienic screen time interaction, it should be part of our vernacular, it should be part of our treatments for anyone that is working for more than four hours per day on screens because it is absolutely relevant to the longevity of their spine and joints.

So now we're gonna move on to the second learning outcome which is you will be able to describe basic research about office ergonomics on which to base evidence-based therapeutic ADL training. So of course, we are pragmatic practitioners and we need to absolutely have everything be evidence-based. And so that is what this section is

about. There is a growing lot of research that is coming from universities regarding this subject. There are however, that's ongoing currently but there is a lot of past research upon which a lot of this stuff that I'm teaching you is based upon. And it's very important that as our interaction time increases as well as the devices that we're using are changing that you stay on top of the research and I would tell you, there are three universities that and I can send you links after this that you should be following. One is Cornell University, the second is Texas A&M and the third is UC Berkeley. These are three universities that invest that have very established well established, computer use, human computer interaction ergonomics, research divisions and, if you're gonna be on alert on Google, for research coming out, this is something that you guys should be following.

So starting with the research. For the purpose of posture observation, there are three possible postures in a chair in an office. There's recline, there's upright and there's forward leaning. Now, I know the traditional or the standard, when we think about office ergonomics, you think the optimum is the middle, right? You think neck over shoulder, shoulders over hips, hips at 90 degrees, knees at 90 degrees, feet at 90 degrees, but in actuality if you look at the evidence it isn't optimal especially for somebody who's interacting for hours a day. In fact, the optimum posture is a reclined posture, very much the way that they designed cars and cockpits. This is much better for the intervertebral pressure, from the neck all the way down to the sacrum, you absolutely need to have a seat back, you absolutely need to have a lumbar support and you do need to be between 10 and 25 degrees of recline to reduce the intervertebral disk pressure. It is not, based on research upright is not optimum so if you have patient handouts where it shows this 90, 90, 90 positioning, you might wanna consider switching it up, based on newer evidence.

So all the way back from 1974 and there's even research that was back done in the 50s, when they were doing automotive design research and really this all started with

automobile ergonomics. They were first to the ergonomics research world, before the office furniture manufacturers. There were car manufacturers that were doing this stuff and in 1974 a premiere researcher said Anderson et al, lumbar disc pressure and myoelectric back muscle activity, during sitting. Studies of an office chair. What they found was that reclining reduces the load on the lumbar spine and paraspinal musculature. When we're talking about repetitive stress injuries of the spine, this is number one, seat back check, recline check. So when you have patients who wanna talk to you about their Swiss ball chairs and they wanna talk to you about this groovy new desk that they found at the healthy back store that has no back. There are times in which that is appropriate seating but not for somebody who's got a job with two monitors and spends 80 plus percent of their time interacting with those monitors eight to 10 hours a day at work. If it's a secondary seating option, maybe but for somebody who's doing the lion's share of their work at a particular workstation and it's more than four hours per day, you absolutely have to recommend a chair with a seat back, preferably with a lumbar support. The influence of the backrest inclination and lumbar support on the lordosis in sitting.

So this research was talking about, well, what about recline? How does it support the lordosis? And what they're saying is not all reclining is equal, if you're going to recline, you need to recline with a lumbar support, for angles of backrest inclination and for different sizes of lumbar support, were studied on 38 healthy subjects. One sitting down from a standing position, the pelvis rotates, it noses up. It is an anterior tilt of the pelvis that flattens the lumbar lordosis. So if you think about like a teenager slouched in a chair, using their laptop, this is what they're talking about. They're talking about an anterior rotation of the pelvis where the lumbar lordosis is flattened. So increases in the backrest seat angle, meaning it more of a recline only had a minor effect, on maintaining that lumbar lordosis during recline. And that really the lumbar support, had a significant influence, meaning the lordosis was increased and fully supported in recline. So when we talk about recline, it's not just any recline, it's not just slouch

sitting, it's sitting with your butt all the way back in the seat with the lumbar support positioned appropriately, for the user so that when they're reclined, their lumbar lordosis is, it's like an orthotic but for your lumbar support. So just as we use orthotics in shoes to support the arch of the foot, we need a lumbar support and reclined to support the arch of the back.

Third research talking about recline. This research was titled Epidemiologic Aspects of Low Back Pain in Industry. Reclining pumps nutrients to the intervertebral disk compared to upright. Upright postures is where the effects of gravity on the spine are the most pronounced. Again, up right postures is where the effects of gravity on the spine are most pronounced. So when you're suggesting to somebody that they sit upright all day long, you are subjecting their spine to excessive loads that will absolutely create compression related issues. So thirdly, reclining reduces compression on the disk and thus reduces the rate of disk fluid dissipation. And disk fluid dissipation, is just a fancy word for disc degeneration, degenerative conditions.

Oh, stability ball versus the standard office chair, in case you wanna point to the science if you get a patient 'cause I don't know about you guys but I get a lot of patients who come in and they wanna tell me about how to do office ergonomics. And keep in mind that they're coming to me with pain so it's an interesting discussion. But the stability ball, we had a big fight there for a couple years with me and my patients with my patients and I regarding this subject. And here's the research, I know that there's a lot more but this one in particular was extremely naysaying of the stability ball. Basically, they found that prolonged sitting on a stability ball does not, alter the manner in which a person sits, doesn't make you sit better, whatever that means. And in fact, it appeared to increase the level of discomfort and most importantly, it is important to fully explore a new chair design and consult scientific research before implementing its use. Amen, ain't that the truth? Evidence-based.

So another issue is leisure seating. So the places that people are also utilizing electronics, people sit on their couches, they sit on home chairs, their office chair with their nifty lumbar support, isn't the only place that they are interacting with electronics. So you have to be mindful as a clinician about how, again, asking your patients where do you do the lion's share of your computer use? Because I always say computer workstations, are like dog beds. There's a primary, there's a secondary, there's a tertiary. So my primary workstation is the one I'm sitting at right now. My secondary one is the one I use in my office and the third is any Starbucks or a coffee shop that I'm in with my laptop. Those are the three places I work and as a clinician, if you have, if you identify with your patient where are the three places you work the most? You wanna concentrate on helping them correct the postures and behaviors at least in the primary so that their total exposure to toxic postures and toxic behaviors is minimized in the one place, they spend the most time doing it. So take into consideration everywhere that they work, not just the office or not just the primary.

So lastly, in terms of what chair is best? Can we reduce the effort of maintaining a neutral sitting posture? Absolutely, the ability to maintain a neutral lumbar posture meaning with the lordosis intact as well as less lumbar multifidus activation, is advantageous during prolonged sitting. And so, evidence that chair design, on longer duration sitting may affect low back pain, meaning if you have a chair with a lumbar support and the person is sitting all the way back spooning with it in a bit of recline, you can actually affect low back pain, meaning decrease it or at least stop the hemorrhage point.

So standing, so what is it about standing? As you know, some say sitting is the new smoking, sitting may increase risk of cardiovascular disease but no evidence supports that standing desk diminish that harm. So, there's a lot of, should you be standing at work? If you can, it depends on your budget, it depends on the culture. There are a lot of places, there are a lot of patients that you'll ask does anybody in your office, have

standing desks? If the answer is no, then recommending one is not going to work. Or vice versa, if everyone has a standing desk then great but companies and budgets aren't always allowing for it. What you want is multiple posture options. Is standing a great one? Yes but if you can't afford it, can you still avoid WMSDs? Absolutely. So telling people to stand instead of sit because sitting is somehow the new leper. That's absolutely not true. So standing is helpful but we're gonna talk about how later when we talk about workstation design. It only burns eight extra calories more than sitting. So don't cut up your gym membership yet. Standing for long periods can actually cause enlarged veins and blood to pool in the feet. Standing and sitting are both fine in moderation and what you've got to understand is that sitting is not the new smoking, an inactive lifestyle is the new smoking. And again, that's outside the scope of this discussion but of course if you're spending 11 hours a day interacting with your electronics, you know what you're not doing? Having a life, you're not exercising, you're not walking around. You're not having interactions with human beings. You are inactive in a more macro level and so but that again is a different discussion. But yeah, absolutely it's about inactivity that's a problem.

So ideal sit-stand-move patterns. So what are the ideal patterns that we're recommending? There was a group of researchers that included Cornell, Texas A&M, UC Berkeley as well as many other universities and research facilities across the pond. And they found they made a global statement that this is a consensus statement where they recommend that you sit to do computer work and that every 20 minutes, every 20 to 30 minutes you change postures. Ideally, you will sit for 20 stand for eight and move around for two. But if you don't have that standing desk, in the absence of a standing desk every 20 to 30 minutes just standing up for a period of two minutes has proven to absolutely reduce your exposure to the cardio metabolic risks that we talked about. So it helps jumpstart blood sugar eating and digesting and processing is much better. If you stand up every 20, 30 minutes, for blood glucose levels as well as glute activation. If you activate the glutes it also decompresses the spine so sit well and stand up that's

the minimum sit-move pattern requirement to get out of WMSD development. Simply standing is insufficient, yet just walking around is plenty. So sit well walk around repeat. This is a work pattern that you can modify to your patients needs but generally speaking, this was the consensus statement in a graph form, for every 30 minutes, you sit for 20, you stand for eight, you move for two. Again, if you do not have a standing desk you can stand and use your cell phone. You can march in place and use your cell phone for a few minutes. 25 five is an excellent movement pattern if somebody can't, change postures three times, maybe changing just from sit to stand twice an hour is a good enough recommendation. Now a lot of people say what about standing up once an hour? Based on research, it's not enough, it's not enough for glute activation and it's not enough for blood glucose levels and you don't have to be doing jumping jacks, just walking around in between, 25 to 30 minute bouts of sitting is ample movement to deter WMSD development.

So great, so we know this but how do people actually sit in office chairs? So it turns out horribly in office chairs so even if they have a terrific chair with a lumbar support what are they actually doing in it? Well, in 2001, in a very large office, they found that 75% of people were forward leaning, in their expensive ergonomic chairs. And what they found was that this was headlining findings. Now, a lot of the research that I'll be quoting from this point forward having to do with office sitting behaviors has not been coming. Well, it's been coming from universities but they are studies that are paid for by office furniture manufacturers 'cause they are the ones that are interested in understanding, they're trying to improve the user experience. We interpret that as trying to reduce pain, or trying to reduce WMSD exposure. So that's another interesting thing that not all the research that you're going to be going into with ergonomics has to do with just the medical academic community, it's really about other stakeholders and the office furniture manufacturers, are definitely stakeholders. So this is what they found. So that means 75% of people were forward leaning that means 75% of their users were having an experience that was not intended. 15 years

later, after the advent of a tremendous, ergonomics furniture became big business and ergonomics consulting and all that jazz, 15 years later, has it really changed? Based on this research 1,004 office workers, 23 different companies, 60 different office chairs, 47% were forward leaning which is considered the most toxic posture. Now this doesn't take into account the other toxic postures, meaning that just because 47% were leaning forward that doesn't mean that 53% were leaning backwards with lumbar support, it just means they weren't outright leaning forward. That means almost half of the people were completely using the chair incorrectly. So oftentimes our recommendations is just teaching people how to utilize the products they already have, in a better way.

Lastly, we're going to review computer workspace risk factors that lead to forward leaning and other toxic pressures that make evidence-based workplace accommodation. No, excuse me, let me start that again. Participants will be able to list computer workspace risk factors in order to make evidence-based, workplace accommodation recommendations. Excellent. So it is our job to understand those toxic postures, what does toxic posture look like? But most importantly what does healthful hygienic sitting posture look like? And how do we assess it? How do we identify? And then how do we, what kind of changes can we implement and recommend that are evidence-based? So there are two traditional assessment forms that are commonly used in the ergonomics world that are accepted by Human Resources, accepted by facilities folks that are recognized, not accepted but recognized.

It's also important to just lemme interject here that OSHA does not have guidelines for office workers, they only have recommendations. So there's a real blurry lines as far as what is best and who is responsible and whatnot and that sort of goes outside the scope of this discussion. But generally speaking, RULA and REBA are forms that these non-medically trained people are familiar with, not the forms but certainly the scoring in terms of justifying the need for an accommodation of some sort of modification of the

workplace. So the RULA is the Rapid Upper Limb Assessment. It's been validated on groups of computer users and it focuses on the neck, trunk and number limbs. And REBA is a little bit newer to the assessment form world here ergonomics assessment. And it focuses sort of the preferred assessment form, for computer users that also that are at standing desks. So again, these forms are used for other occupations but for our purposes, we're using it for work assessment at a computer workstation. They are quick and easy to complete. I encourage you to practice filling them out. We will have links to the forms blank forms but you get really quick at using them and I will tell you that as I've been doing this using the RULA and the REBA for years now, I can look at a person and I can guess their total score, very quickly without necessarily filling out the form but you must fill out the form to make for objective evidence of the number. They are quick and easy to complete and the scores indicate the level of an intervention required.

This is what the RULA form looks like. It breaks it down by body part and what you're looking for is you're gonna score, based on the positioning that you see at the neck, at the trunk, at the legs, at the arm, at the wrists and then you add it all all up together and it spits out a number. It spits out a number right here and this is where the REBA score and again this is, once you start using this, it becomes quite easy for you to see, for you to do. Let's take a look here. And so this is what you do once you are, this is where you're adding up, this is where you actually put the numbers and then you get a score here, you get a score for these body parts here. And then you look it up at a table and it gives you that grand score. There's two other issues that it accounts for, you add a one if the posture is mainly static and for most computer users, you would add that one and then force or load is a number between zero and four. But most force/loads for computer work are zero so unless they are typing with a wrist weight on their hand or if there's some consideration for again, for computer work, the force or the load is usually a zero. And then this is what the scoring means most importantly, one to two means there's not a lot of MSD risk, no action required. Three to four, it's

starting to get a little bit more, again there's some risk, five there's some more risk and six plus that's very high risk change now, hair is on fire change now, you can't wait four to six weeks, for the products to be delivered. You gotta go out and you gotta change that workstation immediately. This would be what a RULA of four looks like, he is not using the lumbar support. He is twisting his neck, rotating his neck, his shoulders are on too much flexion, he has contact over here with the table. His wrists are an extension, typing on that keyboard, his whole body is oriented if he's going to be looking at his laptop, there's gonna be a lot of twisting at the neck and a lot of neck flexion looking down. So this isn't a horrible way to be sitting but it is a RULA of four meaning it's a low risk, change needs to happen, particularly if he is complaining of any chronic pain.

Okay, so now let's go to the next one. So this is an interesting case study because we have a lot of people with this thing called the VariDesk, these are called desktop conversions. And these are products that were designed to sit on top of a static desk and allow people to stand and what we see with the VariDesk quite often is that although people can stand with low REBA scores, when they sit, they have higher RULA scores. So it's not a great solution because again, standing doesn't fix poor sitting and sitting should be the predominance of our computer use, our posture options based on evidence. And so if you have a device that doesn't allow you to sit well, the evidence is actually against, recommending these sorts of products and this is a perfect example as to why. So she needs, she's got no lumbar support, she's leaning forward, she's got multiple screens, her hands are up. This particular patient was complaining of carpal tunnel, that was her issue. She was having wrist problems and this is a photographic proof of the risk factors in the workplace that are participating in that. So the REBA form is very much similar but again, it takes more into consideration for people that do standing desks. So again, it spits out of a total score right here and you add them up and it's got these tables that you have to once you put in the

numbers and it tells you exactly what the total number is, you add the activity score and then you get this final REBA score right here, okay?

So what are the total REBA scores mean? Very similar to the RULA of score but high risk investigate, implement change is eight to 10 and 11 plus is implement change immediately. So this is an example of somebody with a REBA score of four. She has neck flexion, her trunk is also in flexion. Her elbows are at a non neutral angle, her wrists are as well. She's making contact with the table, this is a REBA score of four meaning you're gonna have to educate her on how to stand without those postural. Okay, let's move on to the next one. Second case study for REBA, this is medium risk. So as you can see his monitor is not high enough, his neck flexion is excessive. His wrist extension is not neutral, neither is his elbow, he's completely leaning against the table. This is an issue, this would be medium risk, further investigation and absolutely change soon.

So what does, how do you workspace fit? So there are a lot of these online that are available. These are called ergonomic workspace fitting forms. The forms are completely contingent on what equipment the people are using. So if the person is sitting at a bench desk that doesn't go up and down, you wouldn't be using the right half of it, doesn't have to be standing but this is ideal sitting and this is ideal standing. And then this is exactly how you orient the workstation so that the person engages in these postures during work. It's a measuring process, it's fitting, it's just like getting a suit tailored to you. Your workstation should be tailored to your anthropometrics. Obviously, for example, the seat height is going to be different for somebody who's four foot eight, versus somebody who's taller than that. And again, tell me what workstation design you have and I'll tell you what workspace fitting planner you need. This is the sort of workspace planner that you need to create based on the work styles, workstation styles that the person has. The seat height, the desk height, all these things are measured once the person is sitting, in that ideal positioning and then you

bring the, you bring the equipment to the user that is what it is about ergonomics. A person sits well in the chair first and then the equipment heights are measured and decided upon, you don't first place the furniture and then bring the person to it because then the person will accommodate the workstation. Rather, the workstation needs to accommodate the user sitting and standing in these two ideal positions, two or three. There's other positions. This is now most workspace fitting forms are online that you will find have some general guidelines, based on user height. So from four foot 10 to six foot six, you will see that the seat height will change, the sitting monitor height, the keyboard height, the standing desk height is going to change. So these heights change based on user height. Very important, this is another example of a desk that does not necessarily have a keyboard tray.

And again, this is just another example of how you can sit well and stand well and how you design the workstation so that the heights of everything are oriented to the person so that they can sit and stand without a lot of fidgeting. So, that is what that would look like. So that is a workspace planner. Let's go back to that workspace planner so you can see there's the desk, there's the person in it. Here she is standing and then this is what it looks like in real life. So here she is sitting in that ideal reclined posture and the correct orientation to gravity. This is neutral sitting posture. This is neutral standing posture. There has been ample research that shows when a person's torso and thigh are at this 45 degree of flexion, the lumbar lordosis is in its neutral orientation. That's why when you go to a bar, there's always a foot rail. When you go anyplace where you're standing that foot support that supports that 45 degree thigh angle right here, absolutely supports the low back. So when you're designing a workstation or you're trying to fit that workstation to the user, you absolutely take that into consideration. They need foot support in sitting and they need foot support in standing as well. This is a sit stand station called with a standing biased meaning that the desk is always at standing height, learning how to sit well at a standing desk. This is what I see the corporations sort of trending towards, they're trying to figure out how to oscillate

between sitting and standing without having to change desk height. Because they are finding that changing the desk height twice an hour, is impeding compliance with correct sit-stand-movement routines. So this is just an example of an ergonomic workstation that facilitates that sit-stand-move behavior, without a lot of friction points. And again, this is what it looks like in real life, this is her sitting in that posture, this is her standing. And this is a very interesting thing to take into consideration particularly with upper extremity patients is the advent of cell phone use at work. So you have a place to sit well with your computers, stand with your cell phone and then repeat continually oscillating between the two.

This is an example of a workstation that has what we call a detached keyboard tray. What we have found in the real world is the dual monitors, are becoming more of a dual and triple monitors, are becoming a big issue. So we are absolutely needing to think of ideas outside the box 'cause that chronic neck rotation for the dual monitors, it's becoming highly toxic to the neck and the upper extremities. This is an example of a filled out a workspace planner. We take notes on the side as far as like what other things that they may need, foot rest, with keyboard trays, with mice, again, it's completely contingent on the person's, work style but I'm going to take this through. This is a patient that came in with neck pain. We did a workstation fitting in the office, then I was invited to her office. Her RULA score was a five, this is photographic evidence of what might be participating in her, what might be participating in her neck and in her repetitive wrist issues. So we gave her a detached keyboard, trying to foot rest to allow for that good posture. And this is what if you give me a second now, I'd like to share that video now to show you what that looks like. Is I want you to swivel left and light to see your monitors. See how much easier it is now that you can see your monitors without having to swivel your neck? All right, and how does that feel?

- It feels great.

- [Jeannie] Okay, give me a thumbs up. Okay, so that is the sort of oops, just hold, there we are. So that is for example a solution for somebody who has chronic neck pain or upper extremity pain with multiple monitors. So this is what I'm saying to you, I'm suggesting that you look at the research because what people are using how they're using electronics is really changing so much day to day and there's so much research to come upon that's why it is important that you stay really abreast of the most common or the most up to date research 'cause last year's research may not be applicable to this year's habits.

And now we're just gonna do a before and after, a gallery of my travails as a corporate ergonomist and as a clinician. And so as you can see the before picture that is a RULA score of seven to me and so what do we do? We play some back in the chair, we educate them, feed on an angle platform but all the way back in the chair, sit back, relax in your chair, no upright, stressful sitting, sit back in your chair, adjust your lumbar support so that it is fitted between your ribs and your pelvis comfortably. And then place your shoulders, elbows and wrists in a comfortable position. Place your keyboard and your mouse underneath your hands, whether it is the desk itself, whether it is a keyboard tray, whether it is a detached keyboard tray and the last thing you do is you adjust your monitors so that they are looking straight ahead with zero degrees of neck flexion.

Here's another case study. Low back pain, this is a RULA five, leaning forward, she's leaning on the desk itself. And this is simply going to start causing pain over time. So again, educating feet on a foot rest butt all the way back in the chair, spoon with the lumbar support of your chair, get your elbows by your ribs, get your hands underneath, bend your elbows to 90 degrees. Get your keyboard and your mouse underneath your hands, adjust your monitor, boom, it's a RULA of one.

Same here we start with a very high RULA score. We teach them sit back in your chair, spoon with the lumbar support, get your keyboard and your mouse in your hands, underneath your hands right above your thighs. Whether again, it's the desk, a keyboard tray, a traditional keyboard tray or a detached keyboard tray. Here's again before and after. That chronic reaching caused her to have this as a perfect example of how repetitive shoulder stress injuries happen. And this is what we did for her. We seated her back again, we always go back to the correct positioning. We got her keyboard and her mouse in the right place and then we got her this cute little table on the side because this desk does not have a return. When a desk is L shaped that L part is called a return. We got a little rolling return so she doesn't have to forward lean a lot to reach stuff and get her out of that good neutral posture.

Here's another example of a person who's straining her neck and her arms and her shoulders to look and then completely corrected underneath, another example. Yet another example of us utilizing this great little side table. This little side table really does help for people with lower, with not such great desk, the short desks, this little rolling side table is really quite helpful. Let's see, do I have any more of these? Yeah, and so that concludes our talk and we're gonna do, take some questions now. Does anybody have any questions?

- [Fawn] Hi, Jeannie, thanks for a great talk. Let's see what questions are coming in here. The first one we have is from Michelle, she asks, in the ergonomic seated workspace fitting how is the neck supported? I see potential for forward head posture or neck strain if the chair does not have a neck support?

- [Jennie] That's an excellent question. So according to the RULA and the research that validates the RULA, a person can have up to 20 degrees of neck flexion before, it counts towards MSD development. I'm gonna go back if I can, give me just a minute 'cause I think it's easier to have this discussion. So the RULA allows for 20 degrees of

neck flexion before you actually start with that. So right here, it says up to 20 degrees of flexion in the one, right? So if it's zero to 20 degrees it's okay. It's important to understand that what we're looking at is we're not looking at neck flexion when we see somebody reclined in their seat. What we are seeing is torso extension and there's a difference. So up to 20 degrees, if a person reclines up to 20 degrees, it is okay to have a chair without a headrest. If they are deep recliners, then yes, we recommend chairs with headrests. But it's important to note that there is a difference between, the intervertebral disk pressure of somebody looking down 20 degrees, meaning their torso is plumb, their torso is plumb to gravity and their neck is looking down versus a head that is plumb resting on a torso that is reclined 20 degrees. So they're not the same thing in terms of intervertebral disk pressure. So when we talk about 20 degrees of looking down that is different in terms of compression forces at the neck than when a person is reclined 20 degrees but absolutely, I recommend neck supports as you can see in this graphic. Right here oh, there's my arrow, so I often use neck supports for deep recliners. Does that answer your question?

- [Fawn] That was, thank you for that response. I don't see any more questions and she did not respond but you did a thorough job explaining that. Thank you so much. I think we'll go ahead and wrap now. We are at time but if you have any further questions, please feel free to reach out to her and she'd be more than happy to answer your questions. And at this time, we'll say thank you very much.

- [Jennie] Okay, thank you. If you have any questions, just email me at info@ergoRX.com.

- [Fawn] Thanks, everyone, I hope everyone has a great rest of the day, you join us again on Continued and occupationaltherapy.com. Thanks everyone.