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Geriatric Functional Performance Measures Recorded April 8, 2020

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- [Carolyn] It's my pleasure to welcome to physicaltherapy.com today our presenter, Sarah Stillings. Sarah or Sally Stillings received her physical therapy degree from the University of North Carolina at Chapel Hill and practices in Texas. In her extensive career as a physical therapist she has held a variety of clinical, teaching and administrative roles including as General PT Practitioner, Certified Hand Therapist, Clinic Coordinator and Manager and Continuing Education Instructor. She enjoys creating evidence-based continuing education materials for physical therapy and occupational therapy professionals. Many of her courses focus on best practices in geriatric care. Sally, it's great having you with us today and I'll turn the microphone over.

- [Sally] Great, thank you so much Carolyn and wow, it's so exciting to see people from all over the place joining us today, including some fellow Tar Heels so that's really wonderful. I'm going to talk to you today about geriatric functional performance measures. And you can see that we have a presenter disclosure there and I have nothing really to say other than receiving an honorarium. And we also have your learning objectives, which you'll see on your slides there. After the course you'll be able to discuss at least two significant aspects of the background and history of how we have clinically used functional performance measures, you'll describe the theoretical background behind the development of these functional performance measures, you'll be able to differentiate and describe factors between at least two types of functional performance measures and outcome measures. You'll be able to describe parameters of at least three mobility and four balance measures that are commonly used with older adults and you'll be able to identify at least two appropriate functional performance measures to use in a given case scenario. So let's talk a little bit about why functional performance measures. Well first of all we have heard so much in our lives as physical therapists, it's all about function. We focus on function from the time that we start PT school and we learn that creating good programs to help with function is absolutely

key to helping us get our patients to have an improvement and to meet their goals. In fact if you look at the APTA definition of the physical therapists scope of practice, you see that word function multiple times. "Physical therapy is a dynamic profession "with applications in the restoration maintenance "and promotion of optimal physical function." There you go. "Physical therapists are healthcare professionals "who help individuals maintain, restore "and improve movement, activity and", guess what? "Functioning, thereby enabling optimal performance "and enhancing health, well-being and quality of life." And of course we know that those goals of enhancing health, well-being and quality of life is basically why we're all PT practitioners.

So understanding function and how to address it are both essential to being good therapists and this is especially important as a component of therapy for older adults, those who are age 65 or more. As we age some decline in functional abilities is normal but major declines in function can lead to hospitalization, a need for long-term care and even increased mortality rates so in older age groups we know that even relatively small improvements in function can have a major impact on the patient's independence, quality of life and health care utilization. This is just one of the many reasons that functional performance measures are essential elements in the clinical toolbox of every therapist who works with older adults.

Okay, so we agree that understanding and addressing function is really essential to providing good therapy, especially with older adults, but why do we need standardized functional performance measures? Why can't we just measure all those things we learned about in school, range of motion, strength and so on and work from there? Well let's take a little closer look at that. Why do we measure functional performance? There are four main reasons. The first is screening. For example, if you have a patient who's come in for therapy but is not doing well and you suspect may have some depressive symptoms you might use the geriatric depression scale to screen with them. The second reason is description. It helps us understand where that patient is

functionally today. The third reason is prediction. Where might that patient be functionally in the future if we help them? And finally outcome evaluation, which we all know is so important in today's climate and that's to see what difference our interventions made to that particular patient. So why do we measure functional or why do we use functional performance measures to measure function as opposed to simply using measures like goniometer and manual muscle testing and so on? Well the main reasons are because functional performance measures can provide accurate and objective record of patient performance, they allow comparison with normative data, in other words they give us the ability to compare a patient's performance with age and sometimes gender related peers.

They provide prognostic indicators, that is they give us objective data to predict possible outcomes for that patient, such as fall risk and they help identify specific impairments so that we can develop an appropriate PT plan of care. And finally, they support the development of appropriate patient-centered goals. That is goals that focus on change that is meaningful to that particular patient. Now let's just speak briefly about the history of functional performance measures. The use of standardized tools to assess function is actually a fairly recent innovation in rehabilitation medicine. The first broad-based functional performance measures were not introduced until the last three decades of the 20th century.

Before that time therapists had to use observation and subjective assessment to try to determine each pain level of function and then to understand how specific therapy interventions affected that patient's function. Therapy was based mostly on a good understanding of anatomy and physiology combined with a common sense approach as to what seemed logical for a given situation. This kind of subjective approach was especially difficult with older adults because we know they often have a more complex medical history than younger adults as well as age-related physical changes that directly affect their function. So good therapists during those early eras developed a

knack or a sort of intuitive sense of what worked and what didn't in rehabilitating their patients. But we also know that common sense and intuition may sometimes be wrong because they are based on limited human understanding within a given social and cultural environment. Just as one example, before the germ theory of disease became accepted in the late 19th century, physicians felt that bad air or unbalanced body humors were what caused illness, which led to all kinds of inappropriate treatments that had seemed perfectly logical to them at the time.

Okay, so prior to the mid 20th century, there was very limited scientific or research evidence to support the role of function within therapy assessments, interventions and outcomes. And thus there was little standardization in how function was measured. In 1971, the first definition of functional assessment was published by a gerontologist, MP Lawton. He said that functional assessment was "any systematic attempt to objectively measure the level "at which a person is functioning in a variety of domains." His article, which is listed in your references also discussed various techniques for assessing the function of elderly individuals in several different areas including physical health, physical self-care, instrumental activities of daily living, mental and psychiatric status, social roles and activities, attitudes, moral and life satisfaction.

I mean wow, he wanted to cover all of the bases. However, those first functional performance measures that were created during the 1970s were still very subjective and they didn't have much research to back them up. So for this reason it wasn't until about the early 1980, I mean up until the early 1980s most clinicians still thought of functional assessment as an attempt to measure something that really was essentially unmeasurable. Throughout the 1980s and 1990s that finally began to change. Research had been expanding exponentially across all medical disciplines, including therapy, and there became a major focus in the rehab world on developing better functional assessment tools. So many of the instruments that we are familiar with now were first introduced during those decades of the late 1980s and the 1990s. Now let's

take a quick look at the theoretical background. There were several important reasons for this change that I just mentioned to you. Dale Avers in her chapter, describes two of the primary drivers behind the use of performance measures. These were evidence-based practice and globalization, in particular the universal perspective of health. This Universal perspective of health that she mentions is represented in the World Health Organization's 2001 International Classification of Functioning, Disability and Health. Now we're all familiar with that model that we can see here. The ICF model is a conceptual framework to understand human disability. It's widely used in both physical therapy and occupational therapy to help structure and support the rehab evaluation process.

So instead of focusing solely on physical contributors to disability, this model began to look at the whole person within their environment and you'll remember from school and then looking at the slide, the ICF model looks at the relationships between various domains that include an individual's health condition and any diseases or disorders he or she may have and how that's related to body functions and structures. The individual's ability to complete activities, the person's level of participation in family work, community and so on, all of that within the context of environmental and personal factors.

The ICF model demonstrates that each of these domains affects multiple other domains, which helps shape the understanding of each person's unique health experience. Most functional performance measures are now based on this ICF model or some similar conceptual model that focuses on the whole person within the environment. For example, the person environment occupation model that's often used in occupational therapy practice. These models provide us with an agreed-upon framework for explaining a person's health status and functional impairments in order to develop appropriate interventions to address them. Now we know that impairments are related to functional deficits and let's talk a little bit about how. As we saw in the

ICF model any impairments or deficits that an individual has in body functions and structures will directly influence their ability to complete activities and participate in the world. In other words there's a very strong relationship between impairments and function and this is why we as therapists have always assessed and documented each individual patients specific impairments and also documented how those impairments may improve over time with our interventions. In fact when I was a new therapist that focus on impairments was pretty much how I looked at things. Okay, I see this patient has a decreased wrist extension strength so let me write a goal to increase her wrist strength to four plus out of five and then be happy when that patient met the goal. But we began to realize over the years that wasn't enough and research began to show us that improving impairments didn't always translate into better function.

Over time our emphasis change from impairments to functional deficits. Why does that patient need a stronger wrist? Well to be able to lift a pot off the stove. Okay that goal's better, now we're involving some function, but there was one catch with that. Maybe that particular patient didn't care about that activity, right? So my patient said to me, "But my husband does all the cooking in my house, "that's not important to me." Oops, okay well what is important to her? And she said I love to go fly-fishing and right now casting is a problem for me.

Okay, now we're getting somewhere and we can write a functional goal that is specific to that patients identified needs and desires so let's get this patient out fishing again. So you can see that we've gone over the decades from a focus on impairments alone to a focus on general function and now more appropriately to a focus on patient specific functional goals and this is a place where functional performance measures can really help us identify areas that need attention in order to individualize our interventions to help meet those patient specific goals. In fact we now know that not every impairment relates directly to function, particularly in older adults. For example, if we test an older adults quadricep strength in a seated open-chain position, it may tell

us something about the strength of the muscle group but it doesn't necessarily tell us much about how that muscle group will function in a closed chain position or about its endurance when the patient is descending stairs or walking. So instead of or in addition to manual muscle testing we may want to use a functional performance test. For example, the five times sit-to-stand is an alternative and accurate way to assess lower extremity function and in fact research has shown that it can be used as a surrogate for limb strength. A test like this can actually tell us quite a bit about that individual's function and prognosis as well as allowing us to compare that patient to age group peers. When older adults have body function and structure impairments they may begin to adapt activities and self limit what they do. Sometimes these adaptations are useful and functional but in other cases they are not.

For example, if a senior has lower extremity weakness that means he cannot rise from the floor, he may begin to limit his activities to avoid anything that might require that maneuver. So we now have an increasingly limited range of activities that he will choose and we know that this leads to an increasing decline in function as well as to obvious safety issues if he were to fall and be unable to get up again.

This is just one example of why it is so important to understand body structure and function impairments and the broader context of function and this is where functional performance measures can provide us with information that takes that broader context into account. A little aside here quickly to give you some definitions to use throughout the course. So what exactly is a functional performance measure? Well let's first define what functional performance is. We can say that functional performance is essentially an individual's capacity to carry out activities required for daily life. These activities can obviously cover a wide range of possibilities depending on the individual. In the context of physical and occupational therapy Letts and Richardson define them as: mobility, self-care, leisure pursuits, and activities associated with contributions to society through work or volunteering. Then next we can define functional measurement.

William Frey states it like this, "Functional measurement refers specifically "to quantifying an individual's performance "of particular tasks and activities "in the context of specified social "and physical environments." So if we combine those two definitions we can see that a functional performance measure is a tool or an instrument that allows us to complete measurements of specific functional abilities in an organized and standardized way. Also another definition we're going to use in this course is older adults. We're using that term to refer to individuals of age 65 years or older, a group you're often going to hear referred to as the geriatric population or Medicare age patients. I also sometimes use the word seniors to refer to this group. The majority of what we will discuss here will also apply to middle-aged adults.

For example, those of ages 45 to 64 so you can use a lot of this information for that population as well, although that age group is not our primary focus. So let's talk about what we are measuring when we're using functional performance measures. The focus of most of these instruments is the individual's ability to complete specific mobility tasks and basic ADLs and for a few measurement tools also instrumental ADLs.

Different tools do this in different ways and with varying emphasis on what is most important but regardless of how they're structured functional performance measures provide a standardized format that allows us to assess each patient within a larger context rather than just focusing on single attributes such as range of motion or strength. As adults reach age 65 and beyond their life roles and the kinds of activities they engage in tend to change. We know that leisure time may increase after an individual retires from paid work. However, normal age-related changes in body structure and function may limit how the older adult uses that leisure time. Increased health complications are also common and these often directly affect the seniors functional abilities. So what are the most important contributors to good function among this age group? Well research has shown that there are several priority areas for understanding functional performance among older adults. The first is mobility, the

ability to move independently in one's environment and this may include transfers, ambulation or wheelchair locomotion. And for ambulatory older adults especially walking speed or gait speed. Balance is next, this directly affects fall risk as we know and among older Americans, falls are the leading cause of injuries and of injury related disability and death. Also lower extremity function. Typically we're looking at strength, power and range of motion. Upper extremity function, we're typically going to look at strength, range of motion and fine motor skills.

And then finally activities of daily living, self-care and so forth which directly affect the seniors ability to be independent. Older adults who have good function in these listed areas tend to remain independent longer, they require fewer health care interventions, and they tend to report better quality of life than seniors who have deficits in these areas. Now there are several different ways to categorize instruments that measure functional performance, outcomes and so on in the clinic and I just want to briefly touch on the different categories with you. First is physiological measures. A physiological measure assesses one single biological attribute or body function. That's one biological attribute or body function.

These physiological measures are sometimes also called clinical measures and these measures are not traditionally thought of as functional performance measures. The most obvious examples in this category would be the measurement of the five major vital signs, temperature, pulse rate, blood pressure, respiratory rate, and oxygen saturation where we're looking at one thing at a time. Physiological measures can also include the patient's perception of one specific area of focus. For example, with the fatigue severity scale we look at fatigue levels and how that fatigue affects the person's activities and lifestyle. A few other examples of physiological measures that are used regularly in physical therapy with older adults include a rating of perceived exertion, the pain analog scale, the mini mental cognitive index and the modified medical research council dyspnea scale. The next type of measure is a condition specific or body region

specific outcome measure. We're all familiar with quite a lot of these outcome measures that are for specific conditions or regions of the body and most of us use them quite regularly in the clinic to assess patients function and the outcomes of our therapy interventions. Some authors actually include these conditions specific patient outcome measures in the category of functional performance measures but others consider them a separate category and for the purposes of this course we will consider them as a separate category. You do have some listed there on your slide, ones that you're probably familiar with that have to do with specific regions or conditions. Now another way to categorize functional performance and outcome measures is by how they are administered.

That is whether they are self-reported or performance based tests. Self-report measures are those instruments that can collect information on the patient's perception of the attributes being considered, such as pain impairments, specific functional tasks or activities, quality of life and so on. The most common formats are checklists, rating scales and inventories. The individual or maybe sometimes they're medical proxy, fills them out in writing online or verbally. These types of self-report instruments are generally fairly short and simple to administer so they are used frequently in the therapy clinic.

For example, patients might fill out self-report questionnaires about their condition or their function as part of their standard intake documentation. Self-report measures can include physiological measures such as a visual analog pain scale, a condition specific measure such as the dash for patients who have diagnoses involving the upper extremity or functional performance measures. One example of that is the Short-Form 36, which we'll discuss more later on in the course. As opposed to self-report measures, performance based tests are observer rated measures, most of them examine physical abilities. Simple performance-based measures at the impairment level might include documenting range of motion limitations or strength deficits as we

discussed earlier. At the functional performance level there are many, many instruments available that serve a wide variety of purposes. With these functional performance measure tools, the therapist observes the patient completing specific activities or movements and rates the patient on attributes such as movement quality, the ability to perform those specific tasks and so on. Performance based tests are designed to be as objective as possible, although we do know that every clinician assessment is going to involve some degree of subjectivity. Okay, so we have self-report measures and performance based measures, which cover quite a lot of ground. When we talked specifically about functional performance measures they can also be categorized by whether they assess a single dimension or multiple dimensions of the individual's functional abilities.

Single dimension measures, many of them we use regularly with our patients and these are designed to assess one single dimension of functional performance. This might include one item to look at one specific element of function such as a gait speed test. Or the measure might use multiple items to assess one particular element of function such as the Berg balance test. Multidimensional measures as the name implies look at more than one element or domain of function. In some cases these may be multi-activity mobility measures, which use a variety of different activities to examine different aspects of functional movement.

One example is the Short Physical Performance Battery, which uses various activities to assess lower extremity function, balance and mobility. In other cases the multi-dimensional measures move beyond just evaluating physical performance and may also include domains such as cognition, communication, social interaction or emotional and mental health. The functional independence measure is one example of a tool that examines some of these other domains. Now we've talked a lot about how good functional performance measures are and why they're important but they do also have limitations. They're excellent tools but they are only tools. Excuse me. There are

some obvious limitations to their use and interpretation. The most obvious is that no one tool or even group of tools can truly assess an individual's overall functional abilities. Instead they give us an approximation of function at one moment in time. Think about if we look at a photograph of someone it can give us an idea of what he looks like or maybe suggest a bit about how she interfaces with the world but that photo can't really tell us who that person is or what makes them tick and that's the same that is true with these measures.

They can tell us a little bit about how someone functions but they cannot give us a comprehensive or in-depth picture of every ability that that person has and how they interact with the world. We also need to remember that these tests have to be considered in context. Earlier we mentioned William Frey's definition of functional measurement, which was quantifying an individual's performance of particular tasks and activities in the context of specified social and physical environments. It's really important to pay attention to that second part in the context of specified social and physical environments.

We're looking at how the older adult performs ADLs or other tasks within the given environment where we test them and we need to understand that that senior may perform differently in a familiar home environment than in a new or unfamiliar clinic environment. So these tests are basically snapshots of performance on one specific day within one specific environment and they should not be over generalized to everything that the patient does in other environments. David Scalzitti states it well when he says, "Although these tests employ the method of "direct observation of performance "they most often do not measure the task or activity "as it might be accomplished in the real world "of the patient, which is also influenced by "motivation and habit." Now what are some of the factors that affect the choice of our functional performance measures? We know that there are literally hundreds of performance and outcome measures out there and other clinical assessment instruments as well for us

to use. With that wealth of availability how do we choose which one to use for any particular patient? We know that different instruments measure different things in different ways and no one instrument is perfect for all patients or in all situations. There's also significant overlap between some instruments but with a slightly different focus, wording, method of scoring or domains that are covered. All of this affects their use and the information that they provide. For example, one instrument might be appropriate for moderately healthy older adults but not for those who are frail. While another might be just the opposite, so there's a lot to consider in choosing which tests or tests to use. We also need to remember that there are specific issues with older adults that can affect the evaluation of functional performance.

Some of these issues to be considered include sensory changes that can occur with aging, fatigue which is more common in seniors, cognitive changes, educational level and health literacy level. So keeping all of this in mind how do we ever decide which tests to use? Well by looking at specific attributes of the test it becomes easier to determine which choice or choices may be best. Some of the factors that we need to think about in selecting a functional performance measure include the domain or category of focus, the area physical function. For example, is it mobility, other physical skills, ADLs, IADLs?

The aspect of function being tested. For example independence versus dependence, time required, degree of difficulty, adaptations that are used, the influence of pain and so on. How well the instrument measures the domain being examined. The time frame being sampled. For example, a self-report over the last four weeks like the ABC scale or immediate assessment of specific physical skills like we have with the TUG Test. The mode of administration, the scoring system, the time required to complete the test, who completes it, whether a clinician, patient, family member as proxy or someone else and finally whether additional instruments are needed to get a full picture of the patient's functional status. On the previous slide I have a link there to a wonderful

article on Physiopedia, which I recommend to you. It's called the "Guide to Selecting Outcome Measures" and I think it can be very useful to learn a little bit more about how some of these selections are made. Now the importance of using standard procedures. We heard all about this at school but sometimes when we wander away from it. Most therapists are not using functional performance measures to conduct research but simply to gain more information about their patients in order to make better patient care decisions. So it might then be natural to think we don't really need to adhere to the standard published procedures for whichever test we're using, however evidence does show us that adhering to standard procedures is just as important in the clinic as it is in the research lab because that consistency is the only way we can get accurate interpretations of the domains that we're testing with that particular instrument.

The normative values, reliability, validity, diagnostic accuracy and all the other tests attributes are based on administering the test using the published procedures. So when we vary from those procedures we can't necessarily rely on the results of the tests. Now I'm a realist, we live in the real world, not an ideal one and sometimes we do need to make changes because every patient is different. So if we find that we need to vary from test procedures for some reason to accommodate our patient it's really important to document how our administration differed from those published procedures.

That allows the same procedures to be followed the next time that test is administered for that patient so that there's better consistency. These types of minor adaptations are actually fairly common in geriatric care. We try to stick by the standards but there are times it doesn't work so well. An article by Krohne et al stated that "The test situation generates a tension "between what standardization demands "and what individualization requires." They're qualitative study looked at how PTs and OTs navigate between adherence to the test standard and meeting what they consider to be the individual patients needs in the test situation. The authors found that we

therapists do this using our professional relational competence. In other words, therapists are really good at weighing what's best for the patient against the soundness of the information that we need to obtain and then finding an acceptable compromise that works for the situation. The key to remember is to always document what you've done so someone else can recreate it later. Where to find functional performance measures. Well there are lots of resources. I won't sit and read you the list but I did want to point out just a couple of these.

The Shirley Ryan AbilityLab, which was formerly the Rehabilitation Institute of Chicago, has a wonderful database that has over 400 different rehab measures that are described in detail. So that's often a really good place to start if you're looking for a specific test or more information about it. Physio-pedia.com is a United Kingdom based information website. It's often referred to as Wikipedia for the physiotherapy profession and even though it's not US-based, it's got some really great information so I recommend that website to you as well. If you turn to YouTube for performance of tests, there are some great resources out there. Just be sure to look for ones that are being performed by an experienced and licensed clinician, preferably someone who is in a similar field to the one that you are.

So now that we understand the background of functional performance measures and how they're often used we're going to look next in the next section at some specific examples that are often used with older individuals. Remember that these are just examples. I'm not necessarily recommending the tests I describe as being better than others, however it's just helpful to be familiar with them because these are tests that are used fairly commonly with the geriatric population in a wide variety of therapy settings. Now in some cases as I go through the individual tests I'll give you information on where to find that specific measure. For instruments where I don't supply that information you can use one of the resources on this slide and as I mentioned the Shirley Ryan AbilityLab database is often a very good place to start. So

give me a second here to take a water break. Great and let's talk first about self-report measures. I'm going to discuss just three different self-report measures. The first two are also classified as balanced measures. Later on in the course we'll talk in more detail about other instruments that we can use for assessing balance. The first of these self-report measures is the Falls Efficacy Scale International, which is usually a abbreviated FES-I. This is a tool that assesses an individual's concern about falling during specific activities of daily living. It's a 16 item questionnaire that can be administered in writing or verbally by interview and also online. Each item is rated from one which means very confident, to four which means not confident at all, for a total possible score of 64.

The higher the score the greater the patient's concern about falling obviously. The test takes about 10 minutes to complete. The FES-I has been shown to have good reliability and responsiveness. It has also been shown to have good validity for numerous international populations. In addition to the English version it has been translated into about 30 other languages so you have lots of options out there. There is also a seven item short form of the FES-I available, which was developed in order to increase the tools feasibility of use.

According to Dale Avers the short form is highly correlated with the regular FES-I. It does not have ceiling effects and it assesses fear of falling as well as the FES-I. In fact some authors feel that the short form may actually assess fear of falling better than the standard FES-I. Both of these forms can be administered in writing, online or verbally, by having the clinician read the questions to the patient. The English version and all the translated versions are available on the web through the University of Manchester and you have a link there on your slide. The activity specific balanced confidence scale, which is usually abbreviated either A-SPC or the ABC Scale is a 16 item self-report instrument to measure older adults confidence in their ability to perform daily activities without falling. Each item is rated as a percentage from 0% which means no

confidence to 100% which means complete confidence that the individual will not lose balance or become unsteady during that particular activity. Results of less than 50% indicates low confidence. 50 to 80% indicates moderate confidence and greater than 80% indicates high confidence with balance. The ABC Scale was designed to include a wider continuum of activity difficulty and more detailed item descriptors than the Falls Efficacy Scale. The ABC Scale can be self-administered using a written format or it can be administered through an in-person or telephone interview. The printed version of the scale includes a visual analog scale showing zero to 100%. Whichever way the test is given the instructions state that the administrator should query respondents concerning their understanding of instructions, make sure they understand what they're doing and also probe into any difficulty answering specific items.

The ABC Scale takes about five minutes to complete. No training is required for this tool and it is free to use. It can be found on the neuro toolkit website at the link that's shown there in your materials. Another example of a self-report measure is the Short-Form Health Survey or SF-36. We will discuss that measure later on in the section on multi-dimensional instruments.

Now I did want to mention one other self-report measure here although it's a condition specific scale and not a functional performance measure, I want to mention the geriatric depression scale short form because I feel it's very important for every therapist and therapy assistant to be familiar with either this tool or other similar depression related screening measures to be able to screen for possible depression in our older patients. It may be that your patient seems lethargic or particularly fatigued, maybe they have difficulty concentrating on your instructions or they're having problems making decisions. If there's no obvious physical or cognitive cause for these symptoms then depression screening would definitely be appropriate. We know that both depression and anxiety both tend to be under reported and under diagnosed in older adults and so they frequently go untreated or may get treated inadequately. The

good news is that both of these conditions are quite treatable in the elderly once they're diagnosed. The GDS short form is a 15 item questionnaire that requires only a yes/no answers and takes about five minutes to complete. According to the instructions for clinical purposes a score of greater than five points is suggestive of depression and should warrant a follow-up referral for further evaluation. The GDS is in the public domain and can be freely used by any clinician. It has been translated into more than 30 different languages so again, you have lots of choices. More information and the forms are available on the web through Stanford University at the link that's shown there in your materials.

Let's talk next about mobility measures and first we'll talk about the single activity tests that are mobility measures. The first of these is gait speed. Now earlier on in the course when we discussed physiological measures, we mentioned the five vital signs: temperature, pulse rate, blood pressure, respiratory rate, and oxygen saturation. In geriatric rehab settings walking speed is often informally referred to as the sixth vital sign. Although sometimes you're going to hear that pain is the sixth vital sign or maybe shortness of breath is the sixth vital sign.

The point is it's important. The reason that walking speed or gait speed is sometimes called the sixth vital sign is because it tells us so much about the functional abilities of older adults. A reduction in gait speed is associated with seniors prognosis for decreased balance confidence, future decline in health status and an increased risk of future falls, disability, cognitive impairment, need for hospitalization or institutional care and even mortality. One study by Kirkwood et al showed that declines and walking velocity typically started at about age 65 decreasing by about 0.03 meters per second on average per year after that age and after age 71 walking speed decreased by about 0.18 meters per second per year on average. By the time most adults reach age 75 to 80 there has been a significant decline in gait speed and thus they have this increased risk of adverse health effects. Tests of walking speed are appropriate for most

ambulatory older patients and in all rehab settings. Seniors who use an assistive device should be tested with that device and this should be documented with the test results. Actually before I go on to distance walk, let me say a bit more about gait speed. There are several different protocols for measuring gait speed that have been studied and they use various distances. The consensus appears to be that distances of four meters or less have reduced accuracy and are not recommended. Most authors recommend using either five meters or 10 meters and it should be along a straight path that does not involve turns. The start and end points and the path should be marked on the floor with tape if that's possible, if that's not feasible in the setting where you work you can stretch out a rope of the appropriate distance and lay that on the floor. Several studies also recommend that the patient be allowed a 2.5 to three meter acceleration before the testing area and a deceleration area of equal length beyond it because the research shows that accuracy of the gait speed test is improved when the patient has a walking start as opposed to a static start.

To do this test the therapist begins the timer with the first foot fall at the start point and ends it when the patient passes the end point. The number of meters that were covered is divided by the overall time to give a figure of velocity in meters per second. Most walking speed tests involve asking the patient to walk at a self-selected, that is normal or comfortable pace. However there are occasions when a maximum gait speed test may be useful. This is sometimes also called the fast walking test. The maximum gait speed test is considered a more accurate measure of the individual's community mobility than as normal gait speed. For example, it can provide information about the patient's ability to increase speed in response to environmental demands such as quickly crossing the street at a busy intersection. There are several good online calculators and apps that can be used for walking speed tests. Research suggests that a gait speed of less than or equal to 0.8 meters per second is a predictor of poor clinical outcomes. Now let's talk about some of the different distance walk tests that are frequently used. These are designed to provide information about an

individual's walking endurance and aerobic capacity over a specified distance. They've been widely used for several decades to provide information about patients functional exercise capacity in many different rehab settings. The most familiar of these distance tests is the Six Minute Walk Test, which is abbreviated 6MWT.

This is a submaximal exercise test that has been widely researched with a variety of ages and populations. The test has been shown to be valid, reliable and a responsive indicator of both aerobic fitness and lower extremity strength in older adults and it gives us a good deal of information about a seniors functional capacity. The items required to administer it are a stopwatch or other timing device, a chair, a measuring distance for meters, a long hallway or an open area of at least 12 meters in length with a smooth consistent surface. In other words, like a quiet gym or a hallway. It should not be administered in a busy or noisy environment due to distracting the patient. And you need markings to indicate the turn around which might be tape on the floor, cones or other turn indicators and then either a mechanical lap counter or pencil and paper to count the number of laps that the patient completes.

The patient starts seated in a chair near the start of the marked course. The patient should be rested prior to starting the test. The clinician takes the patient's vital signs and records the current level of perceived exertion before the test. The patient is then asked to walk as far as possible in six minutes back and forth in the hallway or gym. Any assistive device orthoses or braces that the patient normally uses should be used for the tests and the therapist documents that in the record. The patient can take standing breaks whenever he or she needs to but if they need to sit then the test is ended. The therapists documents the patient's vital signs and the rate of perceived exertion again at the end of the test. The score is the total distance walked during the six minutes or until the patient had to sit down. Additional details for administering and scoring the 6MWT can be found on the neuro PT website at the link that's shown in your materials. It can also be found several other places on the web that you might

already be familiar with. Normative data has been established for a number of different populations including older adults. Research has shown that shorter distances covered are indicative of potentially worse health profiles in seniors. For example, a study by Ali Yazdanyar et al found that older adults who walked less than 338 meters on the six-minute test were at increased risk of cardiovascular disease and of all cause mortality. The 12 minute walk test is another distance test alternative that obviously demands a higher level of fitness than the six-minute test. It's used frequently in a few specific clinical settings but it's not used as frequently with geriatric patient populations so I won't go into the details of it here.

The Two Minute Walk Test or 2MWT is another distance walk test that's often used with older adults. It may be more appropriate than the six-minute test with the frail elderly, individuals with poor concentration or seniors with poor endurance and it could also be useful in busy clinics or when you have limited time. It has also been shown to be reliable, valid and responsive in a variety of populations. The equipment needed for the 2MWT is essentially the same as for the six-minute test. The procedures are also similar with the patient asked to cover as much distance as possible in the allotted time. As with the longer walk test, standing rest breaks are allowed but the test is ended if the patient needs to sit down.

A different approach to walking test is the 400 Meter Walk Test, which is sometimes also called the Long Corridor Test. This is a well-researched distance walk test that has been found to be a reliable, valid and responsive with the older adult population. 400 meters is just under a quarter mile, which represents a distance of roughly four to five city blocks so this test is useful for measuring the individual's community mobility and how well they're able to handle that. It's a test of aerobic capacity that obviously requires a higher level of effort than the Six Minute Walk Test. The 400 Meter Walk Test has a floor effect because the patient must be able to complete 400 meters to be able to obtain a score on the test at all. The patient is allowed to take standing rests but if

they sit down before reaching 400 meters then the test ends and no score is given. The instructions for the 400 Meter Walk Test require it to be given in an open area such as a long hallway that is 20 meters, which is about 65 feet in length. So it's obviously not feasible for every setting. The other items required to administer it are essentially the same as for the Six Minute Walk Test. The patient walks back and forth until a total of 10 laps up and down the corridor have been completed. As with the other distance walk tests, an assistive device or orthoses can be used. The clinician will also assess the patient's vital signs before and after the test. As with gait speed test the 400 Meter Walk Test can be given one of two ways. The clinician can ask the individual to walk using a comfortable or normal self selected speed or the clinician can ask the individual to walk as fast as possible without running or jogging to cover the 400 meters.

The variation that's chosen will depend on what information we're trying to obtain about that patient's function. Older adults who are unable to walk 400 meters in seven minutes have been shown to be at risk for significant functional limitations. One study showed that the median time for a large group of individuals aged 70 to 79 years and who had no reported mobility limitations was about five minutes nine seconds for men and five minutes 36 seconds for women.

Now moving beyond the walking test, let's talk about the very familiar Sit-to-Stand or Chair Rise test. Also called the STS Test or the Chair Stand Test, this is a measure of one important component of functional mobility for older adults. Obviously the ability to rise from a seated position. Several variations of this test exist but the two most common are the Five Times Sit-to-Stand Test, which is usually abbreviated 5TSTS and the number of chair stand repetitions that are possible within 30 seconds, which is called the 30 Second STS. Research has shown that both of these versions can serve as a proxy for lower extremity strength and power. Both of these tests have also been shown to have excellent test/retest reliability, validity and responsiveness among older

adults across numerous diagnoses. Both versions of the tests have also been studied as outcome measures such as following hip or knee replacement surgery. To administer the Five Times Sit-to-Stand Test a standard height chair without arms is placed with its back against a wall. The individual sits in the chair with their feet flat on the floor and without their back touching the back of the chair. The test subject is asked to fold their arms across the chest then stand up fully and sit back down as quickly as possible five times in a row. The length of time required is the individual's score. The clinician will also watch for the techniques used to rise that deviate from the requested movements such as the patient extending the arms, rocking, pushing up from the chair and so on.

The 30 Second Sit-to-Stand test is performed essentially the same way. The score is the number of repetitions that the individual can repeat in 30 seconds with a score of zero if the test subject is unable to stand once within 30 seconds. The 5TSTS is also used as part of the Short Physical Performance Battery and a 30 Second STS is used as part of the Fullerton Activities Balance Test and we'll talk about both of those a little bit more later on. The 30 Second STS is also included in the study initiative from the US Centers for Disease Control and Prevention or the CDC. STEADI stands for stopping elderly accidents, deaths and injuries. And again we'll talk a little bit more about that later on in the course.

And here is a graphic that shows the instructions for the 30 Second Chair Stand that is from the study initiative. Now a number of research studies have also found associations between specific test results and a variety of movement related issues among older individuals. Some of the results of these studies include for the 30 Second STS, eight reps or fewer were related to a risk of developing frailty and disability mobility. 12 reps or fewer indicates the need for further assessment of fall risk in patients who are over the age of 74. For the 5TSTS, 10 seconds or greater predicted a risk of disability, greater than 15 seconds predicted multiple falls and an inability to

complete the test predicted ADL related and IADL related disabilities. Now let's talk about the Floor Transfer or Floor Rise Test. Obviously the ability to rise from the floor after a fall is an essential functional skill for all older adults. One study reported that almost half of older adults who fall but are not injured are not able to rise from the floor without assistance. This is obviously a major safety concern as well as a major contributor to increased emergency service calls. The inability to rise from the floor is associated with increasing age, greater comorbidities and lower functional capacity. The Floor Transfer Test was designed specifically to examine this ability in the geriatric population and its results may be one of the earliest indicators of mobility related disability in older age groups.

There are several different approaches to the Floor Transfer or Floor Rise Test and there is not yet one agreed-upon protocol for the test. Some authors recommend that the test begin with the individual in standing with the tests timed from standing to supine on the floor and back to standing again. Other authors have the individual begin in supine or in long sitting on the floor then document the time required to rise to a full stable standing position. Whichever method is used the clinician should also document any assistance that the patient requires, such as pulling up on furniture or asking for help from the examiner.

Now practice in rising from the floor is also an appropriate intervention for many older adults who are in the category of high risk for falls. Some authors feel that moving from sitting to quadruped is the most challenging aspect of floor rise for many older adults. If this seems the case for your particular patient training in that specific test may be appropriate as part of their plan of care. No normative data is currently available for this test although one study showed that the mean floor rise time among healthy older adults was 8.8 seconds while for older adults who were post-stroke the mean time was 20.9 seconds. The Stair Climb Test assesses an individual's ability to ascend and descend a set of stairs and it's been shown to be a reliable, valid and responsive test

of lower extremity strength, power and balance. It's commonly performed clinically to assess individuals who need to manage stairs as part of their daily routine. The results of the test can be used to help determine what therapy interventions might be needed to help increase the patient's strength, power and safety. Several different forms of the Stair Climb Test exist. The most commonly recommended is to have the patient climb up and down a flight of at least 10 stairs using their normal preferred footwear. An assistive device is also allowed if the patient normally uses one and the handrails can also be used. Both of these considerations should of course be documented in your notes. The patient is usually instructed to climb the stairs as quickly but as safely as possible.

Some authors recommend having the patient complete the ascent and descent without stopping. Others recommend that the patient stop at the landing or at step number 10 or 12, rest briefly and then descend. The score is usually designated as the number of stairs divided by the total moving time. So as I mentioned several variations on this are possible. Some of those variations include fewer versus more steps, for example two to four steps versus nine to 12. The choice of pace whether it's self selected or as fast as possible. Whether the patient stops after the ascent or not. Timing the the ascent and the descent separately or not.

Counting the number of steps covered in a specified period of time, for example within 30 seconds versus counting the time to cover a specified number of steps. For example, 10. The only required pieces of equipment for this test are obviously a set of stairs and a stopwatch or some other timing device. The test takes five minutes or less to administer. No normative values have been established for older adults and this is used more as sort of a subjective assessment of where this particular patient is before they're released to home or to some environment where they may have to face stairs. The Timed Up and Go, better known as the TUG Test, is a simple test designed for adults age 65 plus to assess mobility, gait, balance and fall risk. It was originally

designed for the population of frail elderly. It has also been tested in a variety of geriatric settings and other patient populations including those with osteoarthritis, Parkinson's disease, brain injury, stroke and dementia among others. Research has shown it to be valid and responsive in geriatric rehab and to show excellent test retest reliability in the populations studied. The TUG Test is not particularly useful to identify fall risk or functional decline among high functioning healthy older adults, however it is often recommended as a screening tool to identify seniors who may need more in-depth mobility assessment and early intervention such as home health visits, outpatient therapy or maybe prescription of an assistive device.

Research suggests that an older adult who takes greater than or equal to 12 seconds to complete the TUG is at risk for falling while greater than or equal to 14 seconds suggests a high risk of falls. There are several variations of the TUG Test described in literature. Some of these variations include asking the patient to walk quickly versus choosing a self selected pace, having the patient turn at a line versus walk around a cone, using a distance of eight feet versus 10 feet, using a chair with or without arms and even differences in the number of trials, which can range from one to four.

The individual is allowed to use an assistive device if they normally do. For our purposes in this course we'll discuss the TUG Test as it is described in the CDC's STEADI initiative, which is one of the most widely used versions. A graphic of the instructions is shown in your materials after this section. To administer the test all that is needed is an open area to lay out a course of three meters in length, a standard armchair with a seat height of about 46 centimeters or 18 inches, tape to mark the turnaround point on the floor and a stopwatch or other timing device. The person being tested is asked to stand up, walk to the line at their normal pace, turn walk back to the chair and sit down again. The individual's score is the time required to complete the activity from the word go until they are seated again. The clinician will closely observe the person's gait attributes, such as their arm swing, turning ability, balance, the

correct use of an assistive device and so on during the test. The TUG Test takes less than three minutes to administer and requires no special training for the clinician. It's widely available on the Internet including at the link that's shown there. The interpretation for the TUG that research has turned up is that less than or equal to 10 seconds is normal, less than or equal to 20 seconds indicates the person has good mobility and can go outside alone and is usually mobile without a gait aid or assistive device, less than or equal to 30 seconds means they have mobility problems, cannot go outside alone and requires a gait aid or assistive device. And here is the CDC version of the TUG Test, which you can download and use with your patients if you would like.

Now we also have the Dual Task Timed Up and Go or Dual Task TUG Test, which was designed to increase the challenge of the regular TUG in order to better discriminate fall risk and functional decline in seniors. It combines the standard Tug Test with an additional task that is either a motor activity or a cognitive activity. As with the regular TUG, use of an assistive device is permitted. Several variations of the Dual Task TUG exist. Different authors have described their specific versions of the Dual Task TUG and information on their articles is available in the references and there are also more details in the Shirley Ryan AbilityLab database article about the Dual Task TUG.

The most common motor activity that's used is carrying a glass of water and the most common cognitive activity used is counting backwards by threes from a random starting point between 20 and 100. Dale Avers states that a practice test should precede the actual test. She also stresses the importance of following standardized test administration procedures and she describes several important points for the Dual Task TUG that are shown there on your slide. Like the TUG Test, the Dual Task TUG takes less than three minutes to administer and requires no special training for the clinician. Mean time scores for the Dual Test TUG are typically one to three seconds slower than for the standard TUG. Now next we'll talk about mobility measures that are

multi-activity physical performance tests. Keep in mind that most performance measures for older adults are actually testing multiple domains at once because different domains are obviously integrated during movement. For example, mobility measure instruments are also assessing balance to some extent. Just as most balance measures also assess mobility to some extent. So in this course I've divided the discussion of the various tools based on the primary domain that they focus on but they often give us more information and tell us about what's happening in more than one domain.

The Physical Performance Test or PPT was designed to assess multiple physical function domains in older adults and in other populations. The clinician observes the patient completing nine different activities related to mobility and ADL performance. Those include all the things that you see there ranging from writing a sentence to climbing up to four flights of stairs. There is also a seven question version PPT that omits the stair climbing tasks, which may be more appropriate for some settings and with some specific patients. Now on the PPT each item is scored from zero to four based on the instructions with most of the items being timed.

The maximum score of 36 for the nine item test and 28 for the seven item test indicates the best possible performance on the test. The equipment that's required for the tests include a stopwatch or other timing device, a pen and paper, teaspoon, five dried kidney beans, an empty coffee can, a heavy book, access to a shelf that's above shoulder level when the person is seated, a jacket, cardigan or lab coat, a penny, a hallway or open area of 25 feet in length and up to four flights of stairs. Both the PTP versions have been shown to be reliable, responsive and valid with good internal consistency. The full test takes about 10 to 15 minutes to administer and requires no special training. The clinician simply follows the script actions that are included with the test. The PPT is available without charge from a variety of sources and one link is included there in your materials. The modified physical performance test is a nine item

adaptation of the PPT that omits the writing and simulated eating tasks. It includes two components of the short physical performance battery that is the chair rise and static balance tests. These were added so that the test could better assess correlations with nursing home placement and with loss of independence. The modified PPT uses the same equipment as the regular PPT except for those required for writing and eating tasks. In addition it requires a standard height chair without arms. The modified PBT also takes about 10 minutes to administer and it is also freely available for use. It has found to be predictive of the risk of various levels of frailty. That test is also available from the geriatric toolkit website at the link that's shown.

A Short Physical Performance Battery is a test of lower extremity function designed specifically for older adults. The SPPB was developed in 1994 by the National Institutes On Aging, which is a division of the US Department of Health and Human Services. It has been widely used in research studies since that time and it's now also being used in clinical practice with increasing frequency. The test examines patient's abilities in three different areas. First, static standing balance. Second, self selected walking speed and third, repetitive rising from a chair.

The equipment and the area required include a hallway or open area, tape to mark the floor for a four meter walk of course, a standard height chair without arms and again a stopwatch or other timing device. The patient is allowed to use an assistive device if needed and each section of the test is scored from zero to four points based on descriptions in the protocol materials for a maximum of 12. And higher scores indicate better lower extremity function. Research has shown the Short Physical Performance Battery to have high levels of reliability, validity and responsiveness among community-dwelling older adults. Although it may have a ceiling effect with high functioning healthy seniors. Lower scores on the SPPB have been shown to be predictive of an increased risk of falls, decreased independence with ADLs, mobility related disability, a decline in health, hospitalization or rehospitalization, increased

hospital length of stay, nursing home admission and all cause mortality. This test takes about 10 minutes to administer and no special training is required. It is freely available for use by any healthcare provider. Now let's talk next about multi-dimensional instruments. As we discussed previously these multi-dimensional instruments cover more than just physical performance. They may include elements that deal with cognitive issues, mental health, communications or other domains. One of the most familiar of these is the functional independence measure or FIM. The FIM is an 18 item observer rated measure to assess a patient's level of independence for completing specific self-care and mobility tasks.

The clinician uses a seven-point scale to rate mobility, transfers, stairs, feeding, grooming, bathing, dressing and toileting. On the scale seven is completely independent with that activity. One is completely dependent or in other words, total assistance is required for the patient to perform that activity. The FIM also includes items that address communications, cognition and social interaction. The FIM measures what the individual actually does, not what he or she could do under different circumstances.

So as we talked about earlier in the course, it's just essentially a snapshot of that person's functional independence for one particular segment of time. It does provide a uniform system of measurement that also helps assess the burden of care for that particular patient. In other words the amount of time that another person must spend helping that individual with common daily tasks of personal care. It is often used to help determine patient placement and length of stay in post acute facilities. The FIM is part of the uniform data system for medical rehabilitation or UDSMR, which collects data from participating rehab facilities. The dimensions that are assessed by the FIM are shown there in your handout. The inter rater reliability for the FIM is very good and the test-retest reliability with older adults is rated good to excellent. Now the FIM takes about 30 to 45 minutes to complete and it must be administered by a trained and

certified evaluator and a license is required to use it. Many facilities already have this license, if yours does not and this is a test that you feel is needed at your facility the license can be purchased on the UDSMR website at the link that's shown there on your slides. Next we'll talk about an instrument that's very familiar to any of you who have worked in home health care. The Outcome and Assessment Information Set or OASIS instrument was designed to collect data on adult patients receiving home health care in order both to identify care needs and to assess outcomes of care. Home health agencies have been mandated to use the OASIS as a condition of participation in the Medicare program since 1999. Its core items cover assessment of the patient's current health status, functional status, socio demographic characteristics, environmental factors, social support and health service utilization. It can be used by any healthcare professional who is providing home health care, obviously including physical therapists.

Some of the items that are covered in the ADLs and IADLs section include grooming, eating, lower and upper body dressing, bathing, toileting, transfers, ambulation, locomotion, planning and preparing light meals and using the telephone. The OASIS also includes a multifactorial fall risk assessment component. OASIS information is usually collected at the start of care, at 60-day follow-ups and a discharge. Additional information, manuals and forms for the most current version of OASIS are available on the Centers for Medicare and Medicaid Services website at CMS.gov. The short form health survey is a multi-purpose self-report tool that was designed to provide data on adult functional status and health-related quality of life. It is often used in the assessment of older adults with specific chronic medical conditions. Respondents are asked to answer the questions in reference to their status over the previous four weeks. This self-report survey is derived from questions used in the RAND Health Insurance Medical Outcomes Study or MOS. It uses 36 of the 113 original questions on the MOS and thus it became named the SF-36. The items are scored either yes/no answers or on an ordinal scale depending on the question with each answer being

given a specific number of points. The total points are added and are then transformed mathematically to give a percentage score with 100% representing optimal health. The domains covered by the SF-36 include physical functioning, role limitations due to physical problems, general health perceptions, vitality, social functioning, role limitations due to emotional problems, general mental health and health transition. So you can see that it covers quite a wide range. For most patients the survey takes about 10 minutes to fill in. It can be completed in writing, online or verbally by interview. The SF-36 has been shown to have high reliability and validity. The survey instrument and instructions for its use are available on the RAND.org website at the link that's shown on your slide.

Now one thing that we know is really important with older adults is balance and fall risk measures. We all know that balance tests are based on the understanding that central postural control or equilibrium depends on input from three contributing systems, which you all remember. Vision, vestibular sense, and proprioception. When any one of these areas is disturbed it can usually be compensated for either completely or incompletely by input from the other two systems. However when two systems are compromised postural control becomes much more problematic.

The various balance measures are designed to create conditions under which one or more systems is challenged in order to assess how the patient responds. Fall risk measures also incorporate predictive information to help identify those who are at greater risk of falls. Instruments that measure balance and fall risk are obviously extremely important for the population of those age 65 and over. In the United States an older adult falls every second of every day on average. Yes, you heard that right on average an older adult falls every second of every day. Each year about 30% of community-dwelling adults over age 65 have a fall and the risk increases with increasing age. Falls are the leading cause of injuries, injury related disability and injury related deaths among older Americans and they are sharply on the rise in the US. This

places a significant burden on health care systems, families and the community. Physical therapy professionals are frontline providers to help reduce the risk of falls so it's really important to be familiar with measures that assess balance and fall risk. We'll take a look and review some of the most common ones next. Static balance tests such as the Romberg Test will be our first consideration. The Romberg Test is a simple test of static standing balance or equilibrium with a narrowed base of support. It actually has an interesting history. It's been used clinically for almost 200 years. In the early 1800s several European physicians described patients with certain types of neurological disorders who had decreased postural control at night. In other words, when their visual input was reduced.

The German Neurologist, Maurice Heinrich Romberg, described how these patients also had equilibrium problems when standing still with their feet together and he first used this feet together position as a test of proprioception in the 1840s. So quite a long time ago. The test was used primarily to identify patients with damage to the dorsal columns of the spinal cord, which leads to severe proprioception deficits. Now today to administer the Romberg Test the clinician asks the patient to stand on a flat surface with the feet together touching one another. The tests can be done barefoot, which is most common or while wearing shoes.

The patient's arm position has not been standardized, most sources recommend that the patient stand with arms crossed over the chest or they can stand with arms at the sides. The clinician then times how long the patient can maintain this position first with the eyes open and then with the eyes closed. Most sources recommend a maximum of either 30 seconds or 60 seconds in each position. The Romberg Test is considered positive when the patient cannot maintain balance with eyes closed. Losing balance may be defined as an obvious increase in body sway, extending the arms, significant trunk or hip displacement or moving one or both feet. In some cases the patient may even begin to fall so the therapist who's testing has to stand close by and be prepared

to prevent that. The Romberg Test is sometimes made more difficult by adding perturbations or by having the patients stand on a foam pad. These variations are not recommended as part of the standard administration of the test but some clinicians do find them helpful for specific situations. The Romberg Test it's considered more qualitative than it is quantitative and it has low sensitivity and specificity. It is thus best used as a screening tool and not as a functional performance measure. In addition many older adults and individuals who are obese have difficulty standing with the feet together for reasons that are not related to neurological changes. So the Romberg Test is less appropriate for use in these populations, those who are older and those who are obese.

The Tandem Stance Test, also called the Sharpened Romberg Test or Augmented Romberg Test is one of the most commonly used measures of static balance. It's performed in a manner similar to the original Romberg except that the patient stands in a tandem heel to toe position instead of with the feet side-by-side. The patient first stands in this position with eyes open and then with eyes closed. As with the standard Romberg the arm position is not standardized but most guidelines suggest that the patient cross the arms over the chest. Longer times of 30 to 60 seconds are recommended for this test because of ceiling effects.

Most authors actually recommend that timing be stopped in the eyes open position if the patient moves the feet to maintain the balance. In the eyes closed position timing is usually stopped when the patient neither opens the eyes or moves the feet. There are quite a few variations with the Tandem Stance Test. These are shown there on your slide. For example, which trial is used for scoring, sometimes it's the longest and sometimes the shortest. For which foot is forward, it might be the patient's dominant or it might be their non-dominant. The conditions of test termination might include moving the arms from the start position, the amount of sway that's allowed, whether the feet allowed to move at all and the type of surface is firm versus compliance such as foam.

Also a semi tandem stance is often used and that's where the heel of one foot is placed beside the first toe of the other foot so that's another variation that's fairly common. Research suggests that decreased Tandem Stance Test times in older adults may indicate an increased risk of future functional deficits. In healthy adults between the ages of 60 and 80 the main score for the standard Tandem Stance Test with eyes open is 49 seconds and for eyes closed is 29 seconds. Okay, I'm not going to try to say that three times in a row again. All right now let's talk about the Single Leg Stance Test or the SLS. This is used to assess static postural and balance control. It's also called the One Legged Stance Test or the Unipedal Stance Test. Because it uses a narrow base of support with a decreased weight bearing area it is considered the most difficult of the three static positions. In other words, it's more difficult than the Romberg Test or the Tandem or Semi Tandem Stance Test.

The Single Leg Stance Test can be performed with or without footwear but is more commonly done without. The individual is asked to place hands on the hips and lift one foot off the floor. The individual then continues standing in this position as long as possible. When the non-weight-bearing foot touches the floor or the other or when the hands leave the hips then the test is terminated. The time in standing is the person's score.

The Single Leg Stance Test is sometimes given for either 30 or 60 seconds, however the test can have a significant ceiling effect, especially among healthy seniors. For this reason most authors recommend that the test be continued as long as possible, that is until the point of failure rather than for a predetermined length of time. Quite a few variations of the Single Leg Stance Test exist. Some of these include whether or not they wear footwear, the position of the non stance foot, whether they need to raise it slightly off the floor, have the knee flexed to 90 degrees with the foot raised up behind them or have the thigh parallel to the floor with the hip knee at 90 and 90. The time to failure versus 30 or 60 seconds, the arm position and the hand position and eyes open

versus eyes closed as well as whether to add a compliance surface such as foam. Now we see here on left of the slide two different variations of the Single Leg Stance Test. Hands on the hips versus hands crossed and also different way that the leg is being lifted. So you can look for different variations and your particular clinic may prefer one way over another. Some clinicians also refer to the Single Leg Stance Test as the Standing Stork Test but this name is a little bit confusing because other people use the term Stork Test to refer to two different variations of the regular Single Leg Stance Test. The first of these variations is standing in a yoga tree pose, which you see there, where the free foot is placed just below or in this case just above the knee of the weight-bearing leg.

The second variation which is not shown here involves asking the patient to stand on the ball of the foot instead of having the foot flat on the floor. Now because Yoga variation and the ball of the foot variation are both too difficult for many geriatric patients and because they don't have normative data, they're not usually recommended for use with older adults. Dynamic Balance Tests also are important with looking at the function of older adults and one that we'll discuss here is the Four Square Step Test, which is abbreviated 4SST or FSST. The Four Square Step Test is a test to clinically assess an individual's ability to step over low objects forward, backward, and to the side. Excuse me. It was designed to identify older adults who are at risk of multiple falling incidents.

Research studies have shown the 4SST to be a reliable and valid test of dynamic standing balance. It has been studied with older individuals with a wide variety of medical conditions including osteoarthritis, stroke, Parkinson's disease, limb loss and vestibular disorders. The equipment required to administer the 4SST includes four canes or dowel rods and a stopwatch or some other timing device. Just as a side note, if you use the dowel rods they need to be affixed to the floor in some way so that they won't roll if the patient steps on them. The test takes less than five minutes to

complete and no advanced training is required to administer it. Patients who use a cane or crutches may use them during a test but the test is not appropriate for individuals who use a walker. The four canes are set up in a cross pattern that you see there in your illustration. Then the therapist explains the test procedure and may demonstrate it to the patient. The patient is asked to step from one square to the next as quickly and safely as possible preferably while facing forward the entire time. Both feet must make contact with the floor in each square. The patient's score is the time required to correctly complete the stepping sequence without touching the canes or losing balance.

A practice trial is allowed first and then two trials are performed with the better time taken as the score. Some sources actually suggest allowing multiple trials for those patients who have difficulty completing the test. In the older adult population a score of 15 seconds or more on the 4SST has been shown to correlate with an increased risk of multiple falls. Now let's talk about some multi activity balance performance measures. The Berg Balance Scale or BBS is probably the best known balanced measure instrument in clinical practice.

It was designed by a physical therapist, Catherine Berg in 1989 to assess dynamic and static balance in older adults. It's now widely used internationally with this population and it is appropriate for the vast majority of ambulatory geriatric patients. The original longer version of the test, sometimes called the BBS14, has 14 items that examine the patient's ability to maintain standing balance under increasingly difficult conditions. First, by decreasing the base of support and then by progressing through a series of dynamic activities that challenge balance. Scoring for each item is from zero to four for a maximum total of 56 points. Zero means the patient cannot complete the task at all and four means the patient can complete the task with no difficulty. The 14 item test takes about 15 to 20 minutes to administer. Research has shown it to be reliable, valid and responsive for older adults with or without a wide range of medical conditions

including dementia. The items required to complete the test are shown in your materials as are the 14 tasks that are included on the test. There's also a seven items short version of the Berg Balance Scale called the BBS7 that is widely used in the clinic with older adults and those seven tasks are also shown on your slide. This version, the seven item version takes about 10 minutes to administer. The next multi activity balance measure is the Tinetti Performance Oriented Mobility Assessment and this was developed in 1986 by Dr Mary Tinetti. It has been widely used in geriatric care and rehab for over three decades and was one of the first multi activity clinical balanced assessment tools. For quite a while it was actually referred to as the gold standard for testing balance in older adults. Just a little aside here, I haven't given you a shortened name for this because there are lots of them out there. The name of the test can actually be a bit confusing.

It sometimes is shortened to just P-O-M-A, POMA. Or it's simply called the Tinetti Test, which is most common but it's also been called by other names the Tinetti Assessment Tool, Tinetti's Mobility Scale, the Tinetti Fall Risk Index, the Tinetti Balance Score and on and on. In fact I found an article by Kopke and Meyer that listed more than 20 different name variations for this test that have been used in the literature. We're just going to call it the Tinetti Test.

The Tinetti Test uses 16 activity items to assess an individual's gait and balance abilities. Each item is scored on a scale from zero to two with zero representing the most impairment and two representing independence with that activity. There are nine balance items and seven gait items. Each of which is scored separately. The individual scores are then combined to form three measure. An overall gait assessment score, an overall balanced assessment score and a combined gait and balance score. The maximum score for the gait component is 12 points. For balance is 16 and for the total is 28. Research indicates that older adults who score below 19 overall are at a high risk for falls. Those who score from 19 to 24 are at moderate risk for falls and those who

score over 24 are at a low risk for falls. The Tinetti Test has been shown to have good reliability, validity and responsiveness for older adults. The gait portion of the test has been known to have a ceiling effect. The items and areas that are required for administering this test include a stopwatch or other timing device, a hard standard height chair without arm rests, a straight hallway or open area of 15 feet in length and during the test the patients can use any assistive device that they normally would use. For the balanced portion of the Tinetti Test the patient begins by sitting in the chair. The patient is then asked to stand up and remain standing. The clinician assesses standing balanced with eyes open, eyes closed and with perturbations which is using gentle nudges against the patient's sternum. The patient is then asked to turn 360 degrees and sit back down.

During this balanced portion of the test the clinician examines key balance parameters that are outlined in the test document. For the gait portion of the test the patient is asked to walk at a normal pace down the hall then turn and walk back at a fast but safe pace. The clinician evaluates key gait components such as initiation, step height and length, gait symmetry and continuity, trunk sway and deviations from a straight path. The test takes about 10 to 15 minutes to administer and it is available without cost from several sources.

One link is shown in your materials there. There are also several good YouTube videos that demonstrate the test so you might want to seek those out if you haven't done this one before. The Balanced Evaluation Systems Test, BEST or BESTest was developed by Dr Fay Horak, who is a physical therapist in 2009. According to Dr Horak the test was developed to help therapists identify the underlying postural control systems responsible for poorer functional balance in order to direct specific types of intervention for different types of balance problems. So she's helping us really zero in on what our patients need the most. The instrument is a comprehensive clinical balanced measurement tool that assesses balance across six different balanced

control systems, which include biomechanical constraints, stability limits and verticality, anticipatory postural adjustments, postural responses, sensory orientation, and stability in gait. The test consists of 36 items that are scored on a scale of zero to three where zero indicates severe impairment and three indicates no impairment for a maximum score of 108. The score is then calculated into a percentage score ranging from zero to 100%. The best test requires no special training and there's no cost to use it. It does take about 45 minutes to administer so although it's an important test it may not be appropriate to use in all settings.

Some of the items that are used on the BESTest include a functional reach test, floor rise, sit to stand, single leg stance, Romberg Test, several items from the dynamic gait index and the timed up and go, both the regular and the dual task TUG. The equipment required is shown there on your slide. And I also wanted to mention the mini BEST, which is a shorter 14 item version of the test with each item rated from zero to two for a max of 28. This one can be administered in about 15 to 20 minutes. The brief BESTest is an even shorter eight item version maxima score of 24. The BESTest and the mini BEST have both been found to be reliable and valid for community-dwelling older adults with or without imbalance impairments and they have been studied with older adults with a wide variety of medical conditions.

The BESTest and mini BEST forms, directions and training materials are available on the BESTest website at BESTest.us. Translations into nine other languages are also available. So you have several choices there. The Fullerton Advanced Balance Scale called the FAB scale is a test to assess an individual's static and dynamic balance abilities under varying sensory conditions. It was designed to measure balance in high-functioning active older adults who may be at risk for falls due to sensory deficits. This test is not considered appropriate for geriatric patients who have frailty, mobility impairments or significant functional deficits. So this is definitely not a test for everyone. The test uses 10 different activities to examine four dimensions of balance.

Static balance, dynamic balanced, sensory reception and integration and reactive postural control. The equipment required is shown there. The length of non-slip material that's mentioned is to use between the pads if the floor is not carpeted and I also wanted to mention, excuse me, if you don't have a metronome around your clinic there are several smartphone apps that are really good for that. The activities, excuse me. The activities examined on the test include stand with feet together and eyes closed, reached forward with an outstretched arm to retrieve an object at shoulder height, turn 360 degrees in right and left directions, step up onto and over a six-inch bench, tandem walk, stand on one leg, stand on foam with eyes closed, two footed jumped for distance, walk with head turns and reactive postural control.

The 10 activities are scored on a scale of zero to four for a maximum score of 40. Zero means the individual has significant difficulty completing the task and four means the individual completes the task safely and independently. A study by Hernandez and Rose found that for each one point decrease in total FAB Scale score the probability of falling increased by 8%. This test takes about 10 to 12 minutes to administer and requires no advance training. It has been shown to be reliable and valid with the population of high-functioning older adults and it can discriminate between varying balance abilities.

The FAB scale is freely available on the Internet including at the link shown on your slide. The Community Balance and Mobility Scale or CBM Scale assesses higher level balance and mobility skills. It was design to test the individual on tasks that reflect specific physical skills that are necessary for full participation in community environments. The CBM scale consists of 13 different tasks that are presented in progressive levels of difficulty. Six of the items are performed bilaterally. Each item is scored from zero to five where zero indicates the patient is unable to perform the task and five indicates the highest level of completion with a max score of 96. For this test unlike almost all the other balance tests, an assistive device is not allowed except on

the stair climbing task. However individuals being tested may wear any orthoses or braces that are usual for them. This test has been shown to be valid, reliable and responsive among community dwelling seniors including individuals diagnosed with arthritis, those in cardiac rehab and those who are post-stroke. The CBM scale does not have the ceiling effect that is evident with some other balance measures such as the Berg Balance Scale. Like the Fullerton Advanced Balanced Scale, the CBM Scale may be more useful than other balanced measures for assessment with healthy high-functioning older adults.

The equipment that's needed to administer the CBM Scale is shown there and also the tasks that are included on the CBM Scale are on your slide as well and you can also see a link there for where you can find the test. The layout for the tasks is shown here. This test takes about 20 to 30 minutes to administer for clinicians who are experienced with it. The test does not require specific training but therapists should be familiar with the tool and have a good understanding of it prior to using it. Some therapists have reported difficulty with observing all the different required criteria simultaneously when they first use the scale but they find that this does tend to improve with practice. The next multi-activity balanced measure is the Dynamic Gait Index.

This was developed as a way to assess postural gait tasks in adults over the age of 60 who were considered at risk for falling. It examines the individuals ability to adapt their gait to varying demands and to maintain balance. It consists of eight items with each item scored from zero to three with three indicating no gait dysfunction and zero indicating severe impairment for maximum score of 24. It has been shown to be a reliable, valid and responsive instrument. And you can see there on your slide what the equipment is required and what the activities are. On this test the patient is free to use their normal assistive device, the DGI requires no training to administer and takes about 10 to 15 minutes to complete. It is freely available on the Internet including at the link shown in your materials. Older adults who score 23 to 24 points are considered

safe ambulators. A score of less than 19 is considered predictive of falls in this population. Now the activities included on the DGI, you can see look at quite a variety of ways of moving. It includes walking 20 feet on a level surface, walking with gait speed changes, walking with horizontal head turns, walking with vertical head turns, pivoting while walking, stepping over an obstacle while walking, stepping around an obstacle while walking, and also climbing stairs. So it's a fairly complex test and in 2013 the scoring system for the original eight item GDI was modified and expanded. This new scoring system called the modified DGI includes the elements of time, level of assistance and gait pattern for each task. This focus was added in order to avoid the ceiling effect that had been noted with the original DGI.

This modified version of the scoring may be preferable depending on a patient population that you serve and the setting in which you work. A four item short dynamic gait index has also been introduced. It uses the first four tasks shown for the regular DGI, walking 20 feet, walking with gait speed changes, with horizontal head turns and with vertical head turns. It omits the pivot turn, obstacle and stairs. The four item DGI is also scored zero to three for a maximum of 12 points. It has also been shown to be reliable, valid and responsive for older adults but it also has a ceiling effect.

The Functional Gait Assessment is a tool that is quite similar to the Dynamic Gait Index. It was developed to clarify the ambiguous directions of the DGI and to add more challenging items for people with vestibular disorders according to Avers. The equipment is quite similar to the DGI. It uses 10 items, seven of which are the same as on the DGI with a max score of 30. Those tasks include walking 20 feet on a level surface, walking with gait speed changes, walking with horizontal and vertical head turns and a new one, walking with a narrow base of support, pivoting while walking, stepping over an obstacle but not around one like on the DGI, walking with eyes closed, walking backwards, and also climbing stairs. Now the Functional Gait

Assessment or FGA has been shown that less than or equal to 22 the individual has an increased risk of falls. Now finally, I would like to share with you one more resource that I feel that therapists should be aware of even though it's slightly outside the scope of what we've been discussing with our functional performance measures and this is the initiative called STEADI. stopping elderly accidents, deaths and injuries. As I may have mentioned earlier this was developed by the CDC as a way to address the problem with falls among the elderly in the United States. So STEADI is not simply a balance or a functional performance measure but instead it's a broad initiative and it was created to address the high rates of morbidity and mortality that are occurring with falls in the elderly. It was also created to help reduce the economic and healthcare burden that's associated with falls in the United States.

The initiative is designed to help health care providers effectively interact with older adults who are at risk of falling or who may have fallen in the past. The initiative consists of three core elements to reduce fall risk. Screen, assess and intervene. The various parts of the initiative are based largely on the American and British Geriatric Society's clinical practice guideline for fall prevention, which you can find in the references and this is a great resource if you want to learn more about what's being done to help with falls.

These core elements are shown on the STEADI algorithm that is illustrated here in your materials. The algorithm, you might actually want to go download this because it's pretty hard to see in this small print but if you go to the study website you can get this algorithm and it's just an interesting tool to have around for learning more. It can be a helpful tool for clinicians to determine how to screen for fall risk in older adults, when and how to implement a more detailed assessment, what types of interventions are appropriate and when to follow up. Now just on a side note, the principles of the STEADI initiative are very broad in general so it's not usually used on its own as a clinical tool. However STEADI is used in some PT schools and OT schools to teach the

concept of fall risk management. The various elements of the initiative provide a good outline and can serve as a springboard for more in-depth teaching about fall prevention. The three functional performance measures that are included in the assessment portion of the STEADI algorithm are the timed up and go, the 30-second sit-to-stand test, which they call the chair test, and the four stage balance test. We discussed the TUG test and the chair stand test earlier in the course and those handouts are in your PowerPoint slides. The instructions for these tests and all the materials used for the STEADI initiative can be downloaded without charge by any healthcare provider at the CDC's study website, which you can find in your references and you can also get printed materials for minimal or no charge that can be ordered through their website as well. In conclusion, well that winds up our discussion, our long discussion of some of the more commonly used functional performance measures for older adults. Just remember that all of the examples that we've discussed here are useful tools. Every one is useful but remember they are just a few examples and there are literally hundreds of existing instruments out there.

Be sure to choose the best tool available for your specific patients based on all of the factors that we've discussed and your clinical knowledge about what that patient needs. In summary functional performance measures are a very important part of our therapy toolbox when we're dealing with older adults because the better you understand what is going on with your patients or their current function, the better job you can do with designing interventions for them. Using appropriate patient specific interventions for each individual that you treat, provides the greatest impact on their level of function, which obviously also improves their future function and we know that better function directly impacts your patient's health, helps them meet their goals and also helps improve their quality of life. So as you have seen in this course there's a reason we were lectured about function in PT school because after all good therapy is all about function. Thank you so much for listening.

- [Carolyn] Thank you so much for this engaging and informative course. We have a couple of questions and a few minutes. Sally, the first one is from Jennifer. She asked, "The elderly mobility scale was not mentioned, "this is used frequently in my skilled nursing facility. "What is your opinion of this assessment?"

- [Sally] Okay, my opinion is that it's definitely appropriate in some places, not a particular reason I didn't include it. It was just a matter of choosing some over others.

- [Carolyn] Thank you and thanks Jennifer for that question. Nicole asked, "If you have an older adult "who is high-functioning "would you test them on a geriatric measure "even though they could use a regular adult measure?"

- [Sally] Not necessarily. As with any other patient care choice you're going to choose what's best for that patient. So even though something may be listed as a geriatric measure, if that patient is 72 and a former professional ballet dancer you're going to want to choose a different test for them. Choose something that's more appropriate to their physical functioning. So geriatric tests don't have to always be used for older adults.

- [Carolyn] Oh, okay great. And then we'll just take two more questions here. One is regarding the TUG scores. So it looks like there's a little bit of confusion on TUG scores. For the TUG scores listed are they supposed to be less than or equal 30 seconds or greater than or equal 30 seconds? Is the first question and then about the high risk for falls. If you could just review that.

- [Sally] Okay, give me one second. I'm getting back to that in my notes. I'm thinking I might have a typo, is that what you're seeing? Sorry, I'm not there yet.

- [Carolyn] This came in earlier so I didn't pick up on it in the slides but yeah we can go back to that slide.

- [Sally] Okay. Okay, that is very confusing the way that's written. I have pulled that from another resource and I apologize that I didn't clarify that. What they mean is if someone can do the TUG Test in under 10 seconds they're considered normal. If they can do it between 10 and 20 seconds then they're considered in the next category, they have good mobility, usually don't need a gait aid, etc. If they can do it between 20 and 30 seconds, they usually have mobility problems and often require an assistive device. So my apologies that that wasn't clearer. Did that answer the question?

- [Carolyn] Oh no, that... Yes, it does. Thank you so much and we'll take one last question. Somebody said can people sit to rest during Six Minute Walk Test or does the test stop if someone stops like with the 400 Meter Walk Test?

- [Sally] Well I have to say it depends on which source you're looking at. Most of the sources say that if they sit then you have to stop the test. But there are a few sources that allow that so you might want to just look online and get a couple of different versions and tell your clinic manager which one you're using.

- [Carolyn] Great, well thank you for taking the extra time to go through those questions and thanks to everybody who participated today and for sending those in and helping to us to continue the conversation a bit. We just want to remind everyone that today's course is recorded. It will be available on our website in the next few days so if you want to review it again or refer it to colleagues it will be up. Sally, thank you so much. We hope to have you back on physicaltherapy.com in the future and thank you again for this very informative course. Wish everybody a wonderful afternoon, great rest of your week.

- [Sally] Great, thanks so much, Carolyn. Everyone be safe.

- [Carolyn] Thank you, bye bye.