

A caregiver in blue scrubs is assisting an elderly man with a walker in a home setting. The man is wearing a dark blue shirt and light-colored pants. The caregiver is leaning over him, looking at a device in her hands. The background shows a living room with a sofa, a chair, and a window with curtains.

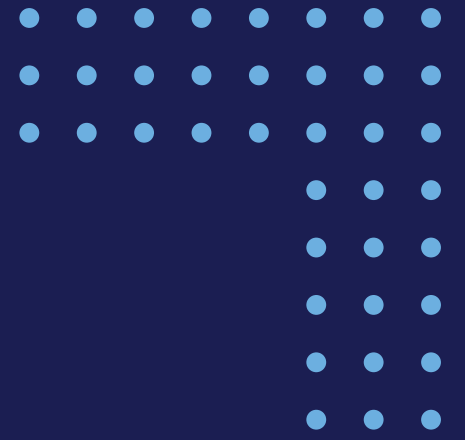
Measurements within Assessment

What We Measure and Why We Measure It



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Overview:

- Within the VALD Hub, our management system, we can view a number of different metrics, each of which with their own degree of importance.
- When assessing our members we view three different tests on our Force Deck platforms.
 - Sit to Stand
 - Squat Assessment
 - Quiet Stand Balance

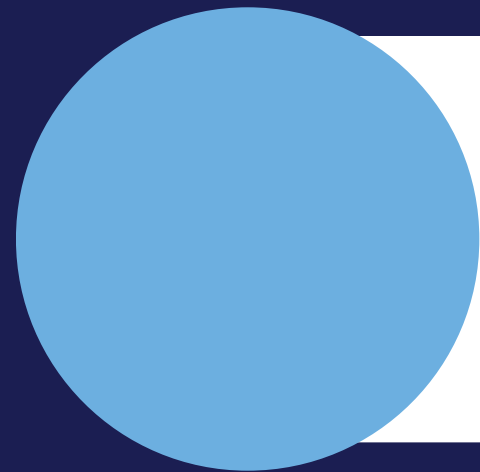


Overview:

- Our goal is to provide what we measure, why we measure it, and its relevance to everyday life.



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Sit to Stand



Sit to Stand

- When we think sit to stand two tests come to mind, the 30-second sit to stand and the timed up and go.
- We dive much deeper, when viewing the test from within our HUB we look into:
 - Mean Standing Force (Left vs. Right)
 - Mean Sitting Force (Left vs. Right)
 - Time to Sit
 - Time to Stand
 - Peak Standing Force
 - Peak Sitting Force



Sit to Stand: Mean Standing Force

- In the context of averages, this is where we are going to take a closer look into the asymmetry that is created.
- If asymmetry is present, where and to what degree does it occur?
- If asymmetry is present without pain, do we believe it may cause a problem in the future?
- If asymmetry is present with pain, what can we do to help alleviate such?



Sit to Stand: Mean Sitting Force

- Similar to mean standing force, the mean sitting force will enable us to understand the asymmetry present.
- For example, if we see asymmetry present on standing force become less apparent when sitting, we note that eccentric movement does not cause the pain or discomfort that may be present. This insight allows us to program accordingly. In this specific scenario we would likely program eccentric and isometric in order to improve strength while avoiding any sort of pain or discomfort.



Sit to Stand: Time to Sit

- Time to sit is clearly an objective measure, but we must consider its subjective nature. For example, if we see a time to sit time stamp being longer than usual, it can mean one of two things.
 - This individual is unstable and must move slowly, while likely assisting with the arms to sit down safely.
 - Or this individual can move extremely slow through the eccentric portion of the movement noting great amounts of strength and stability.
- The same can be said about a quick time stamp on the time to sit measure. Was this movement controlled or did they drop into their chair?



Sit to Stand: Time to Stand

- Contrary to time to sit, time to stand is purely objective. We can use this measure as an indication of rate of force development (power). How quickly are they able to rise from a chair?
- While many may not feel quickness or speed in aged populations is important, power output has become the most accurate predictor of physical function and quality of life. Therefore, the quicker one rises from the chair, the better.



Sit to Stand: Peak Standing Force

- Everything on the line here, how strong is their lower body? What is the greatest amount of force they are able to create?
- How does this peak force compare to the average? How does this peak force compare to other repetitions? If we see a decline we know that muscular endurance may be a concern.



Sit to Stand: Peak Sitting Force

- Peak sitting force is a measure of eccentric strength. To what degree does peak sitting force compare to peak standing force. We'd like to see a correlation between concentric and eccentric force ratios.
- It is said that eccentric strength can be created at a ratio of 1.41:1 when compared to concentric strength, however when looking into our member population we see a ratio of 1:1 being beneficial.



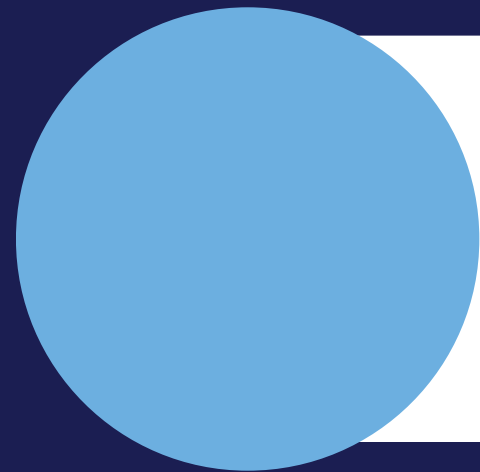
Sit to Stand: Relevance

- One's inability to rise from a chair because of weakness or pain will limit their enjoyment in life. One who struggles to rise from a chair will have considerably less freedom.
- Taking a deeper dive into each of the below allows us to come to a formal conclusion on what would be best for each individual.

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Squat



Squat: Concentric Mean Force

- Similar to our comparison of mean force in our sit-to-stand, we will do the same with the shortening or rising phase of a squat here.
 - Is asymmetry present?
 - If so, which side is the member favoring?
 - What is the cause of this asymmetry? Was there a previous injury or has this occurred due to periods of poor movement patterns?



Squat: Power (Peak and Mean)

- When viewing both peak and mean power outputs we can understand more about this individual's overall level of function.
 - When did peak power occur? Was it on repetition #1 or #4? If it was on four, perhaps they did not quite feel comfortable in the early repetitions? is this due to a fear of falling or simple inexperience with a squat? If it was repetition one, is there a drop of due to fatigue?



Squat: Eccentric Mean Force

- Eccentric or lengthening (the lowering phase of a squat) allows us to understand the ratio of concentric to eccentric strength.
- Comparing concentric versus eccentric forces is important when exercise programming as we want to ensure both are being emphasized, more so on one if we see a drastic difference.
- Members often present with pain in the knees or hips on the concentric portion, therefore measuring the eccentric allows us to understand what level of strength they have and if we improve it what is the likelihood pain subsides?



Squat: Peak Force

- Understanding the variance between peak force and mean force allows us to determine potential fatigue levels.
- Again, if peak force occurs on the first repetition and we see a sharp decline, this will indicate they are unable to maintain that level of effort.



Squat: Relevance

- Using our measures in everyday life is crucial when it comes to impacting members and their quality of life:
 - Mean vs Peak (Power & Force): Understanding where one might begin to experience fatigue is important as many attempt to golf, play pickleball, or simply go out to lunch with friends. If five squats proves to be challenging by the fifth repetition, how are they going to be as they ambulate around a golf course or a shopping mall?



Squat: Relevance

- Using our measures in everyday life is crucial when it comes to impacting members and their quality of life:
 - Mean Force (Concentric & Eccentric)
 - Understanding the ratio between the two is crucial. Those with low eccentric force output cannot create strength on the lowering portion of a squat which will also occur in other movements such as sitting or, the most common cause for a fall, descending stairs (or a curb). Improving eccentric strength on those where a decline is present is a must.

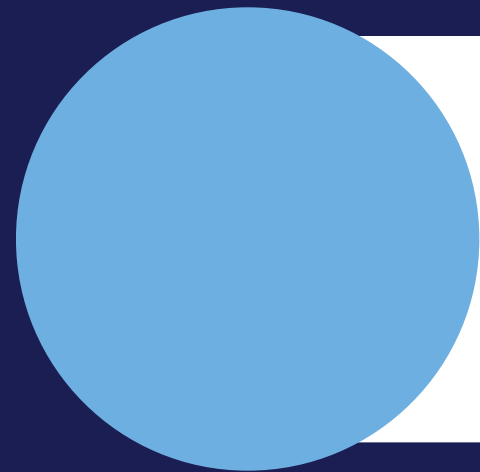


Squat: Relevance

- Using our measures in everyday life is crucial when it comes to impacting members and their quality of life:
 - Mean Force (Concentric & Eccentric)
 - Asymmetry present will cause poor movement patterns and or pain if it has not already
 - Uncorrected asymmetry places a fear of falling within one's head because they are aware one side may be the reason for a fall.



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Quiet Stand



Quiet Stand: Area of Ellipse

- Area of ellipse gives us an indication of the total amount of movement that occurs when attempting a static stand.
- This number is then compared across various cohorts pertaining to the specific individual in order to understand how they compare amongst their peers.
- The larger the area of ellipse, the more concerned we are as it relates to balance.



Quiet Stand: AP vs. ML Movement

- Comparing anterior-posterior vs. medial lateral movement indicates if someone is at an increased fall risk.
- In many cases, when individuals complete the static stand they move between heels and toes which creates the greater AP movement.
- Though research cannot put an exact number on it, those who present greater ML movement compared to AP movement are at an increased risk for a fall.



Quiet Stand: Mean Velocity

- Mean velocity measures the speed at which movement or perturbations occur while completing the balance test.
- There is some subjectivity to this measure due to various mixed reviews.
 - Research points to a slow MV as being an indication for greater postural control.
 - However, other researchers point to increased MV, while upright shows one's ability to recover in a manner that would prevent fall.



Quiet Stand: Relevance

- Measuring balance among aged populations is challenging withoutt the use of technology, why?
 - A single leg stand is often unattainable, therefore measuring how long one can stand on one leg simply cannot occur
 - Many can stand on their feet while remaining still but the naked eye cannot capture the movement that occurs
 - Our measurements during quiet stand paint a clear picture into one's balance or fall risk