

## A DEEP DIVE INTO THE SIX MINUTE WALK TEST

On today's episode, I want to talk about a clinical measure that is widely used, and to some extent, abused, in pulmonary rehabilitation. I'm talking about the every-familiar six minute walk test and the measure it provides, the six minute walk distance.

Before I get into some of the finer details about this walk test, I first want to comment on why walk tests are important in pulmonary rehabilitation. There are many reasons. First, walk tests really do reflect an important outcome – of course, which is walking. Walking is so crucial to independent living, and breathlessness while walking is one of the most commonly reported symptom of patients with chronic lung disease. Walking is what is called a **basic activity of daily living**, in that it is an important skill that is required to manage one's basic physical needs. So, a walk test is an important feature of a patient's day to day life. A walk test is also *responsive* to pulmonary rehabilitation. This means that it is able to detect true change that occurs due to an exercise intervention. Performance on a walking test is also associated with other important outcomes in patients with chronic lung disease, including mortality, other activities of daily living, organ transplant candidacy, breathlessness, and the need for supplemental oxygen.

In general, walking tests do not require a high level of advanced training to conduct, and they don't require a lot of resources. It is now a commonly performed tests in pulmonary rehabilitation, both in research and in clinical practice. We did a survey in Canada that found that 60% of hospital-based programs and 77% of community programs used the 6MWD as a pre-PR measure. An international survey, done around the same time, reported that 33% of European programs, but 54% of North American programs, used this measure. It is a common outcome measure in more than just PR programs too, of course. Many pharma trials in COPD and pulmonary fibrosis use this test.

It should be noted that the results from a walking test can't be used as a direct substitute for measures from maximal tests, measures such as VO<sub>2</sub>max or peak, or maximal workload. There have been several studies which have attempted to use the six minute walk distance to estimate VO<sub>2</sub>max but overall they are not very accurate. However, the 6MWT can elicit a VO<sub>2</sub>peak and peak HR, so you should ensure the safety of the test with appropriate screening. Those criteria are listed in the guidelines that are available to us, I would encourage you to review them and have them listed on your 6MWT form.

How has the walk test evolved over the years? There used to be a 12 minute walking test, but it became the six as time went on. The six minute test appeared to provide a good estimate of exercise tolerance without being so long as to overly tire the patient. There has also been several studies which have created predicted values for walk distance. These equations have varied quite a bit – possibly a reflection of differences in the reference populations. Reference equations derived from populations with a strong culture and habit of walking may look quite different than those derived from more sedentary populations. If you want to calculate the predicted 6MWD for your patients, try to select a reference population similar to your own, in terms of country and culture. Then over time, research has provided values related to the minimal clinically important difference, or the MCID. What is that? Well, you might recall in previous episodes that this relates to the smallest value of improvement that the patient perceives as having a positive impact on their lives. The MCID for the 6MWD for patients with COPD has been estimated at approximately 30 meters. So in research studies, researchers want to see if improvements after an intervention result in at least this amount of improvement before they say the intervention has a benefit. We don't often use this to judge individual patients, but you might see if the average change in your patients exceeds 30 meters, or what proportion of patients in your program achieve at least this increase after your program, if you're interested in assessing the overall impact of your exercise program.

Now, I mentioned that remark about it being widely used, and abused. Why say that? Well, although as I said, it doesn't require a lot of extensive training to perform, it still must be performed correctly to be valid. And that is

where many fall, unfortunately. For some reason, the walking oximetry test has become confused with the six minute walk test, with attributes and methods of both being combined into one. While there are many things done similarly, these are *not* the same tests, and it's important to understand how the 6 minute walk test should be done correctly to ensure its validity.

Now, before I go any farther, I want to acknowledge that what I'm talking about is appropriate for when you are back to doing in-person assessments with your patients. I'm not suggesting trying to follow this if you are attempting distance assessments while COVID-19 restrictions are in place.

So, what I am referring to regarding guidelines: luckily, the American Thoracic Society and the European Respiratory Society got together and published a great guide on how to conduct field tests in pulmonary rehabilitation, specifically the six minute walk test and the incremental and endurance shuttle walk tests. I'll cover shuttle walk tests in a future episode, and I'll provide a link to this paper in the show notes.

As you know, the tests requires a specific set up and methods. I want to talk about some key ones that are often not followed carefully.

You may not know this, but there are a set of standardized instructions to use during the test that you actually say to the patient at the beginning of the test. Why is this necessary? It's important that each participant hears the same instructions regarding the purpose of the test, how to push themselves, permission to rest, etc. This is much better than "walk back and forth between the cones and I'll time you for 6 minutes".

There is also standardized encouragement. Also extremely important, because when doing a walk test, people who are encouraged during the test walk longer distances than those who are not. No surprise there— we've long known the benefits of external encouragement during any physical activity. So why the standardized? This is to reduce bias, which is especially important when the 6MWT is used as a research outcome. If we made up our own encouragement, we may make decisions to provide more 'enthusiastic' encouragement to the group that we wanted, unconsciously or not, to do better. So having standardized encouragement, that we use for each patient, makes sure that everyone receives the same thing. When I teach how to do this test, I tell my students to keep a neutral, but still engaged and attentive tone of voice. Don't be a dull monotone: "You are doing great. Keep it up" for one and a cheerleader for the other "Yay, keep going keep going", but use the same tone of voice even when you're using the same words. A positive, encouraging, but still somewhat neutral tone of voice is best.

One of the biggest gaps that I see when the test is used clinically is the lack of conducting two tests. The guidelines state that two tests, 30 minutes apart, must be conducted, and the larger of the two distances be the 6MWD. Why two tests? Well, there is a large learning effect with this test. People with chronic breathing problems know that they get short of breath when exerting themselves, and they want to pace themselves. So the first test they may hold back, to gauge how fast they can walk without going so fast they have to stop due to dyspnea. By the second test, they are more familiar with it, they know how fast to go, and they often walk farther. But that's not a hard and fast rule – some patients are tired when doing a second test, so the first test might be farther. Research has shown that there often as much as a 30m difference between the first and second test, in people with COPD. And this quite important, because that the value of the minimally clinical important difference for the 6MWD for people with COPD. So to illustrate, say you have a patient starting your PR program, and they do one 6MWT with you, and the measured distance was 370m. You only do one test, and they proceed with the multi-week program. At the end of the program, you repeat the test, and now they can walk 400m. Great, they have had a clinically important improvement, yay! But did they actually have an improvement? What if they had done a second 6MWT at baseline, and there second test ended up being 400m? Now there's no difference between pre- and post-rehab tests.

Clinicians tell me that it's too difficult to fit in two tests. I understand, but I think there is time. If you have a pre-rehab assessment appointment, you can screen for exercise safety, do one test, then continue with your assessment, and do the second test prior to the appointment ending. As long as you have that 30 minute period in between, and their baseline values of heart rate and oxygen saturation have gone back to normal, then you can proceed. Or if you must, you could use your first day of exercise class to do the two tests. It's not a waste, it's still exercise, and it's important to get the most accurate measure you can. But, you don't need to do two tests at the end of the pulmonary rehabilitation program, one test will be fine.

The test procedures are nicely laid out in the guideline paper, including the list of equipment, the training of the staff, patient preparation, safety screening, initial assessment, running the test, and quality assurance.

Some of the common questions which are answered in the guide include: Should I measure oxygen saturation using a pulse oximeter during the test, yes or no? The guidelines note that the lowest SpO<sub>2</sub> which occurred during a test is an important marker of disease severity, and that lowest value may not occur at the end of the test. They recommend continuous measurement, with the assessor walking near the patient, but not right directly with them, you do not want to pace the patient, in order to record those measurements.

Should supplemental oxygen be used during the test, and who should carry it? If the patient is already on supplemental oxygen, then yes, it should be used during the test, at the normally prescribed flow rate, which is kept constant during the test. The same flow rate should be used in subsequent tests after the PR program, unless the prescription has changed. If it has, then you'll need to factor that into the interpretation of the results. The patient should handle their oxygen if that is what is normal for them, but if they can't, then the assessor can carry it, but should walk behind the patient so as not to pace them, and to record they did this so that can be replicated in subsequent tests. All those test conditions need to be recorded.

Another question is: track layout. Most 6MWT are done on a track, usually a quiet hallway without traffic or physical barriers. Walking in a circle does increase the distance compared to walking on a track, so it's important to keep the same layout between patients and between tests. Make sure that if you do a back and forth track, the track isn't too short, should be at least 30m in length, with cones at either ends.

So that's an overview of what to do. Now I want to reinforce why to do it. There are different measures of exercise performance, and I'm not suggesting that the 6MWT is the best choice. There have been debates out there about its use as a primary outcome measure, both clinically and in research! But if you don't currently have a measure of exercise performance, the 6MWT is a good place to start. Improvements in walking distance are strongly linked to mortality and other health status measures, and it is an outcome that is both important to patients, and to referring physicians. If done accurately, it is objective and responsive to the exercise programs in pulmonary rehabilitation. Because it is widely used, you can compare your average improvements in 6MWD at your site with other sites (take your last 20 COPD patients, for example, and calculate the average improvement after rehabilitation. Was it above the 30m MCID? What proportion of your patients achieved this threshold?).

A 6MWD has also been used as a starting place for exercise prescription. The Australia Lung Foundation has a neat website called the pulmonary rehabilitation toolkit, and I'll put a link to that in the shownotes, that describes how to estimate an exercise walking speed on a treadmill or on a track, based on the results of the 6MWD. In short, you calculate the average walking speed of the 6MWT, and then take 60-80% of that speed as your starting speed on the treadmill. It will also give you an understanding of the maximal heart rate and maximal level of breathlessness achieved during the test, which for some patients, may not be that much different from the maximal HR and dyspnea scores achieved on a cardiopulmonary exercise test. If you are using HR-based or dyspnea-level based exercise prescriptions, this gives you that upper threshold to work from,

especially if you are looking at cycle exercises, where it is hard to make that transfer between a walking test and a cycle program.

So in summary, I hope that this episode will inspire to you to take a closer look at the use of the 6MWT in your clinical PR programs. If you use it already, I encourage you to do an 'audit' of its use in your program. Sometimes a test becomes so familiar in our hands that our testing quality can drift a bit, and we cut corners. This is normal, happens in more areas of health care than this, but every deviation from the guidelines has an impact on the accuracy of the score. We expect our lung function tests, our imaging information, or measures of patient safety such as heart rhythm, to be done accurately in order for us to make proper, evidence-care decisions with our patients. We should have the same high expectations for ourselves when we conduct these field tests. Are you following the guidelines? If not, why not? and what ideas can you come up with to address any barriers to proper use? Look at the use of the 6MWT as an outcome measure, to give you overall feedback on how well your program increases exercise performance in your patients. Look at its potential use to create an exercise prescription. If you don't do it or any other tests of walking or aerobic exercise performance, then how can it be included? Practice on your colleagues, and get familiar with its use, then begin with your next class. Use the values in your reports compared to what you are reading in research papers on pulmonary rehab. Report these values back to the referring physician to give them an idea of how your program is improving health outcomes in their patients.

I hope you this episode useful, and that you're inspired to go back to your assessment procedures and see how an accurately-conducted 6MWT might fit into your program.

Take care, and keep moving. We'll see you next time on the LungFIT podcast.