

## PODCAST JOURNAL CLUB - Watson

Watson K et al. In adults with advanced lung disease, the 1-minute sit-to-stand test underestimates exertional desaturation compared with the 6-minute walk test: an observational study. *Journal of Physiotherapy*; 2023.

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Hi everyone and welcome to LungFIT. I thought it was time for another journal club, so on today's episode, I'd like to discuss an article that is currently in press by the Journal of Physiotherapy. Hot off the press! The first author of this article is Kathryn Watson and the senior author is Kylie Hill from Fiona Stanley Hospital and the Notre Dame University in Perth, Australia, respectively, and the title is: *In adults with advanced lung disease, the 1-minute sit-to-stand test underestimates exertional desaturation compared with the 6-minute walk test: an observational study*. Okay, they gave away the ending in the title, but it's a great article, and worth some discussion! And as per usual, this is an open access article— I will put the link in the show notes.

We know that the 6MWT is often used to evaluate cardiorespiratory response to exercise and to develop the exercise prescription for pulmonary rehabilitation. As the authors rightly note, COVID-19 imposed the need for physiotherapists to change their approach of assessment and treatment as in-person visits were cancelled. And the COVID restrictions led to many pulmonary programs transitioning to telehealth. It's pretty difficult to conduct an accurate 6MWT via telehealth, and so there was a need for other measures of exercise, such as sit-to-stand tests. Now, just as a reminder, there are a few different sit-to-stand tests. There are sit-to-stand tests which measure how long it takes to complete a prespecified number of sit-to-stand actions. So the unit of measurement is time. And there are tests which measure how many times an individual can complete a sit-to-stand in a specific amount of time. So the unit of measurement is the number of repetitions. All sit-to-stand tests follow a standardized protocol, and incorporate several aspects of physical function, including gluteus and quadriceps strength and power, balance, cardiovascular function, and proprioception.

You can see how the sit-to-stand could be very helpful in a pulmonary telerehab setting, because it would be more feasible to conduct this test in that context, compared to a 6MWT. But...we need to know does the sit-to-stand test have similarities to the 6MWT in terms of exercise response parameters, such as heart rate, oxygen saturation, fatigue, dyspnea? Which is important to know in order for it to provide the same sort of utility that the 6MWT does? The authors note that this question hasn't been examined in detail before but doing this comparison would help us understand whether the 1minSTS could be used when prescribing walking-based exercise programs instead of a 6MWT, which could be especially useful in the telehealth environment.

So that's the rationale. The authors identified two objectives for this work, which I quote here:

1. In adults with advanced lung disease, do the 6-minute walk test 6MWT and 1-minute sit-to-stand elicit similar cardiorespiratory responses? And
2. Can the 6-minute walk distance be estimated from the 1min sit-to-stand?

So how did the researchers do this? Well, they used a prospective observational study design. What does that mean? To clarify, prospective studies are carried out from the present time into the future, and observational studies are those in which the investigators do not intervene in the variables being studied, but simply observe and record them in specific time points. And if you do that at several time points, then that is a longitudinal observational study (which you might do if you want to see how

variables change). But this was a one point in time (also called cross-sectional) study, with different variables collected during these two different tests.

Another interesting thing to note is that this is data collected from the clinical setting, which was possible because these tests were done following standardized protocols. This is so important, I can't reinforce enough the importance of conducting clinical tests following the standardized protocols. The most obvious reason of course is because following a standardized protocol will give you the most accurate answer. So you have an accurate baseline, and an accurate measure of any change after an intervention. But this study highlights another reason, that – with appropriate approvals of course – there is the possibility that you can explore important clinical questions without having to run a separate parallel study. Many programs aspire to be, or already are, contributing to the knowledge base of pulmonary rehabilitation, and the ability of programs to collect accurate data as part of their clinical practice, and ALSO being able to answer their research questions with their own data, that contributes a lot to their program as well as providing valuable information for all programs.

All these participants had chronic lung disease, and were visiting the clinic because they were possibly going to participate in a pharma trial or visit a specialist. What were the study procedures? Each participant first completed the one 6MWT following standard guidelines. Most had fairly recently done a 6MWT so the researchers decided not to do two tests as part of this study. If they desaturated below 80%, they rested until it reached 85% and then started walking again. People could use supplemental oxygen if it was already prescribed, and whatever walking aid they normally used. They then rested for 20 minutes, then did the 1 minute sit to stand.

What was measured during these tests? The researchers measured SpO<sub>2</sub> and heart rate continuously during each test. They also recorded dyspnea and fatigue levels at the end of the tests. They recorded the SpO<sub>2</sub> and HR at the one minute mark at both tests, to see what the oxygen saturation and heart rate response was at the same time during each test.

So what did they find? Well, they had data from 80 participants, 31 with obstructive lung disease, 28 with restrictive, and 21 with other conditions such as pulmonary arterial hypertension or post lung transplant. The majority were male, and about 64 years old. More than half were on long term oxygen therapy. The 6MWD mean was 419 m and the mean number of repetitions achieved during the 1minSTS was 24.

And what was the answer to the first question Do 6MWT and 1minSTS elicit similar cardiorespiratory responses? The analysis between tests showed that overall, the 6MWT caused the SpO<sub>2</sub> to drop more than the 1 minute walk test. The lowest SpO<sub>2</sub> during the 6MWT was 4% less than the lowest SpO<sub>2</sub> recorded during the 1 minute sit to stand. This difference was more pronounced in people with restrictive disease or on supplemental oxygen. Interestingly, this difference wasn't seen at the 1 minute timepoint, which indicates that this low SpO<sub>2</sub> occurs later in the 6MWT, after the one minute mark. The end of test pulse rate was very slightly less during the 1 minute sit to stand compared to the 6MWT, but not really a clinically significant different. Interestingly, the dyspnea score was similar at the end of both tests, but the leg fatigue score was higher in the 1 minute sit to stand test. No surprise with the leg fatigue score, have you ever done this test, it can very quickly get very fatiguing to the lower extremities!

And what about the second question? The authors found that although there is moderate relationship between the distance you cover on a 6MWT and the number of repetitions you can do on a 1 minute sit to stand test, these are not synonymous tests and you can't use the number of reps to predict how far someone can walk in a 6MWT.

The researchers did comment on some limitations of their study. For example, the restriction to pause tests if SpO2 went below 80% may have hindered their ability to obtain a true lowest level SpO2 for analysis and so the difference in SpO2 between the two tests may actually be even greater. Also, although most of their participants had done a 6MWT just a few months ago, nevertheless doing the two tests in this study may have yielded a higher value. Likely because it was a clinical visit, they performed the order of the test the same for each person, first the walk test, then the sit to stand test. Often in research you'll randomize the order of the test, to avoid any issue with one test impacting the results of another.

So what are the implications for your rehab practice? Considering that the 1minSTS elicited less desaturation than the 6MWT, you can't rely on the 1 minute sit to stand to screen for moderate or severe desaturation that could occur during longer exercise periods, like walking. Given that in-person and telehealth rehabilitation typically relies on walking as a primary exercise modality, you do need to know what is actually happening in terms of SpO2 and so just doing a 1 minute sit to stand won't provide this information. And if you need the 6MWT for exercise prescription, you won't be able to estimate it from a 1 minute sit to stand. Which is too bad. But it just means that we need to continue to explore other exercise assessments that will be feasible in a telehealth setting, and will also provide useful and accurate information in order for us to develop an exercise prescription that is both safe and effective for our patients. There are some suggestions that even if a telehealth program is considered, the first assessment should be in-person, to allow for a detailed assessment, guidance on the exercise prescription, and confirmation of patient safety. We had to 'make-do' quite a bit in COVID, but that doesn't mean that it was optimal and what we had to do then should be immediately the standard for telerehab going forward! As this very nice study illustrates, there is still a lot of interesting work to do to confirm our assessment tests, exercise procedures, and safety protocols. And its work like this that helps to fill in the puzzle a bit more. So a nice paper all around.

Thanks for listening to this episode of LungFIT. I'll be back soon with more episodes dedicated to research, teaching, and clinical care in the lung health environment! All the best to you, talk to you soon.