

OTAGO EXERCISE PROGRAMME

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Introduction



The Otago Exercise Program (OEP) was developed and tested by **the New Zealand Falls Prevention Research Group in New Zealand** to reduce falls in older persons.

The OEP consists of 17 strength and balance exercises and a walking program, performed three times a week by the older adult in the home, outpatient, or community setting. Exercises can be done individually or in a group setting. Studies demonstrate OEP participants experience a 35 – 40% reduction in falls.



The program is most effective for frail older adults. It is recommended for frail older adults that a Physical Therapist (PT) assess and prescribe the initial exercises. The older adult does the exercises independently three times a week and completes a series of 4 visits with the PT, PT Assistant, or the appropriate provider over an 8-week period.

Transitions to a self-management phase for 4 – 10 months. During the self-management phase, the older adult continues to independently do the exercises, and has the opportunity to check in with their program provider via monthly phone calls, and an optional face to face check in at 6 months



Aim: Falls Risk Reduction



Falls in older adults can cause significant physical^[2] and psychological injury^[3] to the individual. As a consequence, falls also incur significant health care costs^{[2][4][5]}. The New Zealand Accident Compensation Corporation (ACC) implemented a project with the goal of reducing falls: The Otago Exercise Programme (OEP).

The OEP was developed by Campbell and Robertson^[6] for the New Zealand Accident Compensation Corporation (ACC) which provides treatment and rehabilitation under a universal, no-fault accidental injury scheme.

The main takeaway results from the research into OEP includes:



- Falls among people participating in the Otago were reduced by 30% to 66% when compared to controls who were not doing Otago exercises.
 - After one year, injuries due to falls were reduced by 28% in participants performing Otago exercises.
- The Otago exercise program was most effective at reducing falls for people over the age of 80 years, but people who were younger still found some benefit.
- Seventy percent of patients performing Otago exercises continued doing the program after one year

Content of the program



1. Baseline Assessment

- The program starts with the first home visit where the physiotherapist can discuss general information and goals of the program with the patient and collect relevant clinical history information. Additionally, an intake assessment of balance and strength is performed, with the 1) the 30 second Chair Stand Test 2) the Four-Stage Balance Test 3) the Timed Up & Go test. Additional home visits and follow-up phone calls are performed during the program by the physiotherapist with the aim of encouraging adherence

30 Second Chair Stand Test¹¹

The purpose of this test is to assess leg strength and endurance. The equipment needed includes a chair with a straight back without arm rests (seat 17 inches high) and a stopwatch.

30 Second Chair Stand Test Instructions	
Participant	Physical Therapist
<ol style="list-style-type: none">1. Sit in the middle of the chair.2. Place your hands on the opposite shoulder crossed at the wrists.3. Keep your feet flat on the floor.4. Keep your back straight.5. On “Go,” rise to a full standing position and then sit back down again.6. Repeat this for 30 seconds.	<ol style="list-style-type: none">1. Place the chair against a wall for safety.2. On “Go,” begin timing.3. Count the number of times the patient comes to a full standing position in 30 seconds.4. If the patient is over halfway to a standing position when 30 seconds have elapsed, count it as a stand.5. A below average rating indicates a high risk for falls.6. Record score on Otago Visit Sheet or in your medical documentation

30 Second Chair Stand (# stands)²⁴

MEN				WOMEN			
Age	Below Average	Average	Above Average	Age	Below Average	Average	Above Average
60-64	<14	14-19	>19	60-64	<12	12-17	>17
65-69	<12	12-18	>18	65-69	<11	11-16	>16
70-74	<12	12-17	>17	70-74	<10	10-15	>15
75-79	<11	11-17	>17	75-79	<10	10-15	>15
80-84	<10	10-15	>15	80-84	<9	9-14	>14
85-89	<8	8-14	>14	85-89	<8	8-13	>13
90-94	<7	7-12	>12	90-94	<4	4-11	>11





Four-Stage Balance Test^{12, 13}

The purpose of this test is to assess static balance. The equipment needed is a stopwatch. This test includes four progressively more challenging positions. Participants should not use an assistive device (cane or walker) and should keep their eyes open and be barefoot.

Describe and demonstrate each position. Stand next to the patient, hold their arm, and help them assume the correct foot position. When they are steady, let go, but remain ready to catch them if they should lose balance. If the patient can hold a position for 10 seconds without moving their feet or needing support, go on to the next position. If not, stop the test. An older adult who cannot hold the tandem stance for at least 10 seconds is at an increased risk of falling.

Four-Stage Balance Test Instructions	
Participant	Physical Therapist
1. Stand in each position for 10 seconds.	1. For each stage, say “Ready, begin” and begin timing.
2. You can hold your arms out or move your body to help keep your balance but do not move your feet.	2. After 10 seconds, say “Stop.”
3. Hold this position until you are told to stop.	

Four-Stage Balance Test Stances

Feet Together Stand	Semi-Tandem Stand	Tandem Stand	One Leg Stand
<ul style="list-style-type: none">Stand with your feet side by side.  <p>A line drawing showing two foot outlines placed side-by-side, touching at the inner edges.</p>	<ul style="list-style-type: none">Place the instep of one foot so it is touching the big toe of the other foot.  <p>A line drawing showing two foot outlines. The front foot is shifted forward so its instep touches the big toe of the back foot.</p>	<ul style="list-style-type: none">Place one foot in front of the other, heel touching toe.  <p>A line drawing showing two foot outlines stacked vertically, with the heel of the front foot touching the toe of the back foot.</p>	<ul style="list-style-type: none">Stand on one foot.  <p>A line drawing showing a single foot outline.</p>

The Timed Up and Go (TUG) Test¹⁴⁻¹⁶

The purpose of this test is to assess older adult mobility. The equipment needed includes a stopwatch, a standard armchair, and a line marked on the floor at 3 meters (10 feet) away from the edge of the front of the chair. The patient may use their usual walking aid and push off with their hands on the arms of the chair to stand up.

Instructions to the Patient

When I say "GO", I want you to:

1. Stand up from the chair.
2. Walk to the line on the floor at your normal pace.
3. Turn.
4. Walk back to the chair at your normal pace.
5. Sit back down again.

Observe the patient's postural stability, gait, stride length, and sway.

Circle all that apply:

Slow tentative pace — Loss of Balance — Short strides —

Little or no arm swing — Steadying self on walls — Shuffling —

En bloc turning — Not using assistive device properly

Notes:

On the word “Go” begin timing.

Stop timing after patient has sat back down and record.

Time: _____ seconds (#.#)

An older adult who takes ≥ 12 seconds to complete the TUG is at high risk for falling.

2. Exercise and walking program



Based on the results of the initial assessment, an exercise and a walking program are prescribed by the therapist. The OEP comprises

- 5 strengthening exercises and 12 balance exercises^[6]. Participants are instructed to perform the exercises three times a week^[9]. Depending on the individual's strength and mobility, the exercises can be progressed, by increasing the amount of repetitions or weight (ankle cuffs with weight can be used and adjusted during the program).
- Participants are provided with a walking program, aiming to include a 2x week 30 minutes walking session (can be broken into smaller periods e.g. three ten-minute blocks)

Prescription of Exercises

Strengthening

- The Otago exercise program focuses on major lower limb muscles:
 - Knee flexors, knee extensors, and hip abductors, which are important for function and mobility.
 - Ankle dorsiflexor and plantar flexor muscles, which are important for maintaining balance.
- Determine the starting level of each exercise by the amount of ankle weight the patient can lift to perform eight to ten good quality repetitions before fatigue. This must be assessed for each muscle group on each leg.
- Recommend that patients aged 80 and older start with two-to-four-pound weights.
- Starting with light weights at the outset will minimize both muscle soreness and compliance problems.
- Ensure throughout prescription that:
 - The patient uses adjustable ankle weights.
 - There is minimal substitution of other muscle groups.
 - The patient uses the correct breathing technique (inhale before a lift, exhale during, and inhale while lowering the lift).
 - The patient does the exercises slowly (two to three seconds to lift the weight, four to five seconds to lower the weight) through the functional range of active joint movement.

Balance Retraining

- Observe the patient during the holding portion of each balance exercise. Make sure they can recover their balance using lower body strategies (as opposed to grabbing with their arms) before prescribing the exercise without support.
- Not everyone will start at the first level or be prescribed all the balance exercises. Unstable patients may initially need a wider base of support.
- Ensure the patient's eyes stay looking ahead.
- It is okay to make lower limb balance adjustments, such as taking a recovery step, while doing the exercise and is confident in doing so.

Otago Exercise Levels and Repetitions

WARM-UP (FLEXIBILITY) EXERCISES

Head Movements	Stand tall, 5 times on each side	Trunk Movements	Stand tall, 5 times each side
Neck Movements	Stand tall, 5 times	Ankle Movements	Stand or sit, 10 times
Back Extension	Stand tall, 5 times		

STRENGTHENING EXERCISES

Knee Extensor	ALL 4 LEVELS		
Knee Flexor	Ankle weights are used to provide resistance; perform 10 repetitions of each exercise, when able to do 2 sets of 10 repetitions add/progress weights.		
Hip Abductor			
Calf Raises	LEVEL C 10 repetitions, hold support, repeat	LEVEL D 10 repetitions, no support, repeat	
Toe Raises	10 repetitions, hold support, repeat	10 repetitions, no support, repeat	

The walking Plan



. Advise the patient that including walking in their plan of care is part of the program and will increase physical activity. Discuss their walking activities and evaluate their gait (e.g., using the Timed Up & Go) and use of walking aid(s) indoors and outdoors to determine safety and feasibility of a walking program.

Make it clear to the patient that walking alone, without the strength and balance exercises will not reduce their chances of falling. – Otago participants should plan to walk up to 30 minutes at their usual pace at least twice a week, if it is safe to do so. ▪ The 30 minutes of walking can be broken up into shorter intervals, such as three 10-minute sessions. – Otago participants should only incorporate the walking plan when they are physically ready and able. – Otago participants should begin by walking indoors and advance to walking outdoors when strength and balance have improved.

Indication



The OEP that improve balance and can help prevent falls, a common problem in many population eg

- Older adults The program is designed for older adults (65+).^[6]. Any elder person interested in preserving and improving their strength, balance and competency in Activities of Daily Living (ADLs) can benefit from participating in the program.
 - Individuals who have already experienced a fall (ie high risk group)^[6]
 - Neuromuscular conditions (multiple sclerosis, parkinsonism, stroke),
 - Cancer Rehabilitation
- De-conditioned Adults eg post lengthy hospital stays; long term corticosteroid medications.

Monitoring



Some simple measures can be used to monitor a patient's success in Otago:

- Calendars or diaries can monitor compliance with strength training, balance retraining, and walking exercises.
- The initial strength, balance, and walking tests (e.g., 30 second Chair Stand Test, Four-Stage Balance Test, and Timed Up & Go) can be repeated periodically and the results can be compared to assess progress. Sharing the results with the patient helps with motivation.
- Use the Otago Visit Chart to monitor frequency and duration of visits, falls, progression of exercises and walking, and comments made at each visit.

Once otago ends

Sustaining the Benefits of Otago

- Provide ongoing support and motivation.
- Encourage walking and other physical activities.
- Involve family members and other caregivers.
- Involve the patient's primary care provider



Concluding Words

Falling down can be a scary thing, and it can cause injury and create a situation where a persons confidence with mobility is shaken. Performing Otago exercises three times a week has been shown to help improve balance and mobility and prevent falls.

The Otago exercise program is a simple, effective, and fun way to improve balance and hopefully prevent falls.



References



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