BIODEX SD Case Report from Solent NHS Trust (Southampton)

The Southampton Central Community Independence Service referred a 58-year-old lady to the Falls Clinical Lead Physiotherapist for assessment and management of vertigo and falls. She was visited at home on 31st October 2017.

Vertigo
She had a prior history of vertigo, including Benign Paroxysmal Positional Vertigo (BPPV), for which she was treated at the Royal Free Hospital. When the vertigo is active, she had problems in shops & crowds, and managing steps.

The episodes of dizziness that she described in October 2017 occurred even when sitting down. The dizziness was provoked by getting up from bed, looking up, looking or bending down, turning her head from side to side, and standing up fast. She only lay on her left side at night. Episodes of dizziness could last 2-3 hours, or even days at a time. It went if she sat quietly.

The symptoms were not entirely consistent with BPPV this time, but she consented to the Dix Hallpike test for BPPV to rule this out. The Dix Hallpike tests were negative for both vertigo and nystagmus, to both left and right, indicating that there was no active BPPV.

Eye movements provoked mild dizziness. Head movements provoked moderate dizziness.
There were three more home visits, between 16th November and 20th December 2017.
She conscientiously practised her vestibular rehabilitation home exercises, such that by 20th December she was not experiencing any dizziness or vertigo. She admitted to feeling unsteady.

She attended the Falls Clinic at the Royal South Hants for nine x one hour sessions on the BIODEX balance platform, between 23rd January and 3rd April 2018.

Falls Efficacy Scale-International (FES-I) score: 43/64. She was very concerned about falling taking a bath or shower, going up or down stairs (she could not come down forwards), reaching for something up high or on the ground, and walking on slippery or uneven surfaces. She was fairly concerned about falling when getting dressed/undressed (she sat down), going to the shop, walking around the neighbourhood, and walking in crowds.

Summary of assessment findings

Test item	Initial score	Details	Final score	Details
BERG balance scale	44/56	See below	56/56	See below
Stand to sit	4	No hands	4	-
Sitting unsupported	4	-	4	-
Sit to stand	4	No hands	4	-
Transfers	4	No hands	4	-
Standing with feet apart	4	120 secs	4	-
Standing with eyes closed	4	10 secs	4	30 secs
Standing with feet together	4	60 secs	4	-
Turning to look behind	4	Equal both ways	4	-
Turning 360^0	2	5.29 secs to right 6.27 secs to left	4	3.83s to right 3.19s to left

Standing with one foot in front unsupported	3	Stride stand for 30s. Unable to heel-toe stand	4	Heel-toe stand 30s with either foot in front
Standing on one leg unsupported (Average for her age is 36 secs on one leg)	1	3 secs on left Unable on right	4	40 secs on left 13s on right
Reaching forwards (Average for her age is 38cm)	3	17cm	4	29cm
Bending to the floor	0	Fear of back pain	4	No pain/fear
Placing alternate foot on step X8	3	24.22 seconds	4	12.91 secs
Turn 180^0	-	4 steps L & R	-	4 steps L & R
Timed Up And Go test (Average for her age is 7 seconds)		31.16 secs with stick in left hand		14.58s Left stick
30 second sit to stand (Average for her age is x 19 stands)		X3 stands		X 11 stands
Dynamic Gait Index		-	-	19/24 Predictive of falls

BIODEX Balance platform results

Clinical Test of Sensory Integration of Balance (CTSIB) 30 secs each condition

Condition	Initial Stability Index	Final Stability Index	Initial Sway Index	Final Sway Index	Sway Index Norm
Eyes open firm surface	1.7	0.4	0.92	0.43	0.50
Eyes closed firm	2.4	1.3	1.00	0.66	1.00
Eyes open foam	1.8	0.7	1.21	0.60	0.75
Eyes closed foam	Unable	2.5	-	2.16	2.25

She was initially unable to balance on a foam cushion with her eyes closed, but achieved this for 30 seconds with practice. Stability index scores improved for all four conditions.
Sway index scores improved for all four conditions, from greater sway than the average for the population, to less sway than average.

Falls Risk Test. Three trials of 20 seconds on unlocked platforms (platform settings 12-8).
Overall Stability score 1.9 initially, & 1.3 in April; STD Dev 1.21 initially, and 0.79 in April. All within normal range for age 17! Good static balance on an unstable base.
She managed to maintain her balance on progressively less stable unlocked platforms, achieving 20 seconds balance on platform setting 5.

Weight shift & Limits of Stability
She practised shifting weight over static feet in different directions on a static platform, progressing quickly to the task that looked like white Maltesers. The targets were set at the edge of her sway envelope. She worked with increasing time on targets, from 0.25 seconds to one second at each target. She achieved all eight direction control goals (>65% accuracy).

Maze Control
This was the task that looked like an old telephone dial. The targets were in a circle, at the edge of her comfort zone, and she was not allowed back into the middle. She achieved 96% overall accuracy, but had completed both clockwise and anti-clockwise circuits with 100% accuracy (although not both in the same trial). Static platform.

Random Control
She was required to maintain the cursor (her centre of gravity) within a randomly moving target, on a static platform. She achieved 100% for 30 seconds with the large target moving slowly; 98% for medium sized target and 95% for small target respectively.

Orthostatic Hypotension
On 2nd October 2017 it was noted that her blood pressure dropped from 152/79 when lying to 123/86 on standing up (a significant postural drop of 29mmHg). At that time, she was unable to remain standing longer than 3 minutes, by which time her BP was 126/84 (so had not returned to the resting rate).
When reassessed on 26th March 2018, her lying BP was 130/78. This dropped to 112/79 on standing (a drop of only 18mmHg), but had not returned to baseline by 5 minutes (although by then had risen to 122/86).
She was given a fact sheet on managing postural hypotension and we discussed coping strategies.

Self-Management Plan
To continue to maintain the improvement in her strength & balance, especially:
1.   stand on one leg without support
2.   heel-toe stand without support
3.   sit to stand x11 or more in 30 seconds (the average for a 60 year old woman is x16 stands)
4.   Stand with her eyes closed for 30 seconds
5.   Practise clock lunges/compensatory stepping as an intrinsic saving reaction (rather than grabbing for support if balance is lost)
6.   Revisiting all her home exercises in the booklets

The evidence is that it takes six months of specific exercises to make lasting physiological changes to strength and balance. She declined the offer of onward referral to the Falls Revolution classes, but had demonstrated that she knew and was doing her home exercises. To continue with these three times a week.

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