

The Prevalence of *Early Balance Dysfunction* & Associated Risk Factors in Community-dwelling Older People



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Research Team:

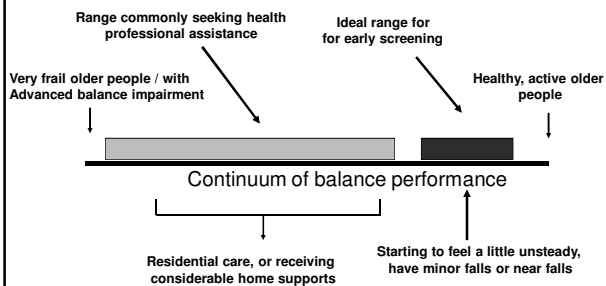
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Background—why study balance?

- Balance dysfunction is known as an important falls risk factor in older people (RR=3.2, 95% CI: 1.6-5.4)
Falls are:
 - > Common: 1 in 3 older people falls each year
 - > Painful: 10% of these falls result in serious injuries (e.g. fractures)
 - > Costly: injurious falls costed \$AUD 498 million in 2001, and this is projected to triple by 2051
- The ability to balance is essential in maintaining older people's independence and mobility.

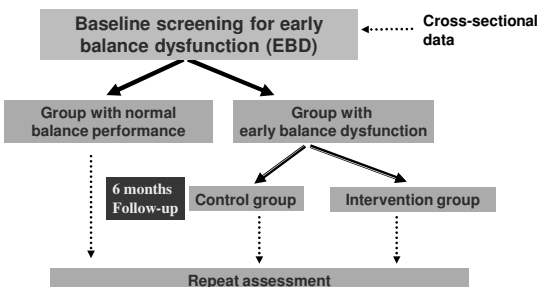
Early identification of balance dysfunction



Research questions

- What is the prevalence of early balance dysfunction in a sample of older people living in the community?
- What are the risk factors associated with early signs of balance dysfunction in older people?

Method: baseline data from a RCT



Inclusion criteria

- > 65+ years
- > living in the community (at home or in a retirement village)
- > community ambulant
- > no walking aid or using a single point stick
- > no more than one fall in the past 12 months
- > **concerned about balance, confidence or near falls**

A comprehensive balance assessment

| | Static balance | Dynamic balance | | | Lower limb muscle strength | Gait |
|---|---|--|----------------|-----------------------|---|------------------|
| | | Reaching /leaning | Stepping | Turning | | |
| Clinical measures | | Functional Reach (FR) | Step Test (ST) | | Hand-held Dynamometer Sit-to-Stand STS (5 times) | six metre walk |
| Laboratory Measures (NeuroCom Balance Master) | Modified Clinical Test of Sensory Interaction of Balance (MCTSIB) | Limits of Stability (LOS) Rhythmic Weight Shift (RWS) | | Step Quick Turn (SQT) | Sit-to-Stand (STS) | Walk Across (WA) |

Clinical measures: dynamic balance

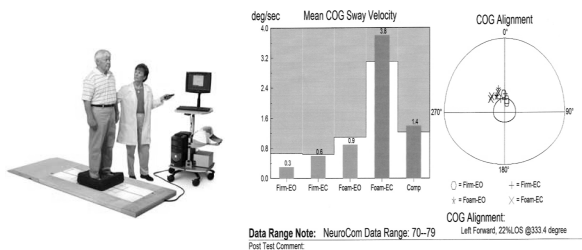


Functional Reach Test (FRT)



Step Test (ST)

Laboratory measure: Modified Clinical Test of Sensory Interaction of Balance (MCTSIB)



Classification of “normal balance performance”

- No gold standard available
- For the purpose of this study, used “*having normal scores on ALL clinical measures, and no more than 3 abnormal scores on laboratory measures*”
- Classification and clinical judgment showed good agreement (tested in a sample of 35 participants)

Other information collected at baseline

- The Human Activity Profile (HAP);
- The Assessment of Quality of Life (AQoL);
- Falls History (in the past year);
- The Modified Falls Efficacy Scale (MFES)
- Date of birth, marital status and living arrangement;
- Medical and health conditions
- Medication use;
- Physical activities and gait aid use
- History of balance concern and activities when concerned about balance
- Height and weight.

Statistical analysis

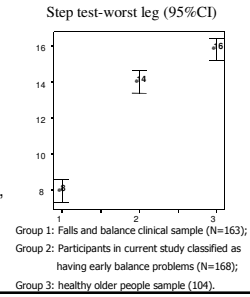
- Descriptive statistics –report the proportion of participants who were classified as having EBD in this study sample, and calculate associated 95% CI
- Multiple logistic regression --information (e.g. gender, age, activity level, medical history, medication use etc.) were investigated in univariate and multivariate analyses to identify those factors associated with EBD while adjusting for the confounding effects of each other

Sample Characteristics: demographic profile

- N=225
- Age: mean age 79.7 years, (95% CI: 78.9-80.5 years)
- Gender: male 56%, female 44%
- Marital Status: 53.8% lived with a spouse or partner

Results: the prevalence of early balance dysfunction

- At baseline, 168 (74.7%) participants were classified as having early balance dysfunction (95% CI: 69%-80%)
- This group's balance performance lies between healthy older people and a sample of falls clinic patients, and is much closer to the healthy sample.



Results: potential risk factors for EBD- univariate analysis

| Variable (factor) | Group without EBD: Prevalence (%) or Mean & 95%CI (N=60) | Group with EBD: Prevalence (%) or Mean & 95%CI (N=165) | Univariate Odds Ratios (95% CI)-before adjusting for age and gender | Univariate Odds Ratios (95% CI)-after adjusting for age and gender |
|---------------------------------|--|--|---|--|
| Age (years) | 76.9 (75.5-78.3) | 80.6 (79.7-81.5) | 1.102 (1.048-1.159) | |
| Living with a spouse | 24.6% | 44% | 0.418 (0.216-0.808) p=0.009 | 0.530 (0.244-1.151) p=0.109 |
| Walking aid use | 3.5% | 23.8% | 5.880 (1.744-19.821) p=0.004 | 4.795 (1.396-16.467) p=0.013 |
| Reported concerns about walking | 60% | 78.85% | 2.886 (1.496-5.566) p=0.002 | 2.601 (1.318-5.134) p=0.006 |
| Walking velocity (m/min) | 74.8 (71.8-77.9) | 62.7 (60.5-64.9) | 0.933 (0.908-0.959) p=0.000 | 0.939 (0.912-0.967) p=0.012 |

Results: potential risk factors for EBD- univariate analysis (cont'd)

| Variable (factor) | Group without EBD: | Group with EBD: | OR & 95% CI-before adjusting (age,sex) p= | OR & 95% CI-after adjusting (age,sex) p= |
|------------------------------------|--------------------|------------------|--|---|
| Fear of falling (MFES score) | 9.67 (9.48-9.87) | 9.16 (8.97-9.35) | 0.539 (0.349-0.833) p=0.005 | 0.982 (0.887-1.041) p=0.181 |
| Activity level (HAP score, AAS) | 69.8 (67.3-72.4) | 61.5 (59.7-63.4) | 0.936(0.9070.966) p=0.000 | 0.944 (0.912-0.977) p=0.001 |
| Total number of medical conditions | 3.6 (3.1-4.0) | 4.1 (3.8-4.4) | 1.166 (0.989-1.373) p=0.067 | 1.166 (0.982-1.384) p=0.079 |
| Total number of prescribed meds | 3.2 (2.6-3.8) | 4.1 (3.7-4.6) | 1.155 (1.020-1.309) p=0.023 | 1.149 (1.011-1.307) p=0.034 |
| History of Hypertension | 42.1% | 58.9% | 2.048 (1.124-3.731) p=0.019 | 2.043 (1.098-3.803) p=0.024 |
| Antihypertensive medications use | 39.3% | 60% | 2.022 (1.102-3.709) p=0.035 | 2.018 (1.076-3.783) p=0.029 |

In univariate analysis, some of the traditional falls risk factors did not appear to be associated with EBD in this sample, e.g. being female; psychotropic medication use; presence of arthritis in lower limbs

Results: potential risk factors- multiple logistic regression

| | Variables in the Equation | | | | | | | |
|---------------|---------------------------|-------|-------|----|------|--------|-------------------|-------|
| | B | S.E. | Wald | df | Sig. | OR | 95.0% C.I. for OR | |
| | | | | | | | Lower | Upper |
| Age | .019 | .033 | .341 | 1 | .559 | 1.019 | .956 | 1.088 |
| Sex | .095 | .407 | .054 | 1 | .816 | 1.099 | .495 | 2.440 |
| Activity-AAS | -.043 | .022 | 4.017 | 1 | .045 | .958 | .918 | .999 |
| Walking speed | -.036 | .017 | 4.382 | 1 | .036 | .965 | .933 | .998 |
| Concern-walk | .805 | .406 | 3.930 | 1 | .047 | 2.237 | 1.009 | 4.960 |
| Gait aid use | 1.027 | .561 | 3.347 | 1 | .067 | 2.791 | .929 | 8.384 |
| HBP | .475 | .569 | .698 | 1 | .403 | 1.609 | .527 | 4.908 |
| No. Medicines | -.086 | .450 | .036 | 1 | .849 | .918 | .380 | 2.217 |
| No.Medical | -.024 | .117 | .043 | 1 | .837 | .976 | .777 | 1.227 |
| Anti-HBP Mec | .402 | .530 | .575 | 1 | .448 | 1.495 | .529 | 4.225 |
| Constant | 3.707 | 3.662 | 1.025 | 1 | .311 | 40.735 | | |

Implications in practice

- Older people who report "feeling unsteady" should have further investigation and appropriate intervention
- Reduced activity level, slow walking speed and loss of confidence in walking appear to be associated with early balance dysfunction in older people
- Many traditional falls risk factors may not predict early balance dysfunction in relatively healthy and active older people