Cognitive impairment and falls

Dr Morag Taylor
NSW Falls Network Webinar
21 August 2018
Outline

1. Background

2. Risk factors for falls (brief)

3. Fall prevention

4. Strategies to assist and practical considerations

5. Summary
Dementia

• Progressive neurodegenerative disorder affecting cognition and as a result ability to function

• Memory, orientation, processing speed, executive function and attention, language, visuospatial ability

Dementia

- Alzheimer’s disease
  - Most common
- Vascular dementia
- Dementia with Lewy Bodies
- Frontotemporal dementia
  - Behavioural and language variants
- Parkinson’s disease dementia
- Mixed dementia

Alois Alzheimer, 1909

Mild Cognitive Impairment (MCI)

- Mild Cognitive Impairment
  - Activities of daily living (ADLS) preserved
    - Minor issues with complex ADLS
  - Cognitive impairment
  - Cognitive complaints
- Amnestic vs non-amnestic
- Single vs multidomain

Dementia prevalence and incidence

Who is affected?

Nearly 10 million new cases every year

One every 3 seconds

47 million people worldwide in 2015

Set to almost triple by 2050

Figure 2 Estimated number of Australians with dementia, 2016-2056

http://www.who.int/mediacentre/factsheets/fs362/en/
Dementia and falls

Fall consequences

- 3-fold increased risk of hip fracture
- Increased mortality
- Increased morbidity
- Less rehab
- Residential Care

2-fold increased risk of head injury

References:
- Draper B et al: The Hospital Dementia Services Project: age differences in hospital stays for older people with and without dementia. Int Psychogeriatr 2011; 23:1649-1658
Consequences: rehab, RACF and mortality

Individuals with dementia:

• 31% less likely to receive rehabilitation after fall-related injury hospitalisation

• 30-day and 1-year mortality double for fall-related injury hospitalisation

• 28% fall-related injury admissions resulted in a new transfer to RACF
Cognitive decline

- Normal age-related decline
- Preclinical
- MCI
  - Amnestic
  - Non-amnestic
  - Single domain
  - Multi-domain
- Dementia
  - Mild
  - Moderate
  - Severe

- Subjective cognitive complaint
- Objective cognitive impairment
- Preserved ADL
- Impaired ADL

Adapted from https://www.mind.uci.edu/dementia/mild-cognitive-impairment/
Postural control

- Higher level cognitive function plays an essential role in interpretation and integration of sensorimotor information
## Physical impairment

<table>
<thead>
<tr>
<th>Measure</th>
<th>Cognitively intact (n=276)</th>
<th>Cognitively impaired (n=138)</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand reaction time, ms</td>
<td>250 ± 51</td>
<td>309 ± 118</td>
<td>1.95 (1.56 – 2.45)</td>
</tr>
<tr>
<td>Knee extension strength, kg</td>
<td>26 ± 11</td>
<td>21 ± 10</td>
<td>0.59 (0.47 – 0.75)</td>
</tr>
<tr>
<td>Sway on foam, mm²</td>
<td>1043 ± 962</td>
<td>1912 ± 1508</td>
<td>2.44 (1.89 – 3.15)</td>
</tr>
<tr>
<td>Coordinated stability</td>
<td>16 ± 13</td>
<td>25 ± 15</td>
<td>1.89 (1.48 – 2.40)</td>
</tr>
<tr>
<td>Sit-to-stand x5, s</td>
<td>16 ± 5</td>
<td>23 ± 12</td>
<td>1.75 (1.36 – 2.26)</td>
</tr>
<tr>
<td>Timed up + go, s</td>
<td>10 ± 3</td>
<td>20 ± 12</td>
<td>6.99 (4.51 – 10.87)</td>
</tr>
</tbody>
</table>
Physical decline

Tolea, et al. (2016). Trajectory of mobility decline by type of dementia. Alzheimer Disease and Associated Disorders, 30, 60-66
Fall risk factors
Incidence and Prediction of Falls in Dementia: A Prospective Study in Older People

May 2009 | Volume 4 | Issue 5 | e5521

Predominantly community-dwelling (83%)
Summary of modifiable risk factors

Cognitive impairment and dementia

Psychological Impairment
- Depressive symptoms (GDS)
- Anxiety (GAS)
- Fear of falling (FES-I)

Sensorimotor, Balance and Functional Impairment
- Reaction time (HRT)
- Static balance (Sway on foam)
- Leaning balance (Coordinated stability)
- Functional mobility (TUG, STS, Gait)

Cognitive Domain Impairment
- Processing speed (Trails A and B, HRT)
- Executive function (Trails B, Verbal Fluency, Cube)
- Visuospatial ability (ACE-R)

Medication Use
- Centrally acting
- Total number
- Four or more

Physical Activity
- Hours of walking per week (IPEQ)

Falls
Fall prevention
Effects of physical exercises on preventing falls in older adults with cognitive impairment

Overall, 32% reduction in rate of falls
<table>
<thead>
<tr>
<th>Study</th>
<th>Intervention</th>
<th>Fall Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stenvall 2007, RCT, n=64</td>
<td>Geriatric unit specialising in geriatric orthopaedic management post NOF</td>
<td>✓</td>
</tr>
<tr>
<td>Haines 2011, RCT, sub-acute, n=300</td>
<td>Patient education: materials +/- physio</td>
<td>✗</td>
</tr>
<tr>
<td>Hill 2015, Stepped- wedge, cluster RCT, rehab wards, n= 1676</td>
<td>Patient education: materials +/- physio for ppts with MMSE &gt;23, combined with staff training and feedback</td>
<td>❓ ✗</td>
</tr>
<tr>
<td>Study</td>
<td>Intervention</td>
<td>Fall outcome</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Jensen 2003, RCT, n=170 MMSE &lt;19, n=171 MMSE ≥ 19</td>
<td>Multifactorial</td>
<td></td>
</tr>
<tr>
<td>Shaw 2003, RCT, n=274</td>
<td>Multifactorial designed for community</td>
<td>X</td>
</tr>
<tr>
<td>Toulotte 2003, RCT, n=20, 15 residents</td>
<td>Group exercise</td>
<td>X</td>
</tr>
<tr>
<td>Rolland 2007, RCT, n=134 AD</td>
<td>Group exercise</td>
<td></td>
</tr>
<tr>
<td>Rosendahl 2008, RCT, n=191, 50% dementia Dx</td>
<td>High intensity functional group exercise</td>
<td>✓</td>
</tr>
<tr>
<td>Rapp 2008, RCT, n=148</td>
<td>Multifactorial</td>
<td>✓</td>
</tr>
<tr>
<td>Neyens 2009, RCT, n=518</td>
<td>Multifactorial</td>
<td>✓</td>
</tr>
<tr>
<td>Chenoweth 2009, RCT 3-arm, n=289</td>
<td>Dementia care mapping and person-centred care, Person-centred care</td>
<td>✓</td>
</tr>
<tr>
<td>Kovacs 2013, RCT, n=86</td>
<td>OTAGO, supervised walk, multimodal</td>
<td>X</td>
</tr>
<tr>
<td>Whitney 2017, pilot cluster RCT, n=191</td>
<td>Multifactorial</td>
<td>X</td>
</tr>
</tbody>
</table>
Systematic review and meta-analysis of RCTs

Nursing homes

Overall, multifactorial interventions reduced number of falls and recurrent fallers

Multidisciplinary

Exercise included 6/7 studies

Fewer fallers in intervention groups that had a greater prevalence of dementia
Progressive Resistance and Balance Training for Falls Prevention in Long-Term Residential Aged Care: A Cluster Randomized Trial of the Sunbeam Program

Jennifer Hewitt BAppSc, MHealthSc, A, Stephen Goodall PhD, Lindy Clemson PhD, Timothy Henwood PhD, Kathryn Refshauge PhD

• Cluster RCT
  • n=113 intervention, n=108 control, 16 facilities
• 49% with diagnosed cognitive impairment, 56% in the intervention group (ACE-R baseline mean = 72)
• MMSE < 15 excluded
• 52% high care status
• Significant difference in SPPB
• 55% reduction in rate of falls
• 54% reduction in injurious falls
Sunbeam (Hewitt 2018)

Stage 1: 0-25 weeks
- 1h x2/week
- PRT and balance exs

Stage 2: Maintenance (7-12 months)
- 30min, x2/week
- resistance, weight bearing balance, and functional group exercise sessions
- not progressive
<table>
<thead>
<tr>
<th>Study</th>
<th>Intervention</th>
<th>Fall Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shaw 2003, RCT, n=274, 22% community</td>
<td>Multifactorial</td>
<td></td>
</tr>
<tr>
<td>Suttanon 2013, feasibility RCT, n=40 AD</td>
<td>Home-based exercise and walking program</td>
<td>X</td>
</tr>
<tr>
<td>Wesson 2013, pilot RCT, n=22 dyads</td>
<td>Home-based exercise and home hazard reduction</td>
<td></td>
</tr>
<tr>
<td>Zieschang 2013, RCT, n=91</td>
<td>Progressive resistance and functional training (group)</td>
<td></td>
</tr>
</tbody>
</table>
| Pitkala 2013, RCT, 3-arm, n=210 AD + spouse | Group exercise  
Home exercise                                                   | ✔            |
| Zieschang 2017, RCT, n=110, 84% Community | Progressive resistance and functional training (group)                      | ✔            |
Unblinded
Modified intention to treat
Primary outcome on trials registry = SPPB
45% reduction in rate of falls
A home-based, carer-enhanced exercise program improves balance and falls efficacy in community-dwelling older people with dementia

- 10 physiotherapy visits
- 5 telephone calls
- Balance and strength training
- 6 months
A home-based, carer-enhanced exercise program improves balance and falls efficacy in community-dwelling older people with dementia

<table>
<thead>
<tr>
<th>Exercise program</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visit</strong></td>
</tr>
<tr>
<td>One</td>
</tr>
<tr>
<td>Five</td>
</tr>
<tr>
<td>Ten</td>
</tr>
</tbody>
</table>

**Adherence**

<table>
<thead>
<tr>
<th>Month</th>
<th>% prescribed exercise sessions completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>63</td>
</tr>
<tr>
<td>Three</td>
<td>47</td>
</tr>
<tr>
<td>Six</td>
<td>34</td>
</tr>
</tbody>
</table>
Can a tailored exercise and home hazard reduction program reduce the rate of falls in community dwelling older people with cognitive impairment: protocol paper for the i-FOCIS randomised controlled trial

Jacqueline CT Close, Jacqueline Wesson, Catherine Sherrington, Keith D Hill, Sue Kurrle, Stephen R Lord, Henry Brodaty, Kirsten Howard, Laura N Gitlin, Sandra D O'Rourke and Lindy Clemson.
Strategies to assist and practical considerations
Functional cognition and cognition
Person-centred care

- Care centred around the persons’ needs as an individual
- Shared goals based on persons’ values and experiences
- Past lived experiences
- Likes/dislikes
- Cultural and religious beliefs
- Precipitants to behaviours
- Specific behaviours are a result of unmet needs
- Respect, dignity and compassion
Carer engagement

- Work in partnership and acknowledge their expertise
- Source of information
- Get to know the person with dementia e.g. TOP 5
- Communicate about the person with dementia’s needs
- Consider impact of intervention on carer
- Education for the carer
- Practical examples
- Refer to support groups/social worker/occupational therapy
- Focus on the individuals strengths
- How to help them keep doing what they can do
Communication

- Body language
- Body position e.g. eye contact
- Tone of voice
- Speak slowly, clearly, use simple words
- Short sentences
- Break down instructions
- Allow time for what has been said to be processed
- Allow time for the person to respond
- Clarify what they have said
- Minimise competing noise
- Hearing and vision aids
- Use personal references
CHOPs

- Cognitive screening
- Delirium risk identification and preventive measures
- Assessment of older people with confusion
- Management of older people with confusion
- Effective communication to enhance care
- Staff education
- Supportive care environment

PRINCIPLE 1: Cognitive screening
Patients aged 65 years and over will be screened for confusion on admission or within 24 hours of admission using a validated screening tool.

PRINCIPLE 2: Delirium risk identification and prevention strategies
Older people will be assessed for delirium risk. Interventions will be put in place for prevention of identified risks. Identified risks will be communicated to the older person, their carer, family and staff involved in their care.

PRINCIPLE 3: Assessment of older people with confusion
Older people who are confused will be assessed. The cause of their confusion will be investigated to determine the appropriate management.

PRINCIPLE 4: Management of older people with confusion
NSW hospitals will have programs in place for older people with confusion that align with these principles. The implementation will be in partnership with the older person, their carer and family.

PRINCIPLE 5: Communication processes to support person centred care
Communication processes and tools will support person-centred care for the older person throughout their hospital journey and at their transfer of care to the community.

PRINCIPLE 6: Staff education on caring for older people with confusion
Staff are supported through training, education and leadership to enable them to deliver skilled, timely and knowledgeable care to the older person with confusion.

PRINCIPLE 7: Supportive care environments for older people with confusion
NSW hospitals will provide a supportive care environment for the older person with confusion.

Prescribing exercise

• Individual
  • Balance, functional exercise, reaction time, strength, gait, dual task, referral for other risk factors

• Program and group
  • Otago, Tai Chi, Stepping On, LiFE

• Population
  • Education about the importance of exercise and physical activity
  • Provision of accessible exercise opportunities
Balance training

- Aims to improve stability, leaning, transfers, stepping, mobility, prevent falls
- Ensure grab rails/chair/table/bench nearby
- Moderate or high challenge
- Exercise while standing and striving for
  - movement of the centre of mass
  - narrowing of the base of support
  - minimising upper limb support

Exercise practical considerations

- Supervision and safety
- Focus on strengths
- Tailored
- Fall risk
- Current level of function/activity
- Co-morbid conditions
- Instructions
- Progressive
- Achievable
- Sustainable
- Environment
- Enjoyment
Summary

• Older people with dementia are at increased risk of falls and fall-related injury

• A number of modifiable risk factors have been identified
  • e.g. balance, mood and anxiety, physical activity, CNS medications

• Exercise likely prevents falls in community-dwelling older people with dementia
  • However, further well conducted RCTs needed to confirm/strengthen evidence
Summary

• Hospital
  • ? Multifactorial interventions for the hospital setting
  • ? Patient (MMSE >23) and staff education in rehab units

• Multifactorial fall prevention initiatives for RACF probably effective in people without dementia
  • Possibly effective for people with dementia too

• Many other positive effects of exercise
  • CVD, diabetes, weight control, mood, cognition

• We need more evidence/research for conclusive evidence
Resources

Active and Healthy (NSW Health; can search for appropriate exercise classes in local area)  

NSW Falls Prevention Network  http://fallsnetwork.neura.edu.au/

Australian and New Zealand Falls Prevention Society (ANZFPS)  http://www.anzfallsprevention.org/

Otago Exercise Program training course  http://www.aheconnect.com/newahec/cdetail.asp?courseid=cgec3


Physiotherapy Exercises  http://www.physiotherapyexercises.com/

Prevention of Falls Network for Dissemination  http://profound.eu.com/


Clinical practice guidelines and principles of care for people with dementia  


The Australian Commission on Safety and Quality in Healthcare (The Commission) developed the National Safety and Quality Health Service (NSQHS) Standards  http://www.nationalstandards.safetyandquality.gov.au/  