The Challenge of Preventing Falls in People with Dementia

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Outline of workshop

- The current evidence
- Results from a prospective risk factor study
- Results from a pilot approach to intervention in preventing falls in people with dementia
- The impact of a focus on dementia and delirium care in preventing hospital falls
- Practical advice on what to do now while we await the research evidence
The current evidence
Epidemiology of falls in CI / Dementia

- Annual incidence of falls in cognitively impaired populations is double the normal population
- Fractures are up to 3x more common
- Gait abnormalities are more common
- Up to 26% of all hospitalisations in people with dementia relate to falls
Delirium / Dementia code present in 351 (36%) admissions

Comparison of LOS data

**Total**

- 25.4 v 18.9 days *p* < 0.0001

**Acute LOS**

- 18.4 v 12.3 days *p* < 0.001

**Rehabilitation LOS**

- 37.2 v 33.8 *p* = 0.053
“As the majority of trials specifically excluded older people who were cognitively impaired, the results of this review may not be generalisable to this important group of people at risk. Research on the impact of management programmes for other risk factors such as cognitive impairment and urinary incontinence on risk and rate of falling appears justified”
“There is insufficient evidence to recommend for or against multi-factorial or single interventions to prevent falls in older persons with known dementia living in the community or in long-term care facilities”.
Results from a prospective risk factor study

Falls
Older
Cognitively Impaired
Subjects

Australian Government National Health and Medical Research Council
Falls in Cognitively Impaired Subjects

- Prospective risk factor study
- Aged 60+
- Cognitive impairment (MMSE <24 or ACE-R <82 or specialist diagnosis of dementia)
- Recruited from hospital, clinics, adverts etc
- Had to have consenting “carer”
Methods

- Demographic information
- Medical history & medication use
- Previous falls
- Physiological measures
- Neuropsychological measures
Follow Up

- 1 year follow up
- Monthly falls calendars
- Fall defined using ProFaNE consensus definition
- Multiple faller defined as someone with 2 or more falls in the one year follow-up
Methods (Case Control Study)

- Case Control Study
- 414 community dwelling older people
  - 138 with cognitive impairment / dementia
  - 276 age and sex matched cognitively intact
- Compared physiological function and prospective falls
ACE-R v MMSE

MMSE 26 ACE-R 72  MMSE 28 ACE-R 74  MMSE 25 ACE-R 77

Letter P

- pencil
- people
- physics

Animals

dog
- dromedary
- duck
- duck's hood
- dragonfly

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Physiological Profile Assessment

Fall Risk Score: predicts recurrent falls with 75% accuracy (Lord et al., 2003)
Co-Ordinated Stability

error score=16
Near Tandem Stand
<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Cognitively Intact N=276</th>
<th>Cognitively Impaired N=138</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean ± SD</td>
<td>81.61 ± 5.84</td>
<td>81.95 ± 6.71</td>
</tr>
<tr>
<td>Female, n (%)</td>
<td>136 (49)</td>
<td>68 (49)</td>
</tr>
<tr>
<td>MMSE, mean ± SD</td>
<td>28 ± 1.6</td>
<td>23 ± 4.1**</td>
</tr>
<tr>
<td>Education, yrs, mean ± SD</td>
<td>11.4 ± 3.4</td>
<td>9.9 ± 3.0**</td>
</tr>
</tbody>
</table>
History of Falls in previous year

- Intact:
  - Multiple Falls: 14%
  - Single Fall: 19%

- Impaired:
  - Multiple Falls: 38%
  - Single Fall: 27%

$p < 0.001$
Physiological Comparisons at Baseline

Sway on foam

Co-Ordinated Stability

$p < 0.001$
Balance: Co-ordinated Stability

![Graph showing co-ordinated stability scores for cognitively intact and impaired groups.](image-url)

- Cognitively Intact
  - Non-multiple fallers: [Score]
  - Multiple fallers: [Score]

- Cognitively Impaired
  - Non-multiple fallers: [Score]
  - Multiple fallers: [Score]
Hand Reaction Time

- Cognitively Intact
  - Non-multiple fallers
  - Cognitively Impaired
    - Multiple fallers
Lower Limb Strength

Quadriceps Strength (kg)

Cognitively Intact
- Non-multiple fallers
- Multiple fallers

Cognitively Impaired
- Non-multiple fallers
- Multiple fallers
Overall Falls Risk Score

[Bar chart showing PPA scores for Cognitively Intact and Cognitively Impaired individuals, with bars for Non-multiple fallers and Multiple Fallers.]
The results from this review suggest that there is insufficient evidence of the effectiveness of physical activity programs in managing or improving cognition, function, behaviour, depression, and mortality in people with dementia. Few trials have examined these important outcomes. In addition, family caregiver outcomes and use of health care services were not reported in any of the included trials.
**EXERCISE INTERVENTIONS – Level 1 evidence**

Wolf, 1996  
“free from debilitating processes”

Campbell, 1997  
MSQ <7

Buchner, 1997  
‘major psychiatric illness”

Robertson, 2001  
“unable to understand trial requirements”

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Means, 2005  
MMSE <25

Li, 2005  
“having no cognitive impairment”

Skelton, 2005  
“significant cognitive impairment”

Voukelatos, 2007  
“excluded if they had dementia”

Extrapolation – if benefits from exercise are from improved strength, balance & reaction time – why shouldn’t people with cognitive impairment and dementia benefit.
Results from a pilot approach to intervention in preventing falls in people with dementia
Objectives

- Feasibility trial
  - a novel approach to falls prevention for people with dementia

- Individually tailored program
  - evidence based strength and balance & home safety interventions

- Professionally prescribed, carer led and delivered with an understanding of preserved cognitive function
Trial Design

- 12 week RCT:
  Randomised following baseline measures
- 22 community dwelling participants >65yrs
  Cognitive impairment
  Carer

- Exclusions:
  - Delirium/ acute medical condition
  - Progressive neurological disorder
  - Severe vision impairment
i-FOCIS Pilot Study - Overview

**Recruitment**

**Baseline Measures & Randomisation**

**INTERVENTION GROUP**
- 12 weeks
- Home Hazards Reduction & Exercise Program
- Monthly Falls Calendars

**CONTROL GROUP**
- Usual Care

**Re Assessment Measures**
Measures

- Demographics, falls and medical history
- Neuropsychological measures
- Physical measures
- Functional measures
- Carer Measures
Allen’s Cognitive Disability Model

- Identifies underlying cognitive processes – focuses on preserved cognitive abilities
- Helps tailor content and instruction process
- Helps educate carers re expectations for behaviour
<table>
<thead>
<tr>
<th>Caregiver training</th>
<th>Environmental modifications</th>
<th>Balance and strength training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrate ability to modify communication skill</td>
<td>Removal of obstacles in pathways below knee height to adjust for reduced functional visual field</td>
<td>Discrete exercise area with reduced noise distraction</td>
</tr>
<tr>
<td>according to level of functional cognition</td>
<td>Colour contrasted rails at stair access</td>
<td>Carer initiates practice and demonstrates exercises each time</td>
</tr>
<tr>
<td>Establish regular routines for participant</td>
<td>Reduce boredom, wandering with appropriate leisure activity to 3.6. level</td>
<td>Use of striking visual or auditory targets to cue participant</td>
</tr>
<tr>
<td>Instruct using strategies such as pausing for responses; copying and adjusting participant’s actions</td>
<td>Incorporate toileting schedule into routine to minimize rushing</td>
<td>Modified verbal instructions for 3.6. level and laminated color coded pictures as reminders</td>
</tr>
</tbody>
</table>
i-FOCIS Intervention Protocol

OT visit

Wk 1

Wk 2

Wk 3

Wk 4

Wk 5

Wk 6

Wk 7

Wk 8

Wk 9

Wk 10

Wk 11

Wk 12

PT visit

PT visit

PT visit

PT visit

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Recommendations based on Westmead Home Safety Ax

Included reasoning to highlight hazards

Three sections:
- Habits to change
- Things to buy
- HMMS referral
Exercise Program

Five exercises given
- Standing balance activities
- Strength – sit to stand
- Step ups

Upgrades
- ↑ repetitions
- reduced support
- eyes closed
## Baseline Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Intervention (n=11)</th>
<th>Control (n=11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (SD)</td>
<td>78.7 (4.2)</td>
<td>80.9 (5.0)</td>
</tr>
<tr>
<td>Education (mean ± SD)</td>
<td>10.6 (2.4)</td>
<td>12.0 (4.2)</td>
</tr>
<tr>
<td>Males: females</td>
<td>6:5</td>
<td>7:4</td>
</tr>
<tr>
<td>ACE-R (SD)</td>
<td>67.8 (12.5)</td>
<td>62.5 (14.5)</td>
</tr>
<tr>
<td>MMSE (SD)</td>
<td>24.5 (3.1)</td>
<td>22.5 (4.2)</td>
</tr>
<tr>
<td>Falls prior year</td>
<td>2.09</td>
<td>2.45</td>
</tr>
<tr>
<td>Quads strength (kg)</td>
<td>28.6 (8.7)</td>
<td>31.5 (7.4)</td>
</tr>
<tr>
<td></td>
<td>19.8 (5.5)</td>
<td>14.0 (3.91)</td>
</tr>
<tr>
<td>Balance – near tandem eyes closed (sec)</td>
<td>5.19 (3.5)</td>
<td>5.71 (3.01)</td>
</tr>
<tr>
<td>Activity/ wk (hrs)</td>
<td>20.7 (11.6)</td>
<td>14.4 (10.5)</td>
</tr>
</tbody>
</table>
## Home Safety Adherence

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Number of Recommendations</td>
<td>207</td>
</tr>
<tr>
<td>Number of recommendations per participant - mean (range)</td>
<td>20.7 (13-29)</td>
</tr>
<tr>
<td>Number implemented – mean (range)</td>
<td>10 (3 – 24)</td>
</tr>
<tr>
<td>Percent adherence per participant</td>
<td>48.6%(^10)</td>
</tr>
</tbody>
</table>

### Reasons for non-adherence:
- No perception of need or risk
- Financial considerations
All participants reported adherence 2 x week minimum

Limitations:
- Carer availability to supervise
- Illness and holidays
- No weights used
- Limited dynamic activities used
- Minimal challenges to base of support
No significant differences in any physical measures
- (analysis of median change scores using Mann Whitney tests)

Trend in the right directions for median change scores on physical activity hours/week
Results

Carer Strategy Use

- Intervention: 8 strategies
- Control: 6 strategies

Carer Burden

- Intervention: 18 Zarit Score (/48)
- Baseline: 12 Zarit Score (/48)
## Falls Data

<table>
<thead>
<tr>
<th></th>
<th>Intervention (n=11)</th>
<th>Control (n=11)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Falls in prior year – mean (SD)</td>
<td>2.09 (± 2.5)</td>
<td>2.45 (± 3.17)</td>
</tr>
<tr>
<td>Range</td>
<td>0-8</td>
<td>0-11</td>
</tr>
<tr>
<td>Percent fallen</td>
<td>63%</td>
<td>81.2%</td>
</tr>
<tr>
<td>Fallen &gt; 2 times</td>
<td>45.4%</td>
<td>45.4%</td>
</tr>
<tr>
<td><strong>Follow Up</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Falls to re-Ax - mean (SD)</td>
<td>0.45 (± 0.82)</td>
<td>1.0 (± 1.48)</td>
</tr>
<tr>
<td>Range</td>
<td>0-2</td>
<td>0-4</td>
</tr>
<tr>
<td>Percent fallen</td>
<td>27.3%</td>
<td>36.4%</td>
</tr>
<tr>
<td>Fallen &gt; 2 times</td>
<td>18.2%</td>
<td>36.4%</td>
</tr>
</tbody>
</table>

58% reduction in falls rate - IRR = 0.42 (p = 0.28)
Lessons learnt

- Intensity / duration of exercise program
- Flexibility of intervention protocol itself
- Tailored approach accommodating both physical & cognitive abilities critical
- Design of written materials with cognitive level frame effective
- Strong integration & collaboration between the occupational therapist and physiotherapist crucial
The impact of a focus on dementia and delirium care in preventing hospital falls
Quality Markers of Care of Older People
In-patient falls rates

Falls Rate - POWH

Falls / 1000 OBD

Falls / 1000 OBD vs Time
Preventing In-Patient Falls - A Journey not an RCT

Falls Rate - POWH

- Falls Committee set-up
- Better reporting?
- Review of data – confusion highlighted
- Better recognition and prevention
- Delirium Workshops & Ward In-Services
- Delivery of CEC Falls Module 1

Falls / 1000 OBD

Jan-06
Mar-06
May-06
Jul-06
Sep-06
Nov-06
Jan-07
Mar-07
May-07
Jul-07
Sep-07
Nov-07
Jan-08
Mar-08
May-08
Jul-08
Sep-08
Nov-08
Jan-09
Mar-09
May-09
Jul-09
Sep-09
Nov-09
Jan-10
Mar-10
May-10
Jul-10
Sep-10
Nov-10
Jan-11
Mar-11
Hypnotic use - POWH

Number of sedatives dispensed per month - POWH
Number of tablets of Vit D dispensed per month - POWH
Antipsychotic use - POWH

POW Med & Surg: mg Haloperidol / mth

POW Med & Surg mg Risperidone/ mth

POW Med & Surg mg Olanzapine / mth
Practical advice on what to do now while we await the research evidence
Extrapolation from existing trials

If the mechanism by which the intervention has its effect is understood and not felt to be affected by the presence of cognitive impairment / dementia then it is reasonable to extrapolate data from trials undertaken in cognitively intact populations.

Example 1. Treatment of osteoporosis with bisphosphonates

Note: It assumes that the relative contribution of risk factors to overall risk in cognitively impaired people is comparable to that of cognitively intact subjects.
# Interventions in Hospitals

<table>
<thead>
<tr>
<th>Study</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haines 2004</td>
<td>Cognitively impaired people included</td>
</tr>
<tr>
<td>Healey 2004</td>
<td>Cognitively impaired people included</td>
</tr>
<tr>
<td>Stenvall 2007</td>
<td>Cognitively impaired people included</td>
</tr>
<tr>
<td>Dykes 2010</td>
<td>Cognitively impaired people included</td>
</tr>
</tbody>
</table>

Cognitively impaired people should not be excluded from multifaceted hospital based falls prevention programs.
Interventions in Hospitals

Don’t consider falls in isolation
Must include people with dementia/delirium
Must be whole of hospital approach
Own the issue at a unit level
Involve all disciplines
Use data both to inform and drive change
<table>
<thead>
<tr>
<th>Study</th>
<th>Result</th>
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<tbody>
<tr>
<td>Ray 1997</td>
<td>Did not exclude cognitively impaired</td>
</tr>
<tr>
<td>Jensen 2002</td>
<td>Did not exclude cognitively impaired</td>
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<tr>
<td>Schnelle 2002</td>
<td>Did not exclude cognitively impaired</td>
</tr>
<tr>
<td>Becker 2003</td>
<td>Did not exclude cognitively impaired</td>
</tr>
<tr>
<td>Jensen 2003</td>
<td>Benefits were in those with MMSE &gt;19</td>
</tr>
<tr>
<td>Becker 2008</td>
<td>Benefits were enhanced in those with cognitive impairment (MDS–Rai)</td>
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Cognitively impaired people should not be excluded from multifaceted RACF based falls prevention programs.
MULTIFACETED INTERVENTION

Ray 1997
Jensen 2002
Schnelle 2002
Becker 2003
Jensen 2003

- benefits were in those with MMSE >19

Becker 2008
- benefits were enhanced in those with cognitive impairment (MDS - Rai)

Cognitively impaired people should not be excluded from multifaceted RACF based falls prevention programs

Interventions in RACF

Must include people with dementia
Stop the bad drugs, start the good
Treat bone health
Proactively manage continence
Must recognise the need to modify staff behaviour / interaction
EXERCISE INTERVENTIONS – Level 1 evidence

- Wolf, 1996: “free from debilitating processes”
- Campbell, 1997: MSQ <7
- Buchner, 1997: ‘major psychiatric illness”
- Robertson, 2001: “unable to understand trial requirements”
- Barnett, 2003: “excluded if they had cognitive impairment”
- Lord, 2003: MMSE <20
- Means 2005: MMSE <25
- Li 2005: “having no cognitive impairment”
- Skelton 2005: “significant cognitive impairment”
- Voukelatos 2007: “excluded if they had dementia”

Extrapolation – if benefits from exercise are from improved strength, balance & reaction time – why shouldn’t people with cognitive impairment and dementia benefit.
Intervention in the Community

Evidence suggests potential to benefit from exercise interventions
Will exercise alone be sufficient?
How do you most effectively get people with dementia to exercise safely and effectively?

EXERCISE INTERVENTIONS – Level 1 evidence

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Extrapolation
– if benefits from exercise are from improved strength, balance & reaction time
  – why shouldn’t people with cognitive impairment and dementia benefit.
## Intervention in the Community

### NON-EXERCISE SINGLE INTERVENTIONS

<table>
<thead>
<tr>
<th>Study</th>
<th>Criteria</th>
</tr>
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<tbody>
<tr>
<td>Cumming, 1999</td>
<td>not excluded if live in carer</td>
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<td>MSQ &lt;7</td>
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<tr>
<td>Pitt, 2007</td>
<td>Intervention was with GPs</td>
</tr>
<tr>
<td>Haran 2010</td>
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Extrapolation – Cognitively impaired people will have been included in some of these studies. Above interventions may have benefit in people with cognitive impairment.
## Intervention in the Community

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**Extrapolation**

- Cognitively impaired people will have been included in some of these studies.
- Above interventions may have benefit in people with cognitive impairment.

### Intervention in the Community

- Sort out the drugs
- Remove the cataracts
- Treat the bones
- PPM if indicated
- Probably do the home visit
- Remove the bifocals / multifocals?
### MULTIPLE / MULTIFACETED INTERVENTIONS

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Measurement</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tinetti</td>
<td>1994</td>
<td>MMSE &lt;20</td>
<td></td>
</tr>
<tr>
<td>Hornbrook</td>
<td>1994</td>
<td>“severely mentally ill”</td>
<td></td>
</tr>
<tr>
<td>Clemson</td>
<td>2002</td>
<td>MSQ &lt;8</td>
<td></td>
</tr>
<tr>
<td>Wagner</td>
<td>1994</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td>Close</td>
<td>1999</td>
<td>not excluded if live in carer</td>
<td></td>
</tr>
<tr>
<td>Davison</td>
<td>2005</td>
<td>MMSE &lt;24</td>
<td></td>
</tr>
<tr>
<td>Mahoney</td>
<td>2007</td>
<td>benefits only in people with MMSE &lt;27</td>
<td></td>
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</tbody>
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**Extrapolation** – Cognitively impaired people will have been included in some of these studies. Above interventions may have benefit in people with cognitive impairment.
Intervention in the Community

MULTIPLE / MULTIFACETED INTERVENTIONS
Tinetti, 1994
Hornbrook, 1994
Clemson 2002
Wagner, 1994
Close, 1999

Identify your high risk population
Sort out the drugs
Treat the bones
Individualise treatments based on identified risk factors and cognitive abilities
Be aware of overwhelming patient and carer!
Acknowledgements

• Morag Taylor
• Jacki Wesson
• Stephen Lord
• Lindy Clemson
• Henry Brodaty
• Stef Mikolaizak
• Tasha Kvelde
• Laura Gitlin
• Sue Kurrle