Exercise for falls prevention in residential aged care

NNSW Falls Prevention Forum 8.10.15

Jennie Hewitt
Positive Living Coordinator Feros Care
PhD Scholar, M Health Sc (Sports PT)
Presentation content

- Background – falls and their impact on seniors and the community
- Previous research
- Specific components of successful exercise programs for falls prevention
- Specific components of exercise programs associated with an increase in falls in residential aged care (RAC)
- Translating this research into practice - “The Sunbeam” program for RAC.
Previous research:
The impact of falls on older people

- Falls are a major health problem for older people
- 30-35% of community dwellers fall once per year (65 y +) (Liu et al 2009)
- 50-60% of residents of aged care fall each year (Lord et al 2003)
- Falls in this population are often traumatic – the most common injury-related cause of death, account for 90% of # (Barker et al 2012)
- Having had 1 fall is a risk factor for future falls (Cameron et al 2012)
Previous research:

The impact of falls on society

• Australia’s residential aged care (RAC) population is projected to more than treble by 2050 (Productivity Commission 2012)

• The number of people living in residential aged care, fall related hospital admissions and costs of follow up care are rising (Bradley et al 2008)

• No other single injury, including road trauma, costs the health system more than injuries resulting from falls (NSW Department of Health 2007)
Previous research:

FALLS PREVENTION

- Falls not purely random events –can be predicted by assessing a number of risk factors

(Gillespie et al 2009, Tiedeman et al 2011, Haran et al 2010)
Previous research:

FALLS PREVENTION

- Falls not purely random events – can be predicted by assessing a number of risk factors

- Gillespie et al 2009
- Tiedeman et al 2011
- Haran et al 2010

Incontinence
- Poor nutrition
- Environment
- Vit D
- Cognition
- Meds
- Foot Pain
- Strength
- Balance
- Arrhythmia
- Vision

(Gillespie et al 2009, Tiedeman et al 2011, Haran et al 2010)
Exercise in older adults

Liu et al 2009 Review from The Cochrane Collaboration
“Progressive resistance (strength) training (PRT) for improving physical function in older adults”

- PRT had a large positive effect on muscle strength
- (73 trials, 3059 participants, SMD 0.84, 95% CI 0.67 to 1.00)

Howe et al 2011 Review from The Cochrane Collaboration
“Exercise for improving balance in older people (Review)”

Weak evidence that some types of exercise are moderately effective, immediately post intervention, in improving clinical balance outcomes in older people. Such interventions are probably safe.

There is some evidence that exercise is beneficial for reducing some of the risk factors for falls
Falls prevention research

COCHRANE REVIEWS

“Interventions for preventing falls in elderly people” (Gillespie et al 2003)

“Interventions for preventing falls in older people living in the community” (Gillespie et al 2009)

“Interventions for preventing falls in older people living in nursing care facilities and hospitals” (Cameron et al 2012)
Factors that reduce falls in community dwellers:

- **Multi-component group exercise** — *balance, resistance*
- eg. Stepping On (Clemson et al 2004)
  - Tai Chi
  - Otago Exercise Program (Robertson et al 2002)

- **Multifactorial intervention customised to individual needs** -
  - Withdrawal of psychotropic meds
  - Pacemakers
  - Cataract surgery

There is clear evidence that exercise is beneficial for the prevention of falls in the community.
Factors that reduce falls in residents of aged care facilities:

• Vitamin D supplementation

Factors that *may* reduce falls in residents of aged care facilities:

• Multifactorial interventions customised to individual needs

Results relating to the effectiveness of exercise in reducing the rate of falls and risk of falling are inconsistent *(Cameron et al 2012)*

There are currently no RCT to recommend *for or against* the use of customised exercise programs to prevent falls in long term aged care settings” *(Clinical Practice Guidelines AGS/BGS 2011)*
Exercise in residential aged care

Cameron et al 2010 Review from The Cochrane Collaboration

Updated 2012 with a focus on level of care, 2010 data relevant for our purposes today.

POOLED DATA FROM:

• 2 studies showed significant reduction in fall rates
  (Shimada 2004 and Sihvonen 2004)
• 2 studies showed no change
  (Choi et al 2005, Sakamoto et al 2006)
• 4 studies showed significant increase
Analysis 1.1. Comparison of supervised exercises vs usual care (nursing care facilities), Outcome 1 Rate of falls.

Review: Interventions for preventing falls in older people in nursing care facilities and hospitals

Comparison: Supervised exercises vs usual care (nursing care facilities)

Outcome: Rate of falls

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Intervention</th>
<th>N</th>
<th>Usual care</th>
<th>log [Rate ratio] (SE)</th>
<th>Rate ratio</th>
<th>Weight</th>
<th>Rate ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faber 2006</td>
<td>142</td>
<td>90</td>
<td></td>
<td>0.12 (0.09)</td>
<td>22.1 %</td>
<td>1.13</td>
<td>0.95, 1.35</td>
</tr>
<tr>
<td>Mulrow 1994</td>
<td>97</td>
<td>97</td>
<td></td>
<td>0.28 (0.17)</td>
<td>18.5 %</td>
<td>1.32</td>
<td>0.95, 1.85</td>
</tr>
<tr>
<td>Rosendahl 2008</td>
<td>87</td>
<td>96</td>
<td></td>
<td>-0.2 (0.32)</td>
<td>11.7 %</td>
<td>0.82</td>
<td>0.44, 1.53</td>
</tr>
<tr>
<td>Sakamoto 2006</td>
<td>315</td>
<td>212</td>
<td></td>
<td>-0.2 (0.12)</td>
<td>20.9 %</td>
<td>0.82</td>
<td>0.65, 1.04</td>
</tr>
<tr>
<td>Schoenfelder 2000</td>
<td>9</td>
<td>7</td>
<td></td>
<td>1.0 (0.33)</td>
<td>11.3 %</td>
<td>2.72</td>
<td>1.42, 5.19</td>
</tr>
<tr>
<td>Shimada 2004</td>
<td>15</td>
<td>11</td>
<td></td>
<td>-0.63 (0.47)</td>
<td>7.3 %</td>
<td>0.53</td>
<td>0.21, 1.34</td>
</tr>
<tr>
<td>Stwenon 2004</td>
<td>20</td>
<td>7</td>
<td></td>
<td>-0.92 (0.43)</td>
<td>8.3 %</td>
<td>0.40</td>
<td>0.17, 0.93</td>
</tr>
</tbody>
</table>

Total (95% CI)

Heterogeneity: Tau² = 0.10; Chi² = 22.82, df = 6 (P = 0.00086); I² = 74%
Test for overall effect: Z = 0.03 (P = 0.98)

Cameron et al 2010
## Analysis 1.2. Comparison of Supervised exercises vs usual care (nursing care facilities), Outcome 2 Number of fallers.

**Review:** Interventions for preventing falls in older people in nursing care facilities and hospitals

**Comparison:** Supervised exercises vs usual care (nursing care facilities)

**Outcome:** Number of fallers

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Intervention</th>
<th>Usual care</th>
<th>log [Risk ratio]</th>
<th>Risk ratio</th>
<th>Weight</th>
<th>Risk ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>N</td>
<td>(SE)</td>
<td>IV/Fixed 95% CI</td>
<td></td>
<td>IV/Fixed 95% CI</td>
</tr>
<tr>
<td>Choi 2005</td>
<td>29</td>
<td>30</td>
<td>-0.51 (0.58)</td>
<td>1.9 %</td>
<td>0.60 [ 0.19, 1.87 ]</td>
<td></td>
</tr>
<tr>
<td>Faber 2006</td>
<td>142</td>
<td>90</td>
<td>0.31 (0.19)</td>
<td>17.5 %</td>
<td>1.36 [ 0.94, 1.98 ]</td>
<td></td>
</tr>
<tr>
<td>Mulrow 1994</td>
<td>97</td>
<td>97</td>
<td>0.15 (0.17)</td>
<td>21.8 %</td>
<td>1.16 [ 0.83, 1.62 ]</td>
<td></td>
</tr>
<tr>
<td>Rosendahl 2008</td>
<td>87</td>
<td>96</td>
<td>0.05 (0.17)</td>
<td>24.6 %</td>
<td>1.05 [ 0.77, 1.44 ]</td>
<td></td>
</tr>
<tr>
<td>Sakamoto 2006</td>
<td>315</td>
<td>212</td>
<td>-0.11 (0.16)</td>
<td>24.6 %</td>
<td>0.90 [ 0.65, 1.23 ]</td>
<td></td>
</tr>
<tr>
<td>Shimada 2004</td>
<td>15</td>
<td>11</td>
<td>-0.49 (0.46)</td>
<td>3.0 %</td>
<td>0.61 [ 0.25, 1.51 ]</td>
<td></td>
</tr>
<tr>
<td>Stxonen 2004</td>
<td>20</td>
<td>7</td>
<td>-0.26 (0.31)</td>
<td>6.6 %</td>
<td>0.77 [ 0.42, 1.42 ]</td>
<td></td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td></td>
<td></td>
<td></td>
<td>100.0 %</td>
<td>1.03 [ 0.88, 1.21 ]</td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: $\chi^2 = 6.47, df = 6 (P = 0.37); I^2 = 7%$

Test for overall effect: $Z = 0.39 (P = 0.70)$

Cameron et al 2010
### Analysis 3.1. Comparison 3 Combination of exercise types vs usual care (nursing care facilities), Outcome 1 Rate of falls.

**Review:** Interventions for preventing falls in older people in nursing care facilities and hospitals

**Comparison:** Combination of exercise types vs usual care (nursing care facilities)

**Outcome:** Rate of falls

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Intervention</th>
<th>Usual care</th>
<th>log [Rate ratio] (SE)</th>
<th>Rate ratio IV/R,-random, 95% CI</th>
<th>Weight</th>
<th>Rate ratio IV/R,random,95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faber 2006</td>
<td>64</td>
<td>90</td>
<td>0.28 (0.1)</td>
<td></td>
<td>39.5%</td>
<td>1.32 [ 1.09, 1.61 ]</td>
</tr>
<tr>
<td>Mulrow 1994</td>
<td>97</td>
<td>97</td>
<td>0.28 (0.17)</td>
<td></td>
<td>30.0%</td>
<td>1.32 [ 1.05, 1.65 ]</td>
</tr>
<tr>
<td>Rosendahl 2008</td>
<td>87</td>
<td>96</td>
<td>-0.2 (0.32)</td>
<td></td>
<td>15.6%</td>
<td>0.82 [ 0.44, 1.53 ]</td>
</tr>
<tr>
<td>Schoenfelder 2000</td>
<td>9</td>
<td>7</td>
<td>1 (0.33)</td>
<td></td>
<td>14.9%</td>
<td>2.72 [ 1.42, 5.19 ]</td>
</tr>
</tbody>
</table>

**Total (95% CI)**

- Heterogeneity: Tau² = 0.05; Chi² = 6.59, df = 3 (P = 0.07); I² = 57%
- Test for overall effect: Z = 2.03 (P = 0.042)

Favours intervention Favours usual care
Shimada et al 2004 (n = 26, 6 months follow-up)
- Perturbed walking using a bilateral separated treadmill v usual care
- TOTAL = 100 hours

Sihvonen et al 2006 (n = 27, 1 year follow up)
- Visual feedback based balance training (computer screen, balance plate causing perturbations) v usual care
- TOTAL = 6 hours
Studies showing no change in fall rates

Sakamoto et al 2006 (n = 527, 6 month follow up)
• Uni – pedal standing v usual care
• TOTAL = 18.2 hours

Choi et al 2005 (n = 68, 12 week follow up)
• Tai Chi v usual care
• TOTAL = 21 hours
Pooled data from these studies showed an increase in fall rates (combination of exercise types)

Faber 2006 (n = 278, 1 year follow up)
• “Functional walking”
• TOTAL = 52 hours

Mulrow 1994 (n = 194, 4 month follow up)
• ROM ex, leg weights until deemed able to walk well then progressed to walking
• TOTAL = 24 hours

Schoenfelder (2000) (n = 16, 6 months follow up)
• Heel raises 5-10 reps as able, 10 mins walking
• TOTAL = 12 hours

Rosendahl 2008 (n = 191, 6 month follow up) (only study that favoured intervention)
• Balance, Squats, stepping up/down, walking program
• TOTAL = 21.75 hours
• Aged care residents with mild mobility impairment have increased risk of falls

• Improving the mobility of residents with moderate to severe mobility impairment may enhance their independence and reduce their burden on staff, paradoxically this may also increase their risk of falls. (Barker et al 2012)

• Let’s not forget

• QUALITY OF LIFE......
However.....

- Improving confidence without simultaneously improving strength, balance, righting reactions, proprioception.....
- May lead to disaster.......
Components of effective exercise programs

(Sherrington et al 2008 and 2011, Tiedeman et al 2011)

- Total dose of exercise – 50 hours minimum
- High level balance work
- Strength work for those who are deconditioned
- All exercises individually upgraded – progressed
- Close supervision – to allow for safe inclusion of high level balance work
- Maintenance program continued after initial conditioning phase
- Walking program (while beneficial for other health conditions) should not be considered a falls prevention program for this group
A new program for RAC designed using these principles... *currently being tested*

- **Strength and Balance Exercise in Aged care = SuNBEAm**
Objectives of the trial.

The key research questions are:

• Is a supervised progressive resistance training and balance group-based exercise program more effective than usual care for prevention of falls among residents over a 12-month follow-up period?
• Does the program result in improvements to the secondary outcomes: quality of life, cognition, mobility and confidence?
• Is the program cost effective?
Research Plan

- Multi-centre cluster randomised controlled trial
- 16 RACF, 220 participants in NNSW and SE Queensland
- RACF randomised to “Intervention Group” or “Usual care group”
16 RACF INCLUDED
Participants

- 58% fallen in past 12 months
- 81% walk with an aid
- 100% have comorbid conditions
INTERVENTION

- Progressive resistance and balance training
- 50 hours minimum (2 x 1 hour per week over a 6 month period)
- Small group setting, high level of supervision
- PRT – target large muscles of the lower limbs, trunk and upper limbs using specialised gym equipment
- Balance work – high level supervised closely
- Maintenance Exercise program 1 -2x weekly from 6-12 months
PLEASE NOTE:

• Slides 28-30 are videos and too large to email
Dosage.

- 2-3 sets
- 10-15 reps

(Sherrington et al 2008 and 2011, Tiedeman et al 2011)
From the residents........

“My back is no longer painful, it used to be my biggest problem, also my legs feel stronger”

“I feel more energised now”

“The exercises have definitely been beneficial; I have much more get up and go now.”
Individual Stories

Since your last workout, exercise(s) were updated. You have progressed +257% since your first visit.
Individual Stories
Potential impact of research

*If falls are reduced:*

- Improved well being for older people
- Reduced healthcare burden
- Contribute to the health policy debate by challenging current funding models
Summary

✓ Background – falls and their impact on seniors and the community

✓ Current research

✓ Translating this research into practice - “The Sunbeam” program for RAC, and a RCT currently being conducted.

Start by doing what’s necessary, then do what’s possible and suddenly you are doing the impossible. 
Frances of Assisi
Acknowledgements

• Professor Kathryn Refshauge
• Professor Lindy Clemson
• A/Prof Stephen Goodall
• Dr Tim Henwood

HUR Health and Fitness Equipment

Feros Care