Interventions that work to prevent falls

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1. See your doctor / nurse / health professional

• If you have a fall – have a check up
  – Even if you think it was just an accident
• If you are feeling unsteady when walking / turning
• If you are reducing your activities

No RCT’s, but best practice guidelines (JAGS 2011)
2. Exercise / physical activity

• Most researched single intervention in falls prevention
• Majority of research in the community setting

**NOTE:** Exercise programs usually have a range of other benefits as well as falls prevention

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COCHRANE 2012: “Multi-component (combination of two or more categories of exercise) exercise classes significantly reduced rate of falls and risk of falling, as did multiple-component home-based exercise…. Tai chi significantly reduced the risk of falling…and appears to be more effective in people who are not at high risk of falling.”
What exercise works?

- A selection of effective exercise programs:
  - Stay Safe, Stay Active (Barnett et al, 2003)
  - The Otago Exercise Programme (Campbell, Gardner)
  - Erlangen Fitness intervention (Freiberger et al, 2007)
  - Tai Chi and modified Tai Chi (Li et al, 2005; Voukelatos et al, 2007; Wolf et al 1996)
  - Falls Management Exercise (FaME) (Skelton et al, 2005)

What exercise doesn’t work?

- Low intensity exercise
- Only one type of exercise
- Walking
- At risk populations e.g. stroke, cognitive impairment – high risk of falls but limited evidence on effective interventions
OTAGO EXERCISE PROGRAMME

- Designed specifically to prevent falls in community dwelling older adults
- Includes strength, balance components + walking program
- Progressive, individually tailored home exercise

**OEP**

- 30 minutes exercise
- 3 x per week
- Walking 2 x per week
- Ankle cuff weights for resistance
- 4-5 home visits
- Record exercise in diary
- Phone calls each month between visits

**OTAGO – Balance exercises**
Where to get it….


Another version:

- http://www.laterlifetraining.co.uk/home-exercise-booklets-free-to-download/

Another type of approach

- Nijmegen Falls Prevention Program

- Gait, co-ordination, obstacle crossing, uneven surfaces, dual tasks, visual constraint, falling practice, simulated crowded environment, walking to music

- Education: simulation of dangerous fall situations; physical activity

Weerdesteyn et al, Gerontology 2006

NFPP

Weerdesteyn et al, Gerontology 2006

- N = 113
- Community dwelling
- 2 x 1.5 hr sessions weekly, 5 weeks
- Pre-post design with control group
- Falls 46% reduction in intervention group, no difference in controls

Smulders et al, Arch Phys Med Rehab 2010

- N = 96
- History of falls/osteoporosis
- 11 sessions, 5.5 weeks
- RCT
- Falling techniques modified
- Fall rate 39% lower in the intervention group after 1 year.
Another approach

- Lifestyle Integrated Functional Exercise (LiFE)
- Strength & balance embedded into everyday activities
- 3 arm study
  - LiFE
  - Structured ex
  - Gentle ex (control)
- 31% reduction in the rate of falls for LiFE
  
  Clemson et al, BMJ 2012

Another effective approach

- Multi-task exercise program performed to the rhythm of piano music
- Walking in time to music, then more complex movements including footwork
- 6 month program
- 1 hour / week class
- Avoid additional ex at home

Emile Jaques-Lacroze

Trombetti et al, 2011

- N = 134
- Intervention group had fewer falls
- 54% reduction in falls rates in intervention group (IRR 0.46, 95%CI 0.27 to 0.79)
- 39% reduction in proportion of fallers in intervention group (RR 0.61, 95% CI 0.39 to 0.96)
Principles for exercise prescription

- Strength training – 8-10 reps before fatigue
- Balance training – less clear
  - time limit for “static tasks”?  
  - Number of “saves”  
- Walking dosage for falls prevention unclear

3. Medication review

- Keep medications to the minimum
- Have medications reviewed by your doctor
- Try to avoid / minimise use of sleeping tablets, anti anxiety tablets etc

Largest effect of any falls prevention study involved weaning people off psychotropic medications: Campbell et al 1999
4. Vision check

COCHRANE 2012: “First eye cataract surgery reduced the rate of falls in women but second eye cataract surgery did not.”

- Regular vision review
- Cataract surgery
  - First eye effective
- Bifocals - change to single vision lenses for those active outdoors (worse for those undertaking little activity)

Haran et al 2010, BMJ: 340:c2265
5. Home safety

Removing environmental hazards will reduce risk of falls

If having falls should have an occupational therapy home assessment if available

COCHRANE 2012: “Home safety interventions reduced rate of falls and risk of falling...particularly in reducing falls rates in participants at higher risk of falling...these interventions appear to be more effective when delivered by an occupational therapist. An anti-slip shoe device worn in icy conditions can reduce falls.”

Environmental safety: Home falls risk assessment & modification

- commonly used
- Cumming et al 1999, JAGS: RCT identifying significant reduction in falls rates for OT home visit / environmental assessment / behaviour risk modification
- IN AT RISK GROUP ONLY
- NB: falls reduced at home and away from home

Cumming et al 1999

<table>
<thead>
<tr>
<th>Modification</th>
<th>% of homes recommended</th>
<th>Adherence at 12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mats/rugs</td>
<td>48%</td>
<td>49%</td>
</tr>
<tr>
<td>Change footwear</td>
<td>24%</td>
<td>54%</td>
</tr>
<tr>
<td>Use non-slip bathmat</td>
<td>21%</td>
<td>75%</td>
</tr>
<tr>
<td>Change behaviour, improve safety</td>
<td>15%</td>
<td>60%</td>
</tr>
<tr>
<td>Use light at night</td>
<td>13%</td>
<td>58%</td>
</tr>
<tr>
<td>Add rail to stairs</td>
<td>12%</td>
<td>19%</td>
</tr>
<tr>
<td>Move electrical cords</td>
<td>12%</td>
<td>67%</td>
</tr>
</tbody>
</table>
6. Vitamin D and calcium

• Many older people have low levels of vitamin D
• Main sources of vitamin D are:
  – Sunlight (approx 20 min/day)
  – Some foods (eg sardines)
  – Supplements
• Vitamin D and calcium together have been shown to reduce fractures and falls (in high risk samples (residential care))
• Vitamin D – ?for people in community with lower levels

Effect of vitamin D on falls

COCHRANE 2012: “Taking vitamin D supplements with or without calcium probably does not reduce falls, except in people who have lower levels of vitamin D in the blood at enrolment.”

Complex series of studies to interpret because of:
• different types of vitamin D (D2 and D3)
• different dosages
• different samples in terms of vit D deficiency
• supplementation of vitamin D with/without calcium
• outcomes of fractures as well as falls
• a more recent study showed increase in falls & fractures with yearly dose of 500,000 IU (Sanders et al 2010, JAMA)
6. Foot

- Foot exercises and orthotics for those with foot pain (Spink et al, 2011): significant decrease in falls

- Foot exercises and podiatry for people with foot pain (rate of falls)

7. Multifactorial interventions (after assessment)

COCHRANE 2012: “Multifactorial interventions consist of more than one main category of intervention and participants receive different combinations of the interventions based on an individual assessment to identify potential risk factors for falling. ... Multifactorial interventions reduce the rate of falls but not the risk of falling.”
Luck et al 2013, Clin Int Aging

- RCT with falls follow-up for 12 months (retrospective)
- N = 230, 80+ years
- Intervention:
  - Multidimensional geriatric assessment
  - Multidisciplinary case conference, identify risk factors, recommend interventions
  - 3 home visits focusing on falls prevention strategies including education
- Results: IRR 0.32 (95% CI 0.22-0.49)

8. Other single interventions

COCHRANE REVIEW: Gillespie et al, 2012

- Pacemakers for carotid sinus hypersensitivity
- Anti-slip shoe device!
Other interventions?

- Safe footwear
- Education
- Nutrition
- Treat postural hypotension
- Treat incontinence
- Change gait aid

Effective interventions – to reduce fractures
WHAT WORKS? - Evidence

- See your doctor
- Exercise
- Medication review
- Vision Check
- Home safety and modifications
- Vitamin D
- Multifactorial
- Podiatry
- Pacemakers (for carotid sinus hypersensitivity)
- Anti-slip shoe device
- Hip protectors (for injury minimisation)

WHAT WORKS? – No evidence yet but try

Examples
- Change gait aid
- Safe footwear
- Education
- Improved nutrition
- Treat postural hypotension
- Treat incontinence