Strengths and Weaknesses of Falls Prevention Strategies

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http://go.to/fropic
My presentation will....

- Very briefly explore the prevalence and consequences of falls
- Discuss the evidence base in relation to single interventions and population-based interventions
  - Strengths and Weaknesses
- Very briefly explore the gaps in the evidence base
- Be available to download
Welcome to the ProFaNE Online Community

The ProFaNE Online Community is an active working group of Health Care Practitioners, Researchers and Public Health Specialists dedicated to the prevention of falls in Europe and beyond. Read more about the ProFaNE Network.

Ever find yourself short of time? We know how hard it is to keep up with developments in Falls Prevention, so, we do it for you! A regular Newsletter is available to everyone who registers that will help you keep up to date with all the latest publications, events and new resources relevant to falls prevention. To subscribe to the ProFaNE Community Update Newsletter all you need to do is Register with the ProFaNE Community.

The ProFaNE Resource Map is now available for anyone to use. This section of the web site is devoted to presenting geographically oriented information about Falls Prevention resources and information pertinent to Falls Prevention within Europe. With approximately 180 map views and over 350 resources, assessment measures and organisations listed, this is one of the richest resources for Falls Prevention available on the web.

The annual ProFaNE newsletter is now available with a great overview of what has happened in the ProFaNE community over the last year; key publications, reports from the network meeting and working group meetings, dissemination events, news of the website developments, future meetings and lots of pictures to enjoy.

Read all about what has been happening in ProFaNE over the last 2 years.

Discussion Board
Resources
Information
2-Monthly e-newsletter
Figure 9. Mortality rate (age standardised - per 100,000) due to falls in the elderly (65+) in the EU25 and EEA, in countries having less than 10% "Other and unspecified" (Table 1)

10 fold difference in mortality from falls in different EU countries

European Network on Safety among Elderly (EUNESE)
Priorities for Elderly Safety in Europe 2006
Falls in the UK

- 11 million people aged > 65 yrs
- 28,000 women aged > 90 yrs
- Fractures costs £1.8 billion pa
- 1 Hip Fracture every 10 mins
- 1 Wrist Fracture every 9 mins
- 1 Spine Fracture every 3 mins
- 500 admitted to Hospital every day
- 33 never go home

Annual European Home and Leisure Accident Surveillance Survey (EHLASS) Report UK 2000
DoH Prevention Package 2009
How common are falls?

- In > 75s, falls are the leading cause of death resulting from injury.
- 75-80% of falls are not reported.
- 1 in 3 >65’s and 1 in 2 >80’s fall p.a.
- 10% of all call-outs for UK Ambulance Service are for people aged 65+ who have ‘fallen’ but nearly half are not taken to Hospital.

Falls more common in people with multiple medical conditions and with poor function and mobility.

There are global variations in fall rates (e.g., China 6-20%, Japan 20%), and few figures are available for developing world.

Appear to be racial differences in likelihood of a fall (white Caucasians particularly at risk).

Women are more likely to fall than men, and to suffer non-fatal injuries (higher risk of osteoporosis).

Social deprivation linked to nocturia and falls at night.

(WHO 2007, Booth 2009)
Risk factors for hip fracture in women

Bone related
- Bone mass
- Bone geometry
- Bone turnover
- Microarchitecture

Age
- Genetics
- Maternal hip fracture
- Previous fracture
- Weight
- Mobility
- Smoking
- Self-related health

Fall related
- Neuromuscular function
- Cognitive impairment
- Visual acuity
- Drug therapy
- Fall mechanics

Masud & Morris, Age & Ageing 2001; 30-S4: 3-7

With thanks to Dr David Reid, University of Aberdeen & NOS
Consequences of Hip Fracture

- By Year 2030 expected 100,000 hip fractures a year.
- **Risk** of a hip # 10x higher for those in **residential settings** than in **own home**
- 50% of individuals will die, move into a nursing home or be in hospital within six months of Hip #
- 80% do not regain pre-fracture mobility

DoH Prevention Package 2009
Cost to the Individual

- **Injuries** include:
  - Cuts and lacerations,
  - Deep bruises, Soft Tissue Injuries,
  - Dislocations, Sprains
  - Increase in joint pain
- Less than 5% of all falls result in a fracture
- Long lie’s (floor) & complications
- Depression, fear of falling
- Avoidance of activities and social isolation

Skelton & Todd, WHO, 2004
When do we become “fallers” instead of “trippers”?

Fracture site changes with age, wrist fractures more common in younger people, hip fractures more common in older people.

Reaction times and gait speed slows, balance deteriorates, strength reduces.....
Functional Ability in older age

EVEN HEALTHY OLDER PEOPLE LOSE...

- Strength (1 % to 2% p.a.)
- Power (3% to 4% p.a.)
- Bone density (Women:1% to 3%, Men:0.4% p.a.)
- Balance, Coordination and reaction
- Transfer skills
- Maintenance of temperature control
- Vision, hearing and other balance sensory inputs

Sedentary behaviour increases the loss of performance...
Falls Prevention Approaches

- Individual Approach (high risk patients)
  - Multi-factorial (eg. PROFET - Close et al, 1999)
    - 2004 Review - Multifactorial trials reduce risk (RR 0.82) Chang 2004
  - Uni-factorial (eg. FaME - Skelton et al, 2005)
    - Exercise only trials reduce risk (RR 0.86) Chang 2004
    - Pacemakers, Cataract Removal, Medication Withdrawal

- Population based approach (targeting communities)
  - Emerging evidence (McClure, 2005)
  - Most include increasing awareness and physical activity, medication and home hazard reviews
    - Reductions in injuries 6-33% but no RCTs
Falls Clinics

- Geriatrician, Physio, OT, nurse
- **Strengths**: Intensive CGA assessment and onward referral
  - Intended interventions not always undertaken
  - Not always evidence based interventions
- **Weaknesses**: different messages from different professionals, lots of double handling and assessment but little ‘action’, lots of waiting around, concern about institutionalisation….lots of DNAs...
- Reports of attendance suggest that the population reach of fall clinics is low (<3% of the population at risk)

Lamb 2008, Gates 2008
OT Intervention

Cumming et al, JAGS 1999
- 65+ years, 1 year, n= 530, RCT
- OT home visit < 3 wks hospital discharge
- list of recommendations and telephone call 2 wks later
- Subjects with fall(s): 36% vs 45%  [p=0.05]

Interactive interventions delivered by professionals involving older people in discussion around falls, behaviour and lifestyle are more successful with high risk groups

(WHO 2007)
Objective 1: Improve outcomes and improve efficiency of care after hip fractures – by following the 6 “Blue Book” standards

Objective 2: Respond to the first fracture, prevent the second – through Fracture Liaison Services in acute and primary care

Objective 3: Early intervention to restore independence – through falls care pathway linking acute and urgent care services to secondary falls prevention

Objective 4: Prevent frailty, preserve bone health, reduce accidents – through preserving physical activity, healthy lifestyles and reducing environmental hazards
– Consider major modifiable risk factors
– Consider bone health / risk of fracture
– Consider if onward referral necessary
– Not be repeated by everyone that comes into contact with an older person!
– Lead to effective interventions
– Be predictive??

Oliver 2009
Falls prediction tools in different settings

- Systematic review of tools to predict falls (up to June 2004)
- Validity and reliability
- Wide range of tools and settings
  - Community setting – 23 tools (14 studies)
  - Acute setting – 8 tools (12 studies)
  - Long term care setting – 10 tools (6 studies)
- Of the 38 tools
  - 11 were multifactorial tools
  - 27 were functional mobility assessment tools
- Few tools were found that were tested more than once or in more than one setting
- No single tool can be recommended for use in all settings or for all subpopulations within each setting.

Systematic reviews of tools that predict risk of a future fall

- *Myers H 2003*
- *Oliver D et al 2004*
- *Scott V et al 2007*
- *Hill K and Haines T 2008*

- All cast doubt on predictive validity of falls tools
- And show up the almost total lack of validated tools in community or nursing home or mental health setting
So what about case finding for bone fragility?

Used to determine 10 year fracture risk in community dwelling adults – then NOGG suggests guidance on treatment
How useful is the fracture Risk Assessment Tool (FRAX) in a falls clinic population?

- NOGG advice (DEXA or treat) followed:
  - 46% (n=6) of those with OP at either spine and/or hip would not be treated or advised a DEXA
  - Of those where DEXA was advised (n=18), 72% did not have osteoporosis (n=13)
  - Treatment advised in 2 patients both of whom had osteoporosis on subsequent DEXA

- McCarthy C, Skelton DA, Gallacher S, Mitchell LE
- Abstract presented at 10th National Conference on Postural Stability and Falls, Blackpool, 07/09/09
# Tools to target your intervention eg.

<table>
<thead>
<tr>
<th></th>
<th>Exercise (group or home) / Walking aids</th>
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<tbody>
<tr>
<td><strong>Balance and Strength</strong></td>
<td>Continence training / Surgical / Medical</td>
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<tr>
<td><strong>Lower Urinary Tract Symptoms</strong></td>
<td>CBT / Counselling / Exercise / Hip Protectors</td>
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<td><strong>Fear of Falling</strong></td>
<td>Vestibular Rehabilitation Exercise Surgery</td>
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<td><strong>Vestibular Function</strong></td>
<td>Pre-transfer exercise / Behavioural Surgical stockings / Medical</td>
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<td><strong>Postural Hypotension</strong></td>
<td>Surgery / Glasses / OT</td>
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<td><strong>Vision</strong></td>
<td>Chiropody / Insoles / Surgery</td>
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<td><strong>Foot health</strong></td>
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**...**
## Different costs to interventions

<table>
<thead>
<tr>
<th>Intervention type</th>
<th>Intervention Components</th>
<th>Delivered by</th>
<th>High risk Cost analysis per fall prevented</th>
<th>Low risk or unspecified risk Cost analysis per fall prevented</th>
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<tbody>
<tr>
<td><strong>Individual Customised Multifactorial Interventions</strong> (1 study)</td>
<td>Assessment, exercise, behaviour modification, medication</td>
<td>Multi-disciplinary</td>
<td>Total health care costs per fall prevented - in those at high risk&lt;sup&gt;3&lt;/sup&gt; Cost saving&lt;sup&gt;6&lt;/sup&gt;</td>
<td>Total health care costs per fall prevented - in those at low risk&lt;sup&gt;6&lt;/sup&gt; EUK 2698&lt;sup&gt;5&lt;/sup&gt;</td>
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<td><strong>Same multiple risk factors targeted to all participants</strong> (1 study)</td>
<td>Pets-related knowledge, attitudes, behaviours, and risk factor awareness campaign</td>
<td>Multi-disciplinary</td>
<td>-</td>
<td>Net monetary benefit to cost ratio for the intervention of 20:1&lt;sup&gt;1&lt;/sup&gt;</td>
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<td><strong>Single Factor Interventions</strong> (7 studies)</td>
<td>Strength and balance training (3 studies)</td>
<td>Physiotherapists and nurses trained in delivery of exercise</td>
<td>For those aged 80 years or older Cost saving&lt;sup&gt;6&lt;/sup&gt;</td>
<td>Mean cost EUK 173 in research setting&lt;sup&gt;6&lt;/sup&gt; EUK 942 in community health care setting&lt;sup&gt;6&lt;/sup&gt;</td>
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- EUK: European Union Currency
- <sup>1</sup> Data from Davis, 2010
- <sup>2</sup> Data from another source
- <sup>3</sup> Data from a study conducted in 2012
- <sup>4</sup> Data from a meta-analysis published in 2013
- <sup>5</sup> Data from a recent systematic review
- <sup>6</sup> Data from a prospective cohort study
- <sup>7</sup> Data from a chart audit study
- <sup>8</sup> Data from a retrospective study
- <sup>9</sup> Data from a randomized controlled trial
- <sup>10</sup> Data from a national survey
- <sup>11</sup> Data from a cross-sectional study
- <sup>12</sup> Data from a single-center study
Weaknesses in Evidence

- Falls definition
- Consensus on outcome measures
- Consensus on reporting intervention detail
- ? Fall per unit of activity – exposure to risk
- Different models of delivery?
- Cost effectiveness and utility reporting rare

- Poor fidelity at implementation (eg. 12 week exercise programme 😞)

Lamb 2005, 2008, Skelton & Todd 2004
Exercise to Prevent Falls

Exercise could help fallers in a number of ways:

- Reducing Falls (or injurious falls)
- Reducing known Risk Factors for Falls
- Reducing Fractures? (or changing the site of fracture)
- Increasing Quality of Life & Social Activities
- Improving bone density
- Reducing Fear
- Reducing Long Lies
- Reducing Institutionalisation

Sherrington 2008; Skelton & Dinan 1999; NICE 2004
Not all physical activity is safe for fallers!

- RCT Increasing physical activity in people with previous upper arm fracture
- Intervention: Brisk walking
- Control: exercise of upper arm
- Falls risk ↑ (Brisk walking > control)
- Fracture risk ↑ (Brisk walking > control)
- Beware unsafe pavements!

*NICE 2004 do not recommend brisk walking!*

Ebrahim et al. (1997)
Tai Chi – secondary prevention in younger years?

- Community Dwelling older people - mild deficits of strength/balance
  - 2x/week for 15 weeks
  - Cut trip and fall rate by half \textit{Wolf et al. (1996)}

- Frail older adults aged 70-97
  - 2x/week for 48 weeks

- Community Dwelling older people aged 70+
  - 3x/week for 24 weeks
  - Increased Falls Self-Efficacy (ABC) and Decreased Fear of Falling (SAFFE) \textit{Li et al. J Gerontol B Psychol Sci Soc Sci 2005; 60:P34-40}
**Results**

RR = 0.83  
95%CI 0.75-0.91  
P<0.001

17% reduction in falls

I² = 62% moderate heterogeneity

Sherrington et al.,  
JAGS 2008
Highly challenging Balance Training

- Exercise in standing involving:
  - movement of the centre of mass
  - narrowing of the base of support
  - minimising upper limb support

24%

RR 0.76
(95%CI =0.62 to 0.93)

Sherrington et al., JAGS 2008
High Dose

- 50+ hours
  - At least 2 hours a week of exercise for at least 6 months
  - Home or group-based or a combination of both

20%

RR 0.80 (95%CI =0.65 to 0.99)

Sherrington et al., JAGS 2008
No reduction:
RR 0.95 (0.78 to 1.16)

No reduction:
RR 0.96 (0.80 to 1.16)

No reduction:
RR 0.91 (0.79 to 1.05)

Increased risk:
RR 1.20 (1.00 to 1.44)
Reducing barriers

- **Walk from Home**
- **Keighley Peer Mentors**
  
  Mary Moffat - 93
  
  - Referred by physio after a fall
  - Loss of confidence and fear of falling
  - Isolated and lonely and dependent upon others to get out
Wider Benefits of Exercise

- **Psychological**
  - Anxiety, depression, sleep, fear of falling

- **Physiological**
  - Maintain bone density, ability to perform everyday activities, reduce breathlessness, reduce stiffness and chance of injury

- **Psychosocial**
  - Isolation, social contacts, peer support, playing with grandchildren, using the bath

- **Even the very frail**
  - DVT, constipation, transfer skills
Gaps in evidence....

- Patient concordance and presentation of information
- Fear of falling and activity avoidance
- Ethnicity and Socioeconomic deprivation
- Reducing falls and injury in stroke, parkinson’s, dementia....
- Different professionals or models of delivery
- Different models of exercise (home vs group, games for health) and necessary duration / intensity / frequency and type
- Different exercise in different population groups?
- Value of falls prevention on other outcomes (quality of life, depression, other syndromes of ageing)
- Getting people to USE fall alarms
- Tele-health and technology opportunities
New technologies?

Wii-fit (Nintendo)?

- Whole Body Vibration
- 6 mths, 3 x p/w
- post-menopausal women
- Strength 15%, Balance 20%,
- Hip BMD 1%

Verschueren SM et al. 2004
Glasgow SECC Aug 13-17th 2012

www.wcaa2012.com

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