

Strengths and Weaknesses of Falls Prevention Strategies



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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

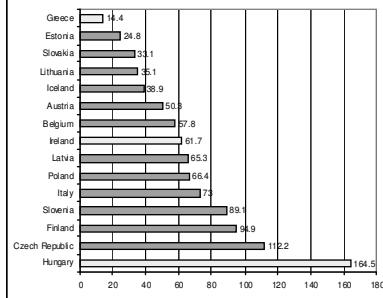
Prevention of Falls Network Europe (ProFaNE)

www.profane.eu.org

- 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.



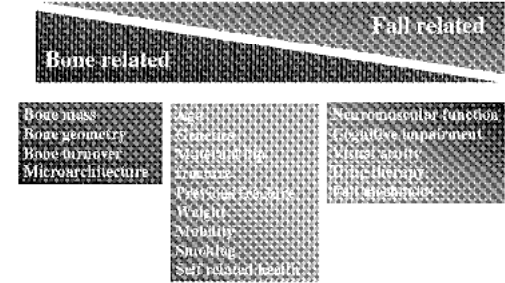
Skelton & Todd, WHO 2004, Gillespie 2005, Close 2008

EPIDEMIOLOGY OF FALLING cont.

- Falls more common in people with multiple medical conditions and with poor function and mobility
- There are global variations in fall rates (eg 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



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

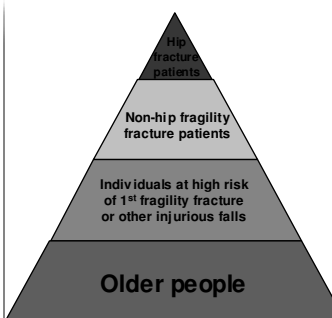
For a typical PCT: 300k population

- ~ 300 - 350 hip fractures pa
- > 1000 other fragility fractures
- > 15,000 fall each year, 6000 twice or more
- > 70 per week will attend A&E
- This costs PCT & council £50m per annum
- This will increase 50% by 2020



DoH Prevention Package 2009

DH 2009: falls & fracture care & prevention: four key objectives



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

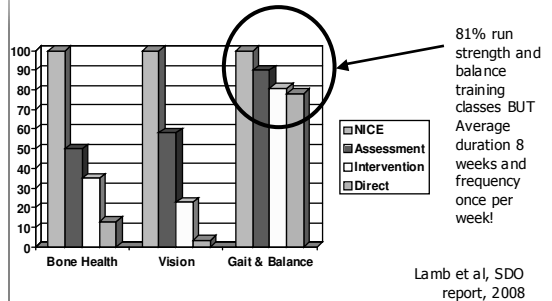
Objective 3: Early intervention to restore independence – through falls care pathway linking acute and urgent care services to secondary falls prevention

Objective 4: Prevent frailty, preserve bone health, reduce accidents – through preserving physical activity, healthy lifestyles and reducing environmental hazards

Bone health opportunities missed

- Royal College of Physicians (RCP) 2009 audit of falls and bone health services
 - “systems to ensure initiation of secondary prevention medical treatments for osteoporotic fragility fractures are not in place”.
- In the RCP national clinical audit of 2007, only 19% of over 5,000 patients presenting to hospital with a non-hip fragility fracture were on the appropriate bone medication three months later.
 - Yet over 40% of people who sustain a hip fracture have had a previous non-hip fragility fracture.

Exercise opportunities missed



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*
 - 2008 Review - Multifactorial trials ineffective - *Gates 2008*
 - 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

Different costs to interventions

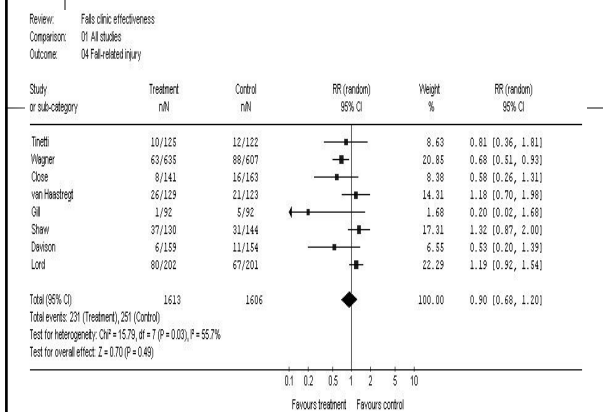
Davis 2010

Intervention type	Intervention Components	Delivered by	High risk: Best analysis per fall prevented	Low risk or unselected risk: Cost per fall prevented
Home hazard assessment	Home hazard assessment, telephone advice, home visits	Community nurses	£10.00	£10.00
Exercise	Exercise program	Community nurses	£10.00	£10.00
Medication review	Medication review	Community nurses	£10.00	£10.00
Podiatry	Podiatry	Podiatrists	£10.00	£10.00
Optician	Optician	Opticians	£10.00	£10.00
GP	GP	GPs	£10.00	£10.00
Day hospital	Day hospital	Day hospital	£10.00	£10.00
GP referral	GP referral	GP	£10.00	£10.00
GP referral to specialist	GP referral to specialist	GP	£10.00	£10.00
GP referral to day hospital	GP referral to day hospital	GP	£10.00	£10.00
GP referral to residential care	GP referral to residential care	GP	£10.00	£10.00
GP referral to nursing home	GP referral to nursing home	GP	£10.00	£10.00
GP referral to care home	GP referral to care home	GP	£10.00	£10.00
GP referral to hospital	GP referral to hospital	GP	£10.00	£10.00
GP referral to residential care	GP referral to residential care	GP	£10.00	£10.00
GP referral to nursing home	GP referral to nursing home	GP	£10.00	£10.00
GP referral to care home	GP referral to care home	GP	£10.00	£10.00
GP referral to hospital	GP referral to hospital	GP	£10.00	£10.00

PROFET: targeting risk factors

(*Close et al. Lancet 1999*)

- Medical assessment
 - General medical
 - Postural hypotension
 - Visual acuity
 - Balance
 - Cognition and affect
 - Carotid sinus syndrome
 - Occupational Therapy
 - Function
 - Physical handicap
 - Psychological handicap
 - Environmental hazards
 - Referral / intervention
 - Day hospital
 - GP
 - O/P
 - Optician
 - Social services
 - Supply minor equipment
- The rate of falls was reduced by 60%



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

Behavioural Modifications

- Stepping On (Clemson, 2004)
- Small Group Learning Environment
- N= 310 >70s with history or concern about falls
- Aimed to improve self efficacy and encourage behaviour change (exercise, medication, home and outdoor safety, vision)
- 31% reduction in falls

OT Intervention

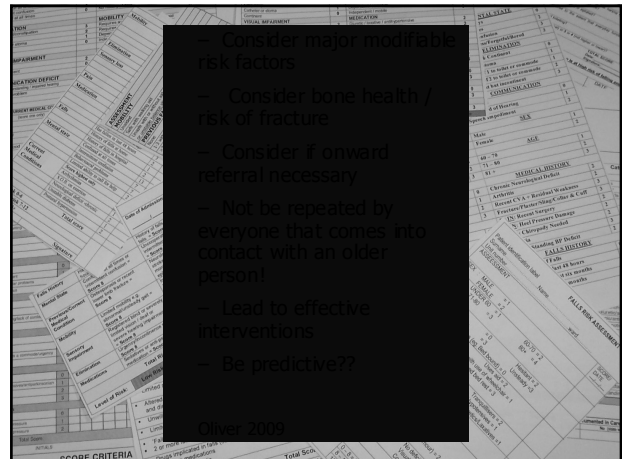
Cumming et al, JAGS 1999
- 65+ years, 1 year, n= 530, RCT

- 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)



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??

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?



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, 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.

Balance and Strength	Exercise (group or home) / Walking aids
Lower Urinary Tract Symptoms	Continence training / Surgical / Medical
Fear of Falling	CBT / Counselling / Exercise / Hip Protectors
Vestibular Function	Vestibular Rehabilitation Exercise Surgery
Postural Hypotension	Pre-transfer exercise / Behavioural Surgical stockings / Medical
Vision	Surgery / Glasses / OT
Foot health	Chiropody / Insoles / Surgery
.....	

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

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...

Exercise to Prevent Falls

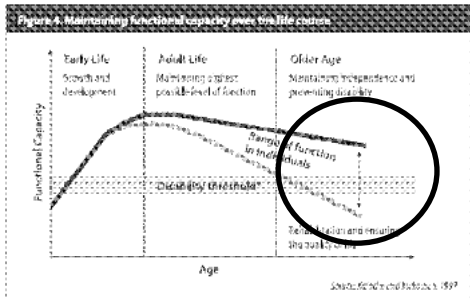
Exercise could help fallers in a number of ways:

- 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

Wide range of abilities and needs



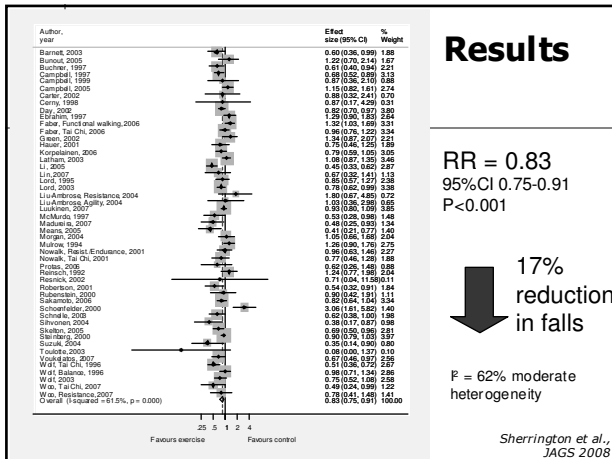
Not all physical activity is safe for fallers!



NICE 2004 do not recommend brisk walking!

- 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!

Ebrahim et al. (1997)



Highly challenging Balance Training



24%

RR 0.76
(95% CI = 0.62 to 0.93)

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



Sherrington et al., JAGS 2008

New Zealand RCTs - OTAGO

Individually tailored programme: Campbell, BMJ 1997

-80+ years, n=233, home-based, physiotherapist
-1 year, falls ↓ 32%, injuries ↓ 39%

Nurse delivered programme at home: Robertson, BMJ 2001

-75+ years, n= 240, home-based, district nurse
-1 year, falls ↓ 46%, ↓ serious injuries and hospital costs

Nurse programme at GP centres: Robertson, BMJ 2001

-80+ years, n=450, home-based, general practice nurse
-1 year, falls ↓ 30%, injuries ↓ 28%

Visually Impaired Older People: Campbell, BMJ 2005

-1 year, home-based. Only effective with full compliance, falls ↓ 28%

6 month programme: Liu-Ambrose, JAGS 2008

-70+ years, home-based, cognitive function improvements after 6 months and after 1 year falls ↓ 47%

FaME Group Exercise Managing frequent fallers

- Women aged 65+ with a history of 3 or more falls in previous year
- 9 months community based intervention
- Group exercise – individually tailored, trained exercise instructors (PSIs)
- Falls risk decreased by half – RR 0.46
- Significantly less people in exercise group had died, entered a nursing home or were in hospital after 3 years

Skelton et al. J.Aging Phys Act 2004; 12 (3): 457-458 & Age and Ageing, 2005: 34: 636-639

FaME FUNCTIONAL ABILITY & BONE

Functional Reach 20%
Up and go 20%
Floor rise 50%
Balance 60%

- Fun and social activity
- Confidence in balance
- Reduced anxiety and fear
- 'tripping' not 'falling'
- Playing with grandchildren
- 'Caring' skills

Site	Exercise	Control
L2-L4 Spine	~1.5	~-1.5
Neck of Femur	~1.5	~-1.5
Wards Triangle	~1.5	~-1.5
Greater Trochanter	~1.5	~-1.5

Avoiding long lies?

Long lies with or without injury

- Long lies (> 1-2 hours) lead to an increased risk of:
 - dehydration
 - hypothermia
 - pneumonia
 - pressure sores
 - kidney failure
 - depression
 - post fall syndrome
 - death

(Tinetti 1993, 1994)

High Dose

↓

20%

RR 0.80
(95%CI = 0.65 to 0.99)

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

Sherrington et al., JAGS 2008

No reduction: RR 0.95 (0.78 to 1.16)	High balance Low dose Walking
No reduction: RR 0.96 (0.80 to 1.16)	Low balance High dose Walking
No reduction: RR 0.91 (0.79 to 1.05)	Low balance Low dose No walking
Increased risk: RR 1.20 (1.00 to 1.44)	Low balance Low dose Walking

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

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 **Wolf et al. (1998)**
- Frail older adults aged 70-97
- 2 x/week for 48 weeks
- no significant reduction in risk of falls
- **Wolf et al. J Am Geriat Soc 2003; 55: 1693-1701**
- Community Dwelling older people aged 70+
- 3 x/week for 24 weeks
- **Increased Falls Self-Efficacy (ABC) and Decreased Fear of Falling (SAFFE)**
- **Li et al. J Gerontol B Psychol Sci Soc Sci 2006; 60:P34-46**



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



Too frail to benefit?

Dose response curve

- The lower the baseline level of physical activity, the greater the health benefit associated with an increase in physical activity. Exercise can be adapted for any medical condition

(Haskell 1994)

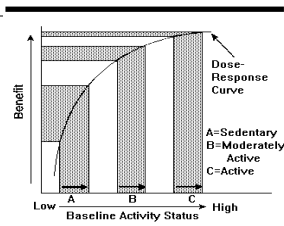


Figure 1.—The dose-response curve represents the best estimate of the relationship between physical activity [dose] and health benefits [response]. The lower the baseline physical activity status, the greater will be the health benefit associated with a given increase in physical activity [arrows A, B, and C].

Patients in Hospital

- 3 rehabilitation and care of the elderly wards, 626 patients, 80 yrs
- Falls risk card, exercise programme, education and hip protectors
- Intervention group had less falls, most significant >45 days
- *Haines et al. Brit Med J 2004; 328:676-680*
- Tai Chi + reaching + stepping + transferring chair to chair
- 1 physiotherapist to max 4 patients, 3 x p/w, 45 mins.
- 173 patients, 82 yrs, sub-acute ward
- Halved the number of falls (participant days in hospital)
- *Haines et al. Clin Rehab 2007; 21:742-753*

Nursing Home Residents

Individually tailored GROUP exercise as part of a multifactorial intervention (staff training, environment modification, drug review etc)

Reduces falls - *Becker et al. J Am Geriat Soc 2003; 51:306-313*

Improves mobility - *Jensen et al. Aging Clin Exp Res 2004; 16: 283-292*

Reduces falls risk factors - *Dyer et al. Age Ageing 2004; 33:596-602*



Components of multifaceted interventions in Hospitals and in Care Homes

- Risk stratification or labelling
- Risk factor assessment (and tailored intervention)
- Medical review (inc. cardiovascular risk)
- Nursing review/care plan
- Education (staff/patients/carers)
- Exercise/Additional Physiotherapy
- Equipment/environmental change/A.T.
- Medication review/adjustment
- Restraint reduction/removal
- Hip protectors

D Oliver, et al. Systematic Review, 2007

Addressing balance in all settings



4 weeks 3 x p/w (5-20mins)

Improvements in

- Ankle Strength
- Lower limb Power
- Balance (TUSS and sway)
- Balance confidence
- Functional Reach
- Timed Up & Go

Skelton, Simey and Dinan (2001) - Data presented at the 2nd National Conference on Falls and Postural Stability, Royal College Physicians, London

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

Perceptions of falls prevention messages

It's good advice - for 'them' - only seen as relevant to 'elderly'

Because we're that much fitter -- we don't really take too much notice of it, only for other people, for other disabled or elderly people that we have to watch when we're -- we always watch older people anyway.

(man aged 79 in sheltered accommodation)

Rejected by fit, younger people, seen as humiliating

I wouldn't go for that [advice] because it didn't apply to me in any shape or form. Is there a bit of pride, is there a bit of "Well, you know, I'm not there yet"

(fit woman in 60s)

Yardley L, Beyer N, Hauer K, McKee K, Ballinger C, Todd C. *Qual. Saf. Health Care.* 2007

Ballinger C, Clemson L. *B J Occ Ther* 2006

Recommendations for Promoting the Engagement of Older People in Falls Prevention Exercise

Yardley L, 2007

1. Raise awareness in the general population that undertaking specific physical activities has the potential to improve balance and prevent falls
2. When offering or publicising interventions, promote benefits which fit with a positive self-identity
3. Utilise a variety of forms of social encouragement to engage older people in interventions
4. Ensure the intervention is designed to meet the needs, preferences and capabilities of the individual
5. Encourage self-management rather than dependence on professionals by giving older people an active role
6. Draw on validated methods for promoting and assessing the processes that maintain adherence, especially in the longer-term

Concordance with interventions ?

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

Practical Examples

- Review the local falls pathway
 - community acute providers
- Agree who does what? Who attends specialist clinics?
- Build falls prevention into mainstream services and intermediate care
- Commission effective exercise programmes
- Consider working with leisure services / voluntary sector



Olympage Games – Sheffield 2009

- 20 Teams competing
- 6 events
- Teams of 6 – 8 (participants + carers)
- Unruly supporters in team kit !
- Medals, certificates and prizes
- Lots of cheating as well !



Other ideas for AA Weeks

- Walking your local area, be a guide or share your knowledge
- Open days to gyms, community centres with sessions etc.....
- Activity breaks in Libraries



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Glasgow SECC Aug 13-17th 2012

www.wcaa2012.com

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