

Fall prevention strategies in nursing care facilities

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4 million population, 11% over 65 years,
25% of pop over age 85 years in care,
900 aged care facilities



Residential care

- Falls are 3 x the rate of community dwelling older people
- 61% of all residents fall
- Hip fracture 10x rate of community dwellers.
- Total cost of falls 41 m yearly (1995)
- 187 m spent on falls in 2 years (ACC only)
- 2/3 of these costs are from residential care residents

Risk Factors – prospective studies

	OR/RR
■ Muscle weakness	(4.4)
■ Hx Falls	(3.0)
■ Gait & balance deficit	(2.9)
■ Use of assistive devices	(2.6)
■ Visual impairment	(2.5)
■ Arthritis	(2.4)
■ Impaired ADL*	(2.3)
■ Cognitive impairment	(1.8)
■ Age >80 years	(1.7)
■ Psychotropics	(1.5)
■ Mobility, being able to ambulate*	

16 studies, residential care

A Cochrane systematic review and meta analysis - methods

- Hypothesis – Interventions are effective
- Population – residential care (nursing care facilities) and hospitals
- Type - Randomised controlled trials, quasi-rand
- Interventions to reduce falls in older people in nursing care facilities or hospitals
 - Majority >65 years.
- Outcomes –raw data - falls, fallers
 - Definition of fall essential
- Search
 - Cochrane Bone, Joint and Muscle Trauma Group Specialised Register (January 2009); the Cochrane Central Register of Controlled Trials (*The Cochrane Library* 2008, Issue
 - MEDLINE, EMBASE, and CINAHL (all to November 2008); trial registers
 - and reference lists of articles

Methods



- Abstracts reviewed, articles pulled
- Independent review and quality assessment
 - 2 authors grade and extract data.
 - Data pooled where appropriate
 - Statistical analysis complex and yet simple

Classified interventions

- Hospitals – nursing care homes
- Single,
 - One major category, given to all
- Multiple
 - Combination delivered to all
- Multifactorial
 - Combination but delivery tied to assessment
- Exercises
- Medication
- Surgery
- Urinary continence management
- Fluid/nutrition
- Psychological
- Environmental/assistive
- Social environ (staff)
- Knowledge

Results

Trials

- 41 trials – 25,442
- 15 cluster RCT
- 30 in nursing care
- 11 hospitals, 1 acute, 6 subacute
- 13 countries
 - UK 10, USA 9, Australia 6
- 21 individual assessment
 - CGA 3, func 1,
 - falls risk 5 (NH) 4 (hosp)
 - Mobility 2, ex cap 3
 - Behav 1 meds 1

Participants

- Age 83, 73% female
- Conditions
 - Cognition – 4 trials specifically targetted cognitively impaired
 - Stroke – 1
 - Hip fracture – 1
- NH 20 trials Single
 - 1 multiple
 - 9 multifactorial

Analysis 5.1: Comparison 5 Vitamin D supplements vs no vitamin D supplements (nursing care facilities), Outcome 1 Rate of falls.

Review: Interventions for preventing falls in older people in nursing care facilities and hospitals
Comparison: 5 Vitamin D supplements vs no vitamin D supplements (nursing care facilities)
Outcome: 1 Rate of falls

Study or subgroup	Vitamin D N	No vitamin D N	log [Rate ratio] (SE)	Rate ratio M-H,Random,95% CI	Weight	Rate ratio M-H,Random,95% CI
1 Vitamin D + calcium vs calcium						
Buchheit 2003	42	40	-0.67 (0.41)	0.51 [0.23, 1.14]	93 %	
Ficker 2005	313	312	-0.31 (0.13)	0.73 [0.57, 0.95]	35.3 %	
Subtotal (95% CI)				0.71 [0.56, 0.90]	44.7 %	
Heterogeneity: $\tau^2 = 0.0$; $\chi^2 = 0.70$, $df = 1$ ($P = 0.40$); $I^2 = 0.0\%$						
Test for overall effect: $Z = 3.77$ ($P = 0.0007$)						
2 Vitamin D vs usual care or placebo						
Brew 2007	23	25	-1.27 (0.51)	0.28 [0.10, 0.76]	45 %	
Law 2006	1762	1955	-0.14 (0.04)	0.87 [0.80, 0.94]	48.7 %	
Subtotal (95% CI)				0.55 [0.19, 1.64]	55.3 %	
Heterogeneity: $\tau^2 = 0.51$; $\chi^2 = 4.88$, $df = 1$ ($P = 0.03$); $I^2 = 80\%$						
Test for overall effect: $Z = 1.07$ ($P = 0.29$)						
Total (95% CI)				0.72 [0.55, 0.95]	100.0 %	
Heterogeneity: $\tau^2 = 0.04$; $\chi^2 = 7.85$, $df = 3$ ($P = 0.05$); $I^2 = 42\%$						
Test for overall effect: $Z = 3.32$ ($P = 0.0009$)						

0.1 0.2 0.5 1 2 5 10
Favours vitamin D Favours no vitamin D

Exercises – overall

1.1 Rate of falls

Study or Subgroup	Intervention log(Rate ratio) SE	Usual care Total	Weight	Rate ratio IV, Random, 95% CI	Rate ratio IV, Random, 95% CI
Faber 2006	0.12 0.09	142	22.1%	1.13 [0.96, 1.35]	
Mulrow 1994	0.28 0.17	97	18.5%	1.32 [0.96, 1.85]	
Rosendaal 2008	-0.2 0.32	91	11.7%	0.82 [0.44, 1.53]	
Sakamoto 2006	-0.2 0.12	315	20.9%	0.82 [0.65, 1.04]	
Schoenfelder 2000	1 0.33	9	7.13%	2.72 [1.42, 5.19]	
Shimada 2004	-0.63 0.47	15	7.3%	0.53 [0.21, 1.34]	
Shivonen 2004	-0.92 0.43	20	7.3%	0.49 [0.17, 0.93]	
Total (95% CI)		689	524 100.0%	1.00 [0.74, 1.35]	
Heterogeneity: $\tau^2 = 0.10$; $\chi^2 = 22.82$, $df = 6$ ($P = 0.0009$); $I^2 = 74\%$					
Test for overall effect: $Z = 0.03$ ($P = 0.98$)					

0.1 0.2 0.5 1 2 5 10
Favours intervention Favours usual care

Exercises – combination exercise modalities

Study or Subgroup	log(Rate ratio)	SE	Total	Weight	Rate ratio IV, Random, 95% CI	Rate ratio IV, Random, 95% CI
Faber 2006	0.26	0.1	64	39.5%	1.32 [1.09, 1.61]	
Mulrow 1994	0.28	0.17	97	30.0%	1.32 [0.96, 1.85]	
Rosendaal 2008	-0.2	0.32	91	15.6%	0.82 [0.44, 1.53]	
Schoenfelder 2000	1	0.33	9	14.9%	2.72 [1.42, 5.19]	
Total (95% CI)			261	294 100.0%	1.37 [1.01, 1.85]	
Heterogeneity: $\tau^2 = 0.05$; $\chi^2 = 6.99$, $df = 3$ ($P = 0.07$); $I^2 = 57\%$						
Test for overall effect: $Z = 2.03$ ($P = 0.04$)						

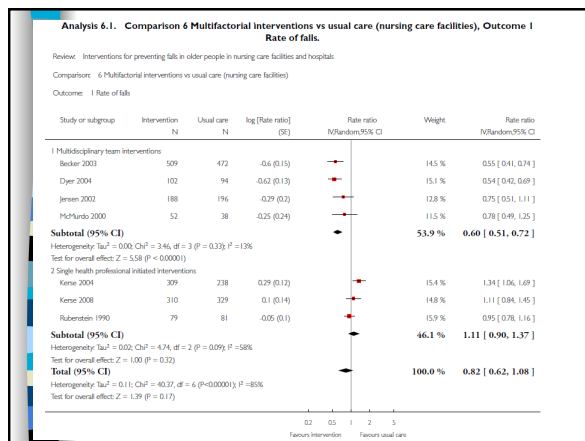
0.1 0.2 0.5 1 2 5 10
Favours intervention Favours usual care

Exercises – by type

Review: Interventions for preventing falls in older people in nursing care facilities and hospitals
Comparison: 02 Single exercise modalities vs usual care (nursing care facilities)
Outcome: 01 Rate ratio (falls)

Study or Subcategory	Intervention N	Usual care N	log(Rate ratio) (SE)	Rate ratio (fixed) 95% CI	Weight %	Rate ratio (fixed) 95% CI
01 30 exercises						
Faber 2006	78	90	-0.0400 (0.1100)		89.27	0.96 [0.77, 1.19]
Subtotal (95% CI)	78	90			89.27	0.96 [0.77, 1.19]
02 Gait, balance and coordination exercises vs usual care (nursing care facilities)						
Shimada 2004	15	11	-0.4300 (0.4700)		4.39	0.53 [0.21, 1.34]
Shivonen 2004	20	7	-0.3200 (0.4300)		5.34	0.49 [0.17, 0.93]
Subtotal (95% CI)	35	18			10.73	0.45 [0.24, 0.85]
Total (95% CI)	113	108			100.00	0.89 [0.70, 1.09]
Test for heterogeneity: $\chi^2 = 5.17$, $df = 2$ ($P = 0.08$); $I^2 = 61.3\%$						
Test for overall effect: $Z = 1.18$ ($P = 0.25$)						

0.1 0.2 0.5 1 2 5 10
Favours intervention Favours usual care



Results

Nursing care homes

- Effect of exercise inconsistent
- Multifactorial interventions
 - Team based > nurse led
- Vitamin D effective

Unsuccessful trial - Auckland

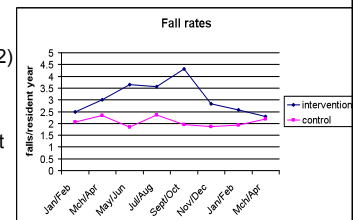
- Falls risk assessment
 - Staff strategies
 - High risk logo
 - Education
 - Low intensity
 - No additional resources
- 14 homes
 - 583 residents
 - >2000 falls



Kerse JAGS 2004

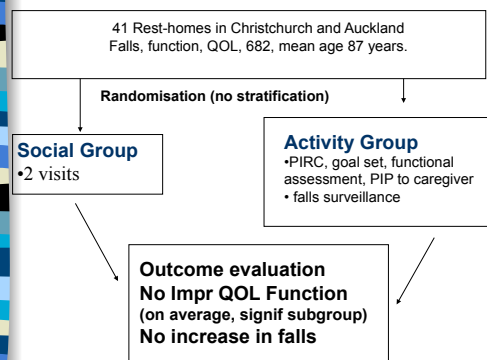
Unsuccessful trial – Auckland 2004

- Increased falls
 - 1.34 (1.06-1.72)
 - ?mobility
 - ?staffing
 - ?measurement



Kerse JAGS 2004

Promoting Independence in Residential Care



Cognition important

Good cognition

- Function ↔
- Depression ↔
- Falls ↔

Poor cognition

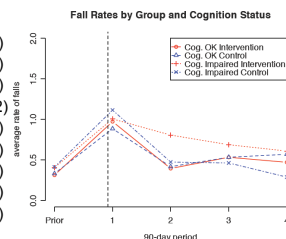
- Function ↓
- Depression ↑
- Falls ↔

Understand the population, target the intervention

Kerse BMJ 2008;337:a1445

Falls – rates analysis

Intervention	1.10 (0.82, 1.46)
ChCh	1.46 (1.09, 1.96)
Age	1.02 (1.01, 1.04)
Female	0.70 (0.53, 0.93)
Cog Imp	1.42 (1.10, 1.72)
Depression	1.49 (1.18, 1.89)
Prior fall	3.00 (2.27, 3.96)
Time in RH	0.99 (0.99, 1.00)
Medicat ^{ns}	1.04 (1.00, 1.08)
Hi SES	0.87 (0.68, 1.11)

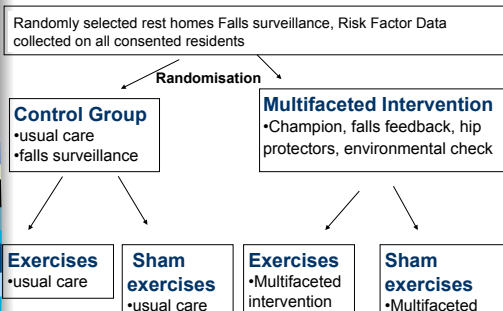


Which works: exercise alone or multifaceted programme?

- Not enough evidence to disseminate existing strategy from other health system
- No clear picture of single vs multi-intervention
- **A pilot study**
 - Staying upright in rest home care
 - *Tu Pakari – to stand with confidence*

Denise Taylor, Liz Binns, Madeline Calder, Clare Robertson

Methods



Falls after 6 months – 4 homes, 62 residents

Numbers of falls and follow up times at 6 months

	Upright exercise classes n=33	Control (seated) exercise classes n=29	Multifactorial intervention homes n=30	Control homes n=32	Total n=62
Rate of falls (falls per person year) in previous 3 months	2.97	3.88	4.48	2.40	3.41
Total time falls monitored (person months)	176	160	162	174	336
Total number of falls during trial	33	39	37	35	72
Number (%) of participants with ≥1 falls during trial	16 (48)	15 (48)	13 (42)	18 (58)	31
Rate of falls (falls per person year) during trial	2.25	2.93*	2.74	2.41†	2.57

*Incident rate ratio from negative binomial regression model for number of falls in Upright exercise class group versus control exercise class group 0.75, 95% confidence interval 0.42 to 1.33, P=0.321;
†multifactorial intervention versus control homes 1.10, 95% confidence interval 0.98 to 1.24, P=0.108.

Conclusions

- Falls prevention is effective
- Be careful what exactly is delivered
- Be careful with exercise
- Ongoing evaluation needed
 - Do no harm