SUNBEAM Trial

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Falls prevention in Australian Residential Aged Care

NSW Falls Prevention Network Forum 2019
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The impact of falls in residential aged care (RAC)

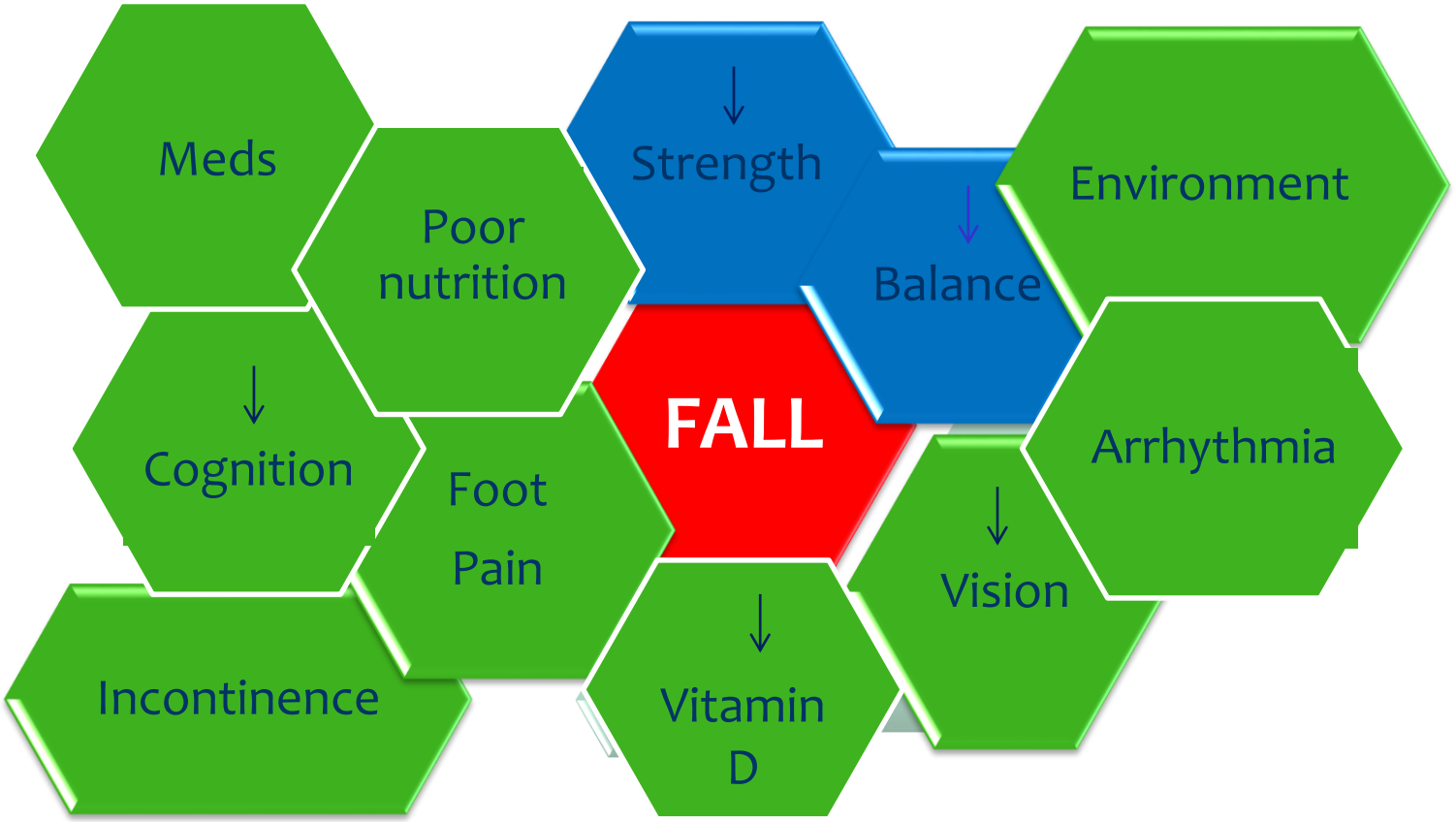
- 30-35% of community dwellers fall once per year (65 y +) (Sherrington 2019)
- 60-63% of residents of aged care fall each year 2.51 falls per person year (Kennedy 2015)
- Falls in this population are often traumatic – the leading cause of preventable death in RAC (Ibrahim 2017)

The impact of falls on society

- Australia's residential aged care (RAC) population is projected to more than treble by 2050 (AIHW 2017)
- The number of people living in residential aged care, fall related hospital admissions and costs of follow up care are rising (AIHW 2017)
- No other single injury, including road trauma, costs the health system more than injuries resulting from falls (Bradley 2012)

Why do people fall?

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



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 2009,2012, 2019)

Interventions for preventing falls in older people living in nursing care facilities and hospitals (Cameron et al 2010, 2012, 2018)

Falls in the community (Gillespie et al 2009)

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

Falls in residential aged care

(Cameron et al 2012, and 2018)

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, 2018)

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)

Supervised exercise versus usual care

Analysis 1.1. Comparison 1 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

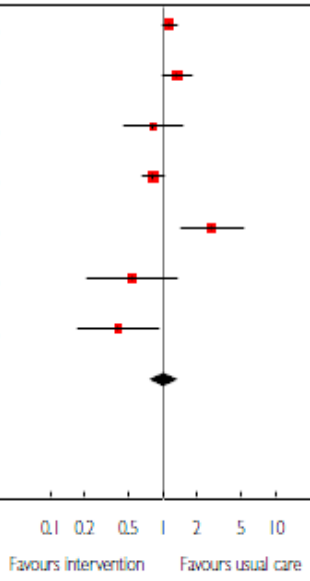
Comparison: 1 Supervised exercises vs usual care (nursing care facilities)

Outcome: 1 Rate of falls

Study or subgroup	Intervention N	Usual care N	log [Rate ratio] (SE)	Rate ratio IV,Random,95% CI	Weight	Rate ratio IV,Random,95% CI
Faber 2006	142	90	0.12 (0.09)		22.1 %	1.13 [0.95, 1.35]
Mulrow 1994	97	97	0.28 (0.17)		18.5 %	1.32 [0.95, 1.85]
Rosendahl 2008	87	96	-0.2 (0.32)		11.7 %	0.82 [0.44, 1.53]
Sakamoto 2006	315	212	-0.2 (0.12)		20.9 %	0.82 [0.65, 1.04]
Schoenfelder 2000	9	7	1 (0.33)		11.3 %	2.72 [1.42, 5.19]
Shimada 2004	15	11	-0.63 (0.47)		7.3 %	0.53 [0.21, 1.34]
Sihvonen 2004	20	7	-0.92 (0.43)		8.3 %	0.40 [0.17, 0.93]
Total (95% CI)					**100.0 %**	**1.00 [0.74, 1.35]**

Heterogeneity: $Tau^2 = 0.10$; $Chi^2 = 22.82$, df = 6 (P = 0.00086); I^2 =74%

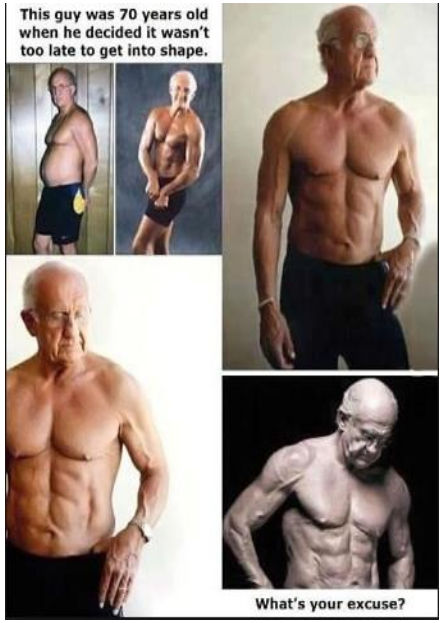
Test for overall effect: Z = 0.03 (P = 0.98)



Cameron et al 2010

Components of effective exercise programs

- ✓ 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

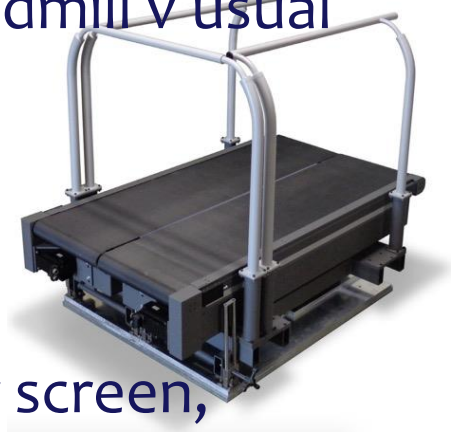


(Sherrington et al 2011, Tiedeman et al 2011)

Studies showing reduction in fall rates

Shimada et al 2004 (n = 26, 6 months follow - up)

- Perturbed walking using a bilateral separated treadmill v usual care
- 3 x weekly 6 months up to 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
- 30 mins 3 x per week 4 weeks = TOTAL = 6 hours

Studies showing no change in fall rates

Choi et al 2005 (n = 68, 12 week follow up)

- Tai Chi v usual care
- 35 mins 3 x per week 12 weeks = TOTAL = 21 hours

Sakamoto et al 2006 (n = 527, 6 month follow up)

- Uni – pedal standing v usual care
- 6 mins per day 7 x per week

26 weeks = TOTAL = 18.2 hours

Pooled data from these studies showed an increase in fall rates

Faber 2006 (n = 278, 1 year follow up)

- "Functional **walking**"
- 1x weekly for 4 weeks then 3 x weekly for 16 weeks for 1 hour each
- 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**
- 3 x weekly for 16 weeks – 30 mins each =TOTAL = 24 hours

Schoenfelder (2000) (n = 16, 6 months follow up)

- Heel raises 5-10 reps as able, 10 mins **walking**
- 3 x weekly for 3 months x 20 mins each session (TOTAL = 12 hours)

Rosendahl 2008 (n = 191, 6 month follow up)

- Balance, Squats, stepping up/down, **walking** program
- 45 mins 5 x every 2 weeks for 13 weeks – total 29 occasions (TOTAL = 21.75 hours)

Exercise as medicine.....

Type

Dosage

Frequency

All matter…

Would I prescribe paracetamol to correct BSL in Diabetes 1?

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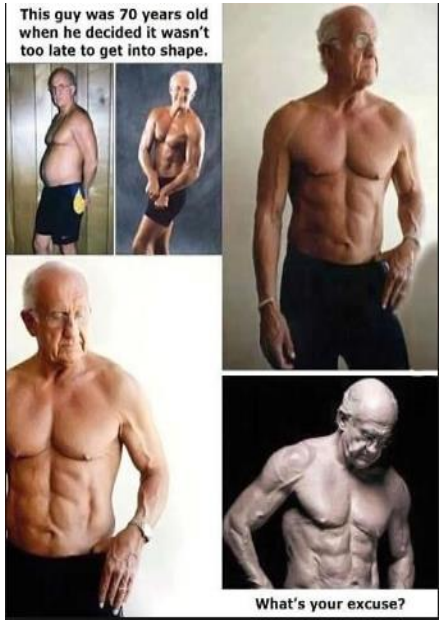

(Sherrington et al 2011, Tiedeman et al 2011)

Objectives of the SUNBEAM trial.

The key research questions were:

- 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?

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RESEARCH DESIGN – SUNBEAM TRIAL

- Multi-centre
- Cluster randomised controlled trial
- Concealed allocation
- Assessor blinded

- 16 Clusters
- 221 Participants

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CHERE
CENTRE FOR HEALTH ECONOMICS RESEARCH AND EVALUATION

THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

Acknowledgements

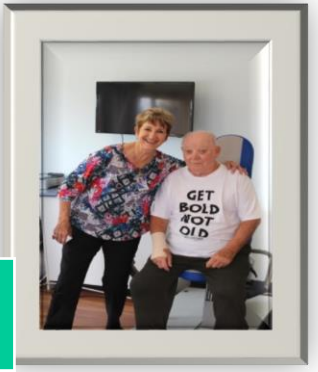
- Professor Kathryn Refshauge
- Professor Stephen Goodall
- Professor Lindy Clemson
- Dr Tim Henwood

HUR Health and Fitness Equipment

Feros Care

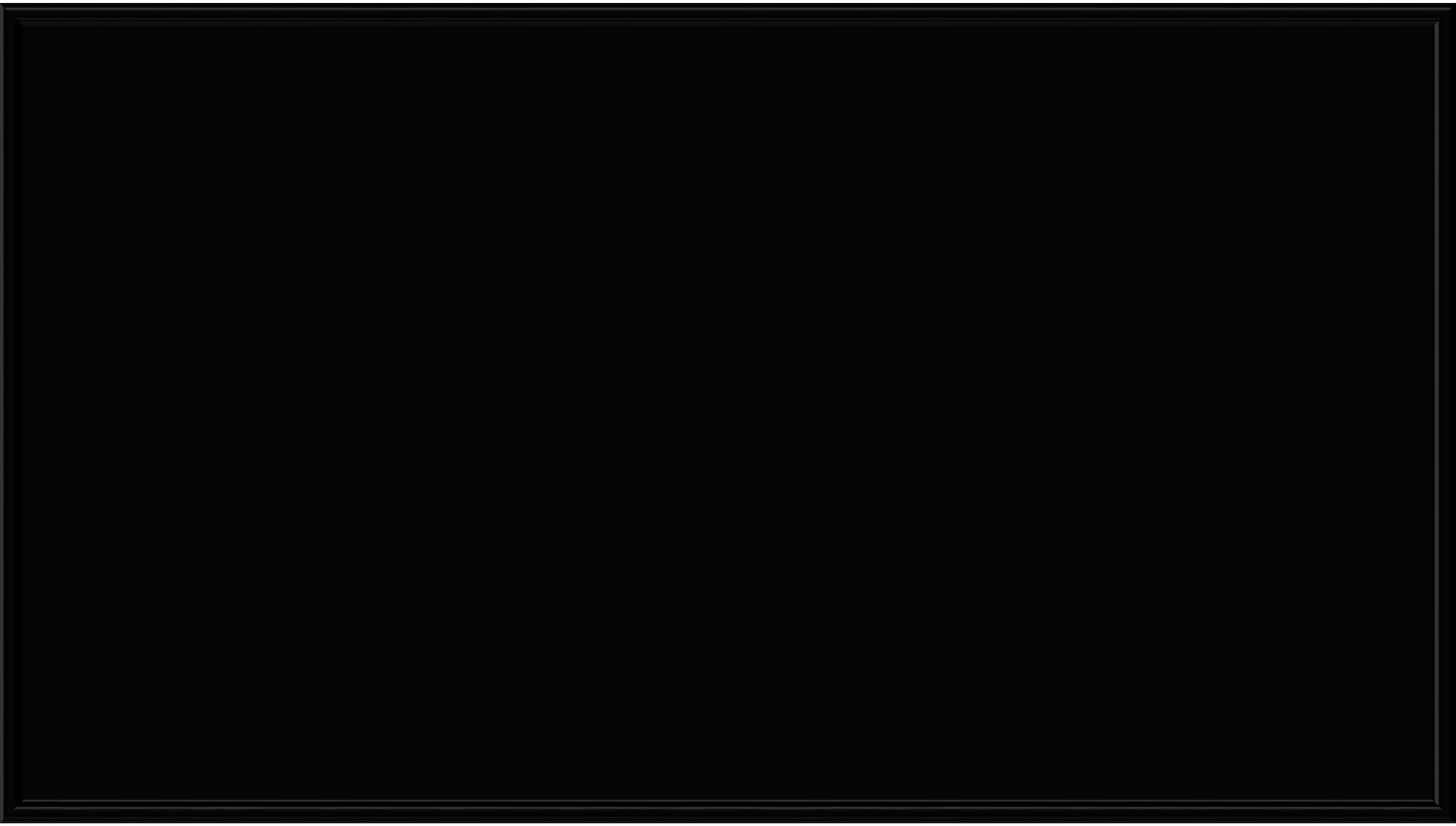

Strength and
Balance Exercise
in Aged Care
SUNBEAM
PROGRAM
NAME VOTED MOST POPULAR BY
PARTICIPANTS …

Participants at Baseline



Characteristic	Intervention Group (n= 113)	%	Usual Care Group (n= 108)	%
Age	86.04 (SD = 6.77)		86.65 (SD = 7.17)	
Female	71	62.8	73	68.22
Months in RACF	22.88 (SD = 27.57) Range 1-192		26.07 (SD = 24.6) Range 1-120	
High Care ACFI	61	54	55	50
Falls in prior 12 months	189		114	
Fallers	69	61.01	54	50.00
Diagnosed co-morbid conditions:				
Anxiety/ Depression	86	76.12	41	37.96
Arthritis	74	65.49	64	59.26
Cardiac Disease	54	47.79	47	43.52
Cognitive Impairment	63	58.33	54	50.00
Diagnosed Gait/balance Disorder	86	76.12	87	80.56
Hypertension	69	61.06	60	55.56
Osteoporosis	40	35.40	31	28.97
MS Pain	60	53.10	48	44.44
Visual Impairment	38	33.63	29	27.10
Prescribed Vitamin D	30	26.55	32	29.91

The Intervention



Falls outcomes

Falls Outcomes

	Intervention Group	Usual Care Group
	8 Clusters, 113 Participants	8 Clusters, 108 Participants
Falls rate, falls per person-year*	1.31	2.91
Total number of falls	142	277
Number of fallers (≥1 falls)	50	73
Number that fell ≥5 times	9	20
Number of injurious falls†	72	157
Number of ambulance attendances	17	41
Number transported to hospital	9	19
Number of fall-related fractures	5	6

*Negative binomial regression, analyzed at participant level and adjusted for clustering.

†Falls resulting in documented pain, bruising, laceration, or fracture.

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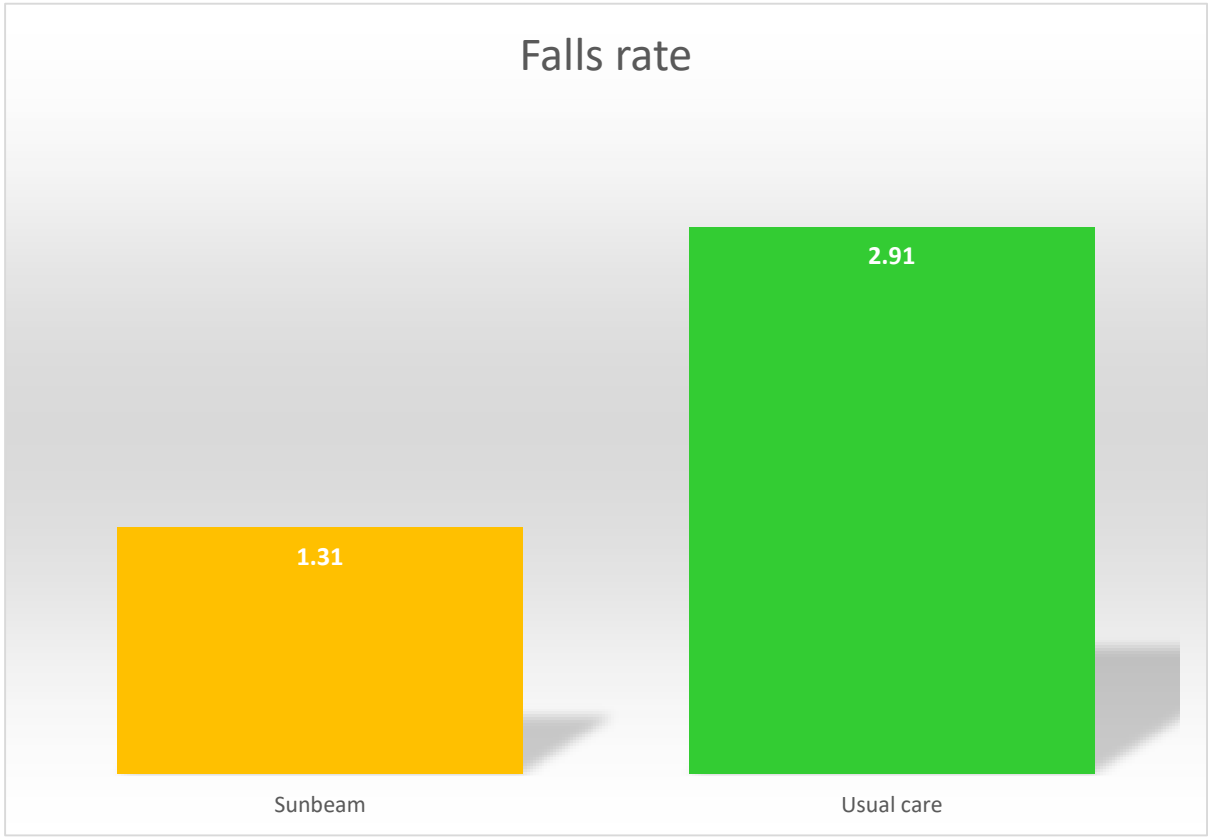
Hewitt et al JAMDA (19) 2018; 361-369

Primary outcome at 12 months



0.45 (95% CI 0.17-0.74)

Hewitt J, Goodall S, Clemson L, Henwood T, Refshauge K. Progressive resistance and balance training for falls prevention in long term residential aged care: A cluster randomised trial of the Sunbeam Program. *JAMDA* 2018; (19): 361-369.

Interviews

Trying to change a system…

AUSTRALIAN PHYSIOTHERAPY ASSOCIATION

Disillusioned with current services in RACF

Search for evidence

Cluster RCT

Lobby for change

Costs of treating a fall

Table 1: Unit costs for attending to or treating a fall

	Cost	Unit	Source
PT - with on costs	$53.93	per hour	Level 2, Year 1[19]
AO - with on costs	$28.52	per hour	Aged Care Employee Level 3; Paid as equivalent to a Personal Care Worker Grade 2[20]
RN - with on costs	$37.23	per hour	Residential Care Nurse 02RCN03[21]
MP	$40.35	per 20 minute session	Item 35 for RACF, 20 minutes, assume 7 patients[22]
Ambulance	$287	per attendance	By road[17]
Ambulance travel	$1.77	per kilometre	By road[17]
Acute Admitted patient without fracture	$4,294	per visit	Acute admitted patient per night[18]
Hospitalisations fractures	$2,672 to $9,096		Weighted average of I178A and I78B [neck of femur]; I175A and I75B [neck of humerus and upper limb fracture]; B79A and B79B [skull fracture and assumed same for spinal fracture]; I77A and I77B [pelvis fracture]; I74Z [lower limb fracture]; I76A and I76B [rib fracture][23]
Hospitalisation for same-day visit	$1,271		Z61B[23]

Abbreviations: AO, activities officer; MP, medical practitioner; PT, physiotherapist; RN, registered nurse. Note: Base year 2015, $AUD

Calculating cost effectiveness

Incremental cost effectiveness ratio (ICER)

$$\frac{\text{cost of intervention - cost of usual care}}{\text{effect of intervention - effect of usual care}}$$

ICER = $22 per fall avoided

$18 per fall avoided (95% CI: –$380.34 to $417.85).

Hewitt J, Goodall S, Saing S, Clemson L, Henwood T, Refshauge K. Cost effectiveness of the Sunbeam strength and balance exercise program for falls prevention in residential aged care

Scenario - All Australian RAC implemented the program

172 000 residents x 0.25 = 43 000

"Current care" = 125 130 falls
Acute cost $400.09 per fall = $50 M

"Sunbeam program" = 56 330 falls
Acute cost $400.09 per fall = $23 M

Estimated cost benefit $27 M

Scenario – Including all acute and long term care costs:

172 000 residents x 0.25 = 43 000 inclusions

"Current care" = 125 130 falls
Cost $1750 per fall = $219 M

"Sunbeam program" = 56 330 falls
Cost $1750 per fall = $99M

Estimated cost benefit = $120 M

Disseminating the results

- ✓RCT Publication
- ✓CE Publication
- ✓Share findings with those responsible for reform
- ✓Lobby for change

SBS NEWS

TRANSLATION TO POLICY


REVIEW OF THE
AGED CARE FUNDING INSTRUMENT
REPORT

PART 1: SUMMARY REPORT

June 2017

Applied Aged Care Solutions Pty Ltd

aacs

Dr Richard Rosewarne, Janet Opie, Dr Richard Cumpston, Victoria Boyd and Akira Kikkawa.

TRANSLATION TO POLICY:
Key Recommendation:

7.2. Are Physical Therapy Programs Effective?

There is a growing body of evidence of the range of positive outcomes from physical therapy interventions with older frail persons. It not only improves or maintains functional ability, but can also impact on the management of chronic diseases and their associated risks, reducing falls, and improving social and quality of life outcomes.

A new Therapy Program is a logical fit with the ACFI pain items, and the new program would be designed to fit with contemporary best pain practice and a broader range of physical interventions – for example, evidence-based pain treatments including therapeutic exercises

TRANSLATION TO PRACTICE

Components of effective exercise programs in residential aged care

- ✓ Total dose of exercise **1.2** hours/week (min)
- ✓ Progressive resistance training (2-3 sets, 10-15 reps)
- ✓ High level balance work
- ✓ All exercises individually upgraded and progressed
- ✓ Close supervision
- ✓ Maintenance program continued after initial conditioning phase

TRANSLATION TO PRACTICE

Progressive resistance training (2-3 sets, 10-15 reps)

Muscle groups included in Sunbeam Program:

- ✓ Knee flexors and extensors
- ✓ Hip extensors, abductors, adductors
- ✓ Elbow flexors and extensors
- ✓ Shoulder retractors
- ✓ Calves

No gym?

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TRANSLATION TO PRACTICE

High challenge balance exercise

Exercises included in Sunbeam Program:

- ✓ Standing bicep curls and shoulder retraction
- ✓ Heel raises
- ✓ Dynamic balance - recovery steps, grapevine
- ✓ Static balance – feet SBS, stride, semi tandem, tandem

Eyes open, eyes closed

- ✓ ROBOS

Balance with flair

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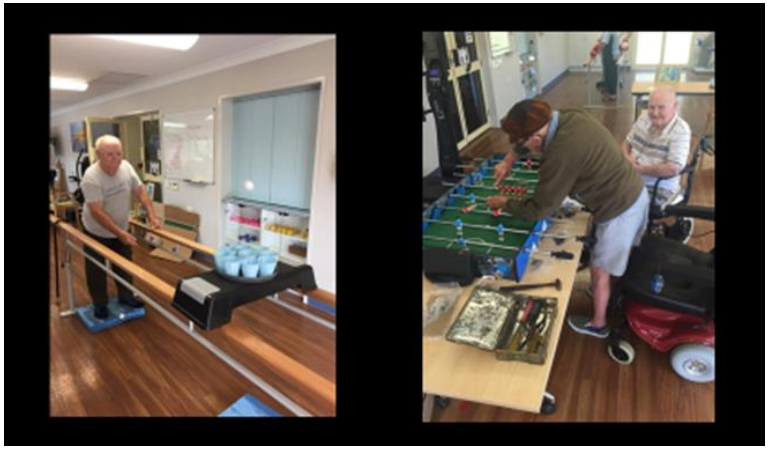

Thank you for listening

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