Preventing falls in hospitals: Understanding interactions between staff, environment and patients

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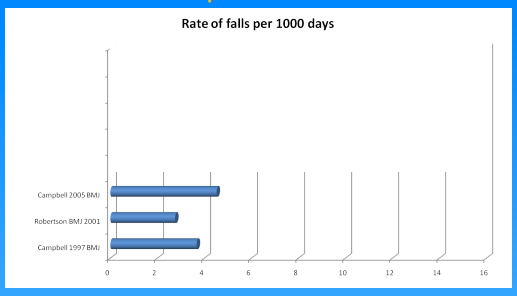
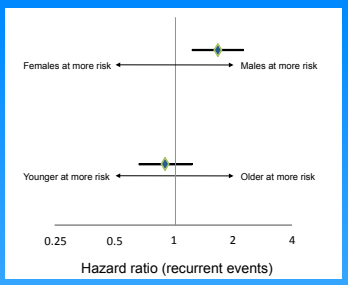
Preventing falls in hospitals

- Why are falls in hospitals different?
- How can we better understand the interactions between patients, hospital staff and their environment?
- Update on the evidence on falls prevention in hospitals

Falls in hospitals are different



Some risk factor differences



N=1,828
Meta-analysis from two trails in Australian hospitals

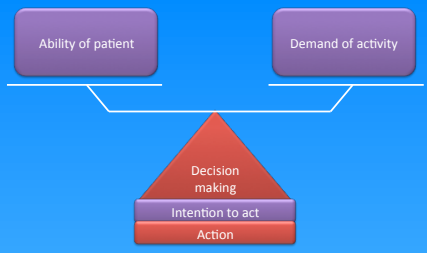
Haines T, Hill A. Inconsistent results in meta-analyses for the prevention of falls are found between study-level data and patient-level data. Journal of Clinical Epidemiology (In Press)

Why do falls occur in hospitals?

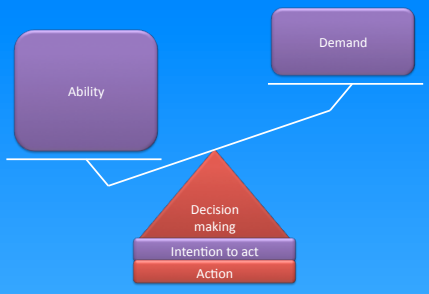
- Staff perspective
  - "...they are not aware that they can't do things that they used to do"
  - "...subconsciously they are in denial"
  - "...they require supervision...they are reluctant to ask for supervision"
- Patient perspective when talking about others
  - "...they try to do something that is too hard"
- When talking about themself
  - "...the bathroom is too crowded"
  - "...it is slippery"

I did not have any role in that fall

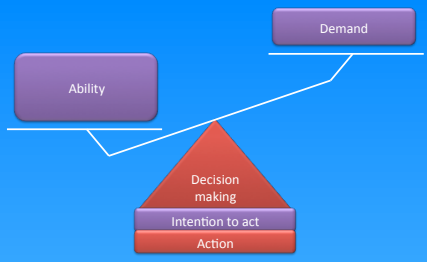
Precipitation: Ability vs demand



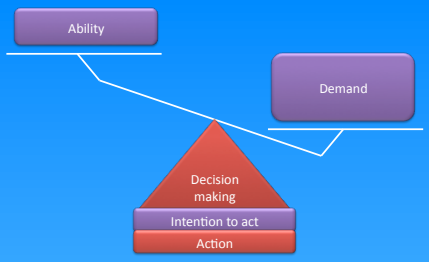
Recovery & rehabilitation



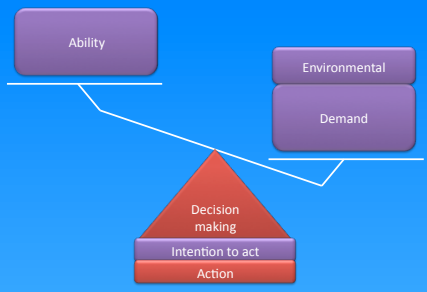
Avoidance of demanding activities



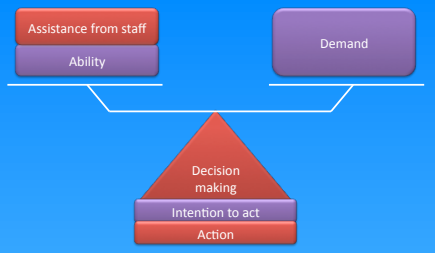
Staff & patients: ↓ability, same activity



Patients: more difficult activity

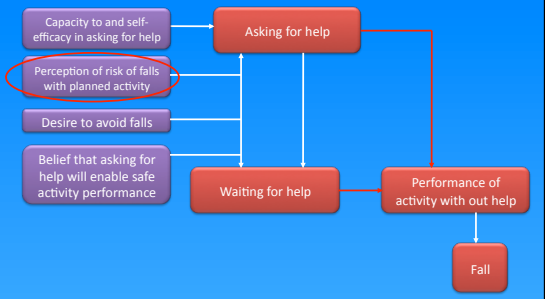


Assistance from hospital staff is critical

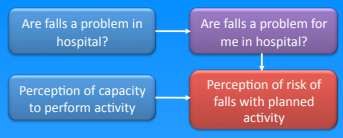


Asking for help

Asking for help



Perception of risk



Do patients perceive a risk from falls?

- Cross-sectional survey, N=125 rehab inpatients
  - 21 (17%) thought they would fall during hospitalisation
  - 28 (22%) thought they would injure if they did fall
    - Haines T, McPhail S. Threat appraisal for harm from falls: Insights for development of education-based intervention. Open Longevity Science. In Press.
    - Hill A, et al. Journal of the American Geriatrics Society. 2009;57(8): 1458-1463

Why do they think it?

- Univariate predictors of self-perceived falls risk

Variable	OR (95% CI), p-value
Better cognitive function (FIM cog)	0.85 (0.74, 0.98), p=0.02
In-hospital fall prior to survey	5.10 (1.39, 18.71), p=0.01

- Univariate predictors of self-perceived injury risk

Variable	OR (95% CI), p-value
Orthopaedic diagnosis	3.7 (1.19, 11.51), p=0.02
Better motor function (FIM motor)	0.96 (0.93, 0.99), p=0.009
Problems personal care (EQ-5D)	3.10 (1.46, 6.58), p=0.003
Problems usual activity (EQ-5D)	2.08 (1.01, 4.27), p=0.04
Perceived % patients who fall	0.99 (0.97, 1.00), p=0.03
Perceived % falls → injury	1.01 (1.00, 1.03), p=0.05

Why do they think it?

Why else would people not ask for help?

- Staff perspective
  - Nurse: "A lot of them are reluctant, reluctant to ask for supervision. They don't want to trouble the nurses."
  - Nurse: "They don't want to lose their sense of independence, particularly if they get embarrassed about having to get someone to give them help to get onto the toilet, so they will attempt to do it themselves."

Why else would people not ask for help?

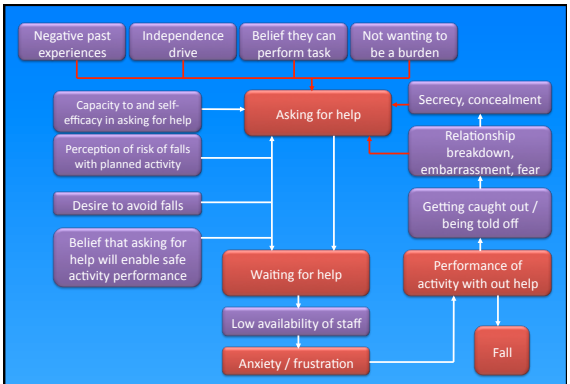
How do staff respond to non-compliance?

- Patient: "I got told off. You're a naughty boy."
- Nurse: "We've just got to keep on reiterating"
- Physiotherapist 1: "I think you know when patients aren't doing exactly what you want them to do but it's really, um letting them ummm"

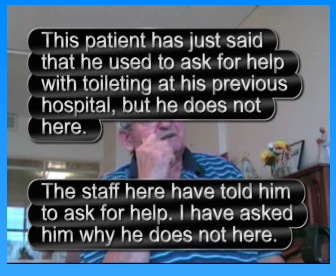
  Physiotherapist 2: "An acceptable risk"

  Physiotherapist 1: "Yeah, an acceptable risk. And letting them get away with what you actually want them to get away with."

  Physiotherapist 2: "I mean no one likes to be treated like a child and that's virtually what you're doing when you're bossing someone around"



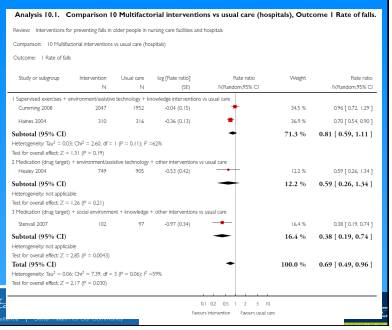
Risk compensation: Interactions between patients, staff & environment



Risk compensation

An update of the evidence

- Cameron I et al. Interventions for preventing falls in older people in nursing care facilities and hospitals (Review). Cochrane Database of Systematic Reviews 2010 Issue 1 Art.No.: CD005465. DOI: 10.1002/14651858.CD005465.pub2.



Analysis 10.1. Comparison 10 Multifactorial interventions vs usual care (hospitals), Outcome 1 Rate of falls.

Review: Interventions for preventing falls in older people in nursing care facilities and hospitals

Comparison: 10 Multifactorial interventions vs usual care (hospitals)

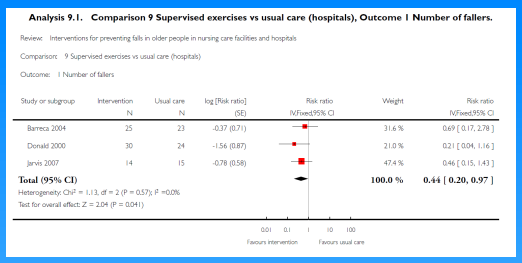
Outcome: 1 Rate of falls

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
1 Supervised exercises + environment/assistive technology + knowledge interventions vs usual care						
Cumming 2008	2047	1952	-0.04 (0.15)		34.5 %	0.96 [0.72, 1.29]
Haines 2004	310	316	-0.36 (0.13)		36.9 %	0.70 [0.54, 0.90]
Subtotal (95% CI)					**71.3 %**	**0.81 [0.59, 1.11]**
Heterogeneity: Tau² = 0.03; Chi² = 2.66, df = 1 (P = 0.1); I² =62%						
Test for overall effect: Z = 1.31 (P = 0.19)						
2 Medication (drug target) + environment/assistive technology + other interventions vs usual care						
Healey 2004	749	905	-0.53 (0.42)		12.2 %	0.59 [0.26, 1.34]
Subtotal (95% CI)					**12.2 %**	**0.59 [0.26, 1.34]**
Heterogeneity: not applicable						
Test for overall effect: Z = 1.26 (P = 0.21)						
3 Medication (drug target) + social environment + knowledge + other interventions vs usual care						
Stenvall 2007	102	97	-0.97 (0.34)		16.4 %	0.38 [0.19, 0.74]
Subtotal (95% CI)					**16.4 %**	**0.38 [0.19, 0.74]**
Heterogeneity: not applicable						
Test for overall effect: Z = 2.85 (P = 0.0043)						
Total (95% CI)					**100.0 %**	**0.69 [0.49, 0.96]**
Heterogeneity: Tau² = 0.06; Chi² = 7.39, df = 3 (P = 0.06); I² =59%						
Test for overall effect: Z = 2.17 (P = 0.030)						

0.1 0.2 0.5 1 2 5 10

Favours intervention Favours usual care

Exercise trials



Analysis 9.1. Comparison 9 Supervised exercises vs usual care (hospitals), Outcome 1 Number of fallers.

Review: Interventions for preventing falls in older people in nursing care facilities and hospitals

Comparison: 9 Supervised exercises vs usual care (hospitals)

Outcome: 1 Number of fallers

Study or subgroup	Intervention N	Usual care N	log [Risk ratio] (SE)	Risk ratio IV,Fixed,95% CI	Weight	Risk ratio IV,Fixed,95% CI
Barreca 2004	25	23	-0.37 (0.71)		31.6 %	0.69 [0.17, 2.78]
Donald 2000	30	24	-1.56 (0.87)		21.0 %	0.21 [0.04, 1.16]
Jarvis 2007	14	15	-0.78 (0.58)		47.4 %	0.46 [0.15, 1.43]
Total (95% CI)					**100.0 %**	**0.44 [0.20, 0.97]**
Heterogeneity: Chi² = 1.13, df = 2 (P = 0.57); I² =0.0%						
Test for overall effect: Z = 2.04 (P = 0.041)						

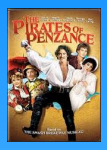
0.01 0.1 1 10 100

Favours intervention Favours usual care

Author's conclusions

Multifactorial falls prevention programmes in hospitals for patients who have longer lengths of stay (at least three weeks) are effective, but no recommendations can be made regarding any particular component of these programmes. Exercise in the subacute hospital setting appears effective.

- A paradox, a paradox, a most ingenious paradox
  - Guilbert and Sullivan 1890, Pirates of Penzance



More recent evidence

- Introduction of low-low beds
- Proximity alarms with visits from team promoting use
- Fall prevention toolkit using health information technology
- Multimedia patient education

Introduction of low-low beds

- cRCT, N = 18 wards 11,099 patients
- Matched wards (pre-study fall rates)
- 1 low-low bed per 12 on ward
- Fall reporting: Incident reports, staff training in application of WHO definition
- No difference in rate of falls or injury
- Haines T, Bell R, Varghese P. Pragmatic, cluster randomised trial of a policy to introduce low-low beds to hospital wards for the prevention of falls and fall-injuries. Journal of the American Geriatrics Society 2010;58:435-441

Proximity alarms with visits from team promoting use

- cRCT, N=16 med-surg units 142,645 patient-days
- Fall reporting:
  - trained evaluators and incident reports

Rates per 1000 patient days	Intervention	Control
Alarm use	64.41	1.79
Fall rate before study	6.04	5.42
Fall rate after study	5.33	4.88
Injurious falls before study	1.29	1.86
Injurious falls after study	1.3	1.32

- Shorr R et al. Trial of proximity alarms to prevent patient falls in hospitals. American Geriatrics Society Annual Scientific Meeting, Orlando Florida, May 2010.

Fall prevention toolkit using health information technology

- cRCT, N=8 acute units 10,264 patients

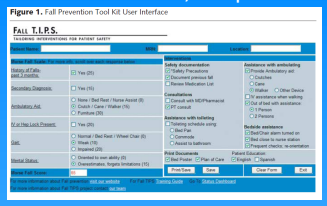


Figure 1. Fall Prevention Tool Kit User Interface

- Dykes et al. Fall prevention in acute care hospitals. A randomized trial. JAMA 2010;304:1912-8

Results

Table 3. Participant Falls and Adjusted Fall Rates in Control vs Intervention Units

	Control Units	Intervention Units	Rate Difference	*P* Value
All patients				
Baseline fall rate per 1000 patient-days[a,b]	5.56	5.85	−0.29	.61
No. of patients with falls/ total No. of patients	87/5104	67/5160		.02
Total No. of falls	89	71		
No. of repeat falls	2	4		.46
Fall rate (95% CI) per 1000 patient-days[b]	4.64 (3.86 to 5.57)	3.48 (2.83 to 4.28)	1.16 (0.17 to 2.16)	.04
Fall rate (95% CI) per 1000 patient-days adjusted for site, sex, race, insurance, age	4.18 (3.45 to 5.06)	3.15 (2.54 to 3.90)	1.03 (0.57 to 2.01)	.04
Observed No. of falls with injury	12	14		.64

Fall reporting

Reporting of patient falls and injurious falls is required at all hospitals and routinely recorded in an event reporting system in all units by the clinician caring for the patient at the time of a fall. Incidents are validated by unit managers and hospital quality personnel. Pa-

- Staff disagree in how to apply definitions of a fall
  Haines et al. JAGS 2009; 57:517-23
- Falls are under-reported on incident report systems
  - 25% missed (Aust)
    Hill A et al. JAGS 2010; 58: (7) 1347-1352
  - 28% missed (USA)
    Shorr R et al. JAGS 2008; 56: 701-4

Patient education for prevention of falls in hospital

Haines T, Hill A, Hill K, McPhail S, Oliver D, Brauer S, Hoffmann C, Beer C. Patient education to prevent falls amongst older hospital inpatients: a randomized controlled trial. Archives of Internal Medicine. Epub ahead of print November 22, 2010.

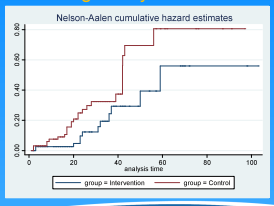
Research Questions

- What is the effect of multi-media patient education program with trained health professional follow-up vs multi-media patient education vs usual care on in-hospital falls and injury?
- Are the results different for patients with and without cognitive impairment?

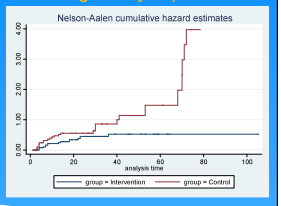
Why include cognitively impaired?

Patient education to prevent falls in subacute care

Cognitively intact



Cognitively impaired



Method

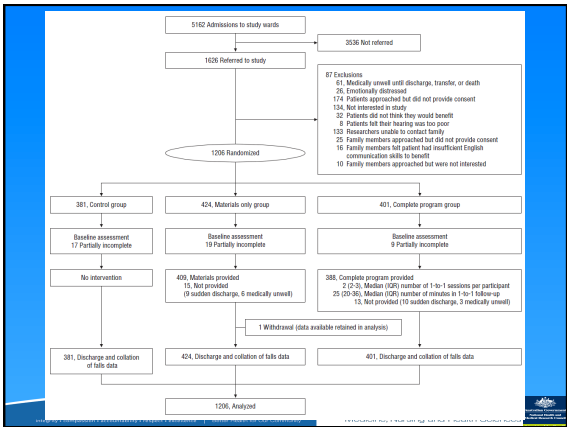
- Design
  - *Hill et al BMC Geriatr 2009*
  - *Trial Registration: ACTRN12608000015347*
  - Multicentre RCT with 3 groups
  - Recruiter, baseline assessor, outcome assessor / collator, statistical analysis designer blinded to allocation
- Setting and participants
  - >60 years
  - Acute medical, orthopaedic, rehabilitation wards
    - Princess Alexandra Hospital, Queensland, Australia
    - Swan Districts Hospital, Western Australia, Australia

Control / intervention conditions

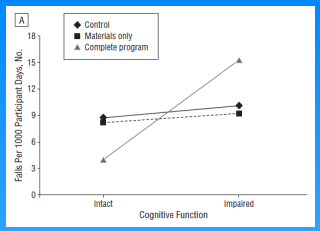
- Usual care – "Control"
- Multi-media education – "Materials only"
  - DVD & workbook
- Multi-media education & health professional follow-up – "Complete program"
  - Training of health professional to provide follow-up
  - Structured progression through education content

Outcome measurement

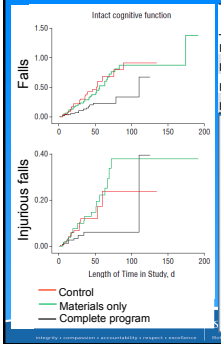
- Falls and injury
  - Incident reports
  - Medical record review
    - Pre-study staff training video in how to apply WHO definition of a fall
      - *Haines et al J Am Geriatr Soc 2009*
      - *Haines et al BMC Health Serv Res 2008*
  - Weekly (at discharge if earlier) patient interview



Results: significant interaction effect with cognitive function



Results – cognitively intact

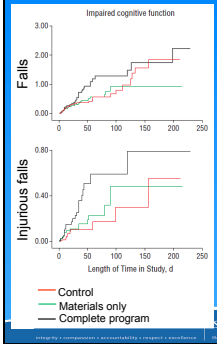


	Control	Materials only	Complete program
Falls	46	61	25
Injurious falls	15	25	10
Falls resulting in fracture	2	1	0
Fallers (%)	30 (11%)	32 (10%)	20 (6%)

Outcome	Materials Only vs Control as Reference: Ratio	*P* Value
Falls per 1000 patient-days	0.83 (0.48-1.44)	.51
Fallers[b]	0.80 (0.46-1.38)	.41
Injurious falls per 1000 patient-days	0.96 (0.44-2.08)	.92[c]

	Complete Program vs Control as Reference: Ratio	*P* Value
Falls per 1000 patient-days	0.43 (0.24-0.78)	.006
Fallers[b]	0.51 (0.28-0.94)	.03
Injurious falls per 1000 patient-days	0.53 (0.23-1.22)	.13[c]

Results – cognitively impaired



	Control	Materials only	Complete program
Falls	35	35	45
Injurious falls	10	15	22
Falls resulting in fracture	0	1	1
Fallers (%)	24 (24%)	24 (22%)	24 (26%)

Outcome	Materials Only vs Control as Reference: Ratio	*P* Value
Falls per 1000 patient-days	0.99 (0.55-1.78)	.97[c]
Fallers[b]	0.92 (0.48-1.78)	.82
Injurious falls per 1000 patient-days	1.51 (0.64-3.57)	.35

	Complete Program vs Control as Reference: Ratio	*P* Value
Falls per 1000 patient-days	1.48 (0.86-2.53)	.15[c]
Fallers[b]	1.38 (0.70-2.75)	.35
Injurious falls per 1000 patient-days	2.63 (1.19-5.84)	.02

Discussion

- Multimedia patient education with trained health professional follow-up reduces falls amongst cognitively intact hospital inpatients
- Follow-up with trained health professionals is critical
  - Provision of materials alone had no effect

Strengths / limitations

- Cognitively intact
  - Concordance with previous work
  - First single intervention trial to demonstrate a benefit
- Cognitively impaired
  - Discordance with previous work
- Blinding of research staff, not patients / staff

Future directions

- Falls prevention amongst cognitively impaired older adults
- Use of behaviour change approaches amongst community-dwelling older adults
  - Particularly those recently discharged from hospital