Falls & Injury Prevention Reflections and Projections

Jacqueline CT Close

Orthogeriatrician – Prince of Wales Hospital
Director - Falls and Injury Prevention Group, NeuRA
Conjoint Professor - Prince of Wales Clinical School, UNSW
The liability of old people to tumble and often to injure themselves is such a commonplace of experience that it has been tacitly accepted as an inevitable aspect of ageing, and thereby deprived of the exercise of curiosity. The literature, in fact, on what has always been a trial for the elderly and is now becoming a problem for the community is very meagre (Sheldon, 1948; Scott, 1954; Droller, 1955; Hobson and Pemberton, 1955; Howell, 1955; DeLargy, 1958; Boucher, 1959; Exton-Smith, 1959; Fine, 1959), and bears little relation to either the practical importance or the intrinsic interest of the subject. An essential preliminary to further investigation is a knowledge of what actually happens, and the present paper is an attempt to meet that need by an account of the natural history of these falls.

The inquiry was directed at old people living at home, since the hospital population of old age has a heavy pathological bias, and, in addition, faces postural risks different from those of the community at large. This paper presents the results of an inquiry into 500 falls which happened to 202 individuals—86 had been brought to the casualty department of the Royal Hospital. old people (Fine, 1959), where the incidence of physical and, particularly, of mental defect is so much greater. The environment contributed a quota to the causation of 224 falls, whereas the cause lay within the old person in the remaining 276, though effective separation is difficult. Thus, while in some of the accidental fall a younger person would also have fallen, in many other balance would have been retained; for old people complain bitterly of inability to preserve their balance as they did when younger, saying, “Once you’ve gone, you’ve got to go”—a remark which reveals a considerable problem in defective physiology.

Accidental Falls
There were 171 falls (34% of total) in 125 individuals as follows:

- On stairs: 63
- Missing last step or step: 15
- Poor illumination: 13
- Vertigo: 12
- Slipping: 49
- Falling over unexpected objects: 40
- Dark: 31
- Various causes: 22

“The liability of old people to tumble.... is such a commonplace of experience that it has been tacitly accepted as an inevitable aspect of ageing and thereby deprived of the exercise of curiosity.
The liability of old people to tumble and often to injure themselves is such a commonplace of experience that it has been tacitly accepted as an inevitable aspect of ageing, and thereby deprived of the exercise of curiosity. The literature, in fact, on what has always been a trial for the elderly and is now becoming a problem for the community is very meagre (Sheldon, 1948; Scott, 1954; Droller, 1955; Hobson and Pemberton, 1955; Howell, 1955; DeLargy, 1958; Boucher, 1959; Exton-Smith, 1959; Fine, 1959), and bears little relation to either the practical importance or the intrinsic interest of the subject. An essential preliminary to further investigation is a knowledge of what actually happens, and this present paper is an attempt to meet that need by an account of the natural history of these falls.

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Accidental Falls

There were 171 falls (34% of total) in 125 individuals as follows:

<table>
<thead>
<tr>
<th>Cause</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>On steps</td>
<td>63</td>
</tr>
<tr>
<td>Missing last step or stairs</td>
<td>15</td>
</tr>
<tr>
<td>Poor Illumination</td>
<td>13</td>
</tr>
<tr>
<td>Vagueness</td>
<td>22</td>
</tr>
<tr>
<td>Slipping</td>
<td>49</td>
</tr>
<tr>
<td>Falling over unsupervised objects</td>
<td>36</td>
</tr>
<tr>
<td>Dark</td>
<td>12</td>
</tr>
<tr>
<td>Various causes</td>
<td>31</td>
</tr>
</tbody>
</table>

“The liability of old people to tumble.... is such a commonplace of experience that it has been tacitly accepted as an inevitable aspect of ageing and thereby deprived of the exercise of curiosity.
20th NSW Falls Prevention Network Forum
301 subjects
70+ yrs and older
Community dwelling
At least 1 identified risk factor
Nurse practitioner and physiotherapist
Direct interaction with GPs
Randomised controlled trial of a general practice programme of home based exercise to prevent falls in elderly women

A John Campbell, M Clare Robertson, Melinda M Gardner, Robyn N Norton, Murray W Tilyard, David M Buchner

- 233 women
- Aged 80+
- Community dwelling
- Invited by GP to participate

![Table 2: Number (percentage) of subjects falling in control and exercise groups*](image)
Prevention of falls in the elderly trial (PROFET): a randomised controlled trial

Jacqueline Close, Margaret Ellis, Richard Hooper, Edward Glucksman, Stephen Jackson, Cameron Swift

<table>
<thead>
<tr>
<th>Study status</th>
<th>Control group (n=213)</th>
<th>Intervention group (n=184)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>In study</td>
<td>163 (77%)</td>
<td>141 (77%)</td>
<td>0.81</td>
</tr>
<tr>
<td>Moved to institutional care</td>
<td>18 (8%)</td>
<td>18 (10%)</td>
<td></td>
</tr>
<tr>
<td>Dead</td>
<td>27 (13%)</td>
<td>19 (10%)</td>
<td></td>
</tr>
<tr>
<td>Lost to follow up</td>
<td>5 (2%)</td>
<td>6 (3%)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Falls</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative number of falls</td>
<td>510</td>
<td>183</td>
<td>0.0002</td>
</tr>
<tr>
<td>Patients reporting falls</td>
<td>111 (52%)</td>
<td>59 (32%)</td>
<td></td>
</tr>
<tr>
<td>Patients reporting three or more falls</td>
<td>55 (26%)</td>
<td>21 (11%)</td>
<td></td>
</tr>
<tr>
<td>Patients reporting serious injury from falls</td>
<td>16 (8%)</td>
<td>8 (4%)</td>
<td>0.26</td>
</tr>
<tr>
<td>Able to go out alone</td>
<td>106 (65%)</td>
<td>108 (77%)</td>
<td>0.04</td>
</tr>
<tr>
<td>Mean (SD) Barthel score</td>
<td>17.3 (3.7)</td>
<td>18.6 (2.5)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resource utilisation</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>GP visits</td>
<td>668</td>
<td>487</td>
<td>0.33</td>
</tr>
<tr>
<td>Hospital visits</td>
<td>524</td>
<td>438</td>
<td>0.55</td>
</tr>
<tr>
<td>Hospital admission</td>
<td>97</td>
<td>69</td>
<td>0.78</td>
</tr>
</tbody>
</table>

GP=general practitioner.

Figure 2: Change from baseline in Barthel score during follow-up

Lancet, 1999
The Effectiveness of a Community-Based Program for Reducing the Incidence of Falls in the Elderly: A Randomized Trial

Lindy Clemson, BAppSc(OT), MAppSc(OT), PhD,* Robert G. Cumming, MBBS, MPH, PhD, ‡ Hal Kendig, MPI, PhD, FASSA, § Megan Swann, BAppSc(OT), † Robert Heard, BA(Hons), PhD, ‡ and Kirsty Taylor, BA(Psych)*

- 310 subjects
- Community dwelling
- Able to leave house
- Recruited from a number of sources
The evidence

Interventions for preventing falls in older people living in the community (Review)

Interventions for preventing falls in older people in care facilities and hospitals (Review)
Cameron ID, Gillespie LD, Robertson MC, Murray GR, Hill KD, Cumming RG, Keese N

159 trials (59 exercise)
79,193 participants

60 trials
60,345 participants
<table>
<thead>
<tr>
<th>Intervention - Community</th>
<th>Rate of falls</th>
<th>Risk of falling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multicomponent group exercise (16, 22)</td>
<td>RaR 0.71 (0.63-0.82)</td>
<td>RR 0.85 (0.76-0.96)</td>
</tr>
<tr>
<td>Multicomponent home exercise (7, 6)</td>
<td>RaR 0.68 (0.58-0.8)</td>
<td>RR 0.78 (0.64-0.94)</td>
</tr>
<tr>
<td>Tai Chi (5, 6)</td>
<td>RaR 0.72 (0.52-1.0)</td>
<td>RR 0.71 (0.57-0.87)</td>
</tr>
<tr>
<td>Multifactorial interventions (19, 34)</td>
<td>RaR 0.76 (0.67-0.86)</td>
<td>RR 0.93 (0.86-1.02)</td>
</tr>
<tr>
<td>Vitamin D (7, 13)</td>
<td>RaR 1.00 (0.9-1.11)</td>
<td>RR 0.96 (0.89-1.03)</td>
</tr>
<tr>
<td>OT intervention (6, 7)</td>
<td>RaR 0.81 (0.68-0.97)</td>
<td>RR 0.88 (0.8-0.96)</td>
</tr>
<tr>
<td>Vision intervention (1)</td>
<td>RaR 1.57 (1.19-2.06)</td>
<td>RR 1.54 (1.24-1.91)</td>
</tr>
<tr>
<td>Cataract extraction (1)</td>
<td>RaR 0.66 0.45-0.95</td>
<td>-</td>
</tr>
<tr>
<td>Bifocal / multifocal glasses (1)</td>
<td>RaR 0.92 (0.73-1.17)</td>
<td>RR 0.97 (0.85-1.11)</td>
</tr>
<tr>
<td>Psychotropic withdrawal (1)</td>
<td>RaR 0.34 0.16-0.73</td>
<td>×</td>
</tr>
<tr>
<td>Pharmacy detailing</td>
<td>-</td>
<td>RR 0.61 (0.41-0.91)</td>
</tr>
<tr>
<td>Pacemakers (3)</td>
<td>RaR 0.73 0.57-0.93</td>
<td>×</td>
</tr>
<tr>
<td>Podiatry for painful feet (1)</td>
<td>RaR 0.64 0.45-0.91</td>
<td>×</td>
</tr>
<tr>
<td>Anti-slip shoe (1)</td>
<td>RaR 0.42 0.22-0.78</td>
<td>-</td>
</tr>
<tr>
<td>Increase knowledge/educate /CBT (2,6)</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>Intervention - Hospitals</td>
<td>Rate of falls</td>
<td>Risk of falls</td>
</tr>
<tr>
<td>--------------------------------------------------------------</td>
<td>--------------</td>
<td>--------------------</td>
</tr>
<tr>
<td><strong>General hospital setting</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trained nurse targeting individual fall risk factors (1)</td>
<td>_</td>
<td>RR 0.29 (0.11-0.74)</td>
</tr>
<tr>
<td>Multifactorial interventions (4, 3)</td>
<td>RaR 0.69 (0.49-0.96)</td>
<td>RR 0.71 (0.46-1.09)</td>
</tr>
<tr>
<td>Orthogeriatric MoC (1, 1)</td>
<td>RaR 0.38 (0.19-0.74)</td>
<td>RR 0.41 (0.20-0.83)</td>
</tr>
<tr>
<td><strong>Subacute setting</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercise (1, 2)</td>
<td>RaR 0.54 (0.16-1.81)</td>
<td>RR 0.36 (0.14-0.93)</td>
</tr>
<tr>
<td>Carpet flooring (1)</td>
<td>RaR 14.73 (1.88-115.35)</td>
<td>RR 8.33 (0.95-73.97)</td>
</tr>
</tbody>
</table>
### RACF

<table>
<thead>
<tr>
<th>Intervention - RACFs</th>
<th>Rate of falls</th>
<th>Risk of falling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise (8,8)</td>
<td>RaR 1.03 (0.81-1.31)</td>
<td>RR 1.07 (0.94-1.23)</td>
</tr>
<tr>
<td>Vitamin D (5,6)</td>
<td>RaR <strong>0.63 (0.46-0.86)</strong></td>
<td>RR 0.99 (0.90-1.08)</td>
</tr>
<tr>
<td>Multifactorial interventions (7,7)</td>
<td>RaR 0.78 (0.59-1.04)</td>
<td>RR 0.89 (0.77-1.02)</td>
</tr>
</tbody>
</table>

Post hoc analysis suggests that people in intermediate care facilities may benefit from exercise but in high level care the risk may be increased.
Management Policy to Reduce Fall Injury Among Older People

Policy in Brief 2003-2007

NSW Health
Working as a Team
Prevention of Falls and Harm from Falls among Older People
2011–2015

Fall-related hospitalisations, NSW residents aged 65 years and over, 1989/90 to 2007/08
(age standardised rate per 100,000 persons)

* Excludes day only admissions
National Guidelines
Handbook for improving safety and providing high quality care for people with cognitive impairment in acute care:

A Consultation Paper
No other simple cause of injury, including road trauma, costs the health system more than falls.
More than one in three people aged 65 or over fall at least once a year and many fall more often. Falls are even more common among residents of aged care facilities and fall incidents in hospital are high.

The Clinical Excellence Commission (CEC), NSW Falls Prevention Program, in collaboration with the Ministry of Health (MoH), the Agency for Clinical Innovation (ACI), Ambulance NSW and local health districts (LHDs) seeks to promote a comprehensive, systematic approach to falls prevention and to reducing fall injury within NSW.

Program Aims

In line with the NSW Health policy Prevention of Falls and Harm from Falls among Older People 2011 - 2016, the NSW Falls Prevention Program aims to:

- Reduce the incidence and severity of falls
- Reduce the social, psychological and economic impact of falls among older people, families and carers.

The key drivers of the NSW Falls Prevention Program are:

- Implementation of the Australian Commission on Quality and Safety in Health Care (ACQHC) 2009, Falls Best Practice Guidelines for Hospital, Community Care and Residential Care
- The ACQHC National Safety and Quality Health Service Standards (NSQHS) Standard 10 Preventing Falls and Harm from Falls
- NSW Government Healthy Ageing Strategy.
Upcoming Events

NSW Falls Prevention Network Forum
Friday 23rd May 2014, 9 am – 4 pm
SMC Conference Centre, 60 Goulburn St,
Sydney
Flyer
Forum Program
Webcast Information

Helpful Resources

Falls Prevention Resources in Community Languages

The NSW Falls Prevention Program has
produced a number of flyers to support the
Staying active and on your feet booklets, some of
which are available in community languages,
these can be downloaded and copies printed.
The NSW Multicultural Health website also has
some falls prevention resources in a range of
Evidence  Guidelines  Standards  Policy

Active network, experts in the field, Falls Lead, Falls Co-Ordinators
Results – Absolute Numbers

- All fall related hospitalisations increased from 14,577 to 25,929 - (78% increase)
- Fracture related hospitalisations increased from 11,107 to 16,105 – (45% increase)
- Non-fracture related hospitalizations increased from 3,470 to 9,824 – (183% increase)
Figure 1.3: All fall-related hospitalisations by metropolitan LHDs, persons aged 65 years and over, NSW, 1998-99 to 2011-12
Figure 1.4: All fall-related hospitalisations by rural and regional LHDs, persons aged 65 years and over, NSW, 1998-99 to 2011-12
Figure 3.5: Fall-related fracture hospitalisations by rural and regional LHDs, persons aged 65 years and over, NSW, 1998-99 to 2011-12
Figure 4a.4: Fall-related TBI hospitalisations by rural and regional LHDs, persons aged 65 years and over, NSW, 1998-99 to 2011-12

Note: Far West LHD not reported due to small numbers (>5 admissions in some years)
Figure 5.2: Fall-related fracture and non-fracture injury hospitalisations, NSW, projected to 2020-21
Hospitalisations due to falls by older people, Australia 2009–10

Clare Bradley

Figure 2.6: Age-standardised rates of fall injury cases (± 95% CI) by state or territory of usual residence, people aged 65+, Australia 2009–10

Figure 2.7: Age-standardised rates of hip fracture cases (± 95% CI) by state or territory of usual residence, people aged 65+, Australia 2009–10

Figure 2.8: Age-standardised rates of head injury cases (± 95% CI) by state or territory of usual residence, people aged 65+, Australia 2009–10
A time to take stock
Why is the rate of hospitalisation increasing?

- Over simplifying a complex area
- Are we targeting the right population
- Assuming all falls are equal
- Is a fall the best outcome measure
- Training and education requirements
- Are we linking to other priorities and initiatives
Effect of Dissemination of Evidence in Reducing Injuries from Falls

Mary E. Tinetti, M.D., Dorothy I. Baker, Ph.D., R.N.-C.S., Mary King, M.D., Margaret Gottschalk, P.T., M.S., Terrence E. Murphy, Ph.D., Denise Acampora, M.P.H., Bradley P. Carlin, Ph.D., Linda Leo-Summers, M.P.H., and Heather G. Allore, Ph.D.

A Serious Fall-Related Injuries

*Figure 1.* Intervention and Usual-Care Regions for the Connectict Collaboration for Fall Prevention. The intervention region included 53 ZIP Code tabulation areas (CZTAs) encompassing Hartford and surrounding towns. The usual-care region (blue) comprised 53 CZTAs that excluded an area in which some Medicare beneficiaries received care from the same clinicians as those in the intervention area (green).

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Usual care</strong></td>
<td>31.2 (30.3–32.0)</td>
<td>31.8 (31.1–32.5)</td>
<td>31.4 (30.6–32.2)</td>
</tr>
<tr>
<td><strong>Intervention</strong></td>
<td>31.9 (30.8–32.9)</td>
<td>29.1 (28.5–29.8)</td>
<td>28.6 (27.8–29.3)</td>
</tr>
<tr>
<td><strong>Adjusted Rate</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>Rate Ratio</strong></td>
<td>1.02 (0.98–1.07)</td>
<td>0.92 (0.89–0.95)</td>
<td>0.91 (0.88–0.94)</td>
</tr>
</tbody>
</table>
Effective Exercise for the Prevention of Falls: A Systematic Review and Meta-Analysis

Catherine Sherrington, PhD,‡ Julie C. Whitney, MSc, Stephen R. Lord, DSc, Robert D. Herbert, PhD, Robert G. Cumming, PhD, and Jacqueline C. T. Close, MD

- To assess effects of exercise on rate of falls
- To tease out the aspects of exercise interventions that are most beneficial
- 49 RCTs included
- 9603 participants
## Effects of exercise on falls (RR)

<table>
<thead>
<tr>
<th></th>
<th>High balance challenge</th>
<th>Low balance challenge</th>
</tr>
</thead>
<tbody>
<tr>
<td>High dose + walking</td>
<td>0.76 (0.66 to 0.88)</td>
<td>0.96 (0.80 to 1.16)</td>
</tr>
<tr>
<td>High dose no walking</td>
<td>0.58 (0.48 to 0.69)</td>
<td>0.73 (0.60 to 0.88)</td>
</tr>
<tr>
<td>Low dose + walking</td>
<td>0.95 (0.78 to 1.16)</td>
<td>1.20 (1.00 to 1.44)</td>
</tr>
<tr>
<td>Low dose no walking</td>
<td>0.72 (0.60 to 0.87)</td>
<td>0.91 (0.79 to 1.05)</td>
</tr>
</tbody>
</table>

Sherrington et al. JAGS 2008
General versus high risk population

<table>
<thead>
<tr>
<th></th>
<th>RR=1</th>
<th>RR=0.89</th>
<th>CI 0.79 to 0.97</th>
<th>RR=0.75</th>
<th>CI 0.65 to 0.86</th>
</tr>
</thead>
<tbody>
<tr>
<td>High risk</td>
<td>11%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General pop</td>
<td>25%</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Attempting to prevent falls in people after recent hospital stays: the WEBB post-hospital trial

Sherrington C\textsuperscript{1}, Lord SR\textsuperscript{2}, Vogler CM\textsuperscript{3}, Close JCT\textsuperscript{2}, Howard K\textsuperscript{4}, Dean CM\textsuperscript{5}, Clemson L\textsuperscript{6}, Barraclough E\textsuperscript{1}, Ramsay E\textsuperscript{2}, O’Rourke SD\textsuperscript{1}, Cumming RG\textsuperscript{4}

- \textsuperscript{1}The George Institute, University of Sydney
- \textsuperscript{2}Neuroscience Research Australia, University of NSW,
- \textsuperscript{3}Northern Clinical School, University of Sydney
- \textsuperscript{4}School of Public Health, University of Sydney
- \textsuperscript{5}Department of Health Professions, Macquarie University,
- \textsuperscript{6}Faculty of Health Sciences, University of Sydney
Older people who have been in hospital are a high risk group

- 34% fell in 3 months after discharge from aged care rehabilitation inpatients (n = 442)
WEBB home exercise study: aim

- To investigate the effects of a home-based exercise program on falls and mobility-related disability among older people who have had recent hospital stays
WEBB home exercise study

- n = 340
- Community dwelling, aged 60+ admitted to aged care, rehabilitation and orthopaedic wards at RNSH, POWH, WMH, Greenwich.
- Potential participants approached while in hospital
- Recruited and randomised to intervention (home exercise) or control groups once at home
WEBB exercises

Individually prescribed by a physiotherapist in 10 home visits and 5 phone calls over a 12 month period

Balance
  • - reducing base of support and controlled movement in standing
  • - stepping in different directions, stepping over obstacles, heel toe walking etc

Strength
  • - sit to stand, step ups, heel raises etc using weight belts/vests as able
### Falls by group

<table>
<thead>
<tr>
<th></th>
<th>Control (n= 169)</th>
<th>Exercise (n = 171)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days of follow up, mean (SD)</td>
<td>354 (51)</td>
<td>355 (47)</td>
</tr>
<tr>
<td>Falls, total number</td>
<td>123</td>
<td>177</td>
</tr>
<tr>
<td>Falls per person, mean (SD)</td>
<td>0.73 (1.22)</td>
<td>1.0 (1.23)</td>
</tr>
<tr>
<td>Fallers, number %</td>
<td>70 (41%)</td>
<td>98 (57%)</td>
</tr>
</tbody>
</table>

**IRR 1.43, 95% CI 1.07 to 1.93, p = 0.017**
Life gets in the way

- Structural re-organisations
- Loss of corporate knowledge
- Limited investment in system re-design
- Staff retention and job security
- Time limited initiatives
- Commonwealth v State issues
Life gets in the way

- Structural re-organisations
- Loss of corporate knowledge
- Administrative burden
- Staff retention and job security
- Time limited initiatives
- Commonwealth v State issues
What is the FIPG up to?

- Hip fracture care
  - Guidelines
  - Standards
  - Registry
  - Clinical variation
  - Intraoperative management

- iPREFER & NSW Ambulance
What is the FIPG up to?

- Dementia
  - Injury related hospitalisation (costs and consequences)
  - Dementia and recovery post hip fracture
  - Exercise to reduce falls risk in dementia
  - THE i-FOCIS (RCT)
## Acknowledgements

### Falls and Injury Prevention Group
- Lara Harvey
- Rebecca Mitchell
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- Sarah Hamilton
- Narelle Payne
- Lyndell Webster
- Paul Simpson
- Stef Mikolaizak
- Jacki Wesson
- Felicia Aulia
- Dharan Sukumar

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- NSW MoH
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- Cathie Sherrington
- Esther Vance
- Lindy Clemson
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- Brian Draper
- Sue Kurrle
- Ian Harris