Welcome

This issue features:

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- April Falls Day® 2014 resources
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- Recent Abstracts from the research literature

“Falls Prevention is everyone’s business®”

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FOR YOUR DIARY:

April Falls Day®
1st April 2014

Tuesday 1st April 2014
NSW Falls Prevention Network Forum
Friday 23rd May 2013

Professor Carolyn DiGuiseppе with Professor Rebecca Ivers at The George Institute for Global Health after a presentation on February 4th by Carolyn on ‘Church based social marketing motivates older adults to take balance classes for fall prevention’. This presentation will be available on CDROM at email e.vance@neura.edu.au.
This mini review has been undertaken as part of the workplan of the NSW Falls Prevention Network.

The effect of water based exercises on fall risk factors: a mini-review

Dr Esther Vance, Professor Stephen Lord
Falls and Balance Research Group, NeuRA.

There is considerable evidence from systematic reviews and meta-analyses that exercise programs that challenge balance can prevent falls in older people living in the community ([1-3]. A recent Cochrane review concluded that multicomponent group exercise significantly reduce the rate of falls (number of fall events in a given population) by 29% (RaR 0.71, 95% CI 0.63 to 0.82, 16 trials, 3622 participants) and the risk of falls (number of people who have fallen in a given population) by 15% (RR 0.85, (95% CI 0.76 to 0.96, 22 trials, 5333 participants). The exercise programs included in these reviews have been land based programs, and to date no randomised controlled trials of water based programs have been conducted with falls as an outcome measure.

Water based exercise programs are often recommended for older people with musculoskeletal conditions such as arthritis as water provides a buoyancy-supported environment that is less stressful on joints [4]. In a Cochrane review on aqua exercises for the treatment of knee and hip osteoarthritis, Bartels and colleagues (2007) concluded that water based exercises had beneficial short term effects on function and quality of life [5]. There were however too few studies to provide further recommendations on the use of aqua exercise in the treatment of hip and knee osteoarthritis [5].

For the current review, we searched Medline and PubMed to identify randomised controlled trials that evaluated the effects of water based exercises on fall risk factors such as poor balance control and reduced strength. Thirteen studies were identified, however eight were of low quality with Physiotherapy Evidence Database (PEDro) scale scores <6 [6], so were not considered further in this article.

The five higher quality studies (PEDro scores ≥6) are listed in Table 1. These studies all involved community dwelling people aged over 40 years; with four of the five studies focusing on specific populations: i.e. those with osteoarthritis, osteopenia or osteoporosis or an increased risk of falls. Brief summaries of the study findings are outlined below and in Tables 1 and 2.

In their study on adults with osteoarthritis of the knee or hip, Wang and colleagues (2007) found that an aquatic exercise program over 12 weeks led to a statistically significant improvement in knee and hip flexibility, strength and aerobic fitness compared to a non-exercise control group, but there was no effect on self-reported physical functioning and pain [7]. They concluded that there were short term beneficial effects of an aquatic exercise program on physical functioning in adults with knee or hip osteoarthritis [7].

The study by Foley and colleagues (2003) compared 6-week gym-based and aqua exercise programs with no-exercise (control group) in older people with osteoarthritis [8]. This study found that the gym program significantly improved quadriceps strength compared with the control group whereas the aqua exercise hydrotherapy program significantly improved quadriceps strength in the left leg only. [8]. Both groups also resulted in significant improvements in walking speed and distance walked in the 6 minute walk test compared with the control group.

The study by Arnold & Faulkner (2010) also involved older adults with osteoarthritis and comprised an 11 week water based exercise program (two session/week) administered either as a stand-alone intervention or combined with fall prevention education. They found that the combined program significantly improved chair stand test performance and falls efficacy (i.e. reduced concern about falling). The aquatic exercise program alone, however did not result in any significant improvements in either fall risk factors or falls efficacy [9].

Hale and colleagues (2012) compared a water based twice weekly program for 12 weeks (with exercise time increasing from 20 to 60 minutes) with a control program of a time-matched computer training program in women with mild to moderate osteoarthritis [10]. This study found that neither program significantly reduced fall risk as measured by the Physiological Profile Assessment (PPA short form). Both groups showed significant improvements in the Step Test (i.e. the number of times a participant can step onto and then off a 7.5 cm step in 15 seconds, with each leg is tested separately) at follow-up. The 10-week randomised controlled trial by Deveraux (2005) and colleagues, comprised women with
osteoarthritis and the intervention group received both a weekly water based exercise program as well as a short (10 minute/week) education program related to osteoporosis, medications, footwear, physical activity, goal setting, home exercise, fall risks and hazards. The control group was requested not to change their physical activity or social habits during the study period [11]. This study found significant between-group improvements in left and right Step Test performance and physical functioning as well as in quality of life measures (SF36 Health Survey), but no differences in falls efficacy as measured with the Modified Falls Efficacy Scale [11].

In summary, the above studies report improvements in some measures of strength, balance, flexibility, fitness, falls efficacy and quality of life. Adherence to the programs has been relatively good (ranging from 65% to 82%) indicating that water exercise is an acceptable intervention for older people, including those with clinical conditions such as osteoarthritis. However, some caution in evaluating these findings is required. First, the pattern of beneficial effects across physical and emotional domains has been inconsistent (see Table 2). Further, each study used different exercise protocols, different trial periods (6 -12 weeks) and different outcome measures; factors that make comparisons between the studies difficult. Three studies also had limitations in that they contained sampling biases due to sub-optimal recruitment processes [8, 10, 11] and in two studies the assessors were not blinded to group allocation [7, 11].

The study by Arnold & Faulkner [9] demonstrated that beneficial effects were only evident in the group randomised to water based exercise classes supplemented with an education session that included information on fall risk factors and prevention strategies and reinforcement with respect to translating the exercises to activities of daily living and further practice of the exercises on the land. This indicates that in addition to water-based exercise, additional fall prevention components may be required to gain important fall prevention benefits.

A previous systematic review has shown that exercise programs that are most effective in reducing falls are those that not only include balance-challenging exercises but also have a high dose, i.e. 2 hours/week for 6 months or more [1]. The studies included in this review did not meet this recommended mode and volume of exercise, all being completed within 12 weeks. While sufficient for measuring beneficial effects on physical outcomes, such short term programs are unlikely to have enduring benefits with respect to fall prevention.

In conclusion, the research conducted to date provides only limited evidence that water based exercise programs can improve strength, balance and quality of life measures. However, importantly, while these outcome measures are known fall risk factors, these findings do not necessarily translate to preventing actual falls. High quality studies are needed to provide definitive evidence that water based exercise programs are effective in improving strength, balance, stepping and gait and for preventing falls in older people.

**Acknowledgements:** We are grateful to Professor Cathie Sherrington and Dr Anne Tiedemann (The George Institute for Global Health) and Dr Daina Sturnieks (Falls and Balance research Group, NeuRA) for reviewing this article.

**References**


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**Table 2**

**Significant improvements in water exercise groups (between group comparisons)**

<table>
<thead>
<tr>
<th>Study</th>
<th>Strength</th>
<th>Balance</th>
<th>Fitness #</th>
<th>Flexibility</th>
<th>Falls Self Efficacy / Balance Confidence</th>
<th>Quality of Life Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foley et al 2003</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Deveraux et al 2005</td>
<td>-</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>✓</td>
</tr>
<tr>
<td>Wang et al 2007</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>Arnold &amp; Faulkner 2010 - Aquatic Exercise</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Hale et al 2012</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

✓ significant improvement, X no significant change, - not examined

# Six minute walking distance
<table>
<thead>
<tr>
<th>Authors and Year</th>
<th>Study Design (PEDro score)</th>
<th>Participant characteristics</th>
<th>Intervention</th>
<th>Outcome measures</th>
<th>Main findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foley, Halbert, Hewitt &amp; Croggy 2003</td>
<td>Single blind, three arm RCT (8/10)</td>
<td>105 Community dwelling adults with osteoarthritis; 70.9 years (SD 8.8 years), 52% women</td>
<td>Hydro exercises (n=35) Gym (n=35) Control (n=35) 2 exercise groups 3 x 30 min sessions/week for 6 weeks</td>
<td>Quadriceps strength, 6 minute walk test; Western Ontario and McMaster Universities WOMAC, OA Index, Adelaide Activities profile and SF-12 Health Survey, Arthritis self-efficacy questionnaire</td>
<td>Hydrotherapy group ↑ left quadriceps strength, Gym group ↑ left and right quadriceps strength. Walking speed and distance ↑ in both exercise groups Arthritis self-efficacy score improved in gym group</td>
</tr>
<tr>
<td>Devereaux, Robertson &amp; Briffs 2005 [11]</td>
<td>RCT with concealed randomisation (7/10)</td>
<td>50 community dwelling women with diagnosis of osteopenia or osteoporosis; 73.2 years (SD 3.9 years), 100% women</td>
<td>Intervention (n=25) water based exercise (50 minutes) and education (10 minutes) per week conducted by Physiotherapist for 10 weeks Control (n=25)</td>
<td>SF-36 Health Survey, Modified Falls Efficacy Scale (MFES), Step Test (maximal times a participant can step up onto and down from a single step in 15 s)</td>
<td>Significant improvement in Step Test and the physical functioning, vitality, social functioning and mental health domains of the SF36 in the intervention group compared with control group.</td>
</tr>
<tr>
<td>Wang, Belza, Thompson, Whitney &amp; Bennett 2007 [7]</td>
<td>RCT, two group convenience sample (6/10)</td>
<td>38 community dwelling adults with osteoarthritis; 66 years (SD 12), 84% women</td>
<td>Exercise (n=20) water based [1 x 50 min session/week for 12 weeks] Control (n=18)</td>
<td>6 minute walk test, flexibility, muscle strength, 14 items on ADL on Health assessment Questionnaire (MDHAQ)</td>
<td>Exercise group showed significant improvement in knee and hip flexibility and strength and aerobic fitness (six minute walking distance), no effect on self-reported physical functioning and pain.</td>
</tr>
<tr>
<td>Arnold &amp; Faulkner 2010 [9]</td>
<td>Single blind, three arm RCT (6/10)</td>
<td>79 community dwelling with hip osteoarthritis and at least 1 falls risk factor Aquatic Exercise + education (A+E): 73.2 (SD 4.8 years), 71% women Aquatic Exercise (A): 74.4 (SD 7.5 years), 77% women Control: 75.8 (SD 6.2 years), 64% women</td>
<td>A+E (n=28) 2 x 45 min/week Aquatic Exercise and education 30 min/week for 11 weeks A (n=27), 2 x 45 min session/week aquatic exercise for 11 weeks Control (n=27)</td>
<td>Berg Balance Scale, 6 min walk, 30s chair stand, Activities and Balance Confidence (ABC) scale and Timed up and Go TUG test (included a cognitive task while completing standard test)</td>
<td>A+E significant improvement in number of chair stands and for ABC scale compared with A and Control group (for completers).</td>
</tr>
<tr>
<td>Hale, Waters &amp; Herbison 2012 [10]</td>
<td>RCT, two arm concealed randomisation (8/10)</td>
<td>39 community dwelling with mild to moderate osteoarthritis and risk of falling Intervention: 73.6 (SD 1.5) years, 74% women Control: 75.7 (SD 1.1 years), 75% women</td>
<td>Water based program (n=23) 2x/week for 12 weeks progressed from 20 to 60 min sessions over first 9 weeks of the program Control Group (n=36) - time matched computer training program</td>
<td>Short form PPA Step Test, TUG WOMAC, Arthritis Impact Measurement Scale 2 - short form AIMS2-SF, ABC scale</td>
<td>No significant between-group difference found for any outcome measured. Two PPA items (contrast sensitivity and reaction time) improved significantly in the control group. The Step test improved significantly in both groups.</td>
</tr>
</tbody>
</table>
The theme for April Falls Day® 2014 is *Medicate right to stay upright*: Medications and Falls Prevention.

Older people are more susceptible to side effects from medications. These side effects can include drowsiness, dizziness, poor balance, changes to eyesight and can result in a fall. Taking multiple medications regardless of what they are increases a person’s falls risk.

All of the resources below can be accessed at:


April Falls Day® is on Tuesday 1 April, 2014 and a day for your Health Service to promote Falls Prevention Messages to:

- Staff and Patients
- Families and Carers,
- Community Services and
- General Community

**Resources available:**

Logo: April Falls Day® 2014

Logo: Falls Prevention is everyone’s business®

Flyers:

- Medications and Falls Prevention
- Translated Medications and Falls Prevention: Arabic, Simplified Chinese, Traditional Chinese, Vietnamese, Italian and Greek

Posters:

- Medicate right to stay upright
- Don’t go head over heals
- Don’t bite the dust
- Your cat has nine lives...you only have one. Pets can be a tripping hazard
- Take your dog for a walk...not at trip.
• Falls Look out Please

Booklet:
• Staying active and on your feet booklet
• Active and Healthy website flyer

Flyers
A suite of Falls Prevention information flyers that can be used in Hospital and Community (some flyers are available in community languages).

These can be ordered through Fuji Xerox go to http://www.cec.health.nsw.gov.au/programs/falls-prevention/falls-one-page-flyers and scroll down for order number and cost.

Presentations for education
• Hospital Staff – Medicate right to stay upright – April Falls Day 2014
• Community Care staff: Medicate right to stay upright – April Falls Day 2014
• Residential Care staff: Medicate right to stay upright – April Falls Day 2014
• Community Groups: Medicate right to stay upright – April Falls Day 2014

CEC Hospital Package also has a number of resources for the Hospital Setting including information for meeting the requirements of Standard 10: Preventing Falls and Harm from Falls.

Useful websites:
National Prescribing Service - www.nps.org.au

NPS MedicineWise is an independent, not-for-profit and evidence based organisation, that helps enable better decisions about medicines and medical tests.

They have good information about keeping an up to date medication list.

Australian Commission on Safety and Quality in Health Care
Taking a best possible medication history

Get it right! Taking a Best Possible Medication History (BPMH) is a video training tool developed by the Commission that guides clinicians on how to obtain an accurate and complete BPMH.

It can be accessed via the Commission’s You Tube site - http://www.youtube.com/watch?v=dc5jFuba6CI

All of the resources listed above can be downloaded at:
Webinars, Meetings & Conferences

WEBINAR

Promoting Active Ageing: The Uptake of Fall Prevention Strategies, Wednesday April 2, 12 noon

This webinar is free to AAG members ($20 for non-members) and will explore the uptake of falls prevention strategies in hospital and the community. Presenters include:

Professor Terry Haines (Southern Health & Monash University): will provide an overview of a detailed community based survey conducted on factors influencing intention and uptake of fall prevention recommendations.

Dr Anne-Marie Hill (University of Notre Dame) will highlight barriers and facilitators to achieving high levels of engagement by older people in falls prevention / physical activity in the hospital setting, and following discharge home from hospital.

A/Prof Leigh Hale (University of Otago) will address factors influencing participation in physical activity to improve balance and fall related outcomes in older people with co-morbidities, including issue of fatigue in some of these populations.

Further information and to register go to:


FORUM

NSW Falls Network Forum Friday 23rd May, SMC Conference Centre, 66 Goulburn St Sydney

Plenary Presenters include: Prof Stephen Lord, Associate Professor Jacqueline Close, Associate Professor Colleen Canning, Ms Lorraine Lovitt and presentations of best practice falls prevention initiatives in the afternoon sessions.

More details will be available shortly.

CONFERENCE

Australian and New Zealand Falls Prevention Society

6th Biennial Australasian Falls Prevention Conference, Sydney, 16-18 November 2014

http://www.anzfpconference.com.au
Abstracts

Recent abstracts from the research literature

Reviews

Do continence management strategies reduce falls? A systematic review
Batchelor FA, Dow B, Low MA.


Affiliation: National Ageing Research Institute, Melbourne, Victoria, Australia.

(Copyright © 2013, Australian Council on the Ageing, Publisher John Wiley and Sons)

Abstract

Urinary incontinence is associated with increased fall risk, and fall prevention programs include recommendations to manage continence as one component of fall reduction. However, the evidence to support this recommendation is unclear. The aim of this study was to identify continence management interventions that are effective in decreasing falls. A systematic review of the literature was conducted. Studies were included if they evaluated the effect of any type of continence management strategy on falls in older adults. The included studies were assessed for quality, and data relating to participants, interventions and outcomes were extracted by two independent reviewers. Four articles met the inclusion criteria. Two studies were randomised controlled trials, one a retrospective cohort study and one an uncontrolled intervention study. Interventions included pharmacological agents, a toileting regime combined with physical activity and an individualised continence program. Only the study evaluating the combination of physical activity and prompted voiding found an effect on falls. It is surprising that there has been so little research into continence management interventions that include fall outcomes. A toileting regime combined with physical activity may reduce falls in residential care. There is a need for further studies investigating the impact of continence management on falls.

Fall detection devices and their use with older adults: A systematic review

Chaudhuri S, Thompson H, Demiris G.


Affiliation: 1Department of Biomedical Informatics and Medical Education, University of Washington School of Medicine, Seattle. 2Department of Biobehavioral Nursing and Health, University of Washington School of Nursing, Seattle.

(Copyright © 2013, American Physical Therapy Association)

Abstract

BACKGROUND: Falls represent a significant threat to the health and independence of adults aged 65 years and older. As a wide variety and large number of passive monitoring systems are currently and increasingly available to detect when individuals have fallen, there is a need to analyze and synthesize the evidence regarding their ability to accurately detect falls to determine which systems are most effective.

OBJECTIVES: The purpose of this literature review is to systematically assess the current state of design and implementation of fall-detection devices. This review also examines to what extent these devices have been tested in the real world as well as the acceptability of these devices to older adults.

DATA SOURCES: A systematic literature review was conducted in PubMed, CINAHL, EMBASE, and PsycINFO from their respective inception dates to June 25, 2013.

STUDY ELIGIBILITY CRITERIA AND INTERVENTIONS: Articles were included if they discussed a project or multiple projects involving a system with the purpose of detecting a fall in adults. It was not a requirement for inclusion in this review that the system targets persons older than 65 years. Articles were excluded if they were not written in English or if they looked at fall risk, fall detection in children, fall prevention, or a personal emergency response device.

STUDY APPRAISAL AND SYNTHESIS METHODS: Studies were initially divided into those using sensitivity, specificity, or accuracy in their evaluation methods and those using other methods to evaluate their devices. Studies were further classified into wearable devices and nonwearable devices. Studies were appraised for inclusion of older adults in sample and if evaluation included real-world settings.
RESULTS: This review identified 57 projects that used wearable systems and 35 projects using nonwearable systems, regardless of evaluation technique. Nonwearable systems included cameras, motion sensors, microphones, and floor sensors. Of the projects examining wearable systems, only 7.1% reported monitoring older adults in a real-world setting. There were no studies of nonwearable devices that used older adults as subjects in either a laboratory or a real-world setting. In general, older adults appear to be interested in using such devices although they express concerns over privacy and understanding exactly what the device is doing at specific times.

LIMITATIONS: This systematic review was limited to articles written in English and did not include gray literature. Manual paper screening and review processes may have been subject to interpretive bias.

CONCLUSIONS AND IMPLICATIONS OF KEY FINDINGS: There exists a large body of work describing various fall-detection devices. The challenge in this area is to create highly accurate unobtrusive devices. From this review it appears that the technology is becoming more able to accomplish such a task. There is a need now for more real-world tests as well as standardization of the evaluation of these devices.

Impact of Tai Chi Chu'an practice on balance and mobility in older adults: An integrative review of 20 years of research

Hackney ME, Wolf SL.


Affiliation: Atlanta Veterans Affairs Rehabilitation Research and Development Center of Excellence for Visual and Neurocognitive Rehabilitation, Atlanta, Georgia. (Copyright © 2013, American Physical Therapy Association)

Abstract

Falls in older adults, which often result from decreased balance and mobility, are an important public health issue. The American College of Sports Medicine recommends multidimensional balance and mobility training to prevent falls. In the past 20 years, Tai Chi Chu'an (tai chi) has been found to be effective in improving balance, reducing falls and fear of falling for older adults. Efficient use of time devoted to exercise is critical; therefore, more research is needed into the underlying mechanisms of balance and mobility improvements in older adults as a result of tai chi practice, so that these interventions can be most targeted and efficient. The purpose of this integrative review is twofold. First, evidence is presented to show that balance and mobility have been improved by tai chi in older adults. Second, potential mechanisms of balance improvement from research conducted in longtime tai chi practitioners, and from clinical research conducted in older adults, are offered. A PubMed search with the terms “tai chi” and “balance” entered simultaneously was conducted. Articles were included if they were systematic reviews, pilot or clinical trials, related to both balance and tai chi, and/or specifically related to determining the mechanisms potentially underlying tai chi’s effects. The systematic reviews and meta-analyses show that aspects of tai chi research findings remain equivocal. In spite of the inconclusiveness of these review findings, many researchers have considered tai chi worthy of further investigation. Furthermore, practitioners in the clinic and those who deliver exercise in the community have evidently embraced tai chi as an appropriate exercise for older adults. This review, spanning 2 decades, suggests that tai chi has impacted the health and health behaviors of many older adults. Going forward, informing novel balance and mobility rehabilitation by uncovering mechanisms of tai chi’s effects definitively may be the most important area of discovery in this field.

Is the Timed Up and Go test a useful predictor of risk of falls in community dwelling older adults: a systematic review and meta-analysis

Barry E, Galvin R, Keogh C, Horgan F, Fahey T.


Abstract

BACKGROUND: The Timed Up and Go test (TUG) is a commonly used screening tool to assist clinicians to identify patients at risk of falling. The purpose of this systematic review and meta-analysis is to determine the overall predictive value of the TUG in community-dwelling older adults.

METHODS: A literature search was performed to identify all studies that validated the TUG test. The methodological quality of the selected studies was assessed using the QUADAS-2 tool, a validated tool for the quality assessment of diagnostic accuracy studies. A TUG score of $\geq 13.5$ seconds was used to identify individuals at higher risk of falling. All included studies were combined using a bivariate random effects model to generate
pooled estimates of sensitivity and specificity at >=13.5 seconds. Heterogeneity was assessed using the variance of logit transformed sensitivity and specificity.

RESULTS: Twenty-five studies were included in the systematic review and 10 studies were included in meta-analysis. The TUG test was found to be more useful at ruling in rather than ruling out falls in individuals classified as high risk (>13.5 sec), with a higher pooled specificity (0.74, 95% CI 0.52-0.88) than sensitivity (0.31, 95% CI 0.13-0.57). Logistic regression analysis indicated that the TUG score is not a significant predictor of falls (OR = 1.01, 95%CI 1.00-1.02, p = 0.05).

CONCLUSION: The Timed Up and Go test has limited ability to predict falls in community dwelling elderly and should not be used in isolation to identify individuals at high risk of falls in this setting.
ED, a baseline assessment was initially undertaken and then repeated after 12 months. The Human Activity Profile Adjusted Activity Score (HAP-AAS) at the 12-month follow-up assessment was the functional outcome measure.

RESULTS: Over the follow-up period, 37.3% (95% CI 33.4, 41.2) of participants declined in their HAP-AAS score. Increased age, pre-index fall functional impairment, poorer mobility/balance, and sustaining falls and severe injuries over the 12-month follow-up period were some of the factors predictive of a lower HAP-AAS score.

CONCLUSION: This study highlights the importance of preventing falls in the 12 months after discharge from an ED. Some of the factors identified as being predictive of lower function are the same as those previously found to be predictive of falls.

Epidemiology of emergency medical service responses to older people who have fallen: A prospective cohort study

Simpson PM, Bendall JC, Tiedemann A, Lord SR, Close JC.


(Access © 2014, National Association of EMS Physicians, Publisher Informa - Taylor and Francis Group)

Abstract

OBJECTIVES: To describe the characteristics of older people who fall and call an emergency ambulance, and the operational and clinical impact of the ambulance responses they receive. METHODS: A prospective cohort study of people aged ≥65 who had fallen and called for an ambulance was conducted between October 1, 2010 and June 30, 2011. Fall-related data were collected using a project-specific data collection tool. These data were then linked to routinely collected ambulance service clinical records and dispatch data, providing a sequential description of fall-related cases from time of ambulance dispatch through to the end of the prehospital episode of care.

RESULTS: There were 1,610 cases eligible for analysis. The median response time was 15 minutes (IQR 10-24) and “long-lies” (>60 minutes on the ground) occurred in 13% of cases. Patients were predominantly female (61%) and community dwelling (82%). Forty-four percent had never previously called an ambulance for a fall, whereas 248 (15%) had called within the past month. The most common patient-reported reasons for falling were loss of balance (30%) and “simple trips” (25%). New injury and/or pain was documented for 1,172 (73%) of patients, and 656 (41%) presented with “abnormal” physiology; only 238 (15%) presented with no new injury/pain and normal physiology. The nontransport rate was 28%.

CONCLUSION: In this population, ambulance services appear to provide timely responses to older people who have fallen, and “long-lies” are relatively uncommon. More than one-quarter of patients were not transported to an emergency department, and repeat use of ambulance resources appears to be common. Opportunities exist to explore alternate pathways and models of care that maximize outcomes for nontransport patients as well as improving operational efficiency of the ambulance service.

Associations between obesity and overweight and fall risk, health status and quality of life in older people

Mitchell RJ, Lord SR, Harvey LA, Close JC.


Affiliation: Falls and Injury Prevention Group, Neuroscience Research Australia, University of New South Wales.

(Access © 2014, Public Health Association of Australia, Publisher John Wiley and Sons)

Abstract

OBJECTIVES: To determine whether overweight and obese individuals have higher reported fall and fall injury risk than individuals of healthy weight, and to examine the influence of BMI on health, quality of life and lifestyle characteristics of fallers.

METHODS: A representative sample of community-based individuals aged 65 years and older in New South Wales was surveyed regarding their history of falls, height, weight, lifestyle and general health within a 12-month period.

RESULTS: Obese individuals had a 31% higher risk of having fallen, but no higher risk of a fall-related injury compared to healthy-weight individuals. Obese fallers also had a 57% higher risk of believing nothing could be
Abstracts Continued

Recent abstracts from the research literature

done to prevent falls; a 41% higher risk of using four or more medications; a 30% higher risk of experiencing moderate or extreme pain or discomfort; were 26% less likely have walked for two or more hours in the last week; and were less likely to think they were doing enough physical activity.

CONCLUSIONS: Older obese individuals have an increased risk of falls and obese fallers have a higher prevalence of pain and inactivity than fallers of a healthy weight. Implications: A decrease in sedentary lifestyle and regular weight-bearing exercise may reduce fall risk in older obese individuals.

Long-term outcomes of ground-level falls in the elderly
Ayoung-Chee P, McIntyre L, Ebel BE, Mack CD, McCormick W, Maier RV.

Affiliation: From the Department of Surgery (P.A.-C.), New York University School of Medicine, New York, New York; Departments of Surgery (L.M., R.V.M.), Pediatrics (B.E.E.), and Epidemiology (B.E.E.), Division of Gerontology and Geriatric Medicine (W.M.), Department of Medicine, and Harborview Injury Prevention and Research Center (B.E.E.), University of Washington; and Group Health Research Institute (C.D.M.), Seattle, Washington.

Abstract

BACKGROUND: For older adults, even ground-level falls (GLFs) can result in multiple injuries and are associated with significant morbidity and mortality. Previous studies have focused on in-hospital outcomes and patients with isolated injuries. Our study examined outcomes following discharge for older adults who were hospitalized following a GLF.

METHODS: A retrospective cohort study of patients older than 65 years admitted to a regional Level I trauma center, from 2005 to 2008, after a GLF was conducted. Hospital trauma registry data were linked to state hospital discharge data and the death certificate registry. Skilled nursing facilities (SNFs) were contacted to verify ultimate patient placement, with follow-up through December 2010. Kaplan-Meier and Cox proportional hazards models were used to analyze postdischarge mortality. RESULTS: There were 1,352 consecutive admissions; 48% had an Injury Severity Score (ISS) greater than 15, and 12% died during admission. Of the patients who survived hospitalization, 51% were discharged to an SNF, 33% to home without assistance, 6% to home with assistance, and 5% to inpatient rehabilitation facilities. Within 1 year of injury, 44.6% of the patients were readmitted. The 1-year mortality for the overall cohort was 33%; for patients who were discharged alive, the 1-year mortality was 24%. After adjusting for confounders, patients discharged to an SNF had a threefold greater risk of 1-year mortality (hazard ratio, 2.82; 95% confidence interval, 1.86-4.28), compared with patients discharged home with no assistance. Of the patients discharged to an SNF, 48% died by the end of the follow-up period (mean, 28.2 months), and 62% of these patients died while residing at an SNF.

CONCLUSION: GLFs in the elderly result in severe injury, high rate of readmissions, and increased mortality, both in-hospital and after discharge. Overall, only one third of the patients were discharged home to independent living. Future efforts should examine whether improvements in the quality of posthospital care affect both mortality and functional outcomes.

LEVEL OF EVIDENCE: Prognostic and epidemiologic study, level III.

Why older women do or do not seek help from the GP after a fall: A qualitative study
Dollard J, Braunack-Mayer A, Horton K, Vanlint S.

Affiliation: Discipline of General Practice and School of Population Health, University of Adelaide, Australia

Abstract

BACKGROUND: It is recommended that older people report their falls to their general practitioner (GP), to identify falls risk factors. However, many older people do not report falling to their GP. Little is known about the reasons why older people do and do not seek help about falling.

OBJECTIVE: To explore why older women do or do not seek GP help after a fall.
METHODS: A qualitative study, using semi-structured interviews with 11 community-dwelling women aged ≥65 years, living in Adelaide, Australia, who had fallen in the last 12 months. Interviews focused on women’s experience of falling and seeking GP help. Interviews were analysed using constant comparison.

RESULTS: Four women sought GP help when they believed their fall-related injury was serious enough. Family and a bystander persuaded three women to attend for a fall-related injury. The four women who did not seek help believed their fall or fall-related injury was not serious enough to seek help and justified this by using internal rationales (they monitored and managed the outcome of falling, they wanted to be associated with a positive image and attitude, and they recognized and interpreted the cause and control of falling) and external rationales (they did not want to waste GPs’ time for trivial reasons and they believed they did not have timely access to their GP).

CONCLUSIONS: Given the reasons why some older women do not seek help for falling, GPs should routinely ask older women for their 12-month fall history.

Fear of Falling
Fear of falling in age-related macular degeneration
van Landingham SW, Massof RW, Chan E, Friedman DS, Ramulu PY.
(Copyright © 2014, BioMed Central)
Abstract
BACKGROUND: Prior studies have shown age-related macular degeneration (AMD) to be associated with falls. The purpose of this study is to determine if age-related macular degeneration (AMD) and AMD-related vision loss are associated with fear of falling, an important and distinct outcome. METHODS: Sixty-five persons with AMD with evidence of vision loss in one or both eyes and 60 glaucoma suspects with normal vision completed the University of Illinois at Chicago Fear of Falling questionnaire. Responses were Rasch analyzed. Scores were expressed in logit units, with lower scores demonstrating lesser ability and greater fear of falling.

RESULTS: Compared to glaucoma suspect controls, AMD subjects had worse visual acuity (VA) (median better-eye VA = 20/48 vs. 20/24, p < 0.001) and worse contrast sensitivity (CS) (binocular CS = 1.9 vs. 1.5 log units, p < 0.001). AMD subjects were also older, more likely to be Caucasian, and less likely to be employed (p < 0.05 for all), but were similar with regards to other demographic and health measures. In multivariable models controlling for age, gender, body habitus, strength, and comorbid illnesses, AMD subjects reported greater fear of falling as compared to controls (beta = -0.77 logits, 95% CI = -1.5 to -0.002, p = 0.045). In separate multivariable models, fear of falling increased with worse VA (beta = -0.15 logits/1 line decrement, 95% CI = -0.28 to -0.03, p = 0.02) and CS (beta = -0.20 logits/0.1 log unit decrement, 95% CI = -0.31 to -0.09, p = 0.001). Greater fear of falling was also associated with higher BMI, weaker grip, and more comorbid illnesses (p < 0.05 for all.)

CONCLUSIONS: AMD and AMD-related vision loss are associated with greater fear of falling in the elderly. Development, validation, and implementation of methods to address falls and fear of falling for individuals with vision loss from AMD are important goals for future work.

A community-based Falls Management Exercise Programme (FaME) improves balance, walking speed and reduced fear of falling
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Affiliation: Department of Medicine and Therapeutics, The Chinese University of Hong Kong, Shatin, Hong Kong.
(Copyright © 2014, Cambridge University Press)
Abstract
BACKGROUND: Although effective community falls prevention programmes for the older persons have been described, challenges remain in translating proven interventions into daily practice. Aim To evaluate the efficacy, feasibility and acceptability of a falls prevention programme that can be integrated into daily activities in a group of community-dwelling older adults with risk of falling. METHOD: A cohort study with intervention and comparison groups was designed to evaluate a 36-week group-based falls prevention exercise programme (FaME) in the
Abstracts Continued
Recent abstracts from the research literature

community setting. Participants were aged 60 years or older, had fallen in the past 12 months, had fear of falling with avoidance of activities or had deficits in balance control. Primary outcome measures included assessment of balance control and mobility; secondary outcome measures included level of physical activity, assessment of fear of falling and health-related quality of life.

RESULTS: There were 48 and 51 participants in the intervention and comparison groups, respectively. There were improvements in measurements of balance, walking speed and self-efficacy. The drop out rate was low (14.6% and 3.9% from the intervention and comparison groups, respectively). Overall compliance in the intervention group was 79%. Factors that motivated continued participation include the regular and long-term nature of the programme helping to reinforce their exercise habits, the simplicity of movements and friendliness of the group.

CONCLUSION: The FaME programme improves balance, walking speed and reduces fear of falling. It could be widely promoted and integrated into regular health and social activities in community settings.

Risk Assessment
Trained community providers conduct fall risk screenings with fidelity: An effective model for expanding reach
Schrodt LA, Garbe KC, Shubert TE.


Affiliation: Western Carolina University, Cullowhee, NC, USA.

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Abstract

Reliable and valid tools are available for health care providers to screen older adults for fall risk. Proficient administration of these tools by lay or community providers (individuals without formal medical training) may be a viable channel to expand the reach of fall risk screenings. However, the ability of community providers to administer screens is not known. This project examines community providers’ ability to proficiently administer a fall risk screening following a standardized training. Forty community providers were trained and then performed community screenings. Knowledge and confidence were assessed with pre- and postsurveys. A standardized skills checklist assessed proficiency in fall risk screening administration immediate posttraining and at onsite community screenings. Knowledge and confidence surveys demonstrated improvements pre- and posttraining (p < .001). In all, 66% of participants demonstrated screening skill proficiency at their first onsite screening. With further coaching, 91% participants demonstrated proficiency by their third onsite screening. Participants achieving early proficiency were on average younger. Community providers can reliably administer a fall risk screening algorithm with training and coaching. This is a low-cost model and can extend the reach and dissemination of fall risk screenings, potentially providing early identification and interventions to those at risk of falling.

Risk Factors
Altered visual-spatial attention to task-irrelevant information is associated with falls risk in older adults
Nagamatsu LS, Munkacsy M, Liu-Ambrose T, Handy TC.

Neuropsychologia 2013; 51(14): 3025-3032. (Copyright © 2013, Elsevier Publishing)

Abstract

Executive cognitive functions play a critical role in falls risk—a pressing health care issue in seniors. In particular, intact attentional processing is integral for safe mobility and navigation. However, the specific contribution of impaired visual-spatial attention in falls remains unclear. In this study, we examined the association between visual-spatial attention to task-irrelevant stimuli and falls risk in community-dwelling older adults. Participants completed a visual target discrimination task at fixation while task-irrelevant probes were presented in both visual fields. We assessed attention to left and right peripheral probes using event-related potentials (ERPs). Falls risk was determined using the valid and reliable Physiological Profile Assessment (PPA). We found a significantly positive association between reduced attentional facilitation, as measured by the N1 ERP component, and falls risk. This relationship was specific to probes presented in the left visual field and measured at ipsilateral electrode sites. Our results suggest that fallers exhibit reduced attention to the left side of visual space and provide evidence that impaired right hemispheric function and/or structure may contribute to falls.
Prevalence and impact of fall-risk-increasing drugs, polypharmacy, and drug-drug interactions in robust versus frail hospitalised falls patients: A prospective cohort study


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Abstract

BACKGROUND: Several measures of medication exposure are associated with adverse outcomes in older people. Exposure to and the clinical outcomes of these measures in robust versus frail older inpatients are not known.

OBJECTIVE: In older robust and frail patients admitted to hospital after a fall, we investigated the prevalence and clinical impact of fall-risk-increasing drugs (FRIDs), total number of medications, and drug-drug interactions (DDIs).

METHODS: Patients ≥60 years of age admitted with a fall to a tertiary referral teaching hospital in Sydney were recruited and frailty was assessed. Data were collected at admission, discharge, and 2 months after admission.

RESULTS: A total of 204 patients were recruited (mean age 80.5 ± 8.3 years), with 101 robust and 103 frail. On admission, compared with the robust, frail participants had significantly higher mean ± SD number of FRIDs (frail 3.4 ± 2.2 vs. robust 1.6 ± 1.5, P < 0.0001), total number of medications (9.8 ± 4.3 vs. 4.4 ± 3.3, P < 0.0001), and DDI exposure (35 vs. 5 %, P = 0.001). Number of FRIDs on discharge was significantly associated with recurrent falls [odds ratio (OR) 1.7 (95 % confidence interval [CI] 1.3-2.1)], which were most likely to occur with 1.5 FRIDs in the frail and 2.5 FRIDs in the robust. Number of medications on discharge was also associated with recurrent falls [OR 1.2 (1.0-1.3)], but DDIs were not.

CONCLUSION: Exposure to FRIDs and other measures of high-risk medication exposures is common in older people admitted with falls, especially the frail. Number of FRIDs and to a lesser extent total number of medicines at discharge were associated with recurrent falls.

Intervention

Effect of a multifactorial, interdisciplinary intervention on risk factors for falls and fall rate in frail older people: a randomised controlled trial

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Abstract

BACKGROUND: frail older people have a high risk of falling.

OBJECTIVE: assess the effect of a frailty intervention on risk factors for falls and fall rates in frail older people.

DESIGN: randomised controlled trial.

PARTICIPANTS: 241 community-dwelling people aged 70+ without severe cognitive impairment who met the Cardiovascular Health Study frailty definition.

INTERVENTION: multifactorial, interdisciplinary intervention targeting frailty characteristics with an individualised home exercise programme prescribed in 10 home visits from a physiotherapist and interdisciplinary management of medical, psychological and social problems.

MEASUREMENTS: risk factors for falls were measured using the Physiological Profile Assessment (PPA) and mobility measures at 12 months by a blinded assessor. Falls were monitored with calendars.
RESULTS: participants had a mean (SD) age of 83.3 (5.9) years, 68% were women and 216 (90%) completed the study. After 12 months the intervention group had significantly better performance than the control group, after controlling for baseline values, in the PPA components of quadriceps strength (between-group difference 1.84 kg, 95% CI 0.17-3.51, P = 0.03) and body sway (-90.63 mm, 95% CI -168.6 to -12.6, P = 0.02), short physical performance battery (1.58, 95% CI 1.02-2.14, P ≤ 0.001) and 4 m walk (0.06 m/s 95% CI 0.01-0.10, P = 0.02) with a trend toward a better total PPA score (-0.40, 95% CI -0.83-0.04, P = 0.07) but no difference in fall rates (incidence rate ratio 1.12, 95% CI 0.78-1.63, P = 0.53).

CONCLUSION: the intervention improved performance on risk factors for falls but did not reduce the rate of falls.

Trial registration: ACTRN12608000250336.

Barriers and enablers to physical activity among older Australians who want to increase their physical activity levels

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(Copyright © 2013, Human Kinetics Publishers)

Abstract

BACKGROUND: Physical activity interventions targeting older adults are optimised if barriers and enablers are better understood. This study identified barriers and enablers of physical activity and examined whether these were associated with meeting physical activity recommendations.

METHODS: 2,225 adults aged 65 years and above who perceived themselves to be insufficiently active but would like to be more physically active self-reported their barriers and enablers to physical activity in the 2009 New South Wales Falls Prevention Survey. Binary logistic regression analyses examined associations between barriers and enablers and meeting the physical activity recommendation.

RESULTS: After adjusting for gender, age, BMI, and education, people who listed ill health (52%; OR=0.56, 95%CI 0.45-0.70) as a barrier or who listed people to exercise with (4%; OR=0.49, 95%CI 0.27-0.88) as an enabler had significantly lower odds of meeting recommendations. Those citing too expensive (3%) as a barrier (OR=2.07, 95%CI 1.11-3.87) or who listed nothing will help (29%; OR=1.40, 95%CI 1.10-1.77) and making time to be active (9%; OR=1.78, 95%CI 1.23-2.58) as enablers had significantly higher odds of meeting physical activity recommendations.

CONCLUSIONS: These findings give insights into older adults’ perceptions of factors that influence their physical activity, which could assist physical activity program planning in this population.

Recommendations abstracted from the American Geriatrics Society Consensus Statement on Vitamin D for Prevention of Falls and Their Consequences


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Abstract

The goal of this Consensus Statement is to help primary care practitioners achieve adequate vitamin D intake from all sources in their older patients, with the goal of reducing falls and fall-related injuries. The workgroup graded the quality of evidence and assigned an evidence level using established criteria. Based on the evidence for fall and fracture reduction in the clinical trials of older community-dwelling and institutionalized persons and meta-analyses, the workgroup concluded that a serum 25 hydroxyvitamin D (25(OH)D) concentration of 30 ng/mL (75 nmol/L) should be a minimum goal to achieve in older adults, particularly in frail adults, who are at higher risk of falls, injuries, and fractures. The workgroup concluded that the goal-to reduce fall injuries related to low vitamin D status-could be achieved safely and would not require practitioners to measure serum 25(OH)D concentrations in older adults in the absence of underlying conditions that increase the risk of hypercalcemia (e.g., advanced renal disease, certain malignancies, sarcoidosis).
The effectiveness of a combined exercise intervention on physical fitness factors related to falls in community-dwelling older adults

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Affiliation: Department of Sport and Exercise Science, The University of Auckland, Auckland, New Zealand.

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**Abstract**

This study aimed to evaluate the effectiveness of an innovative exercise program on muscle strength, balance, and gait kinematics in elderly community-dwellers. The exercise program included strength and balance training and the 8-form Tai Chi Chuan. The measurements were carried out at baseline and 12 weeks, and consisted of four physical performance tests, joint isokinetic strength tests, and three-dimensional gait analysis. Fifty-six community-dwelling older adults aged 60-80 years old were randomly assigned to an intervention or control group. After 12 weeks, the intervention group showed a 17.6% improvement in the timed up and go test, accompanied by a 54.7% increase in the 30-second chair stand test score. Significant increases in the score of star excursion balance tests, and the strength of the extensor and flexor muscles at knee and ankle joints were also observed. In addition, the intervention group walked at a faster speed with a longer step length, shorter support phase, and a greater sagittal plane range of motion at the hip and ankle joints. No statistical improvements were seen in the control group. This study provided an effective, evidence-based falls prevention program that can be implemented in community settings to improve physical fitness and reduce fall risks among community-dwelling older adults. The star excursion balance test could be a sensitive measure of physical performance for fall risk assessment in older people.

Letting go of an old habit: Group leaders’ experiences of a client-centred multidisciplinary falls-prevention programme

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**Abstract**

**OBJECTIVE:** It has been suggested that the prevention of disability and falls should be conducted from a client-centred approach, especially when it includes how individuals learn new strategies in everyday life. In addition, programmes for the prevention of falls need to be multi-professional and multidisciplinary in order to be effective. In preventive work with clients, using the approach of client-centredness, the therapists work together with the clients to enable them to achieve occupational goals. There are few studies in fall prevention that have explored group leaders’ experiences, i.e. studies that focus on the experiences of group leaders when working from a client-centred approach.

**METHODS:** This study aims to explore, by the use of focus-group interviews, the therapists’ experiences of being group leaders in a fall-prevention programme that applied the ideas and approaches described above.

**RESULTS:** The analysis revealed that a change in the role of being a group leader had taken place during the intervention process. Three primary categories pertaining to this process were identified: (i) the group leaders moved between the role of expert and the role of facilitator; the group climate (ii) facilitated the translation of expert knowledge to applied knowledge; and (iii) increased awareness as a prerequisite for change.

Long-term participation in peer-led fall prevention classes predicts lower fall incidence

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Abstract

OBJECTIVE: To investigate the association between length of participation in Steady As You Go (SAYGO) peer-led fall prevention exercise classes for older adults and 12-month fall incidence. DESIGN: Twelve-month prospective cohort study

SETTING: Community settings in the Otago region of New Zealand

PARTICIPANTS: Two hundred seven older adults (65+ years) actively participating in SAYGO classes

INTERVENTION: Peer-led fall prevention exercise classes

MAIN OUTCOME MEASURES: Twelve month prospective fall incidence data was collected by monthly calendars. Falls in the previous year and number of years of SAYGO participation were obtained by baseline questionnaire. Class attendance was monitored weekly by class attendance records.

RESULTS: Two hundred and seven participants were recruited (mean age 77.7 SD 6.6 years, 189 females, 18 males). Mean SAYGO participation was 4.3 years (SD 2.5, range 1-10). Average class attendance was 69%. Crude fall rate was 0.75 per person year. Fall incidence at 12 and 24 months were highly correlated (r=.897, p<0.001). Longer SAYGO participation (≥3 years) resulted in lower 12-month fall incidence (IRR 0.90, 95%CI: 0.82 to 0.99, p=0.03) compared to shorter duration participation (1-2 years).

CONCLUSION: SAYGO appears to be an effective fall prevention intervention with high attendance and lower fall incidence with long-term participation. Prospective, controlled studies on long-term participation in peer-led fall prevention exercise programmes are needed to confirm and extend these findings.

Twelve month follow up of a falls prevention program in older adults from diverse populations in Australia: A qualitative study

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Abstract

Several randomised trials demonstrate that multi dimensional falls prevention programs are effective in reducing falls in older adults. There is a need to examine the impact of these programs in real life settings where diverse populations exist. The aim of this study was to examine the acceptability and impact on sustained participation in falls prevention activities of a combined exercise and education falls prevention program. A semi structured telephone interview was conducted with 23 participants 12 months following the completion of a 15 week falls prevention program tailored to diverse communities in Victoria, Australia and provided in both a group and home based format. Reported benefits of the falls prevention program included physical improvements in joint flexibility, mobility and balance and enjoyment derived from both the exercises and socialisation. Recall of the educational component was minimal as were ongoing behavioral changes to reduce the risk of falling other than exercise. Participation in sustained exercise for falls prevention following the completion of the program was also inconsistent. Future improvements of such programs could focus upon ensuring the exercises prescribed are sufficiently challenging for each individual in order to be of physical benefit, altering the educational style to be goal directed and more enjoyable, and integrating further strategies to support sustained participation in falls prevention behavioral changes. Linking participants with alternate ongoing exercise opportunities or potential sources of ongoing support may be advantageous in enhancing long term participation in exercise for falls prevention following cessation of the program.
Joining the Network
To join the NSW Falls Prevention Network listserv, send an email to:

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and in the body of the message type

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If you have any problems, contact Esther Vance at e.vance@neura.edu.au.

Share your news and information/ideas
Do you have any news on Falls Prevention you want to share with others on the network, or do you want to report on a project that is happening in your area.

Please email Esther with your information. We also welcome suggestions for articles and information you would like to see in this newsletter.

Send your information to:

e.vance@neura.edu.au

The Network Listserv
It is great to see the increased activity on the listserv and we want to continue to promote this. To send an item to the listserv where all members of the network can see it, send an email to:

nsw-falls-network@lists.health.nsw.gov.au

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Recently some posts to the listserv have bounced due to email address changes, you need to re-subscribe with your new e-mail address and unsubscribe from your old address following the Join the Network instructions as shown on this page.

NSW Falls Prevention Network Background
The NSW Falls Prevention Network was established in 1993. The role of this network has grown since its inception and now includes:

- Meetings for discussion of falls related issues;
- Dissemination of research findings both local and international;
- Sharing resources developed and exploration of opportunities to combine resources in joint initiatives;
- Encouragement of collaborative projects and research;
- To act as a group to influence policy;
- To liaise with NSW Ministry of Health to provide information on current State/Commonwealth issues in relation to falls and
- Maintenance of resources pertinent to the field.

The main purpose of the network is to share knowledge, expertise and resources on falls prevention for older people.

The NSW Falls Prevention Network activities are part of the implementation of the NSW Falls Prevention Policy funded by the NSW Ministry of Health.

“For Falls Prevention is everyone’s business®”