

The cost of falls in older adults in the community

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ABSTRACT

Introduction

Little is known about the cost of falls that do not result in hospital admission.

Aim

To estimate the community-based costs associated with minor falls of older people.

Methods

Two hundred and two patients with a previous fall aged 75 and over, were recruited from 12 Hutt Valley general practices during 2005. Falls were recorded prospectively on monthly postcard calendars over six months. Data on personal costs and health care utilisation from each fall were collected by telephone interview. Unit costs of health care were collected from providers.

Results

Ninety-seven falls were reported (2.4 falls/person-year), 58 (60%) resulting in injury, and 18 (19%) requiring medical care. Total cost of falls was NZ\$7,597. The median cost per fall incurring cost was NZ\$153.53 (health care cost NZ\$151.93; personal cost NZ\$7.90).

Discussion

The cost of minor falls in older adults is high. Larger studies to confirm these costs and effective interventions to prevent falls in the community are needed.

Keywords

Cost analysis, accidental falls, primary health care, aged

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Introduction

Falls are the leading cause of injury in New Zealand, occurring most often in older adults.¹ The health and economic burden of falls is large, particularly related to falls resulting in serious injuries such as hip fractures in this older population.² It has been estimated that at least 30% of community-dwelling older adults fall each year.³

Approximately 20% of falls in older adults result in injury requiring medical intervention and 4% require hospitalisation.⁴ While the cost of falls resulting in hospitalisation has been quantified in some studies, for the majority of falls less is known about other costs incurred. Attempting to quantify the health care costs of falls in the community is important as they contribute to overall

burden of falls and health care savings resulting from community-based falls prevention strategies can be quantified.⁵ In New Zealand, the Accident Compensation Corporation (ACC) has estimated that they spend \$105 million per year in treatment and rehabilitation of injuries likely to be due to falls in all age groups.⁶ However, few studies have attempted to quantify costs associated with all

falls in older adults prospectively, and from a societal perspective.

Previous falls costing studies have focused on the cost-effectiveness of implementing various community-based programmes to prevent falls and have quantified intervention costs per fall prevented.⁷⁻¹¹ Health care service costs per participant have also been noted.^{7,12,13} Some studies have quantified health care costs in selected populations only,⁹ or for older people living in institutions.¹⁴ The costs of falls of older people in the community in Australia have been documented in two studies,^{15,16} but data were only captured on falls resulting in emergency department presentation, therefore excluding falls that were managed entirely in primary care or in the community. We do not have an accurate empirically-based estimate of the cost of falls in older adults in the community.

In addition, most falls occur in older people who have fallen previously and falls prevention interventions are most effective and cost effective in those who have had previous falls.⁴ Therefore this study aimed to quantify the personal and health care costs of falls not resulting in hospitalisation. It does not seek to address the wider costs of falls such as loss of productivity or loss of quality of life.

Methods

This is a prospective cost study of recurrent falls in older adults occurring in the community.

Study population

Inclusion criteria comprised adults aged 75 years and older who had had a fall in the previous 12 months, identified from 12 general practices in the Hutt Valley. Maori and Pacific people were eligible if over 55 years in accordance with advice from local Maori and Pacific advisors. Participants included those recruited during the first six months of a randomised controlled trial, the Falls Assessment Clinical Trial (FACT). Exclusion criteria comprised inability to comprehend

study information and consent processes, progressive and severe medical condition, severe physical disability, or cognitive impairment (a score of 7/10 or less on a shortened mini mental status examination).⁷

Recruitment strategy

All general practices in two Hutt Valley primary care organisations were contacted and invited to take part. Practices and participants enrolled in the first six months were included in this cost of falls study. In the first practices enrolled, all those in the age group attending the practice over one month were asked if they had had a fall in the last 12 months and invited to participate if they had fallen. When this method was trialled in a number of subsequent smaller practices, recruitment proved slow. Therefore, subsequent practices mailed out a screening and invitation letter to all patients in the age group from the practice registers. The Wellington Ethics Committee approved the study in October 2004 (WGT/04/08/064).

Outcome measures

Data were collected prospectively for the duration of the six-month study from March to September 2005. Outcome measures included the number and nature of falls, and health care and personal costs associated with each fall. Data were not collected on loss of productivity as most of the population are retired, or loss of quality of life as this was beyond the scope of the study.

Assessment of falls and health care utilisation

A 'fall' was defined as '*an unexpected event in which the participant comes to rest on the ground, floor, or lower level.*'⁸ Falls were recorded using postcard calendars filled in daily and posted monthly by participants.⁸ If a fall was indicated on the calendar, follow-up telephone interviews established the circumstances and consequences of the fall. Information was also collected on any health care

services utilised and any personal costs incurred by participants as a result of the fall. Health care use included such items as visits to the general practitioner (GP), physiotherapist, practice nurse or other health professional, radiological investigation, pharmaceuticals, emergency department (ED) attendance, ambulance transport, and specialist consultations.

Assessment of unit costs to the health care provider

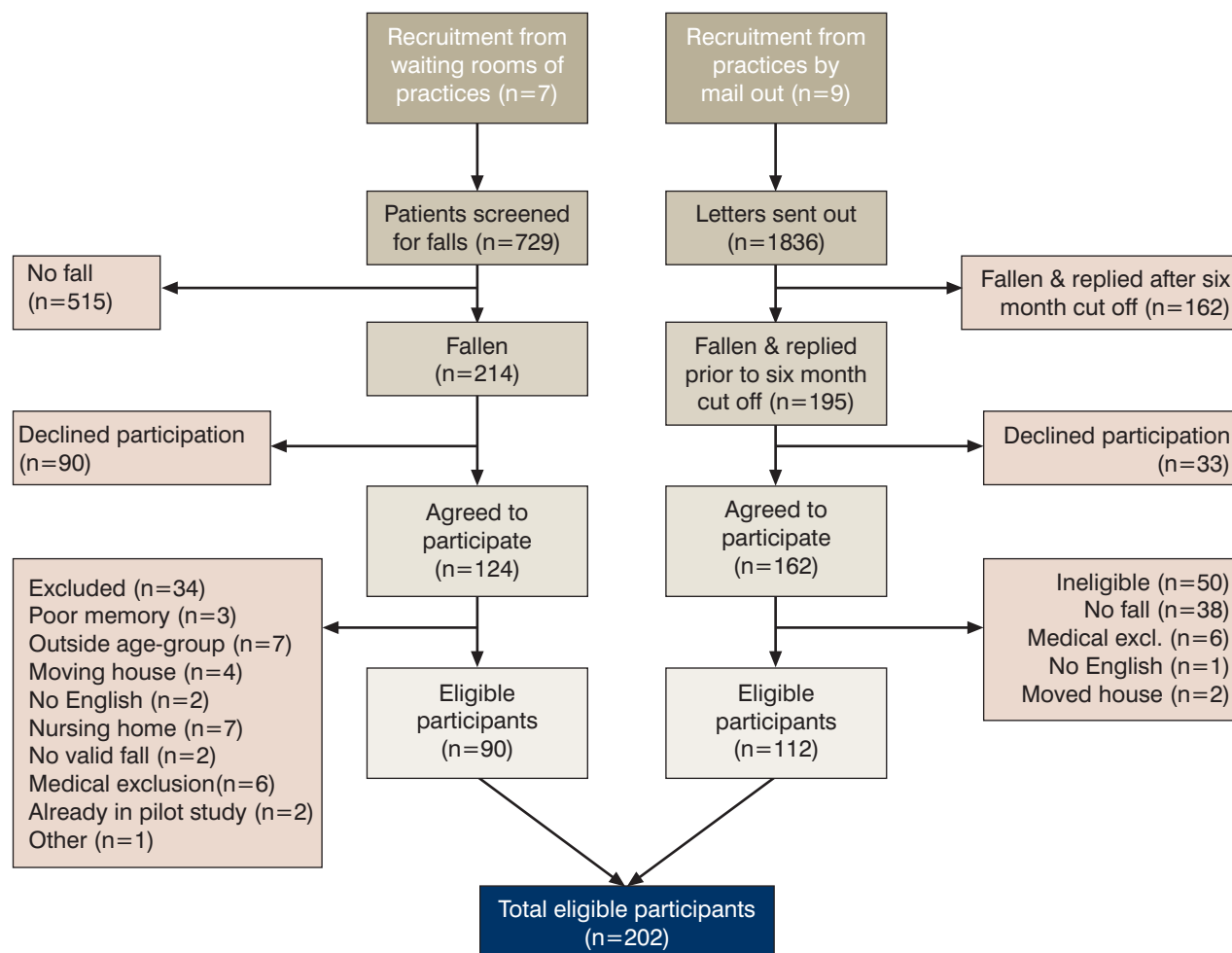
A cost was assigned to each item identified as a health system resource. Unless stated otherwise, all costs have been recorded including goods and service tax (GST – a value added tax currently levied at 12.5% on almost all transactions). Actual costs of emergency department presentations were obtained from the Hutt Valley hospital for each participant from accounting records. Ambulance transport costs for different types of call-out were obtained from a report prepared for the Ministry of Health and local ambulance service.⁹

GP and practice nurse costs covered by ACC were determined according to a schedule detailing 'the cost of treatment.'¹⁰ ACC costs of allied health consultations, such as those to a physiotherapist, were provided by the regional ACC coordinator. The costs of actual pharmaceuticals used were assessed according to the government-funded pharmaceutical management agency (Pharmac) website.¹¹

Assessment of costs to the individual

Personal financial costs included co-payments for health care, transport, and other costs identified by participants such as damage to personal property. These costs did not include loss of income from work as almost all of the study population were retired. Transport to and from treatment was calculated using the participants' self-reported transport use and distance travelled. Running costs per kilometre (for a 1600–2000cc motor) were obtained from the Automobile

Figure 1. Flow diagram of participants recruited into the cost of falls study



Association.¹² Co-payments/surcharge costs of health care use were obtained by asking participants if they were required to make any payments at the time of seeing the health professional or when purchasing pharmaceuticals.

Data analysis

Data were entered into an ACCESS database and analysed in Excel and STATA 7.0 programmes. The proportion of falls incurring costs and specifically health care service utilisation were calculated. Total cost, total health care provider cost and total individual cost are also reported. Confidence intervals have been calculated for aggregate falls cost. All

costs are reported in New Zealand dollars. Discounting* was not undertaken due to the short duration of the study. Actual costs were reported unless indicated otherwise.

Results

Recruitment rate

From the 27 general practices in the Hutt Valley, 19 agreed to take part. Rolling recruitment of practices and participants was undertaken from March 2005 to January 2006. The 'cost of falls' sub-study used data collected from the first six months only, representing participants from the first 12 practices. Over the six-

month period a total of 202 participants were recruited and followed up. Recruitment rates of participants into the study are presented in Figure 1. The mean and median length of time in the study was 73.5 days and 63 days, respectively.

Baseline characteristics

Characteristics of the participants are presented in Table 1. All participants were European except one Maori and one Indian. The most common medical condition for participants was arthritis, either osteoarthritis or rheumatoid arthritis (63.3%), followed by hypertension (55.4%) and visual impairment (44.6%).

* Discounting addresses the problem of translating values from one time period to another.

Falls

During the six-month period, 97 falls were recorded, with 58 people having experienced one or more falls. A total of 58 falls (60%) resulted in some form of injury, but only 18 falls (19%) resulted in participants seeking medical attention and incurring a health service cost. Two falls resulted in more extensive injury, a fractured clavicle and a laceration to the leg, requiring sutures. None of the falls resulted in hospitalisation.

Health care and personal costs

Unit costs are listed in Table 2 and were obtained in 2005. The costs resulting from falls have been divided into health care provider costs and personal costs as presented in Table 3. Aggregate costs are presented in Table 4.

Discussion

This study demonstrates that the community cost of falls not incurring hospitalisation in older adults is considerable to both the health care system and to the individual. Over the duration of the study, involving 202 individuals and 97 falls, the total cost was \$7,596.91. Median cost per fall (incurring a cost) was \$153.53. Mean cost per falls (incurring a cost) was \$422 (95% Confidence Interval \$193.73–\$648.57) and \$74 (95%CI \$34.16–\$122.48) cost per fall (including all falls).

Strengths and limitations

Costs were collected prospectively,⁸ costing data collected was comprehensive, follow-up rates were 100% and actual costs rather than estimated costs were used. Although there is good internal validity of results, external validity is limited by the moderate participation rates. Results relate to second time fallers only. The cost of first time falls may be different. In addition, participants in this study also agreed to be part of a longer term falls prevention trial. The characteristics and costs of falls of those willing to participate in a trial may be different than those who did

Table 1. Characteristics of study participants

Characteristics	Mean (SD) N=202
Age, years	81.2 (4.8)
Number of medical conditions	7.0 (2.9)
Number of medications	5.5 (3.2)
	n (%)
Aged ≥80	116 (57.4)
Men	68 (33.7)
Live alone	103 (51.0)
Community Services Card ^a	159 (78.7)

^a Indication of low income

Table 2. Unit costs of health care resources

Item	Unit Costs 2005 (NZ\$ including GST)	Source
Ambulance attendance	Basic Crew \$461.80 Intermediate/Advanced \$574.90	Wellington Free Ambulance
Emergency Department Presentations	Range \$170.40–\$473.78 ^a	Hutt Valley DHB
GP visit	\$32.00 (+ patient co-payment)	ACC ^b
Pharmaceutical	Various ^a	Pharmac ¹¹
Practice nurse visit	\$15.00 (usually charged with GP as joint visit \$35.00)	ACC
Physiotherapy (initial)	\$45.00 (+ patient co-payment)	ACC
Physiotherapy (f/up)	\$36.00 (+ patient co-payment)	ACC
Radiology	Various ^a	ACC/Hutt Valley District Health Board

^a Actual costs obtained for each event

^b ACC: Accident Compensation Corporation, a government funder of costs associated with injury

not agree to take part. Participation in such a trial may also have affected the falls and cost of falls, even in the first few months of the participants' study enrolment. Results cannot be generalised to those with severe comorbidities or dementia, as they were excluded from the study.

This study only collected data for six months, mostly over the winter months. The falls may not be representative of the whole year. Rarer fall-related events such as hospital admissions and deaths were also less likely to occur, and in fact did not occur, over this time period. Ninety-

five per cent confidence intervals on the costing data are large due to the small sample size and large range of costs. Verification of this data is needed using a larger population or longer follow-up.

Recall bias has been minimised by adhering to falls recording guidelines recommending prospective monthly calendar recording with follow-up telephone interview.⁸

Comparison of this study with previous studies

Unlike other studies on the cost of falls,^{5,13} this study focuses on costs in-

Table 3. Health care provider costs of falls occurring during the study period

Health care use incurred from falls (n=17)	Falls incurring cost N (%)	Mean (SD) cost per fall involving cost [Range]	Total cost
Ambulance call out	4 (4.1)	\$490.07 (56.55) [410.49–511.03]	\$1960.30
ED attendance	5 (5.2)	\$281.07 (119.84) [151.47–421.14]	\$1405.33
Hospital outpatient attendance	1 (1)	\$174.42	\$174.42
Attendance with GP	11 (11.3) ^a	\$204.69 (289.30) [32.00–995.88]	\$2251.56
Physiotherapist attendance	2 (2)	\$117 (50.91) [36.00–72.00]	\$234
Attendance with practice nurse	6 (6.2)	\$27.02 (30.93) [3.00–87.00]	\$162.10
Requiring Xray	7 (7.2)	\$105.29 (93.28) [43.94–274.07]	\$736.98
Attendant care required	1 (1)	\$78.89	\$78.89
Pharmaceutical use ^b	3 (3)	\$51.94 (43.51) [1.50–68.50]	\$155.81
Personal costs incurred from falls (n=14)			
Treatment co-payments ^c	8 (8.2)	\$24.50 (16.86) [10.00–60.00]	\$196.00
Pharmaceutical costs	3 (3)	\$11.67 (15.01) [2.67–25.77]	\$35.00
Transport (non-ambulance)	12 (11.3)	\$12.20 (22) [0.39–78.35]	\$146.39
Non-subsidised private treatment ^d	1 (1)	\$60.00	\$60.00

a Total number of GP visits = 60

b Excludes over-the-counter analgesia

c GP, physiotherapist, radiology

d Chiropractor

curred in the community not resulting in secondary care. Primary care costs were collected, such as the costs of accessing GPs, physiotherapists and pharmaceuticals. This differs from other studies that have tended to collect costs from falls resulting in presentation to secondary services only, missing the costs of falls that were managed entirely in the community.⁵ Furthermore, previous 'cost of falls' studies have focused on certain populations, for example, women 80 years and over.¹⁴ Despite variations in

methodology, some results are comparable with previous findings. Pooled data using similar populations indicate that 22% of falls resulted in health care services being sought.⁴ Individual data from two of these studies places the figure slightly higher at 23%.^{15,16} However, the population in one of the studies was older (80 years and over). Even so, these figures are similar to the 19% noted in the current study.

Health care and personal costs of falls in community-based older populations from two previous stud-

ies indicate a mean cost per fall of AUS\$4,291–\$4,642 (NZ\$5,055.56–\$5,469.10)^{†‡§} and NZ\$399[†].¹⁴ The first study was completed in Australia and captured costs on falls resulting in emergency department attendance only and therefore involved more injurious falls.⁵ Interestingly, personal costs made up only 4% of the total, similar to the 6% in the present study. The second study, using women 80 years and over, is New Zealand-based and produced very similar results to the NZ\$422 found

[†] Adjusted for inflation to 2005 equivalent value using Reserve Bank of New Zealand CPI Inflation Calculator at <http://www.rbnz.govt.nz/statistics/0135595.html>

[‡] Converted to NZ\$ using New Zealand currency calculator at <http://discovernz.co.nz/currency/smlconv.html>

Table 4. Summary of health care provider and personal costs of falls occurring during the study period

Costs incurred from falls	Cost of falls (95% Confidence Interval) [NZ\$ incl. GST]	Median (Inter-quartile range)
TOTAL HEALTH CARE PROVIDER COSTS	\$7159.52	
Mean cost per fall incurring costs (n=17)	\$421.15 (\$193.73-\$648.57)	\$151.93 (\$72.39-\$679.23)
Mean cost per total falls (n=97)	\$73.80 (\$24.12-\$123.48)	
TOTAL PERSONAL COSTS	\$437.39	
Mean cost per fall incurring costs (n=14)	\$31.24 (\$7.30-\$55.10)	\$7.90 (\$1.30-\$37.56)
Mean cost per total falls (n=97)	\$4.51 (\$0.72-\$8.30)	
TOTAL COSTS	\$7596.91	
Mean cost per fall incurring costs (n=18)	\$422.05 (\$187.58-\$656.52)	\$153.53 (\$73.29-\$604.87)
Mean cost per total falls (n=97)	\$78.32 (\$34.16-\$122.48)	

in the present study. These similarities are reassuring and inform us that falls in these different populations are likely to incur similar costs. Comparisons with other studies are difficult due to the different funding mechanisms of health care in other

countries and the focus on reporting inpatient costs.

Conclusion

The costs of minor falls managed in the community are substantial. This study has gone some way towards

quantifying the personal and health care provider costs of falling in older adults. Given the large body of knowledge available with regard to falls prevention programmes, this study reinforces the need to implement falls prevention strategies for older adults.

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Competing interests

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