Efficiency of Falls Prevention Interventions

Tischa van der Cammen, MD, PhD
Department of Internal Medicine, Section of Geriatric Medicine
Erasmus University Medical Center, Rotterdam;
&
Faculty of Industrial Design Engineering
Delft University of Technology, Delft

Ed van Beeck, MD, PhD
Department of Public Health
Erasmus University Medical Center, Rotterdam

Erasmus MC
Universitair Medisch Centrum Rotterdam

TU Delft
Delft University of Technology

Costs of falls -- The Netherlands 2007-2009

- **Between 2007–2009, each year 3% of all persons ≥65 years visited an Emergency Department (ED) due to a fall.**
- **Related annual medical costs were estimated at €675 million.**
- **Fractures led to 80% (€540 million) of the fall-related healthcare costs .**

Ref. Hartholt K., et al. J Trauma. 2011 Sep;71(3):748-53.

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Costs of falls ---The Netherlands 2007-2009

Mean costs per fall were €9370, higher for women than for men, and increased with age.

Persons ≥80 years accounted for 47% of all fall-related ED visits, and 66% of total costs.

Ref. Hartholt K., et al. J Trauma. 2011 Sep;71(3):748-53.

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Falls in the elderly: high costs at individual and population level

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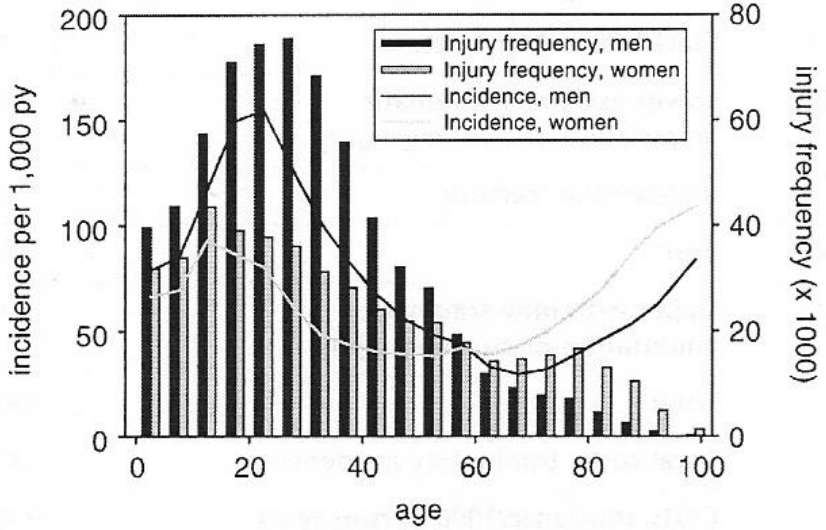
Incidence and costs of injuries in The Netherlands

Willem Jan Meerding[1], Saakje Mulder[2], Ed F. van Beeck[1]



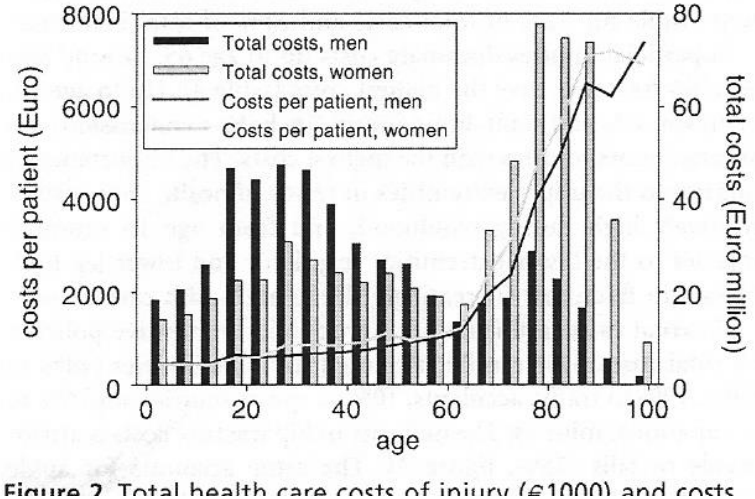


Figure 2 Total health care costs of injury (€1000) and costs

Effective interventions needed

High total costs

&

High mean costs per fall

→ the necessity of implementing effective preventive interventions at community level.

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Effective interventions in community-dwelling elderly

Group and home-based exercise programmes, and home safety interventions reduce rate of falls and risk of falling.

Multifactorial assessment and intervention programmes reduce rate of falls

Tai Chi reduces risk of falling.

Vitamin D supplementation may be effective in reducing falls in people with low vitamin D levels.

This evidence has been translated into practice guidelines on falls prevention.

REF Gillespie et al, Cochrane 2012. Interventions for preventing falls in older people living in the community (Review).

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What about efficiency?

Several studies have shown

the potential for cost savings from delivering the intervention to particular subgroups of older people at high risk of falling.

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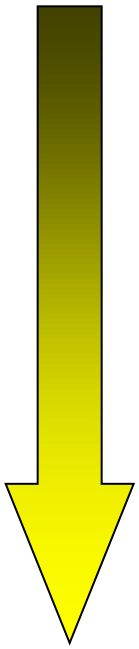
The different steps of evidence



- Can it work? Efficacy
- Does it work in reality? Effectiveness
- Is it worth doing it, compared to other things we could do with the same money? = Efficiency

Efficiency: comparing costs and effects

High costs intervention 1

Much effect intervention 1

Which intervention is most efficient?

ill

Moderate costs intervention 2

Reasonable impact intervention 2

Types of economic evaluation

Type of study	Measurement of benefits
Cost-benefit analysis(CBA)	Monetary units (euros gained)
Cost-effectiveness analysis(CEA)	Natural units (falls prevented, injuries prevented, life years gained)
Cost-utility analysis (CUA)	Healthy years (Quality adjusted life years (QALYs) gained)

Cost-Benefit Analysis (CBA)

- CBA compares the monetary value of providing a program or intervention with the monetary value of the outcome (benefit) from that program or intervention.
- In CBA, both costs and outcomes are measured in money.
- Advantage: CBA allows comparison of programs or interventions with entirely different outcomes.

Cost Effectiveness Analysis (CEA)

- CEA is a method to determine which program or treatment accomplishes a given objective at the least cost.
- In CEA, the effectiveness is expressed in terms of non-monetary units that describes the desired objective.
  - lives saved (life years gained)
  - disability days avoided
  - cases treated
- Limitation: CEA cannot be used to compare interventions with different health outcomes because of its nonmonetary measurement of outcomes.

Cost Utility Analysis (CUA)

- Similar to CEA.
- CUA tries to combine the quality and quantity of life in its outcome measures.
- What is the U in CUA?
  - Utility. It refers to level of satisfaction or usefulness that consumers derive from the consumption of goods and services.
- The most commonly used outcome measure in CUA is Quality Adjusted Life Years (QALYs)

Steps of Performing An Economic Evaluation Study

I. Defining the study design (perspective, specify alternatives)
II. Estimating health effects of the intervention (trials, reviews and meta-analyses)
III. Estimating costs of the intervention
IV. Calculating the incremental cost-effectiveness ratio
V. Analysis of data; adjustments for timing and uncertainty
VI. Reporting CEA results

III. Estimating Costs

COST CATEGORY	TYPE OF COST	COMPONENTS
Direct	Medical	Hospital inpatient Hospital outpatient Transport / ambulance Emergency department Physician Drugs / laboratory tests Counselling Rehabilitation services
	Non-medical	Intervention Legal services
Indirect	Tangible (non-medical)	Loss of productivity Mortality costs
	Intangible	Health related quality of life

IV. Incremental Cost-Effectiveness Ratio

$$ICER = \frac{Incremental \quad Cost}{Incremental \quad Effectiveness}$$

Incremental Cost=(Cost of program A)-(Cost of program B)

Incremental Effectiveness =(Effectiveness of program A) - (Effectiveness of program B)

- **ICER (e.g., € invested per fall prevented,€ invested per disability day avoided) is used to make decisions.**
- **The alternative with the lowest ICER will be chosen.**

What is known on the efficiency of falls prevention?

REF Gillespie et al, Cochrane 2012. Interventions for preventing falls in older people living in the community (Review).

In 13 studies in this review, the authors reported a comprehensive economic evaluation which provided an indication of value for money for the interventions being tested.

Variations in the methods used, however,made comparisons across studies difficult.

There was some, although limited, evidence that falls prevention strategies can be cost-saving during the trial period, and may also be cost-effective over the participants' remaining lifetime.

The results indicate that, to obtain maximum value for money, effective strategies need to be targeted at particular subgroups of older people.

Effectiveness and economic evaluation of a nurse delivered home exercise programme to prevent falls. 1: Randomised controlled trial

M Clare Robertson, Nancy Devlin, Melinda M Gardner, A John Campbell
BMJ 2001;322:1–6

Target population	Type of economic evaluaton	Country	Intervention (intervention costs per person)	Costs included	Incremental cost per fall prevented
Men and women aged 75+ from 17 GP's	CEA	New Zealand	Otago exercise program ($NZ 432)	Intervention costs only + Fall-related Health care costs	$NZ 1803 $NZ 155
Men and women 80+	idem	idem	idem	Intervention costs only + Fall-related Health care costs	$NZ 682 cost savings of $NZ 576

The cost effectiveness of a home hazard reduction program to reduce falls among older persons.

Salkeld G, Cumming RG, O'Neill E, Thomas M, Szonyi G, Westbury C. *Australian and New Zealand Journal of Public Health* 2000; **24**(3):265–71.

Target population	Type of economic evaluaton	Country	Intervention (intervention costs per person)	Costs included	Incremental cost per fall prevented
Men and women recruited before hospital discharge, mean age 77	CEA	Australia	Home safety visits ($AU 223)	Total health care costs (incl hospital, nursing home, other)	$AU 4986
Participants with a fall in previous year	idem	idem	idem	idem	$AU < 0 Cost savings

The cost effectiveness of a multifactorial targeted prevention program for falls among community elderly persons

Rizzo JA, Baker DI, McAvay G, Tinetti ME.*Medical Care* 1996;**34**(9):954–69.

Target population	Type of economic evaluaton	Country	Intervention (intervention costs per person)	Costs included	Incremental cost per fall prevented
Men and women aged 70+	CEA	USA	Multifactorial intervention ($US 905)	Intervention costs only Total health care costs	$US 1772 < $US 0 Cost savings
Low risk group (< 4 risk factors)	idem	idem	idem	Intervention costs only Total health care costs	$US 2886 $US 2771
High risk group (4+ risk factors)	idem	idem	Idem	Intervention costs only Total health care costs	$US 1496 < $US 0 Cost savings

Community falls prevention for people who call an emergency ambulance after a fall: an economic evaluation alongside a randomised controlled trial.

Sach, T., et al. Age and Ageing, 2012, 41: 635

Target population	Type of economic evaluaton	Country	Intervention (intervention costs per person)	Costs included	Incremental cost per fall prevented
*Men and women aged 60+ • Calling an ambulance after a fall • Not transported to hospital	CEA	UK	Multifactorial community intervention (pound sterling 262)	Total costs of health care + social services	< 0 (-1551) Cost savings The intervention patients experienced on average 5.34 (!) fewer falls over 12 months (95% CI: −7.06 to −3.62). Note that the huge number of prevented falls points to the very high risk profile of the target population

Efficient interventions: which subgroups?

Those aged 80 years and over

(Otago Exercise Programme, New Zealand)

A home safety programme when delivered to the participants with a previous fall (Australia)

A multifactorial intervention for those with 4 or more of 8 targeted risk factors (**USA**)

1.Postural hypotension; 2.use of sedatives; 3.medications 4+; 4.unsafe toilet transfers 5. impairments in arm strength and range of motion 6.leg strength and range of motion 7. balance and gait 8. environmental hazards

A community fall prevention programme for high risk patients (UK) The mean difference in costs between the intervention group and the control group in that study was £-1,551 per patient over 1 year.

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Efficiency of falls prevention in the general population?

Modelling studies: incremental costs per Qality Adjusted Life Year (QALY) gained for most interventions higher than acceptability threshold (e.g. $AU 50.000 in Australia)

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The cost effectiveness of falls prevention interventions for community dwelling Australians.

Churh J, Goodall S, Norman R, Haas M. Aust N Z J Public Health 2012;36(3):241-8

Interventions in the general population	Tai Chi	Group based exercise	Home based exercise	Multifactorial intervention
• Incremental Cost Effectiveness Ratio (ICER) • (Incremental costs per QALY gained)	$AU 44000 Only intervention below acceptability threshold	$AU 71000	$AU 93000	$AU 126000-166000

Conclusions-1

- **Falls prevention has a high potential to be cost-effective, and even cost saving, but depending on the target population and the prevention modalities results may differ enormously.**

- **The efficiency of falls prevention targeted at unselected populations in the community seems to be low.**

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Conclusions-2

- **Evidence based effective falls prevention interventions directed at high risk populations seem also efficient and cost saving**

- **Efficiency might be further optimized by increasing program adherence rates of high risk groups**

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Conclusions-3

- **Current insight in the efficiency of falls prevention based on a low number of studies in a few countries; cost utility analyses (CUA) hardly available**

- **International consensus needed on standardisation of methods (CEA + CUA= costs per prevented fall +costs per QALY gained; costs included; uncertainty analyses; reporting of results)**
- **Economic evaluation (CEA+CUA) alongside falls prevention trials should become standard practice**
- **Economic evaluation is not just economics, but needs multidisciplinary involvement (medicine, epidemiology, economics, ….)**

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Discussion

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