Home Visits to Prevent Nursing Home Admission and Functional Decline in Elderly People: Systematic Review and Meta-regression Analysis

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JAMA. 2002;287(8):1022-1028 (doi:10.1001/jama.287.8.1022)

http://jama.ama-assn.org/cgi/content/full/287/8/1022

REVIEW

Home Visits to Prevent Nursing Home Admission and Functional Decline in Elderly People

Systematic Review and Meta-regression Analysis

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Context The effects of home visitation programs to prevent functional decline in elderly persons have been inconsistent, and the value of these programs is controversial.

Objective To evaluate the effect of preventive home visits on functional status, nursing home admission, and mortality.

Data Sources Studies published in English, French, German, Italian, or Spanish reporting randomized trials of the effects of preventive in-home visits in older people (mean age >70 years) living in the community were identified through searches of MEDLINE, PSYCHINFO, and EMBASE (January 1985–November 2001). We also searched the Cochrane Controlled Trials Register, checked reference lists of earlier reviews and book chapters, searched conference proceedings and specialty journals, and contacted experts.

Study Selection We screened 1349 abstracts and excluded those that did not test in-home interventions or in which the mean age of the study population was younger than 70 years. After further exclusions, 17 articles describing 18 trials were analyzed.

Data Extraction Two reviewers independently screened abstracts. Discrepancies were resolved by consensus with a third reviewer. For each included trial, we extracted data on the study population and the characteristics of the intervention. Two of us extracted information on 3 end points: nursing home admissions, mortality, and functional status. One of us assessed trial quality, including an examination of the method of randomization, blinding of caregivers and research staff ascertaining outcomes, and proportion of patients included in analyses of the 3 end points.

Data Synthesis The 18 trials included 13447 individuals aged 65 years and older. The effect on nursing home admissions depended on the number of visits performed during follow-up. The pooled relative risk (RR) was 0.66 (95% confidence interval [CI], 0.48-0.92) for trials in the upper tertile (>9 visits) but was 1.05 (95% CI, 0.85-1.30) in the lower tertile (0-4 visits). Functional decline was reduced in trials that used multidimensional assessment with follow-up (RR, 0.76; 95% CI, 0.64-0.91) but not in other trials (RR, 1.01; 95% CI, 0.92-1.11). Functional decline was reduced (RR, 0.78; 95% CI, 0.64-0.95) in trials with a control group mortality rate in the lower tertile (3.4%-5.8%) but not (RR, 0.98; 95% CI, 0.84-1.13) in those with a control-group mortality rate in the upper tertile (8.3%-10.7%). A beneficial effect on mortality was evident in younger study populations (RR, 0.76; 95% CI, 0.65-0.88 for ages 72.7-77.5 years) but not in older study populations (RR, 1.09; 95% CI, 0.92-1.28 for ages 80.2-81.6 years).

Conclusion Preventive home visitation programs appear to be effective, provided the interventions are based on multidimensional geriatric assessment and include multiple follow-up home visits and target persons at lower risk for death. Benefits on survival were seen in young-old rather than old-old populations.

JAMA. 2002;287:1022-1028 www.jama.com

PREVENTIVE HOME VISITATION programs in elderly people are part of national policy in several countries, including the United Kingdom, Denmark, and Australia.[1] The rationale is to delay or prevent functional impairment and subsequent nursing home admissions by primary prevention (eg, immunization and exercise), secondary prevention (eg, detection of untreated problems), and tertiary prevention (eg, improvement of medication use).[2] However, the value of home visitation programs is controversial. Although individual trials and meta-analyses[3,4] suggest that some programs are effective, there is uncertainty regarding whether they can prevent functional status decline, which program components are effective, and which populations are most likely to benefit.[5,6]

In an earlier analysis of hospital-based comprehensive geriatric assessment programs, we found that programs including extended ambulatory follow-up were more effective than other schemes.[3] A subgroup analysis of a trial of a home visitation program suggested that older people with relatively good functional status at baseline were more likely to benefit.[7,8] We confirmed this hypothesis in a planned analysis of a subsequent trial, which showed favorable effects among individuals at low risk but not among those at high risk for nursing home admission.[9] Finally, evalua-

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tion in the home setting results in a high yield of undetected problems.[10] Therefore, it seems likely that successful programs should include multidimensional geriatric assessment as a basis for in-home prevention.

We performed an updated meta-analysis to evaluate the effect of preventive home visits on functional status, nursing home admission, and mortality and to test the hypotheses that they are beneficial if they are based on multidimensional geriatric assessment and frequent follow-up visits and conducted in individuals at low risk of functional decline at baseline.

METHODS

Literature Search and Eligibility Criteria

We aimed to identify all randomized trials of the effects of preventive in-home visits in older people (mean age >70 years) living in the community. Published studies were identified through searches of MEDLINE, PSYCHINFO, and EMBASE (January 1985 to November 2001; key words: *aged*, *home* or *in-home*, *prevention*, and *geriatric assessment*). We also searched the Cochrane Controlled Trials Register, checked reference lists of earlier reviews and book chapters, searched conference proceedings and specialty journals, and contacted experts. Articles published in English, French, German, Italian, or Spanish were considered. Two reviewers screened abstracts. Discrepancies were resolved by consensus with a third reviewer.

Data Extraction and Outcome Definition

For each trial, we extracted data on the study population and the characteristics of the intervention. Programs were classified as being based on multidimensional geriatric assessment for identification of risk factors with follow-up if they included a systematic evaluation in medical, functional, psychosocial, and environmental domains and a follow-up for the implementation of the intervention plan.[11] The average number of preventive home visits performed and the total duration of the intervention were also recorded.

For each study, 2 of us extracted information on 3 end points: nursing home admissions, mortality, and functional status. We recorded the number of participants admitted to nursing homes (excluding short-term and residential or board and care-unit admissions) and the number of persons for whom information about nursing home admissions was available. For mortality, the number of deaths from all causes and participants with known vital status were recorded for intervention and control groups. We abstracted the number of persons with functional status decline. The definition of functional status was based on activities of daily living or lower or upper extremity function. If several outcome measures were reported, we used the measure for which the prevalence of impairment at follow-up was closest to 20%, corresponding to the disability rate of 19.7% in the elderly US population.[12] Four trials used continuous rather than discrete outcomes and provided their means and SDs.[13-16] These results were converted to an estimate of the risk ratio.[17]

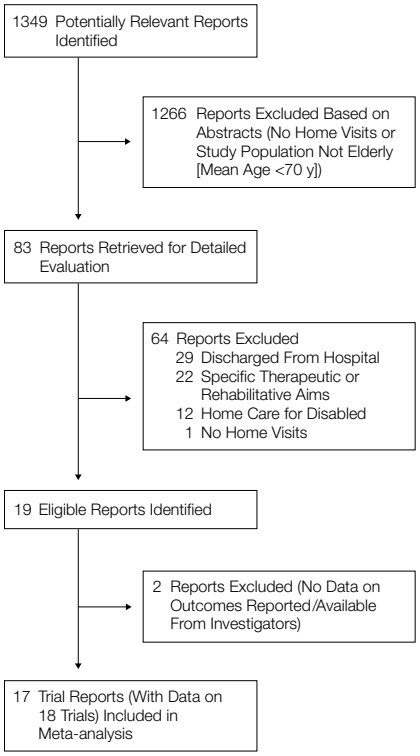
Original investigators were contacted if published data on study populations and interventions were incomplete or if reporting of at least 1 of the 3 types of outcome data (functional status, nursing home admissions, and mortality) was missing or incomplete. Additional unpublished information was obtained from 9 studies.[13-15,18-23]

Assessment of Methodological Quality and Statistical Analysis

One of us assessed trial quality by examining the method of randomization, blinding of caregivers and research staff ascertaining outcomes, and the proportion of patients included in the analyses of the 3 end points.[24]

We combined results on the risk ratio scale by using fixed and random effects models.[25] The degree of intertrial heterogeneity (τ^2) was estimated with an iterative restricted maximum likelihood method.[26] A statistical test of funnel plot asymmetry, which may indicate the presence of publication bias, was performed.[27] Standard tests of homogeneity of risk ratios were also calculated.[26] The extent to which 1 or more study-level variables explained heterogeneity in the treatment effects was then explored by fitting meta-regression models.[26] The following variables were considered: mean age of the study population and mortality rate (per year) in control groups (indicators of baseline risk), duration of the intervention, number of home visits, and whether the intervention was based on multidimensional geriatric assessment with follow-up. Variables relating to the quality of trials, the geographic location of the study, and groups of authors were also considered. Fixed effects meta-analysis stratified by the factors that explained part of the intertrial heterogeneity was then performed. A random effects model was used to calculate a typical risk difference, which was converted to the number needed to visit to prevent 1 adverse outcome. In a sensitivity analysis

Figure 1. Identification of 18 Eligible Randomized Controlled Trials



we excluded 1 trial[9] whose results had been influential when we formulated study hypotheses.

RESULTS

Identification of Eligible Trials

We screened 1349 abstracts and excluded 1266 studies because they either did not test in-home interventions or the mean age of the study population was younger than 70 years. We excluded 29 studies that were based on patients at hospital discharge, 22 studies that analyzed home visits for therapeutic or rehabilitative purposes (treatment of depression, support for dementia, cardiac rehabilitation, stroke rehabilitation, terminal care, exercise programs, vaccination programs, or pharmacy programs), 12 studies that tested home care services for disabled persons, and 1 study that did not include home visits.

Nineteen articles with eligible trials were identified.[7,9,13-15,18-23,28-34] Two articles were excluded because no information on relevant outcomes was reported and attempts to obtain unpublished data from the authors were unsuccessful.[33,34] A total of 17 trial reports with data on 18 trials (1 report included the results of 2 trials) were available for analysis (FIGURE 1).

Characteristics of Trials, Patients, and Interventions

These trials included a total of 13 447 individuals aged 65 years and older. Study participants were selected from general practice lists and population or

Table 1. Characteristics of 18 Trials Included in Meta-analysis of In-Home Preventive Programs in Community-Dwelling Elderly People

Study, y (Location)	Source of Study Population	Inclusion Criteria and Age, y	No. Allocated, Intervention/ Control Group	Mean Age at Baseline, y	Intervention Personnel	Multidimensional Geriatric Assessment and Follow-up	No. of Follow-up Visits
Gunner-Svennson et al,[28] 1984 (Denmark)	Population register	≥75	2055/2073	78.6	Nurse	No	5
Hendriksen et al,[18] 1984 (Denmark)	Population register	≥75	300/300	78.5	Home visitor (nurse or physician)	No	12
Vetter et al,[29] 1984 (Gwent, UK)	General practice list	≥70	296/298	76.8	Health visitor	No	2.9
Vetter et al,[29] 1984 (Powys, UK)	General practice list	≥70	281/273	77.5	Health visitor	No	1.9
Sorensen et al,[19] 1988 (Denmark)	Population register	75, 80, 85	777/778	79.8	Physician, social worker	No	0
Carpenter and Demopoulos,[20] 1990 (UK)	General practice list	≥75	272/267	80.2	Volunteer	No	8.5
McEwan et al,[21] 1990 (UK)	General practice list	≥75	151/145	81.0	Nurse	No	0
Clarke et al,[22] 1992 (UK)	General practice list	≥75, living alone	261/262	81.0	Lay community worker	No	3
Pathy et al,[30] 1992 (UK)	General practice list	≥65	369/356	73.4	Health visitor	No	9
Vetter et al,[31] 1992 (UK)	General practice list	>70	350/324	76.8	Health visitor	No	4
van Rossum et al,[16] 1993 (the Netherlands)	Population register	75-84, not receiving home care	292/288	78.4	Public health nurse	No	12
Fabacher et al,[13] 1994 (USA)	Directories of veterans of US armed services	>70, no terminal illness or dementia	131/123	72.7	Physician, nurse	Yes	4
Tinetti et al,[23] 1994 (USA)	Insurance register	≥70, at risk of falls	153/148	77.9	Nurse practitioner, physical therapist	Yes	7.8
Stuck et al,[7] 1995 (USA)	Voter register	≥75, not severely impaired	215/199	81.3	Nurse practitioner, geriatrician	Yes	12
Stuck et al,[9] 2000 (Switzerland)	Insurance register	≥75, not severely impaired	264/527	81.6	Health nurse, geriatrician	Yes	7.5
van Haastregt et al,[14] 2000 (the Netherlands)	General practice list	≥70, at risk of falls	159/157	77.2	Nurse	Yes	4
Hebert et al,[32] 2001 (Canada)	Population register	>70, at risk of functional decline	250/253	80.3	Nurse	Yes	0
Newbury et al,[15] 2001 (Australia)	Practice register	≥75	50/50	79.9	Nurse	No	0

insurance registers (TABLE 1). Ten trials included all individuals older than a certain threshold (between 65 and 75 years). Eight studies had additional selection criteria (eg, individuals living alone) or excluded some individuals (eg, those receiving home care). Mean age of study participants at baseline ranged from 72.7 years to 81.6 years. The yearly mortality rates in control groups ranged from 3.4% to 10.7%. Twelve of the 18 trials were classified as not based on multidimensional geriatric assessment and follow-up because they did not include a medical, functional, and psychosocial assessment[16,18,20,22,28-31] or because these assessments were not combined with a follow-up intervention.[15,19,21] Reported outcome data of the individual trials are provided in online Table 1 (http://jama.ama-assn.org/issues/v287n8/jma10044).

Table 2. Risk Ratios for Mortality, Nursing Home Admission, and Functional Status Decline in 18 Trials of In-Home Preventive Programs in Community-Dwelling Elderly People

Study	Risk Ratio (95% Confidence Intervals)		
	Nursing Home Admission	Functional Status Decline	Mortality
Gunner-Svennson et al[28]	0.82 (0.67-1.01)	Not assessed	1.02 (0.91-1.15)
Hendriksen et al[18]	0.69 (0.40-1.20)	Not assessed	0.79 (0.58-1.06)
Vetter et al[29] (Gwent)	Not reported	1.19 (0.95-1.49)	0.59 (0.40-0.86)
Vetter et al[29] (Powys)	Not reported	0.78 (0.60-1.01)	0.97 (0.66-1.41)
Sorensen et al[19]	1.02 (0.81-1.28)	0.96 (0.67-1.37)	0.96 (0.83-1.11)
Carpenter and Demopoulos[20]	0.68 (0.30-1.56)	1.01 (0.79-1.30)	1.20 (0.87-1.65)
McEwan et al[21]	Not reported	0.94 (0.54-1.65)	0.67 (0.37-1.21)
Clarke et al[22]	Not reported	1.74 (1.04-2.90)	1.14 (0.82-1.61)
Pathy et al[30]	0.69 (0.40-1.20)	1.19 (0.80-1.77)	0.75 (0.57-0.99)
Vetter et al[31]	1.42 (0.59-3.44)	0.94 (0.79-1.11)	0.77 (0.61-0.98)
Van Rossum et al[16]	1.38 (0.44-4.30)	1.17 (0.79-1.72)	0.83 (0.57-1.21)
Fabacher et al[16]	No admissions	0.77 (0.42-1.42)	0.95 (0.24-3.70)
Tinetti et al[23]	0.48 (0.04-5.28)	0.51 (0.32-0.82)	1.35 (0.44-4.17)
Stuck et al[7] (USA)	0.42 (0.19-0.89)	0.54 (0.32-0.90)	0.85 (0.51-1.44)
Stuck et al[9] (Switzerland)	1.51 (0.99-2.30)	0.83 (0.60-1.15)	1.40 (0.99-1.97)
van Haastregt et al[14]	0.97 (0.06-15.3)	0.83 (0.50-1.40)	0.69 (0.32-1.51)
Hebert et al[32]	1.02 (0.30-3.47)	0.97 (0.68-1.38)	0.68 (0.33-1.38)
Newbury et al[15]	1.50 (0.26-8.60)	0.74 (0.30-1.82)	0.20 (0.02-1.65)
Combined risk ratio (fixed effects)	0.90 (0.80-1.02)	0.95 (0.87-1.03)	0.94 (0.88-1.00)
Combined risk ratio (random effects)	0.91 (0.76-1.09)	0.94 (0.83-1.06)	0.91 (0.81-1.01)
P value, test of heterogeneity	.19	.03	.04

Methodological Quality of Trials

Measures of allocation concealment were described for 5 trials.[7,9,13-15] Randomization was stratified in several trials, but block sizes were reported only in 2 reports.[9,32] For 7 trials,[7,9,15,16,18,23,30] some measures of blinding were described. The proportion of trials analyzed using intent to treat without missing outcome data was 72.2% (13/18) for mortality, 69.2% (9/13) for nursing home admission, and 0% (0/16) for functional status. Results of a detailed quality assessment are available in online Table 2 (http://jama.ama-assn.org/issues/v287n8/jma10044). In meta-regression analyses, there was little evidence ($P>.10$) that these aspects of methodological quality influenced results. There was also little evidence of funnel plot asymmetry ($P>.10$). Finally, results did not differ significantly according to geographical region or groups of investigators ($P>.10$).

Effects on Nursing Home Admission

The analysis was based on 13 trials. Four studies did not report on nursing home admissions, and in 1 study, no admissions occurred. Overall, the reduction in the risk of admission was modest and nonsignificant (TABLE 2). In meta-regression analysis, there was evidence of an association of treatment effect with the number of follow-up visits ($P=.05$), which explained a large proportion of intertrial heterogeneity (τ^2 was reduced from 0.034 to 0.012). Meta-analysis of trials stratified by tertiles of the number of follow-up visits is shown in FIGURE 2: the reduction in admissions is evident only for programs with at least 5 follow-up visits. The estimated reduction in the risk of admission for trials in the upper tertile (>9 follow-up visits) was 34% (RR, 0.66; 95% CI, 0.48-0.92) and the typical risk difference was 2.3%, for a number needed to visit of 43.

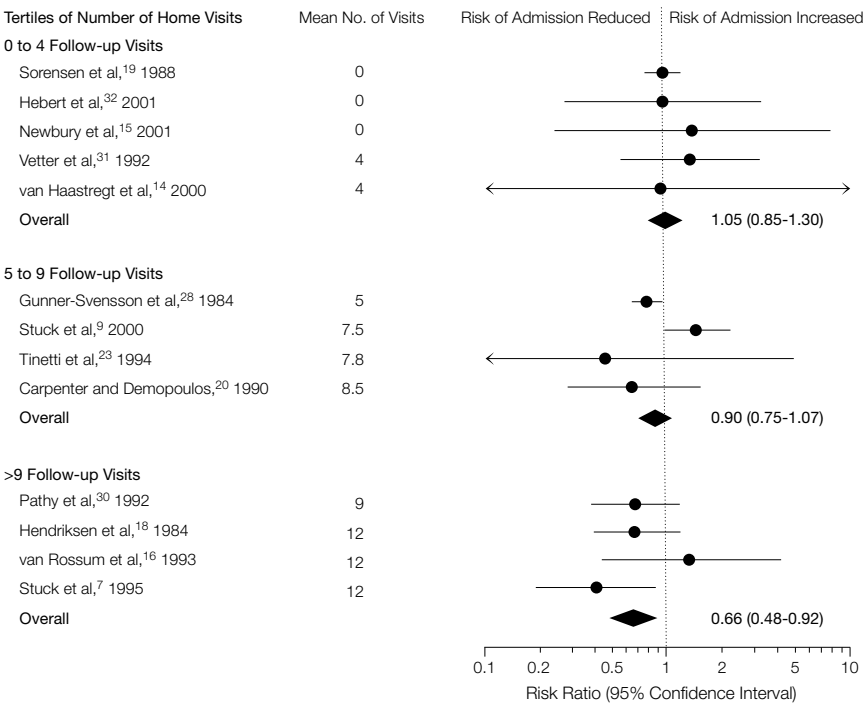
Effects on Functional Status

Data were available for 16 trials. Overall, preventive home visits appeared to have little effect on functional status, but results were heterogeneous (Table 2). In meta-regression analysis, beneficial effects were associated with multidimensional geriatric assessment with follow-up ($P=.01$) and inversely correlated with control-group mortality ($P=.04$). In multivariable analysis, the type of intervention was the more important factor and explained about half of intertrial heterogeneity (τ^2 was reduced from 0.021 to 0.010). Combining trials according to multidimensional assessment and follow-up resulted in a 24% reduction in the risk of functional decline (RR, 0.76; 95% CI, 0.64-0.91) (FIGURE 3). The typical absolute reduction in risk was 6.7%, for a number needed to visit of 15. When trials were analyzed by tertiles of control group mortality, a beneficial effect on function was evident for the first tertile (5 trials with annual mortality from 3.4%-5.8%), with an RR of 0.78 (95% CI, 0.64-0.95). The combined RR for the middle tertile (6 trials with mortality rates from 6.1%-8.2%) was 1.00 (95% CI, 0.89-1.13); for the third tertile, 0.98 (95% CI, 0.84-1.13; 5 trials with mortality from 8.3%-10.7%).

Effects on Mortality

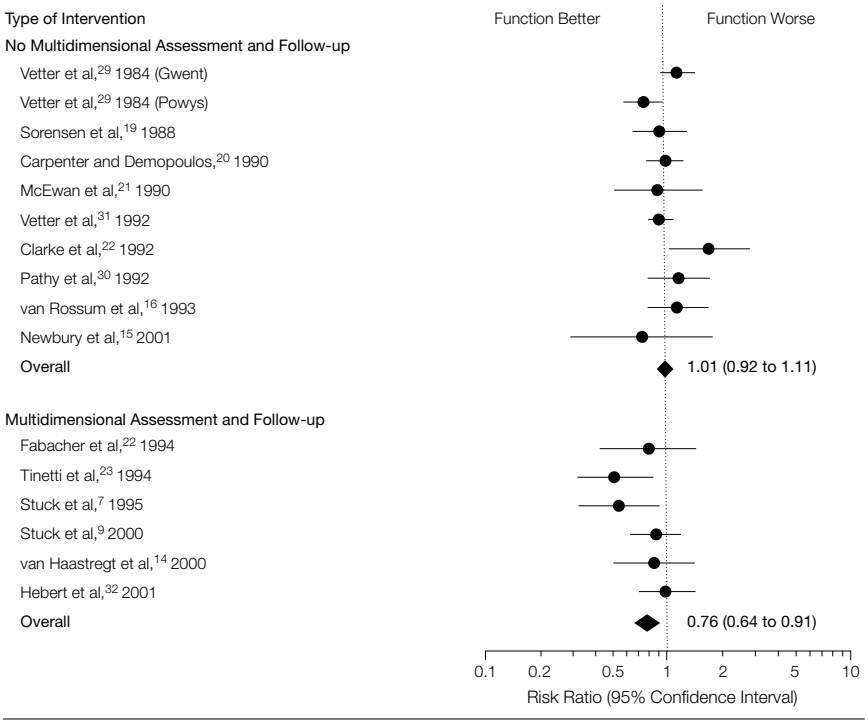
This analysis was based on 18 trials. Preventive home visits appeared to reduce

Figure 2. Effect of Preventive Home Visits on the Risk of Nursing Home Admission



Trials stratified by tertiles of the mean number of follow-up home visits.

Figure 3. Effect of Preventive Home Visits on Functional Impairment



Trials stratified by whether the intervention was based on multidimensional assessment with follow-up.

mortality, but results were again heterogeneous (Table 2). In meta-regression analysis, there was strong evidence ($P=.004$) that the mean age of study participants was negatively associated with effects on mortality. Intertrial variance was reduced from 0.021 to 0.003 when age was included in the model. Meta-analysis of trials stratified by tertiles of age is shown in FIGURE 4: the reduction of mortality diminishes as mean age approaches 80 years. The estimated reduction in mortality in the lowest tertile (mean age, 72.7-77.5 years) was 24% (RR, 0.76; 95% CI, 0.65-0.88) and the typical risk difference 4.1%, for a number needed to visit of 24.

Sensitivity Analysis

Results were not materially changed after the trial[9] whose results had influenced the formulation of study hypotheses was excluded. There was still evidence supporting the importance of the number of follow-up visits for the prevention of nursing home admissions ($P=.02$), of multidimensional geriatric assessment with follow-up for the prevention of functional decline ($P=.01$), and of age as an effect modifier for all-cause mortality ($P=.03$). The RRs of nursing home admission (95% CIs) from meta-analysis of trials stratified by tertiles of the number of follow-up visits were 1.05 (0.85-1.30, lower tertile), 0.81 (0.66-0.99, middle tertile) and 0.66 (0.48-0.92, upper tertile). The RRs for functional status decline was 0.77 (0.62-0.95) if programs included multidimensional geriatric assessment with follow-up and 1.01 (0.92-1.11) if they did not. Finally, RRs for mortality from meta-analysis of trials stratified by tertiles of mean age were 0.76 (0.65-0.88, lower tertile), 0.97 (0.89-1.05, middle tertile), and 1.00 (0.83-1.21, upper tertile).

COMMENT

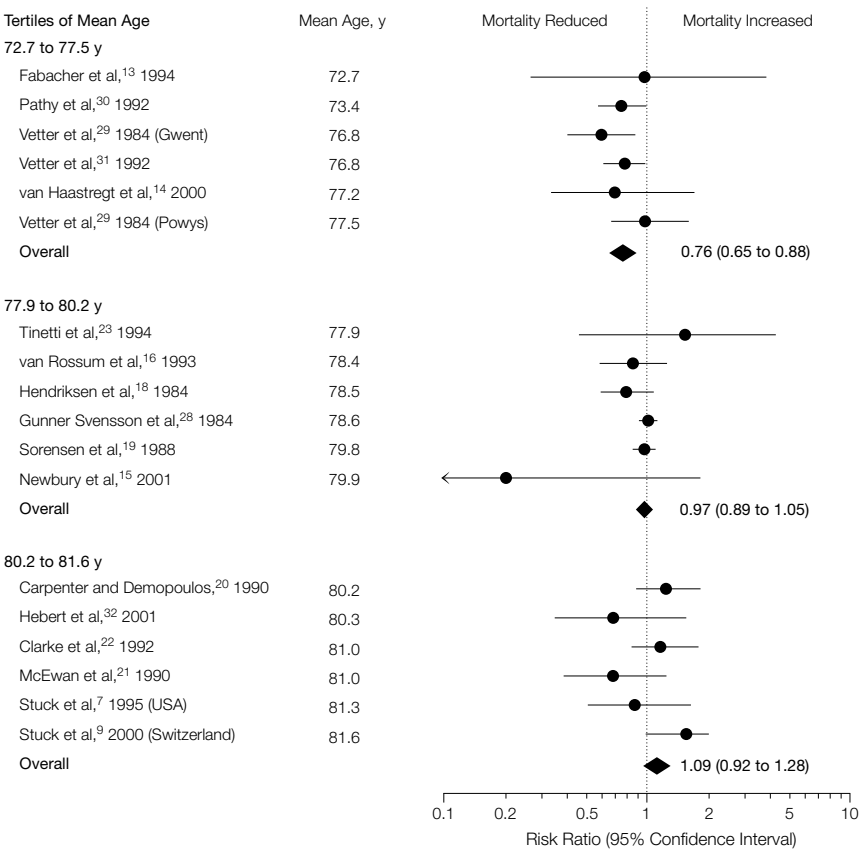
We hypothesized that preventive home visitation programs are effective if based on multidimensional geriatric assessment with extended follow-up and if offered to older persons with relatively good function at baseline. Based on a

large number of trials, the findings from our meta-analysis support these hypotheses and indicate that preventive home visitation programs are effective only if interventions are based on multidimensional geriatric assessment, include multiple follow-up home visits, and target persons at lower risk for death and those who are relatively young.

Our results contrast with those of the recent review by Elkan et al.[4] Those authors reported favorable effects on mortality and nursing home admissions when combining all types of home-based programs but found no improvement in functional status, which is inconsistent with the rationale for home visits. The discrepant results may be explained by differences in the number and type of studies included. Elkan and colleagues' analysis combined trials of in-home preventive programs with trials of home-based care coordination programs for patients discharged from the hospital, whereas our analysis was restricted to trials of preventive home visitation programs. Furthermore, the authors did not include 4 recently published randomized trials[9,14,15,32] and included quasi-randomized studies. Finally, Elkan et al did not obtain additional information from the investigators,[4] which meant, for example, that their pooled analysis of functional status was based on 4 studies only, rather than the 16 trials included in our analysis, and that the power of detecting program effects and explaining heterogeneity was limited.

In our study, the use of multidimensional geriatric assessment and follow-up was the most important determinant of program effects on functional status outcomes. This finding is compatible with the concept that functional status decline can be delayed or prevented by periodic multidimensional evaluation for detection of modifiable risk factors and subsequent long-term intervention to modify these risk factors as well as to identify new risks. The result that a higher number of follow-up home visits was associated with a greater reduction of nursing home admissions is consistent with this concept.

Figure 4. Effect of Preventive Home Visits on All-Cause Mortality



Trials stratified by tertiles of mean age of the study population.

Favorable intervention effects on functional status were also related to a low underlying mortality rate of the study population, which is compatible with the hypothesis of better reversibility in the earlier stages of decline. Preventive programs reduced mortality in the younger study populations (mean age <80 years) but not in older populations, indicating that mortality risk was modifiable in the former group but not the latter. Further studies are required to determine whether, in very old populations, in-home prevention might affect disability-free survival without prolonging overall survival. It is noteworthy that the factors associated with effects on mortality differed from those predicting effects on functional status and nursing home admissions, which supports the notion that different processes of care are important in mortality and functional status outcomes.[35]

These results can be used to approximate the cost implications of preventive home visits. The lifetime costs for a person admitted to long-term care in a UK nursing home has been estimated as $65 000 (£42 250).[36] We found that the number needed to visit to prevent 1 admission in programs with frequent follow-up visits is about 40. Therefore, programs with expenditures of less than $1500 (£1000) per participant should reduce costs. Furthermore, costs are approximate and probably not linear over time. We found that preventive home visits required an initial investment of $433 per person the first year to produce net savings of $1403 per person annually in the third year.[9]

Our study has limitations because it was based on randomized controlled trials; the comparisons made in meta-regression analyses are observational. Meta-analytic subgroup analyses, like

subgroup analyses within trials, are prone to bias and confounding and therefore need to be interpreted with caution.[37-39] Particular caution is required when the data inspire hypotheses. However, this problem is unlikely to have introduced bias in this study. Both hypotheses were defined a priori. The hypothesis regarding program characteristics was generated in a previous meta-analysis of a different set of trials of hospital-based interventions.[3] The other hypothesis was based on a planned subgroup analysis of a trial that was also included in the present study[9]; however, results were robust after the exclusion of this trial. Nevertheless, prospective validation of these results is warranted.

Our results have important policy implications. In countries with existing national programs of preventive home visits, the process and organization of these visits should be reconsidered according to the criteria identified in this meta-analysis. In the United States, a system for functional impairment risk identification and appropriate intervention to prevent or delay functional impairment should be considered. A variety of health maintenance organization programs specifically address the care needs of elderly patients.[40] In addition, an increasing number of chronic-disease management programs have been introduced.[41-43] Grafting the key concepts of home-based preventive care programs into these programs should be feasible as they continue to evolve and should be cost-effective. Identifying risks and dealing with them as an essential component of the care of older persons is central to reducing the emerging burden of disability and improving the quality of life in elderly people.

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Analysis and interpretation of data: Stuck, Egger, Hammer, Minder, Beck.
Drafting of the manuscript: Stuck, Egger, Beck.
Critical revision of the manuscript for important intellectual content: Stuck, Egger, Hammer, Minder, Beck.
Statistical expertise: Egger, Minder.
Obtained funding: Stuck.
Administrative, technical, or material support: Hammer, Beck.
Study supervision: Stuck.
Funding/Support: This project was supported by grants from the Swiss National Science Foundation (32-52804.97), the Swiss Federal Office for Education and Research (BBW990311.1 and QLK6-CT-1999-02205), and the Swiss Foundation for Health Promotion (398).
Acknowledgment: We would like to thank the authors who provided additional data and Gerhard Gillman, Eva Gerber, MD, Daniel Weyermann, MD, and Jutta Walthert, MD, for help with the literature search.

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Online Table 1. Reported Outcome Data for Mortality, Nursing Home Admissions, and Functional Status Decline in 18 Trials of Preventive Programs in Community-Dwelling Elderly People*

	Mortality				Nursing Home Admissions				Functional Status Decline				
	Intervention		Control		Intervention		Control			Intervention		Control	
Study	Deaths	(N)	Deaths	(N)	Events	(N)	Events	(N)	Definition	No. With Decline	(N)	No. With Decline	(N)
Gunner-Svennson et al[28]	449	(2055)	443	(2073)	154	(2055)	189	(2073)	Not assessed	. . .		. . .	
Hendriksen et al[18]	59	(300)	75	(300)	20	(285)	29	(287)	Not assessed	. . .		. . .	
Vetter et al[29] (Gwent)	35	(289)	60	(291)	. . .		. . .		Townsend disability score‡	107	(254)	82	(231)
Vetter et al[29] (Powys)	45	(279)	45	(270)	. . .		. . .		Townsend disability score‡	68	(234)	84	(225)
Sorensen et al[19]	240	(777)	250	(778)	126	(777)	124	(778)	Able to wash oneself	54	(429)	53	(404)
Carpenter and Demopoulos[20]	66	(272)	54	(267)	9	(272)	13	(267)	Winchester disability score[20]	75	(181)	76	(186)
McEwan et al[21]	16	(151)	23	(145)	. . .		. . .		Getting up/into chair	20	(118)	20	(111)
Clarke et al[22]	57	(261)	50	(262)	. . .		. . .		ADL	35	(192)	20	(191)
Pathy et al[30]	67	(369)	86	(356)	20	(369)	28	(356)	Needs home help	46	(223)	34	(196)
Vetter et al,[31] 1992	88	(350)	106	(324)	12	(336)	8	(319)	Townsend disability score‡	127	(240)	118	(209)
van Rossum et al[16]	42	(292)	50	(288)	7	(292)	5	(288)	ADL	. . .†		. . .†	
Fabacher et al[13]	4	(104)	4	(99)	0	(104)	0	(99)	Instrumental ADL	. . .†		. . .†	
Tinetti et al[23]	7	(153)	5	(148)	1	(153)	2	(148)	Impairment in balance or transfer	21	(129)	37	(116)
Stuck et al,[7] USA	24	(215)	26	(199)	9	(215)	20	(199)	Basic ADL	20	(170)	32	(147)
Stuck et al,[9] Switzerland	47	(264)	67	(527)	34	(264)	45	(527)	Basic ADL	41	(217)	104	(459)
van Haastregt et al[14]	10	(159)	14	(154)	1	(159)	1	(154)	Daily activity (Frenchay activities index§)	. . .†		. . .†	
Hébert et al[32]	12	(245)	18	(249)	5	(245)	5	(249)	Functional Autonomy Measurement System‖	48	(233)	49	(231)
Newbury et al[15]	1	(50)	5	(50)	3	(50)	2	(50)	ADL	. . .†		. . .†	

*Ellipses indicate not reported. ADL indicates activities of daily living (basic ADL includes activities such as bathing, dressing, feeding, grooming, moving from bed to chair, and moving around the house; instrumental ADL includes activities such as cooking, handling finances, handling medications, housekeeping, and shopping).
†Results were reported as means and SDs (the number of subjects was not reported).
‡Townsend P. Poverty in the United Kingdom. Harmondsworth: Penguin Books, 1979.
§Schuling J, de Haan R, Limburg M, Groenier KH. The Frenchay activities index: assessment of functional status in stroke patients. *Stroke*. 1993;24:1173-1177.
‖Hébert R, Carrier R, Biladeau A. The functional autonomy measurement system (SMAF): description and validation of an instrument for the measurement of handicaps. *Age Ageing*. 1988;17:293-302.

Online Table 2. Methodological Quality of 18 Controlled Trials of In-Home Preventive Programs in Community-Dwelling Elderly People*

Study	Method of Allocation	Blinding	Participants Included in Analysis, %†		
			Mortality	Nursing Home Admission	Functional Status
Gunner-Svennson et al[28]	Random, based on census register	Not mentioned	Intention to treat	Intention to treat	NA
Hendriksen et al[18]	Random, based on municipal register	General practitioners	Intention to treat	95.0/95.7	NA
Vetter et al[29] (Gwent)	Random, at household level, based on GP lists	Not mentioned	97.6/97.7	NA	97.3/97.1
Vetter et al[29] (Powys)	Random, at household level, based on GP lists	Not mentioned	99.3/98.9	NA	99.2/98.7
Sorensen et al[19]	Random, based on census register, allocation before consent	Not mentioned	Intention to treat	Intention to treat	79.9/76.5
Carpenter and Demopoulos[20]	Random number table, at household level, based on GP list	Not mentioned	Intention to treat	Intention to treat	87.9/87.3
McEwan et al[21]	Age- and sex-stratified randomization	Not mentioned	Intention to treat	NA	87.4/91.0
Clarke et al[22]	Randomization stratified by social contact score	Not mentioned	Intention to treat	NA	94.1/90.1
Pathy et al[30]	Randomization by household, no further details given	Independent, blinded assessment of mortality and admissions	Intention to treat	Intention to treat	73.8/72.6
Vetter et al[31] (1992)	Random number tables, no contact with participants	Not mentioned	Intention to treat	96.0/98.5	91.6/95.9
van Rossum et al[16]	Randomization stratified by sex, health status, type of household, social class	Interviewers	Intention to treat	Intention to treat	92.8‡
Fabacher et al[13]	Randomization using sealed envelopes	Not mentioned	79.4/80.5	NA	78.7/79.8
Tinetti et al[23]	Randomization at practice level	Interviewer	Intention to treat	Intention to treat	88.4/81.1
Stuck et al[7] (USA)	Randomization using sealed envelopes, at household level, stratified by age and sex	Interviewer was "not involved in intervention"	Intention to treat	Intention to treat	89.0/85.0
Stuck et al[9] (Switzerland)	Central 1: 2 randomization, stratified by risk of nursing home admission	Interviewers	Intention to treat	Intention to treat	100/99.8
van Haastregt et al[14]	Computer-generated random numbers, at household level	Not mentioned	100/98.1	100/98.1	80.5/80.4
Hébert et al[32]	Randomization stratified by sex, age, and level of disability	Interviewers	98.0/98.4	98.0/98.4	97.9/98.3
Newbury et al[15]	Randomization using sequentially numbered sealed envelopes	Research team was blinded when reporting problems to general practitioners	Intention to treat	Intention to treat	91.8/97.8

*NA indicates not applicable; GP, general practitioner.
†Percentage of those evaluated for the outcome compared with the number randomized (for mortality and nursing home admission) or alive at follow-up (for functional status) by intervention/control group.
‡Data per group not reported.