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Abstract

Background: Preventive primary care outreach interventions with older persons have the potential to decrease mortality and institutionalization.

Methods: We conducted a meta-analysis to assess the effect of preventive primary care outreach interventions on mortality, admissions to long-term care, admissions to acute care hospital, living in the community and use of homemaking and meals on wheels.

Data Sources: Studies were identified by searching MEDLINE, CINAHL, AgeLine, Cochrane Controlled Trials Register, and EMBASE, and by reviewing reference lists of retrieved articles.

Study Selection: Studies were included if patients were 65 years and over and lived in the community; the intervention was primary preventive care outreach defined as proactive, provider initiated care that is above and beyond usual care and provided in a primary care setting; the study was a randomized controlled trial; and at least one patient outcome (as above) was assessed.

Data Extraction: Independent data extraction was conducted by two investigators.

Data Synthesis: Using a random effects approach, summary odds ratios were estimated for each outcome.

Results: Nineteen randomized trials with 14,911 patients were reviewed. Preventive primary care outreach interventions were associated with a reduction of mortality (Summary Odds Ratio [OR] 0.83, 95% confidence interval [CI] 0.75 to 0.91) and an increased likelihood of living in the community (Summary OR 1.23, 95% CI 1.06 to 1.43).

Conclusions: Preventive primary care outreach interventions with older persons can be expected to reduce the risk of dying by 17% and to increase the likelihood of living in the community by 23%.

Introduction

The provision of high-quality, comprehensive care for older Canadians is becoming increasingly challenging because of the aging of society, rising health care costs and the shortage of primary care physicians. These trends are encouraging health care providers and decision makers to explore innovative approaches to patient care. This paper reports on one such approach, preventive primary care outreach (PPCO). We define PPCO as proactive, provider initiated care which is above and beyond demand-led usual care. It is provided in an ambulatory primary care community setting and linked to the usual care system. The goal of PPCO is to identify unrecognised problems and individuals at increased risk, and to link individuals to appropriate care and support. PPCO most often involves an initial comprehensive assessment followed by linkage of individuals to appropriate health and social services. PPCO can be provided by physicians, nurses, or other professionals and volunteers. Such services may be provided through home visits, office visits, telephone contacts, or a combination of these methods. It has been suggested that a preventive approach based on screening those at risk and provision of early intervention should help to prevent functional decline, promote independence, and control social and health costs.[1,2]

The results of primary studies of PPCO interventions with older persons have been mixed, with only some studies demonstrating benefits that are both clinically important and statistically significant. One recent systematic review of 15 trials of preventive home visits to elderly people living in the community concluded that there was no clear evidence in favour of these interventions.[3] However, this review included studies that used resources not readily available in a primary care context (e.g., specialist care) and did not incorporate meta-analysis.

A recent meta-analysis of 15 trials found that home visiting programmes that offer health promotion and preventive care to older people reduced mortality and admissions to long term care.[4] This review, however, also included intervention studies that involved resources not readily available in a primary care context (e.g., consultation by geriatricians). A previous meta-analysis based on seven studies of home assessment services found that mortality at 36 months was reduced by 14% (Common OR 0.86, 95% CI 0.75-0.99).[5] A systematic review of randomized controlled trials of health assessments for older persons found inconsistent study results, with the methodologically stronger studies showing

improvements in health;[6] no meta-analysis was done.

There has not been a meta-analysis specifically aimed at determining the effectiveness of PPCO interventions among community dwelling older persons. We were interested in assessing models of preventive primary care that utilized only primary care resources and were consistent with current approaches to primary care in the developed world. Our inclusion criteria were carefully developed to ensure commonality of studies included in the meta-analysis.

Methods

Our objective was to examine the effect of PPCO interventions on older persons. We hypothesized that PPCO interventions would result in lower mortality rates, fewer admissions to long term care and acute care hospital, a higher proportion of people living in the community (not living in residential care or nursing homes) at the end of the study, and higher proportions of people referred to community services, specifically homemaking and meals on wheels.

Data Sources. We searched MEDLINE (1966 to 2001/07), CINAHL (1982 to 2001/07), AgeLine (1978 to 2001/07), Cochrane Controlled Trials Register (2001/07), and EMBASE (1988 to 2001/07) for reports of primary research. The indexing terms used for article retrieval were:

"aged" and ["geriatric assessment" or "preventive medicine" or "home care services" or "risk assessment"] and "randomized controlled trial." Articles were limited to: "age 65 and over" and "English language." The searches were conducted by two people with specialist knowledge and training in conducting searches for systematic reviews. The reference lists of all retrieved articles were reviewed.

Study Selection. The computer searches and reference lists of all retrieved articles were reviewed by two investigators. Complete texts of all potentially relevant articles were reviewed using the following inclusion criteria: the majority of patients were aged 65 and over; patients were community dwelling (not living in residential care or nursing homes); the intervention was PPCO defined as proactive, provider initiated care (not in response to a patient health problem or event such as hospitalization or a fall) that was above and beyond usual care; the intervention was provided in the context of the usual primary care community setting; the study design was a randomized trial; and at least one patient outcome was reported. We report here on randomized controlled trials in which one or more of the following patient

outcomes was assessed: mortality, number of persons admitted to long-term care and acute care hospital, number of persons living in the community, and number of persons referred to homemaking or meals on wheels services. To resolve disagreements about inclusion of studies, a third investigator was consulted and consensus was reached.

Studies were excluded if patients were selected on the basis of a specific existing condition such as dementia or a history of falls, and if patients were part of a post-hospital discharge program. Studies were also excluded if they used resources generally available only in the secondary care context (e.g., consultations with geriatricians).

Data Extraction. Teams of two investigators independently abstracted data from all studies that met our eligibility criteria. One team extracted data related to characteristics of the study population and types of interventions and another team extracted outcome data. Disagreements were resolved by consensus. We attempted to contact authors when data were missing. Four authors provided additional data as noted in Table 1.

The methodological quality of each study included was assessed using the Jadad scale which has demonstrated validity.[7] This instrument assesses three areas: (a) randomization, (b) double blinding, and (c) reporting of withdrawals and dropouts. The maximum possible score for this scale is five. Two investigators independently appraised the quality of each study and resolved disagreements by discussion.

Data Analysis. Summary odds ratios were calculated using methods described by Fleiss.[8] Two-by-two tables were constructed for each outcome in each study for which data were available. A value of 0.5 was added to each cell of the two-by-two table to adjust for zero cell frequencies.[9] The summary estimates of effect were calculated by combining the individual trial estimates weighted by the inverse of their variances. Both fixed and random effects[10] estimates were calculated. Heterogeneity was assessed using the Q statistic, which follows a chi-square distribution with N-1 degrees of freedom, where N is the number of trials.[8] We defined statistical heterogeneity as $p<0.10$.

For each outcome, we analyzed data provided for the final follow-up (range 12-60 months). The denominator used to calculate effect sizes for the outcomes was the number of subjects randomized. We also examined the effect of length of follow-up on mortality by calculating summary odds ratio at 6, 12, 24,

36, and 48 months separately using all possible data. In an exploratory analysis, we examined 7 methodologic, patient population and intervention characteristics that might modify the effect of PPCO (See Table 2). To test whether differences among studies in these characteristics influenced the magnitude of treatment effect, for each variable we divided the trials into two pre-specified categories. We used the z-score to test for a difference in effect size between the two groups by dividing the difference of the summary log relative risk from both groups by the standard error of the difference. Referral to homemaking services and meals on wheels, assessed in only two trials, were excluded from this analysis.

We used a logistic regression method to adjust for all 7 covariates simultaneously.[11] Fitted cell frequencies were estimated for each study using logistic regression to adjust for all factors that were hypothesized as possible explanations of heterogeneity in treatment effect. These adjusted cell frequencies were then used as input for the standard meta-analysis program to estimate an adjusted summary odds ratio.

Results

The search strategies yielded 1,030 citations. We identified and screened 242 potentially relevant randomized controlled trials; 90 studies were retrieved for more detailed evaluation (See Figure 1 for study flow). Among these, 22 reports of 19 studies were identified that met the inclusion criteria.[12-32] Descriptive details regarding these 19 studies are presented in Table 3. In fourteen studies, the sample was selected from practice settings such as a primary care physician's registry[12-18,21-25,27,32]; in the other five studies, the sample was selected from a general population base such as a census list or health insurance list.[26,28-31]

Typically, the intervention involved an initial health and social assessment or screening of subjects by a professional or volunteer. Subjects in the intervention group received one or more home, phone or office visits by family physicians, nurses, and/or volunteers. During these visits, subjects received health teaching and were referred to relevant community agencies for health and social services (e.g., nursing visits, meals on wheels, homemaking), or to their family physician for follow-up of health issues. The frequency of follow-up contacts varied as did the duration of the intervention. Duration of

follow-up varied from 12 to 60 months, with fourteen studies following patients for 24 months or longer. Table 4 indicates the outcomes assessed in the 19 trials included in this meta-analysis.

The methodological assessment of studies is summarized in Table 5. Double blinding was not possible in any of the studies. From 15 studies that provided data, we calculated the total loss to follow-up as 7.2% (range 0% to 18%).

The main results are summarised in Table 6, and the results for the outcomes of mortality, living in the community, admission to long term care and acute care hospital are presented in Tables 7 to 10.

Mortality (19 studies). The summary OR was 0.83 (95% CI 0.75 to 0.91), a 17% reduction in mortality (Table 7). In all but three studies,[12,13,25] the intervention was associated with a reduction in mortality, with exact ORs ranging from 0.25 to 0.91. In only two studies was the reduction statistically significant[17,18] Heterogeneity of study results was not significant (p=0.39). Assuming a mortality rate in the absence of the intervention equivalent to the overall mortality rate in the control arms of the studies included in our review, PPCO would prevent one death for every 36 elderly people targeted for intervention.

Living in the community (7 studies). In all 7 trials, patients receiving PPCO interventions were more likely to be living in the community at the end of the study (Table 8). For two of these trials,[15,26] the increased likelihood of living in the community was statistically significant. The summary OR was 1.23 (95% CI 1.06 to 1.43). Heterogeneity of study results was not significant (p=0.22).

Admission to long-term care (12 studies). The summary OR for admission to long-term care was 0.88 (95% CI 0.74 to 1.05) (Table 9). PPCO interventions were associated with a reduction in admissions to long-term care in seven trials[12,15,18,25-27,29] and an increase in admissions in four trials[17,28,30,31]; for one study the exact odds ratio was 1.0.[32] In none of these trials was the increase or decrease in admissions to long-term care statistically significant. Heterogeneity of study results was not significant (p=0.66).

Admission to acute care hospital (9 studies). The summary odds ratio for admissions to acute care hospital was 1.00 (95% CI 0.85 to 1.16) (Table 10). Heterogeneity of study results was significant (p=0.04).

Referral to Homemaking Services (2 studies). The summary OR was 1.49 (95% CI 1.02 to 2.16), indicating an increase in referrals to homemaking services. Heterogeneity of study results was not significant (p=0.45).

Referral to Meals on Wheels (2 studies). The summary OR for referral to meals on wheels was 1.31 (95% CI 0.67 to 2.57). Heterogeneity of study results was not statistically significant (p=0.13).

Length of Follow-Up. The summary OR for mortality was significant at 12 months (OR=0.80, 95% CI 0.66 to 0.98) and at 24 months (OR=0.78, 95% CI 0.70 to 0.87) (Table 11).

Exploratory Analyses. Methodological (study quality) and intervention characteristics (frequency of contact, length of follow-up) did not modify the effect of PPCO on the outcomes of mortality, living in the community, and admission to long-term care or acute care hospital. Patient population characteristics (source of sample, age, risk status, and geographical area) did not modify the effect of PPCO on mortality, admissions to long-term care or admission to acute care hospital. For proportion of people living in the community, trials conducted with younger persons had significantly higher summary odds ratios compared with trials conducted with older persons (Summary OR=1.68 and 1.13 respectively, p=0.03). For the outcome of mortality, the summary OR for trials conducted in Canada was 0.75 compared with a summary OR of 0.83 for trials conducted in other countries (p=0.39).

Adjusted analysis. When we adjusted for all covariates (trial quality, age, sample source, target group risk, geographical location of trial, frequency of contact, and length of follow-up) the adjusted summary random effects ORs for the outcomes of mortality, living in the community and admission to long term care and acute care hospital were very similar to the unadjusted ORs. Two trials with missing data [15,17] were excluded from this analysis.

Random vs Fixed Effects Model. We found minimal to no differences in summary odds ratios when using the random effects compared to fixed effects model. For mortality, for example, the summary odds ratio using the random effects model was 0.83 (95% CI 0.75 to 0.91) compared to 0.83 (95% CI 0.76 to 0.90) for the fixed effects model.

Discussion

The results of this meta-analysis of 19 randomized controlled trials provide evidence that PPCO interventions reduce the risk of mortality and increase the likelihood of living in the community. The dramatic impact of the interventions on these outcomes suggests that PPCO interventions can make a difference in the lives of community dwelling older persons. The effect of PPCO interventions on

mortality (OR=0.83, 95% CI 0.75 to 0.91) is comparable to the effect of pharmacotherapy for hypertension in the elderly (OR=0.84, 95% CI 0.75 to 0.94).[33] PPCO would prevent one death for every 36 older persons targeted for intervention compared to one death prevented for every 63 hypertensive elderly persons treated over five years. Because PPCO is applicable to a larger segment of the elderly population than drug treatment of hypertension, PPCO has the potential to produce greater overall health benefits.

The findings of our meta-analysis are generally consistent with the results of a recent meta-analysis of home visiting programmes that offer health promotion and preventive care to older people.[4] That study, which included six of the trials used in our meta-analysis and 9 others not meeting our inclusion criteria, found that home visiting was associated with a 24% reduction in mortality in members of the general elderly population and a 28% reduction in mortality in frail older persons. That study also found no significant reduction in admission to hospital (OR 0.95; 0.80 to 1.09). Unlike our meta-analysis, however, that study found a significant reduction in admission to long term care of 35%.

The findings of our meta-analysis are in sharp contrast with the conclusion of a recent systematic review of preventive home visits to elderly.[3] That systematic review, which included 9 of the studies used in our meta-analysis, found no clear evidence in favour of preventive home visits. These contradictory findings may be due to the different (but overlapping) sets of studies included and to our use of meta-analysis which the previous review did not employ.

Four of the included studies were conducted in Canada. The results of these trials were comparable to those of the whole set of studies included in this review. For example, the summary OR for mortality for Canadian studies was 0.75, compared with 0.83 for all studies. In three of the four Canadian studies,[26-28] PPCO interventions were associated with a reduced risk of dying and admission to long term care, although individual study results were not statistically significant. One Canadian study[26] found that PPCO interventions resulted in a statistically significant two-fold increase in the likelihood of living in the community.

Our meta-analysis does not include any unpublished studies and included only English language articles. The existence, direction, magnitude and importance of bias resulting from the exclusion of unpublished and non-English language studies is controversial.[34-36]

We used a validated scale to determine the quality of studies.[7] However, double blinding (one of the scale's criteria) was not applicable to this literature. Given considerable variability in study quality, we included all studies in the meta-analysis and then performed an adjusted analysis that included study quality as a covariate.

Implications for Future Research

While these results in themselves provide important information to assist planning decisions, a number of unanswered questions remain. It is possible that PPCO interventions, like geriatric evaluation and management interventions,[37,38] may result in more positive outcomes when targeted at specific groups of frail elderly people. Patient characteristics such as age and degree of functional impairment may be useful selection criteria for such interventions.

Some of the nineteen studies reviewed for this meta-analysis provided data related to other outcomes such as physical functioning or activities of daily living, quality of life, cognitive or mental status, self-rated health, and economic impact, but the data were not comparable across studies. Thus, we do not know the impact of preventive primary care outreach on such outcomes. Well designed and adequately powered intervention studies are clearly needed to address these unanswered questions.

Conclusion

Based on a meta-analysis of nineteen randomized controlled trials, PPCO interventions can be expected to reduce the risk of mortality by 17% among community dwelling older persons. PPCO interventions can also be expected to increase the likelihood of living in the community by 23%. Our analyses do not indicate that PPCO interventions reduce admissions to long term care or acute care hospitals. This study represents the first known meta-analysis of the impact of PPCO interventions. The results have important implications for future research and health services planning.

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Table 1

Inclusion and Exclusion Criteria

Inclusion Criteria
1. The majority of patients were aged 65 and over. 2. Patients were community dwelling (not living in residential care or nursing homes). 3. The intervention was Preventive Primary Care Outreach defined as proactive, provider initiated care (not in response to a patient health problem or event such as hospitalization or a fall) that was above and beyond usual care. 4. The intervention was provided in the context of the usual primary care community setting. 5. The study design was a randomized trial. 6. At least one of the following patient outcomes was reported: mortality, living in the community, admission to acute care hospital, admission to long term care, referral to homemaking, referral to meals on wheels.
Exclusion Criteria
1. Patients were selected on the basis of a specific existing condition (e.g., dementia or a history of falls). 2. Patients were part of a post-hospital discharge program. 3. The intervention used resources generally available only in the secondary care context (e.g., consultations with geriatricians).

Table 2

Methodologic, Patient Population and Intervention Characteristics that Could Modify the Effect of PPCO

A. Methodologic Characteristic
1. Methodological quality (score of 2 or less vs. 3 or more)
B. Patient Population Characteristics
1. Source of sample (practice-based vs. population-based). 2. Age (mean/median less than 75 years vs. mean/median equal to or greater than 75 years). 3. Targeting of a high risk group (intervention targets a high risk group vs. intervention does not target a high risk group). 4. Geographic area (Canada vs. others).
C. Intervention Characteristics
1. Frequency of contacts (one or less per year vs. 2 or more per year). 2. Length of follow-up (24 months or less vs. 36 months or more).

Table 3

Description of Randomized Controlled Trials That Evaluated Preventive Primary Care Outreach Interventions for Older Persons

Study	Sample size and characteristics	Intervention	Intervenors
Burton, 1995; 1997; German 1995 (USA)	4195 persons aged 65 and over on practice lists; 57% aged 65-74; 34% aged 75-84; 8% aged 85 plus; 63% female; providers recruited from 102 solo/partnership practices, 13 community group practices, and three hospital based general medicine clinics ‡	Intervention group was mailed a voucher to receive a free preventive exam from their physician for each of two years of the intervention; physician could request voucher be sent to patient for follow-up counseling visit (focused on health risks) after each exam §	Physicians, nurse practitioners, physician assistants, doctors of osteopathy
Carpenter, 1990 (UK)	539 persons aged 75 and over from two general practices; 87% aged 75-84; 13% aged 85 and over; 65% female*†‡	Intervention group received volunteer visits over 3 years to complete activity of daily living questionnaire; those with no disability were visited every 6 months, those with some or severe disability were visited every 3 months; people with increased scores were referred to general practitioner; referrals to other health agencies§	Volunteers
Clarke, 1992 (UK)	523 persons aged 75 and over living alone from large group practice of 12 family practitioners*†‡	Intervention group had visits by lay community worker for 1.25-2 years; minimum of 3 visits in first year. Type of assistance tailored to personal requests and included social, financial, housing, nursing and medical services§	Lay community worker
Dalby, 2000 (Canada)	142 persons aged 70 and over at risk of functional decline listed on roster of 2 physicians affiliated with a capitation-funded family practice; mean age 79; 67% female*†‡	Visiting nurse developed care plan with physician, patient, family; follow-up visits and phone calls as needed over 14 months to promote health, provide support, make referrals§	Nurses
Hall, 1992 (Canada)	167 persons aged 65 and over receiving personal care at home; mean age 78 years; 78% female* †	Both groups received standard long term care services including screening and assessment, arrangement of services, review at 3 months and at least yearly for 3 years; treatment group also received visits from project nurse, development of personal health plan, and referral. Frequency of visits varied, average of 4-12 hours per annum per client§	Nurse
Hay, 1998 (Canada)	619 persons aged 65 and over listed on practice roster who screened positive for health concerns or risks; mean age 74; 58% female†‡	Intervention subjects were referred for follow-up care for issues identified on the screening form; follow-up care was provided by physician, nurse practitioner, social worker, chiropodist, optometrist and nurse responsible for giving influenza vaccine	Physicians

Table 3: Description of Randomized Controlled Trials That Evaluated Preventive Primary Care Outreach Interventions for Older Persons (cont'd)

Study	Sample size and characteristics	Intervention	Intervenors
Hébert, 2001 (Canada)	494 persons aged 75 and over listed on the Quebec Health Insurance Plan; identified to be at risk of functional decline by postal questionnaire; mean age 80; 64% female*†	Assessment visit by nurse who sent results to general practitioner; referral to specialized resources and contact with GP; monthly contact with clients for 1 year§	Nurse
Hendriksen, 1984 (Denmark)	600 persons aged 75 or over listed on a register of municipal social welfare authorities; median age 78; 62% female*	Intervenor visited subjects, conducted assessment, applied for and coordinated community services; intervention group received home visits every three months over 3 years and could phone to request additional visits§	One medical resident and two home nurses each visited the same third of the intervention group throughout the study
Leveille, 1998 (USA)	201 persons aged 70 and over registered in two HMOs; receiving treatment for at least one chronic condition excluding dementia or terminal disease; mean age 77; 56% female*†‡	Targeted multi-component disability prevention and disease management program at a senior centre for one year; nurse met with each person to develop health management plan addressing risk factors for disability; follow-up visits (average of 3) and phone calls (average of 9) by nurse; volunteer mentors provided peer support; referrals to health services§	Geriatric nurse practitioner; volunteer mentors
McEwan, 1990 (UK)	296 persons aged 75 and over registered in a general practice*‡	Nurses visited subjects and completed assessment, gave health advice, and made referrals. One visit.	District nurses
Newbury, 2001 (Australia)	100 persons aged 75 and over registered in 6 general practices; median age 79; 63% female*‡	One health assessment in home by nurse and reported to GP	Nurse
Pathy, 1992 (UK)	725 persons aged 65 or over registered with a general practice; mean age 73; 60% female†‡	General practitioner sent postal questionnaire yearly for three years to subjects. If questionnaire indicated a problem, the health visitor arranged home visits and gave practical advice, health education, or referred to GP or community services	Health visitor (nurse)
Schraeder, 2001 (USA)	941 persons aged 65 and over who had at least one risk factor (hospitalized in previous 6 months, lived alone, no caregiver, taking 4 or more prescription medications, difficulty walking, limitations in ADL, difficulties with memory, incontinent, experiencing multiple illnesses or disabilities); registered with one of 32 family practice or 19 internal medicine physicians; mean age 76; 73% female*†‡	Intervention patients received in-home assessment by the nurse. Collaborative team generated a plan of care. Case assistant provided telephone monitoring, education, health promotion, referral to and coordination of supportive services. Team provided flexible home or office visits over 2 years§	Collaborative team of physicians, nurses, and case assistants
Sorensen, 1988 (Denmark)	1554 persons aged 75, 80 and 85 drawn from the Central National Register; for intervention group, 33% in each age group and 49% female*	One home visit by social worker and physician. Social worker conducted assessment, referred to social services. Physician conducted medical exam. Referred to general practitioner as needed.	Social worker and physician

Table 3: Description of Randomized Controlled Trials That Evaluated Preventive Primary Care Outreach Interventions for Older Persons (cont'd)

Study	Sample size and characteristics	Intervention	Intervenors
Tulloch, 1979 (UK)	295 persons aged 70 or more from a general practice register; 44% aged 70-74; 27% aged 75-79; 29% aged 80 plus; 46% female*‡	Letter sent with medical questionnaire and offer of physical exam (at medical office or person's home if required). Patients kept under regular surveillance in geriatric clinic run by general practitioner, practice nurses and health visitors for two years	General practitioner, practice nurses, and health visitors
van Rossum, 1993 (Netherlands)	580 persons aged 75-84 years living in the city of Weert; 73% aged 75-79; 27% aged 80-84; 58% female*	Home visits by nurses four times a year for three years with extra visits if necessary; subjects could contact nurse by phone to discuss problems; nurses discussed health topics, gave information and advice, referred to other services or general practitioner§	Nurses
Vetter, 1984 (UK)	1148 persons aged 70 years from two general practice registers‡	Health visitor made minimum of one home visit per year for 2 years to provide health education and prevention, referral to services and follow-up. Health visitors followed up if problems identified at yearly visit.	Health visitors
Wagner, 1994 (USA)	1559 persons aged 65 or older enrolled in three group health cooperatives; mean age 72.5; 60% female†‡	Nurse assessment visit and follow-up interventions targeting risk factors for disability and falls (exercise, alcohol, falls, medication use, hearing or vision). Referrals made. 1-2 follow-up phone calls in first month after visit; mailed reminders; written summaries of risk factors placed in medical record. No active intervention in year 2§	Nurses
Wasson, 1992 (USA)	497 males aged 54 or older attending a primary care clinic; mean age 66‡	For intervention clients, clinicians doubled their recommended interval for face-to-face follow-up and scheduled three intervening telephone contacts.§	Internists, physicians assistants, nurse practitioners

Notes: * sample classified as older (age indeterminate in Vetter, 1984)
† sample classified as targeted risk group
‡ sample source classified as practice
§ intervention classified as frequent contacts

HMO: Health Maintenance Organization; GP: General Practitioner

Table 4

Outcomes Assessed in Randomized Controlled Trials of Preventive Primary Care Outreach Interventions for Older Persons

Study	Duration of Follow-up (months)	Outcomes						
		Mortality	Living in Community	Admission to Long Term Care	Admission to Acute Care Hospital	Referral to Home-making	Referral to Meals on Wheels	Other
Burton, 1997	48	yes		yes	yes			use and costs of health services, physical and mental health status, health behaviours
Carpenter, 1990	36	yes		yes	yes	yes	yes	ADL, falls
Clarke, 1992	42	yes	yes					ADL, perceived health, use of health and social services
Dalby, 2000	14	yes		yes				use of health services
Hall, 1992	36	yes	yes	yes				
Hay, 1998	24	yes		yes				ADL, use and cost of health services, mental health score
Hébert, 2001	12	yes		yes				functional ability, general wellbeing, perceived social support
Hendriksen, 1984	36	yes	yes	yes	yes	yes	yes	contacts with GP; home nursing care, social services, costs
Leveille, 1998	12	yes			yes			disability days; physical health, depression, physical performance, use and costs of health services
McEwan, 1990	20	yes						ADL, morale, health profile, use of health and social services
Newbury, 2001	12	yes		yes				number of health problems, physical function, self rated health, memory, depression, falls
Pathy, 1992	36	yes*	yes*	yes	yes*			GP contacts, functional status, general health status, quality of life, self rated health

Table 4: Outcomes Assessed in Randomized Controlled Trials of Preventive Primary Care Outreach Interventions for Older Persons (cont'd)

Study	Duration of Follow-up (months)	Outcomes						
		Mortality	Living in Community	Admission to Long Term Care	Admission to Acute Care Hospital	Referral to Home-making	Referral to Meals on Wheels	Other
Schraeder, 2001	24	yes			yes			health status, medicare payments
Sorensen, 1988	60	yes*	yes*	yes*				use of health and social services; self rated health, quality of life, ADL/IADL
Tulloch, 1979	24	yes			yes			resolution of problems, use of health and social services
van Rossum, 1993	36	yes	yes*	yes	yes			self rated health, functional status, well being and mental state, use and cost of services
Vetter, 1984	24	yes	yes*	yes*				physical disability, anxiety, depression, subjective view of life, use of health services
Wagner, 1994	24	yes						physical function, falls, health behaviors
Wasson, 1992	24	yes			yes			use of health services and costs

*Additional data obtained from author

Table 5

Quality Assessment of Randomized Controlled Trials of Preventive Primary Care Outreach Interventions for Older Persons

Study	Randomi-zation Reported	Random Allocation Described	Random Allocation Appropriate	Double Blinding Reported	Double Blinding Described	Double Blinding Appropriate	Withdrawals and Dropouts Described	Total Score
Burton, 1997	Yes	No	NA	No	NA	NA	Yes	2
Carpenter, 1990	Yes	Yes	Yes	No	NA	NA	Yes	3
Clarke, 1992	Yes	No	NA	No	NA	NA	Yes	2
Dalby, 2000	Yes	Yes	Yes	No	NA	NA	Yes	3
Hall, 1992	Yes	Yes	Yes	No	NA	NA	Yes	3
Hay, 1998	Yes	No	NA	No	NA	NA	Yes	2
Hébert, 2001	Yes	Yes	Yes	No	NA	NA	Yes	3
Hendriksen, 1984	Yes	No	NA	No	NA	NA	Yes	2
Leveille, 1998	Yes	Yes	Yes	No	NA	NA	Yes	3
McEwan, 1990	Yes	No	NA	No	NA	NA	Yes	2
Newbury, 2001	Yes	Yes	Yes	No	NA	NA	Yes	3
Pathy, 1992	Yes	No	NA	No	NA	NA	Yes	2
Schraeder, 2001	Yes	No	NA	No	NA	NA	Yes	2
Sorensen, 1988	Yes	No	NA	No	NA	NA	Yes	2
Tulloch, 1979	Yes	No	NA	No	NA	NA	Yes	2
van Rossum, 1993	Yes	Yes	Yes	No	NA	NA	Yes	3
Vetter, 1984	Yes	No	NA	No	NA	NA	No	1
Wagner, 1994	Yes	No	NA	No	NA	NA	No	1
Wasson, 1992	Yes	Yes	Yes	No	NA	NA	Yes	3

Scoring of Jadad scale:[7]
Score one point for each 'yes' or zero points for each 'no' to the following questions:
1. Is randomization reported? (Score 1 if yes)
2. Was the method of randomization described? (Score 1 if yes)
3. Was the randomization method appropriate? (Subtract 1 if no)
4. Is double-blinding reported? (Score 1 if yes)
5. Was there a description of the method used to double blind? (Score 1 if yes)
6. Was the double blinding method appropriate? (Subtract 1 if no)
7. Was there a description of withdrawals and dropouts for each arm? (Score 1 if yes)

Table 6

Main Results

Outcome	Number of Trials	Total Sample Size	Random Effects Summary Odds Ratio (95% Confidence Interval) *	Random Effects P-value	Range of Odds Ratios	Test of Heterogeneity P value†
Mortality	19	14911	0.83 (0.75, 0.91)	<0.001	0.25-2.14	0.39
Living in the community	7	5297	1.23 (1.06, 1.43)	0.01	1.03-2.07	0.22
Admission to long-term care	12	10872	0.88 (0.74, 1.05)	0.16	0.31-1.39	0.66
Admission to acute care hospital	9	8617	1.00 (0.85, 1.16)	0.96	0.53-1.55	0.04
Referrals to homemaking	2	1139	1.49 (1.02, 2.16)	0.04	1.26-1.68	0.45
Referrals to meals on wheels	2	1139	1.31 (0.67, 2.57)	0.43	0.96-1.93	0.13

*The summary OR is a weighted average of the ORs from all the studies reporting the outcome where the OR from each study is weighted by the precision of the estimate (1/variance). The 95% confidence intervals reported here were calculated using a random effects model.
†P values for test of heterogeneity of the summary odds ratio using the Q statistic

Table 7

Mortality

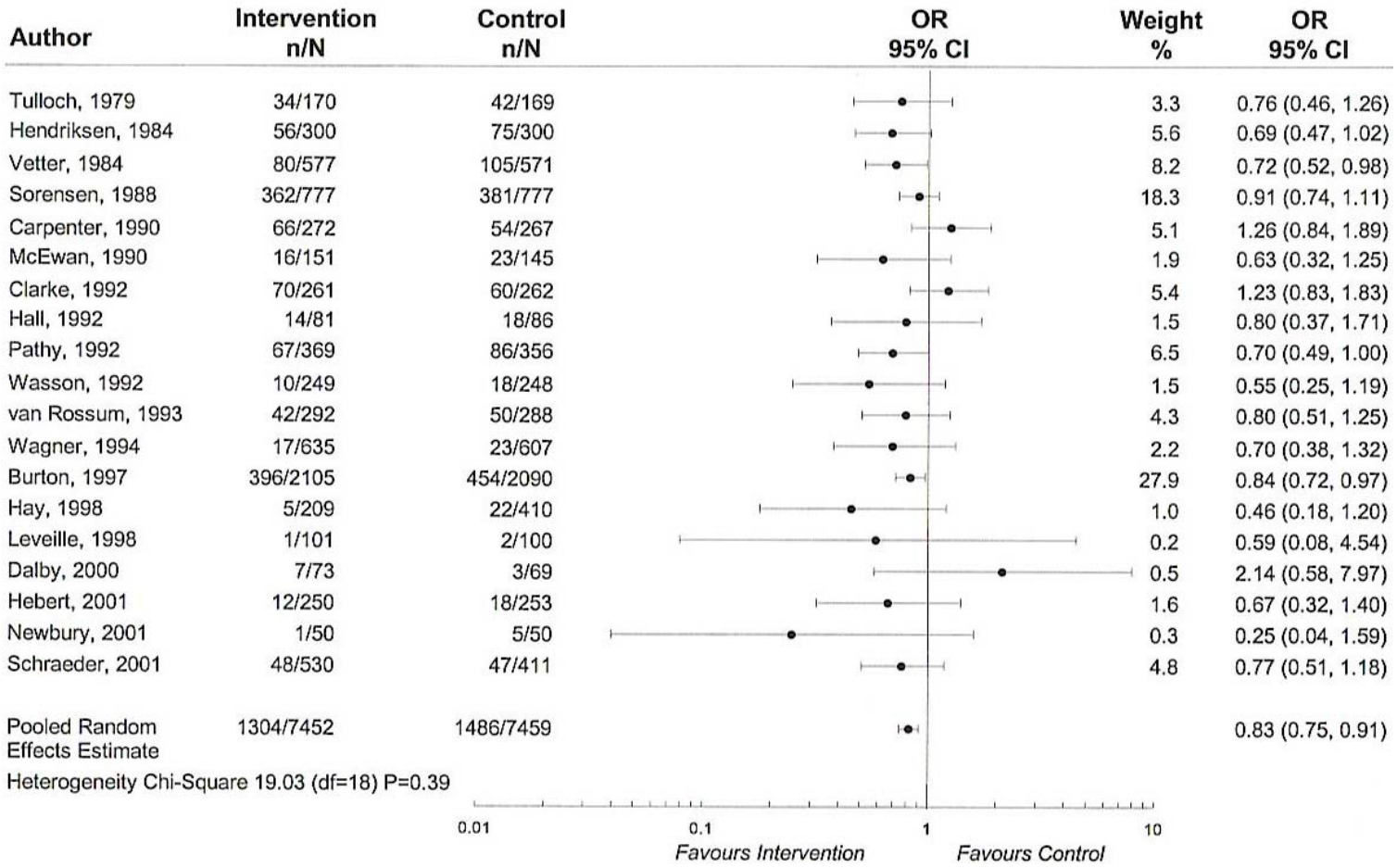


Table 8

Living in the Community

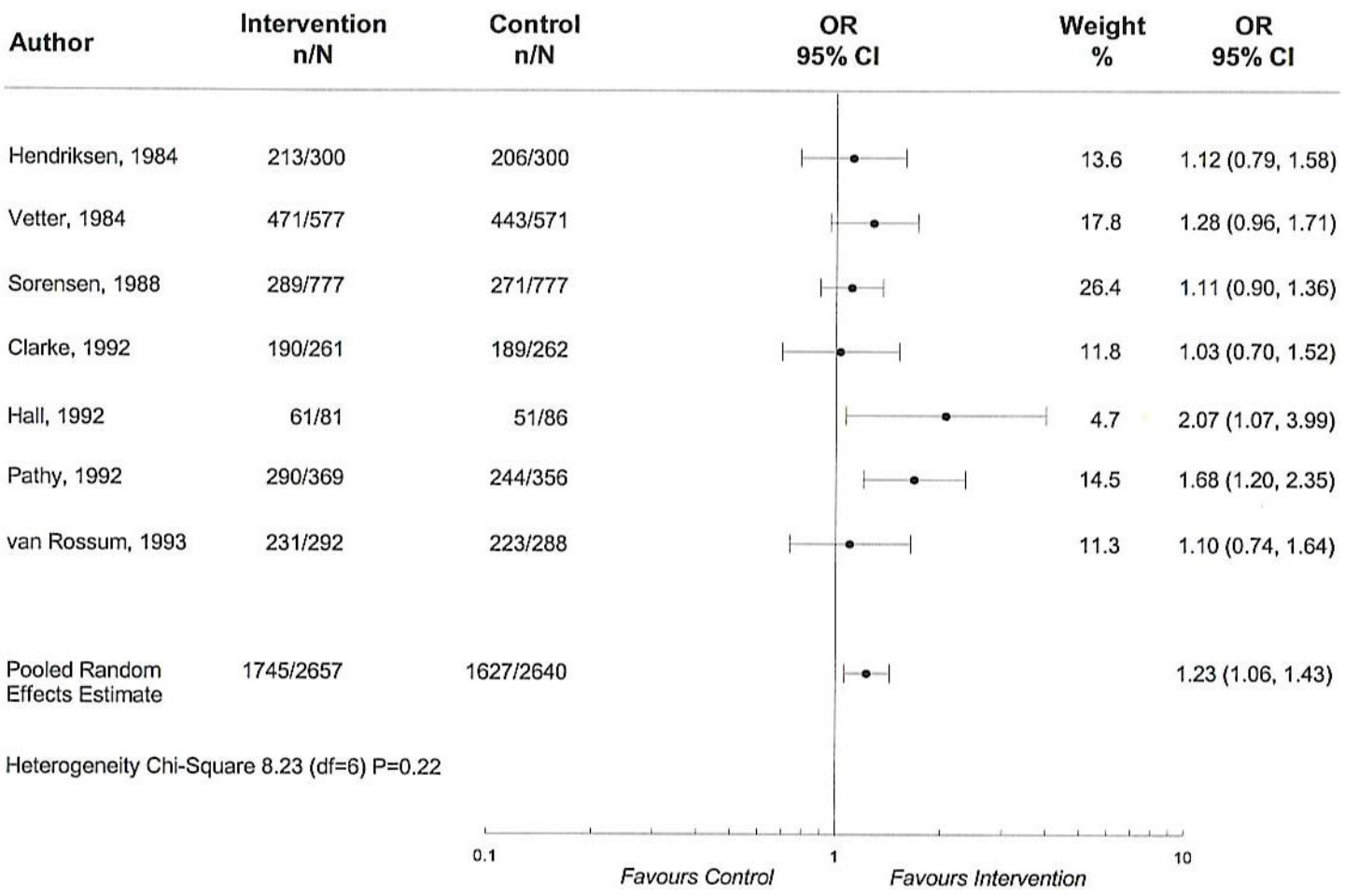


Table 9

Proportion of People Admitted to Long Term Care

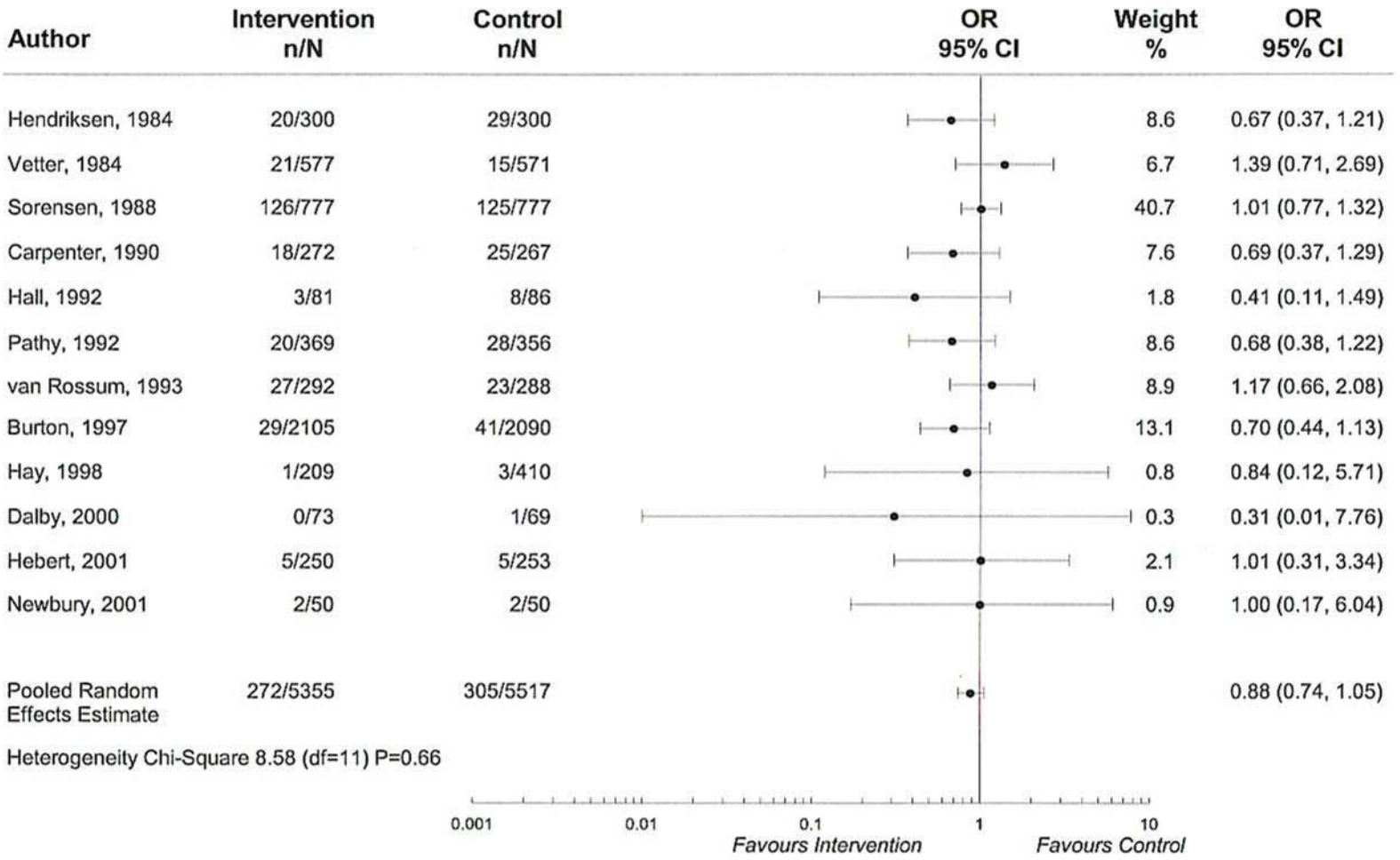


Table 10

Proportion of People Admitted to an Acute Care Hospital

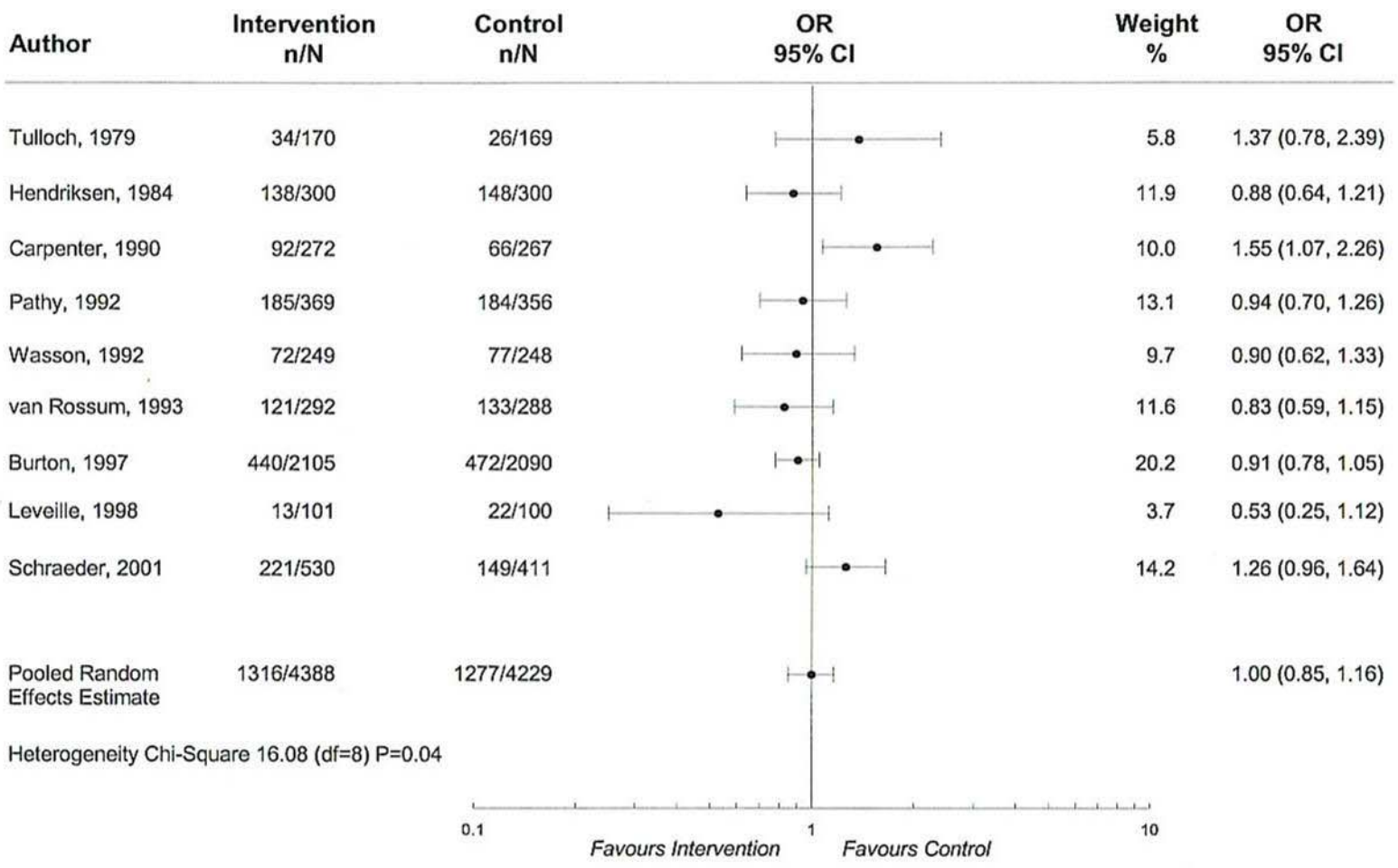


Table 11

Mortality Summary OR and 95% Confidence Intervals by Length of Follow-up

Length of Follow-up	Number of Studies	Total Sample Size	Heterogeneity P-value	Summary OR 95% CI
6 Months	n=2	n=1123	p=0.99	1.00 (0.57, 1.77)
12 Months	n=11	n=5714	p=0.80	0.80 (0.66, 0.98)
24 Months	n=11	n=13426	p=0.87	0.78 (0.70, 0.87)
36 Months	n=7	n=4688	p=0.20	0.90 (0.75, 1.06)
48 Months	n=2	n=5749	p=0.15	0.90 (0.76, 1.08)

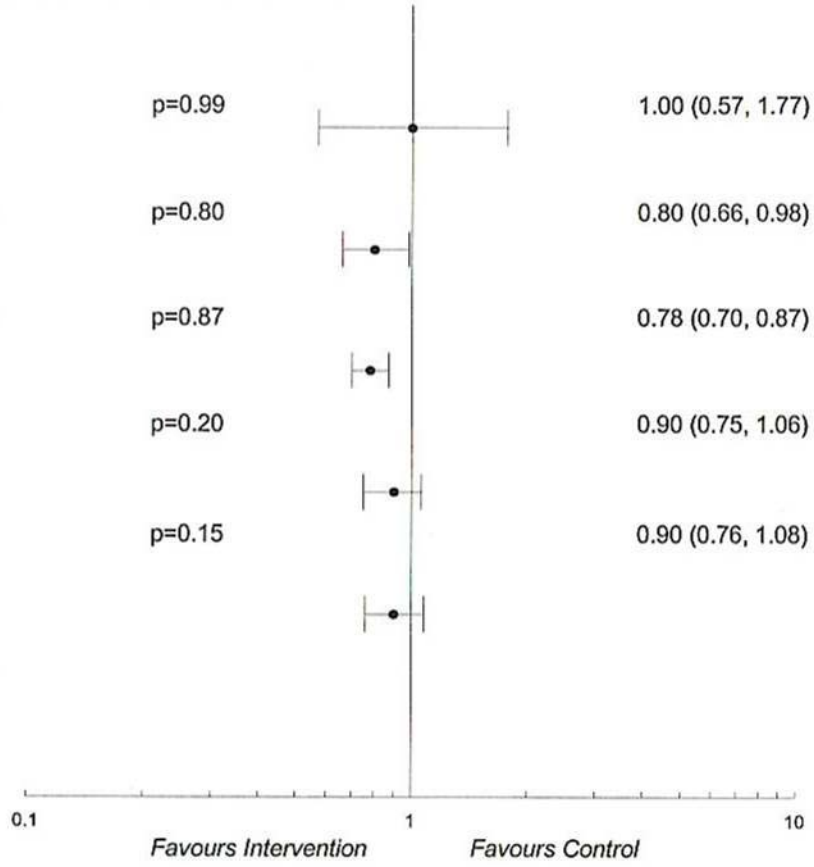
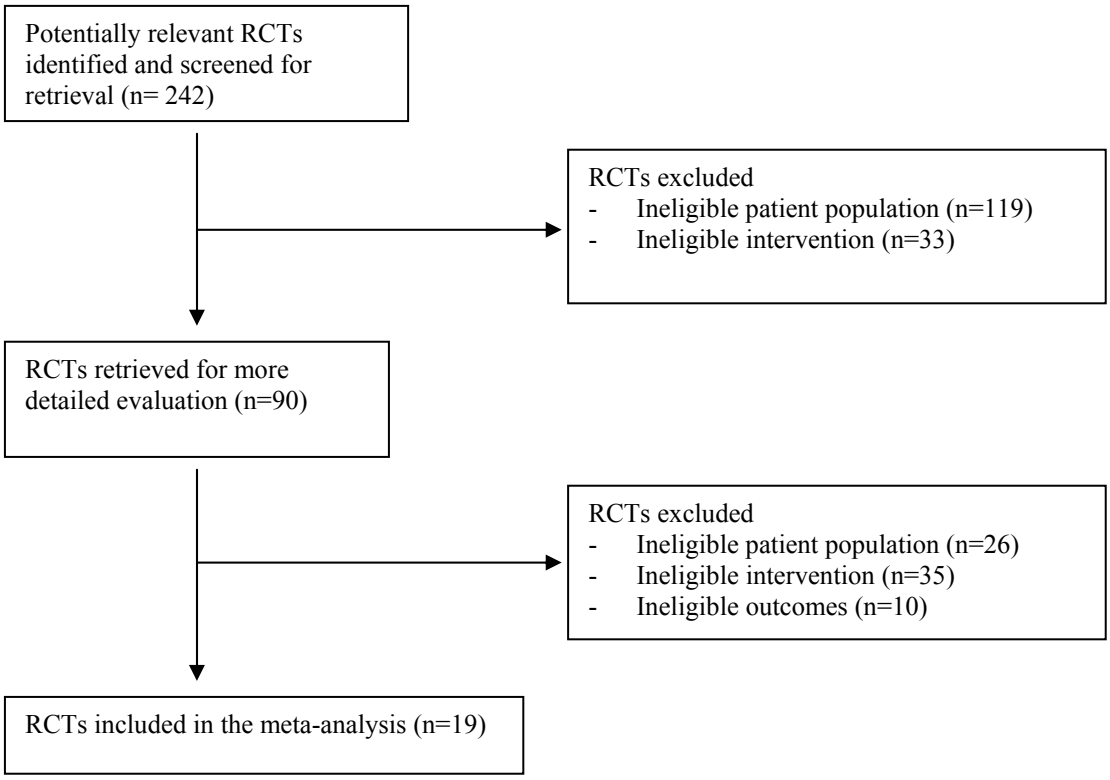


Figure 1

Study Flow