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[Intervention Review]

Community screening for visual impairment in the elderly

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ABSTRACT

Background

While the aims of multicomponent screening of older people are broad, any benefit arising from the inclusion of a vision component in the assessment will necessarily be dependent on improving vision.

Objectives

To assess the effects on vision of mass screening of older people for visual impairment.

Search methods

We searched the Cochrane Central Register of Controlled Trials (CENTRAL) (which contains the Cochrane Eyes and Vision Group Trials Register) (*The Cochrane Library*, Issue 1, 2008), MEDLINE (1966 to February 2008), EMBASE (1980 to February 2008), PubMed (on 8th March 2006; last 90 days), UK Clinical Trials Gateway on 29 February 2008, SciSearch and reference lists of relevant trial reports and review articles. We contacted investigators to identify additional published and unpublished trials.

Selection criteria

We included randomised trials of visual or multicomponent screening for identifying vision impairment in people aged 65 years or over in a community setting.

Data collection and analysis

Both authors independently extracted data and assessed trial quality.

Main results

Visual outcome data were available for 3494 people in five trials of multicomponent assessment. Length of follow up ranged from two to four years. All the trials used self-reported measures for visual impairment, both as screening tools and as outcome measures. In four of the trials people reporting visual problems were referred to either eye services or a physician. In one trial people reporting visual problems received information about resources in the community designed to assist those with poor vision. The proportions of participants in the intervention and control groups who reported visual problems at the time of outcome assessment were 0.26 and 0.23 respectively (risk ratio for visual impairment 1.03, 95% confidence interval (CI) 0.92 to 1.15). Visual outcome data were also available for 1807 people aged 75 years and over in a cluster randomised trial in which physicians' general practices were randomised to two different screening strategies; universal or targeted. Three to five years after screening, the risk ratio for visual acuity less than 6/

18 in either eye comparing universal with targeted screening was 1.07 (95% CI 0.84 to 1.36, $P = 0.58$). The mean composite score of the National Eye Institute 25 item visual function questionnaire was 85.6 in the targeted screening group and 86.0 in the universal group, a difference of 0.4 (95% CI -1.7 to 2.5, $P = 0.69$).

Authors' conclusions

There is no evidence that community-based screening of asymptomatic older people results in improvements in vision.

PLAIN LANGUAGE SUMMARY

Community screening for visual impairment in the elderly

Visual impairment is common among older people and is associated with falls and reduced quality of life. Visual problems in older people are often not reported to medical services. Screening has been recommended because vision could be improved by encouraging treatment in the majority of older people with impaired vision. The review found five studies in which vision was tested as part of a broader screening assessment. No improvement in vision was seen two to four years after screening compared to elderly people who were not screened. This may be due to the lack of a clear plan of intervention for visual problems found on screening. In another study, the risk of having visual impairment in either eye was similar with universal and targeted screening, three to five years after screening.

BACKGROUND

Health services for older people are of increasing importance. In promoting health for older people, in recent years there has been a change in emphasis away from a medically-orientated approach and towards an approach which focuses on the improvement of functional ability and quality of life (Rubenstein 1989; Williams 1993). Improving sensory function is central to this approach.

A number of community surveys have demonstrated high levels of visual impairment among older people (Klein 1991; Wormald 1992), much of which could potentially be improved by treatment. A variety of adverse factors have been reported in association with visual impairment including: reduced functional status, social interaction and quality of life; depression; and falls.

Multicomponent assessment of older people was originally developed in the United Kingdom (Williamson 1964) and has been introduced in many countries. Multicomponent assessment aims to determine an older person's medical, social, psychological and functional problems, and to form a plan for treatment and follow up. Most forms of this assessment include some attempt to assess vision. While multicomponent assessment has been shown to produce some small overall benefits (Stuck 1993), exactly which procedures within the assessment are effective and which are ineffective is uncertain. Specific screening procedures for chronic open-angle glaucoma or diabetic retinopathy have not been included in trials or programmes of multicomponent screening assessments.

Although the aim of improving visual impairment is clearly to produce improvements in other clinical outcomes, (such as improved quality of life or a reduction in falls), any benefit arising from vision assessment will necessarily be dependent on improved vision. Similarly, while the aims of multicomponent screening of older people are broad any benefit arising from the inclusion of a vision component in the assessment will necessarily be dependent on improved vision. Therefore, this review used improvement in vision as the outcome measure of interest.

OBJECTIVES

The objective of this review was to assess the effects on vision of mass screening of older people for visual impairment.

METHODS

Criteria for considering studies for this review

Types of studies

We included all randomised trials of visual screening alone or as part of multicomponent screening in unselected people aged 65 years or over in a community setting.

Types of participants

Participants in the trials were people aged 65 years or over who were not identified as belonging to a particular risk group.

Types of interventions

We included trials in which there was any attempt at population screening for visual impairment in a community setting, either vision alone or as part of a multicomponent screening assessment.

Types of outcome measures

The outcome included was the level of visual impairment in the population at the end of the trial. Assessment of vision by any method (questions about vision, measures of visual function or use of an acuity chart) at least six months after the initial vision screening assessment was included.

Search methods for identification of studies

Electronic searches

We searched the Cochrane Central Register of Controlled Trials (CENTRAL) (which contains the Cochrane Eyes and Vision Group Trials Register) (*The Cochrane Library*, Issue 1, 2008), MEDLINE (1966 to February 2008), EMBASE (1980 to February 2008), PubMed (on 8th March 2006; last 90 days) and the UK Clinical Trials Gateway. There were no language or date restrictions in the search for trials. The electronic databases were last searched on 29 February 2008.

See: Appendices for details of search strategies for *The Cochrane Library*, MEDLINE, EMBASE, the UK Clinical Trials Gateway and PubMed.

Searching other resources

We scanned the reference lists of identified trial reports and of review articles for further relevant reports. We used the SciSearch database to search for articles that cited the included studies. We contacted the named author for correspondence for each of the included trials to obtain information about any other trials.

Data collection and analysis

Selection of studies

Two authors independently assessed the titles and abstracts identified from the searches and full reports were obtained of studies which possibly or definitely fulfilled the selection criteria. A vision

screen may have been only one small part of a multicomponent screening programme and data about vision outcomes may not have been included in published reports of trials. Therefore, we contacted trial authors for further information about visual outcome data if these were not reported. Trial authors were also asked to provide further details about the screening and outcome assessments and about the interventions offered. Studies for which vision outcome data were available were selected for quality assessment and data extraction.

Data extraction and management

Two authors independently extracted data about visual outcomes using paper data extraction sheets. We resolved disagreements by discussion. The proportions of people with visual impairment in the experimental and control groups formed the comparison.

Assessment of risk of bias in included studies

Trial quality was assessed based on the recommendations in Section 6 of the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2005b). Four parameters were considered; each parameter of trial quality was graded: A (adequate), B (not clear), or C (inadequate). The following criteria were used.

(1) Allocation concealment. This was graded A if there was some form of centralised randomisation scheme, an on-site computer system or if sequentially-numbered sealed opaque envelopes were used.

(2) Attrition bias. This was graded A if follow-up rates were similar in the comparison groups.

(3) Intention-to-treat analysis. This was graded A if performed.

(4) Masking of outcome assessment. This was graded A if the outcome assessors were masked to the allocation.

Because of the nature of the intervention it would not have been possible to mask either recipients or providers of care to their allocation and, therefore, this was not used as quality parameters for this review.

Two authors assessed trial quality; disagreements were resolved by discussion. Authors were not masked to the report authors or trial results. For any trial graded B (or C unless an explicit statement was made about the quality component in the trial report), the trial authors were contacted for clarification. Trials scoring C on allocation concealment were excluded.

Data synthesis

Results of studies which were similar with respect to the three factors outlined above were combined to produce a summary risk ratio using the fixed-effect Mantel-Haenszel method. A random-effects model was also used and the results compared to the results from the fixed-effect model. For cluster randomised trials standard errors take account of the cluster design. We assessed the amount

of between study heterogeneity using the I^2 statistic and tested for heterogeneity between trials using a standard chi-squared test.

Sensitivity analysis

Three possible effect modifiers were identified prior to analysis. Firstly, trials of visual screening alone might be expected to produce a different effect to trials of visual screening included in a broader assessment. It was decided that these two sub-groups of trials would be analysed separately because a pooled result would be difficult to interpret. Secondly, it is known that questions about vision, formal assessment using an acuity chart, and measures of visual function differ in their sensitivity and specificity for detecting reduced visual acuity, and use of different types of screening tools may lead to differences in the effects of screening (Smeeth 1998a). Thirdly, differences in trial quality may produce differences in the effect size seen. We planned sensitivity analyses to assess the effects of including or excluding trials which differed in these characteristics. We also planned an exploration of any difference in effect size according to the screening tool used or trial quality.

RESULTS

Description of studies

See: [Characteristics of included studies](#); [Characteristics of excluded studies](#).

Results of the search

The initial searches found 2862 citations and abstracts. Of these 154 full text articles were reviewed in detail. Five trials met the final inclusion criteria, that is, visual outcome data were available with follow up of at least six months. There were no trials that were primarily of visual screening.

Subsequent searches, conducted in February 2006, identified 1269 titles and abstracts. There was one new trial relevant for inclusion in this review (Smeeth 2003). This was a cluster randomised trial. A further update search was done in February 2008. The electronic searches retrieved 8 references from *The Cochrane Library*, 277 references from MEDLINE, 363 references from EMBASE and 26 references from the UK Clinical Trials Gateway. After deduplication the search identified a total of 561 references. The Trials Search Co-ordinator scanned the search results and removed any references which were not relevant to the scope of the review. One report (Tay 2006) was identified as being potentially relevant, however, further information is required from the authors prior to this study being assessed for inclusion in the review.

Included studies

The following is a broad description of the included studies. See table: 'Characteristics of included studies' for more detailed information on the individual trials.

Setting and participants

The five individually randomised trials included a total of 3494 participants. The cluster randomised trial included 4340 participants (Smeeth 2003). Four of the studies were undertaken in the United Kingdom (McEwan 1990; Smeeth 2003; Vetter 1984; Vetter 1992), all of which recruited participants from general practice (family practice). One study was undertaken in The Netherlands (Van Rossum 1993) and recruited from a defined geographic area. One study was undertaken in the United States (Wagner 1994) and recruited from a health maintenance organisation.

Interventions

In all trials visual screening was undertaken as part of a broader assessment of health and functioning. In Wagner 1994 the assessments were undertaken at a clinic. In Smeeth 2003 33.9% of screening assessments were undertaken in peoples' own homes, the remainder being undertaken at the general practice surgery. In the remaining trials the assessments were undertaken in participants' homes. In Smeeth 2003, visual acuity screening was offered to all participants in one arm of the trial and was compared with targeted screening in which only participants with a range of health related problems were offered an assessment including visual acuity screening. The remaining five trials used questions about vision for the screening assessment. They did not measure vision. Assessments in all trials were undertaken by specially trained nurses or health visitors.

Outcome measures

In Smeeth 2003 visual acuity was assessed and a 25 item version of the National Eye Institute Visual Function Questionnaire (NEI VFQ-25) (Mangione 2001) completed. The remaining five trials used questions about vision to assess visual outcome. In Wagner 1994 visual outcome was assessed as part of a postal questionnaire. In the other four trials the outcome assessment was by face to face interview. Length of follow up ranged from two to four years, except in Smeeth 2003 where the range was three to five years.

Excluded studies

Sixteen trials were excluded from this review and reasons for exclusion are given in the table: 'Characteristics of excluded studies'.

Risk of bias in included studies

Allocation concealment

All six trials were graded A. Descriptions of the randomisation process were obtained for all six trials. Randomisation was undertaken centrally in all trials using random number tables or random number generators.

Attrition bias

Because of the ages of the trial participants there was a high mortality rate in most of the trials. In [Smeeth 2003](#) around one third of participants died prior to outcome assessment. Excluding people who had died, the overall response rate was 62.8%. However, there was a difference between the two arms. The response rate to follow up among those still alive was 67.8% (978/1443) in the targeted screening group and 57.9% (829/1432) in the universal screening group. This was a possible source of bias and the trial was thus graded C. Follow-up rates were similar between the comparison groups in the remaining five trials and all were graded A.

Intention-to-treat analysis

All six trials were analysed by intention-to-treat and were graded A; that is participants with outcome data available were analysed in the groups to which they were originally randomised.

Masking of outcome assessment

The trial participants would clearly have been aware of whether they had received a screening assessment. Thus, in spite of attempts to mask the outcome assessors, which arm of the trial participants were in could have emerged during the face to face outcome assessments. This phenomenon was noted to a small degree in [Vetter 1984](#) and [Vetter 1992](#). Predicting that this phenomenon was likely, such masking was considered impossible in [McEwan 1990](#). In [Van Rossum 1993](#) and [Smeeth 2003](#) outcome assessors were masked as far as possible. Postal questionnaires to participants were used to assess outcomes in [Wagner 1994](#).

Effects of interventions

The results in all five trials in which individuals were randomised were very similar. There was no evidence of heterogeneity of effect between the five trials (I^2 was 0%, $\chi^2 = 0.88$, $df = 4$, $P = 0.93$). The pooled risk ratio for people in the intervention and control groups having self-reported visual problems when outcome assessments were performed was 1.03 (95% confidence interval (CI) 0.92 to 1.15). The pooled odds ratio was 1.04 (95% CI 0.89 to 1.22). In the cluster randomised trial ([Smeeth 2003](#)), analysis took account of the clustered design. Three to five years after screening, the risk ratio for visual acuity less than 6/18 in either eye comparing universal with targeted screening, was 1.07 (95% CI 0.84 to 1.36, $P = 0.58$). The mean composite score of the NEI VFQ-25 was 85.6 in the targeted screening group and 86.0 in the universal group, difference 0.4 (95% CI -1.7 to 2.5, $P = 0.69$).

Only one trial ([Smeeth 2003](#)) differed in any of the aspects identi-

fied a priori as possible effect modifiers (visual assessment method used for screening, visual outcome used) but it was similar to all the remaining trials for the other aspects identified a priori (whether visual screening was undertaken as part of a wider screening assessment, and trial quality). However, in spite of the differences between [Smeeth 2003](#) and the other five trials, the results obtained were remarkably similar.

DISCUSSION

Visual impairment is common among older people and is frequently unreported. It has several adverse associations including falls, reduced quality of life and reduced functional ability ([Smeeth 1998a](#)). Results from community surveys in the over 75 years age group suggest that over half the visual impairment in this age group could potentially be reduced with treatment, notably by cataract surgery or refractive correction ([Klein 1991](#); [Wormald 1992](#)). In light of this, the lack of improvement seen in these trials is somewhat surprising and cannot be explained with any certainty from the data available.

Possible explanations for lack of effectiveness

A number of factors may have contributed. Firstly, the visual assessment was only one component of the screening package in all six trials. It is possible that visual screening performed in isolation may have produced a greater effect. This hypothesis was previously suggested as an explanation of the lack of effectiveness of screening for visual impairment seen in a trial of a multicomponent screening assessment among middle-aged men ([SLSSG 1977](#); [Stone 1978](#)). However, in clinical practice screening for visual impairment is highly likely to be one part of a broader screening package and, therefore, an assessment of effectiveness within a broader package is the most pragmatically useful measure.

Secondly, a screening procedure alone would not be expected to lead to improvements in vision. Such improvements would be dependent on the subsequent interventions to improve vision. In four of the trials ([McEwan 1990](#); [Van Rossum 1993](#); [Vetter 1984](#); [Vetter 1992](#)) those reporting visual problems were given advice and referred to either an optometrist or their general practitioner. In [Wagner 1994](#) those reporting problems received information about resources in the community that were designed to assist those with poor vision. In [Smeeth 2003](#), participants with a pinhole vision of less than 6/18 in either eye were referred to an ophthalmologist unless they were registered blind or had seen by an ophthalmologist in the previous year. Participants with presenting vision of less than 6/18 in either eye that improved with a pinhole to better than 6/18 were advised to see an optician. In [Smeeth 2003](#), high levels of visual impairment were found among participants: almost 29% had a visual acuity less than 6/18 in either eye. In spite of a high level of glasses ownership, 17.5% people with visual impairment had evidence of uncorrected refractive

error. The level of uncorrected refractive error would have been under-estimated because many eligible people did not complete a pinhole assessment, largely because of difficulties using a pinhole occluder in this age group. Among people in whom refractive error was diagnosed, around half obtained new glasses and the level of uncorrected refractive error was reduced. For people with visual impairment not thought to be due to refractive error, 35% had seen an ophthalmologist in the past 12 months and a further 14% were registered blind or partially sighted. Both these groups were not eligible for referral. Only around half of those people recommended for referral to an ophthalmologist were actually referred; although when referral did occur, attendance at eye clinics was high. People with worse vision were more likely to be referred and people with evidence of cognitive impairment at the time of screening were less likely to be referred. However, explanations for the low adherence by general practitioners to recommendations for referral are lacking. Around half of those who attended an ophthalmologist following screening had cataract surgery and their vision improved. Among the remaining people who attended an ophthalmologist following screening, there was no improvement in visual acuity. It is possible that some of these people received interventions for low vision that were of benefit in terms of function and quality of life, but that would not be expected to improve visual acuity. However, the result for visual function did not differ in the two trial arms. The study authors concluded that while overall as a result of the visual screening some people obtained beneficial interventions, the numbers of people benefiting was small in the context of a population-based screening programme and were not sufficient to affect the prevalence of visual impairment among all participants. For the remaining trials, no information was available about whether participants attended the referrals; diagnoses made; and interventions offered and accepted.

A third factor which may have contributed to the lack of effect seen is that individuals who reported visual problems when prompted to do so in a screening programme may not have perceived their previously unreported visual impairment as a 'need' for intervention. Gradual adjustment to and assimilation of reduced visual function may occur with ageing among some people. Therefore, in spite of reporting problems with vision when asked directly, they may not have acted on advice to seek further care. There is very little information on whether older people accept interventions for visual problems discovered by screening. In a randomised trial of multicomponent screening in the United States 15 out of 18 older people complied with advice to attend for an eye examination (Fabacher 1994). In a United Kingdom general practice-based survey one third of those referred to the eye services with a visual problem did not attend (Wormald 1992). In addition to participants not concurring with the need for intervention, there may have been barriers to obtaining help with the eye problems identified. Possible barriers include: costs of further eye tests, glasses and other treatments; and an inability of ophthalmic services to meet demand, for example for cataract extraction.

Finally, the use of questions about vision both for the initial screening assessment and for the outcome assessment may have affected the results in five of the trials. Questions about vision have a low sensitivity, and to a lesser extent, a low specificity for detecting visual impairment when compared to formal acuity testing (Smeeth 1998a). However, in the one trial that measured visual acuity both at the screening assessment and at the outcome assessment, the lack of effect of screening on visual outcomes was very similar to the results seen in the remaining trials.

AUTHORS' CONCLUSIONS

Implications for practice

The evidence from randomised controlled trials undertaken to date does not support the inclusion of a visual screening component in multidimensional screening programmes for older people in a community setting. The reasons for the lack of effect seen in these trials are unclear. However, it seems likely that before population screening can be effective existing obstacles to reducing visual impairment among older people, once it has been discovered, may need to be overcome.

In five of the trials included in this review, questions about visual problems were used, both for the visual screening assessment and for the assessment of visual outcomes. However, in the one trial that used visual acuity for screening, and measured both visual acuity and visual function at outcome assessment, a similar lack of improvement in vision as a result of screening was observed.

There are no data from trials to assess the effects of screening older people for visual impairment alone and, therefore, no recommendation can be made on this issue.

Implications for research

Given the importance of visual impairment among older people, further research into strategies to improve vision of older people is needed. The effectiveness of an optimised primary care-based screening intervention that overcomes possible factors contributing to the observed lack of benefit in trials to date warrants assessment.

There are a number of unresolved issues around optimal tools to be used for screening for visual impairment, particularly in the context of multidimensional screening in primary care. If primary care teams are to be expected to detect refractive error, better methods of diagnosis which can be completed by a higher proportion of the older population than the pinhole assessment will be needed. Whether visual acuity is a good screening tool to identify people who are likely to benefit from interventions to improve their vision needs to be assessed. The value of screening for other measures such as visual fields or contrast sensitivity warrants further work. While single questions about self-reported visual difficulties

are poor predictors of low visual acuity, the development of brief screening instruments that assess visual function could be of great value (Iliffe 2005).

With regards to multidimensional assessment for older people, in the one trial with data on this issue the low level of ophthalmological referrals for those people deemed eligible for referral following screening was notable. There is scope for more research on the determinants of clinician adherence to recommendations for referrals arising from multidimensional assessments. Specific issues of interest are assessing the appropriateness of the referral decisions made and the role of the patient in the decision whether to refer or not.

The effectiveness of an increased role for optometry services in the detection and management of visual problems among older people on a population basis warrants evaluation.

Detailed prospective research on the detection, referral, diagnosis and management of visual problems in older people could help shed further light on the reasons for the ineffectiveness of screen-

ing. As well as looking at health service issues, research from the perspective of the older people themselves is also needed. Areas which particularly need to be addressed include: older peoples' perceptions of their visual problems and of the need for interventions; and perceived barriers to interventions to help their vision.

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies [ordered by study ID]

McEwan 1990

Methods	Randomised: random number generator, centrally Stratified by age: 75 to 84, 85+ Masking: outcome assessors not masked	
Participants	Geographic region: United Kingdom All people registered with a general practice Age: over 75 Exclusion criteria: too ill for assessment or in hospital (11) Prior to randomisation all participants interviewed regarding mental and physical health and functioning, including questions about vision N = 296	
Interventions	(1) Multicomponent home nurse assessment (including social functioning, current medical problems and additional question about vision). Those reporting visual problems given advice and referred to an optometrist (n = 151) (2) Usual care (n = 145) Follow-up period: 20 months	
Outcomes	Proportion who 'always' or 'quite often' had difficulty reading ordinary newsprint (with glasses if worn) Attrition: outcome data available on 78% of participants in intervention group (16 deaths and 17 lost to follow up) and 77% in control group (23 deaths and 11 lost to follow up)	
Notes		
Risk of bias		
Item	Authors' judgement	Description
Allocation concealment?	Yes	A - Adequate

Smeeth 2003

Methods	Centralised cluster computer generated randomisation of general practices	
Participants	Geographic region: United Kingdom A random sample of 220 people registered with each general practice and eligible for trial entry Age: over 75 Exclusion criteria: terminal illness or resident in a long-stay hospital or nursing home 20 practices randomised, with a total of 4340 participants	
Interventions	Participants were randomised to one of two screening strategies (1) Universal screening group: all trial participants were invited to complete a brief assessment followed by a detailed health assessment by a trained nurse that included measurement of visual acuity on the logMAR	

Smeeth 2003 (Continued)

	<p>scale using a Glasgow acuity chart. People with visual acuity less than 6/18 in either eye had measurements repeated using a pinhole occluder. Participants with a pinhole vision of less than 6/18 in either eye were referred to an ophthalmologist unless they were registered blind or had seen an ophthalmologist in the previous year. Participants presenting with vision of less than 6/18 in either eye that improved with pinhole to better than 6/18 were advised to see an optician</p> <p>N = 2140 randomised. 1565 had an assessment, response rate 73.1%</p> <p>(2) Targeted screening group: participants were invited to complete a brief screening assessment that included a question about difficulty seeing. Only people found to have a pre-specified range and level of problems during the brief assessment were invited to have a detailed assessment including visual acuity</p> <p>N = 2200 randomised. 1684 had an assessment, response rate 76.5%</p> <p>120 people out of the 1684 who had a brief assessment went on to have visual acuity measured</p> <p>Follow-up period: 3 to 5 years</p>
Outcomes	<p>Visual acuity less than 6/18 in either eye and mean composite score of the NEI VFQ-25 comparing universal with targeted screening</p> <p>A total of 1807 outcome assessments were completed. Around one third of participants died prior to outcome assessment. Excluding people who had died the response rate was 67.8% (978/1443) in the targeted group and 57.9% (829/1432) in the universal screening group</p>
Notes	Cluster randomised

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	A - Adequate

Van Rossum 1993

Methods	<p>Randomised: random numbers generator, centrally</p> <p>Stratified prior to randomisation by sex, self-rated health, composition of household and neighbourhood (as a marker of social class)</p> <p>Masking: outcome assessors masked</p>
Participants	<p>Geographic region: Netherlands</p> <p>All people living at home in a geographically defined area were sent a postal invitation</p> <p>Age: 75 to 84</p> <p>Exclusion criteria: people already receiving home nursing care or their partners (126); people living in a monastery (20)</p> <p>N = 580</p>
Interventions	<p>(1) Four visits per year for 3 years by trained nurses. One question about vision: 'How do you assess your vision at present?' Possible answers: excellent, good, fair, not so good or bad. Those answering 'fair', 'not so good' or 'bad' to the screening question advised to contact an optometrist (n = 292)</p> <p>(2) Usual care, no screening (n = 288)</p> <p>Follow-up period: 3 years</p>

Van Rossum 1993 (Continued)

Outcomes	Proportion answering 'fair', not so good' or 'bad' to the screening question at the end of the study Attrition: outcome data available on 79% of participants in intervention group (42 deaths and 19 lost to follow up) and 77% in control group (50 deaths and 17 lost to follow up)	
Notes		
<i>Risk of bias</i>		
Item	Authors' judgement	Description
Allocation concealment?	Yes	A - Adequate

Vetter 1984

Methods	Randomised by household: random number tables, centrally. Household randomisation undertaken because it was felt it would be difficult for the health visitor to intervene on behalf of one member of a household and not for another Masking: outcome assessors masked	
Participants	Geographic region: United Kingdom People living at home registered with two general practices Age: over 70 Exclusion criteria: people in permanent residential care N = 1148	
Interventions	(1) Annual assessment at home by a health visitor. Two questions about glasses and difficulty seeing. Those reporting difficulties seeing were referred to an optometrist or to their general practitioner and were offered advice from the health visitor (n = 577) (2) Usual care, no screening (n = 571) Follow-up period: 2 years	
Outcomes	Proportion with a positive response to the question 'Do you have any difficulty seeing (even when wearing your glasses)' Attrition: outcome data available on 84% of participants in intervention group (80 deaths and nine lost to follow up) and 79% in control group (105 deaths and 10 lost to follow up)	
Notes		
<i>Risk of bias</i>		
Item	Authors' judgement	Description
Allocation concealment?	Yes	A - Adequate

Vetter 1992

Methods	Randomised: random number tables, centrally. Household randomisation undertaken because part of intervention included improvements in the home environment Masking: outcome assessors masked
Participants	Geographic region: United Kingdom People registered with one general practice Age: 75 and over Exclusion criteria: people excluded by general practitioners because it was felt they were likely to refuse trial entry (9) N = 674
Interventions	(1) Annual assessment at home by a health visitor, specifically aimed at reducing falls and fractures. Two questions about glasses and difficulty seeing, and third question about recent eye tests. Those reporting difficulties seeing were referred to an optometrist or to their general practitioner, and were offered advice from the health visitor (n = 350) (2) Usual care, no screening (n = 324) Follow-up period: 4 years
Outcomes	Proportion with a positive response to the question 'Do you have any difficulty seeing (even when wearing your glasses)' Attrition: outcome data available on 69% of participants in intervention group (88 deaths and 22 lost to follow up) and 65% in control group (106 deaths and eight lost to follow up)
Notes	

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	A - Adequate

Wagner 1994

Methods	Randomised: random number table, independent of trialists or participants Masking: outcomes assessed by postal questionnaire, no masking
Participants	Geographic region: United States Random sample of health maintenance organisation enrollees Age: over 65 Exclusion criteria: people in residential care, people too ill to undertake the assessment N = 1559
Interventions	(1) Invited for a multicomponent nurse assessment (including vision) aimed at reducing disability and falls. Those reporting problems received information about resources in the community designed to assist those with poor vision (n = 635) (2) Invited to a general health promotion visit with no visual assessment (n = 317) (3) Usual care, no screening (n = 607) Follow-up period: 2 years

Wagner 1994 (Continued)

Outcomes	Proportions reporting visual problems on a mailed questionnaire Attrition: 5% of total (89), 53 deaths, 18 refusals, 15 too ill, 2 institutionalised, 1 could not be contacted. Author states attrition evenly distributed across groups For this review, group 1 (who received a visual screen) has been analysed against groups 2 and 3 together (who received no visual screen)	
Notes		
<i>Risk of bias</i>		
Item	Authors' judgement	Description
Allocation concealment?	Yes	A - Adequate

General practice is equivalent to family practice

Characteristics of excluded studies [ordered by study ID]

Study	Reason for exclusion
Carpenter 1990	No visual outcome data
Clarke 1992	No visual outcome data
Epstein 1990	No visual outcome data
Fabacher 1994	No visual outcome data
Hall 1992	No visual outcome data in report
Hanger 1990	No control group
Hendriksen 1984	No visual outcome data
Pathy 1992	No visual outcome data
Rubenstein 1986	No control group
Sorensen 1988	No visual outcome data
Stone 1978	Participants aged 64 years and under only
Stuck 1995	No visual outcome data

(Continued)

Tinetti 1994	All participants selected on basis of being at high risk of falling No visual outcome data
Tulloch 1979	No visual outcome data
Williams 1987	No visual outcome data
Yeo 1987	No visual outcome data

DATA AND ANALYSES

Comparison 1. VISUAL SCREENING AS PART OF A MULTICOMPONENT SCREENING PACKAGE VERSUS STANDARD CARE

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Not seeing well (as defined by each trial)	5	3494	Risk Ratio (M-H, Fixed, 95% CI)	1.03 [0.92, 1.15]

Comparison 2. UNIVERSAL VISUAL ACUITY SCREENING AS PART OF A MULTICOMPONENT SCREENING PACKAGE VERSUS TARGETED SCREENING

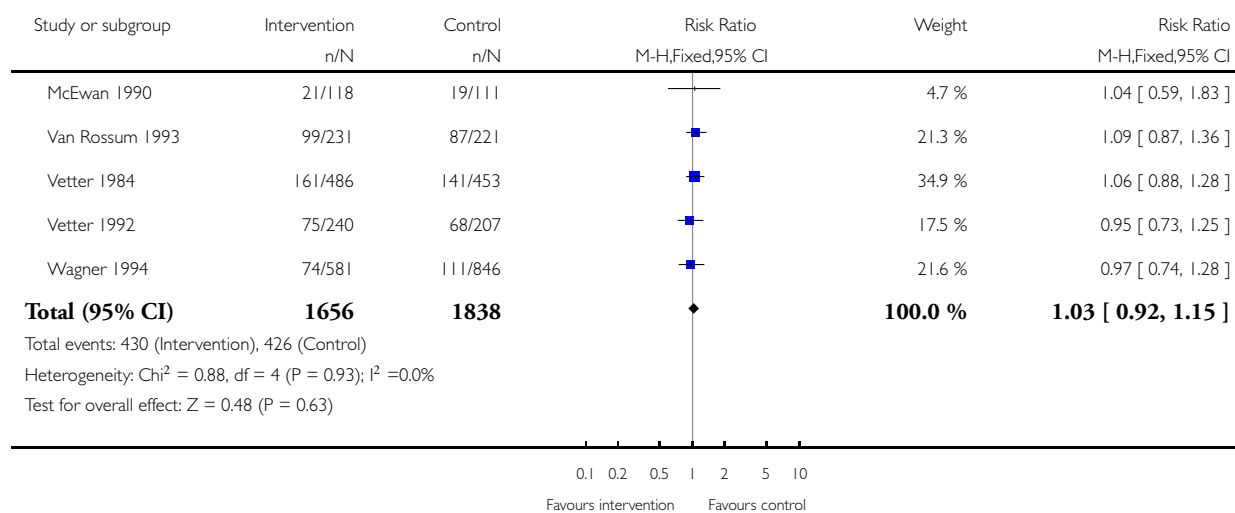
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Visual acuity less than 6/18 in either eye			Other data	No numeric data
2 Mean composite visual function score (VFQ-25)			Other data	No numeric data

Analysis 1.1. Comparison 1 VISUAL SCREENING AS PART OF A MULTICOMPONENT SCREENING PACKAGE VERSUS STANDARD CARE, Outcome 1 Not seeing well (as defined by each trial).

Review: Community screening for visual impairment in the elderly

Comparison: 1 VISUAL SCREENING AS PART OF A MULTICOMPONENT SCREENING PACKAGE VERSUS STANDARD CARE

Outcome: 1 Not seeing well (as defined by each trial)



Analysis 2.1. Comparison 2 UNIVERSAL VISUAL ACUITY SCREENING AS PART OF A MULTICOMPONENT SCREENING PACKAGE VERSUS TARGETED SCREENING, Outcome 1 Visual acuity less than 6/18 in either eye.

Visual acuity less than 6/18 in either eye

Study	Universal n	Universal N	Targeted n	Targeted N	Relative risk	95% CI	P value
Smeeth 2003	307	829	339	978	1.07	0.84 to 1.36	0.58

Analysis 2.2. Comparison 2 UNIVERSAL VISUAL ACUITY SCREENING AS PART OF A MULTICOMPONENT SCREENING PACKAGE VERSUS TARGETED SCREENING, Outcome 2 Mean composite visual function score (VFQ-25).

Mean composite visual function score (VFQ-25)

Study	Universal screening	Targeted screening	Difference	95% CI of difference	P value
Smeeth 2003	86.0	85.6	0.4	-1.7 to 2.5	0.69

APPENDICES

Appendix 1. CENTRAL search strategy

- #1 MeSH descriptor Vision Screening
- #2 MeSH descriptor Vision Tests
- #3 (vision or visual*) near5 (screen* or assess* or test* or diagnos* or surveill*)
- #4 (#1 OR #2 OR #3)
- #5 MeSH descriptor Aged
- #6 MeSH descriptor Health Services for the Aged
- #7 old* near5 (age* or people or person*)
- #8 geriatric* or elderly or senior*
- #9 (#5 OR #6 OR #7 OR #8)
- #10 MeSH descriptor Eye Diseases
- #11 MeSH descriptor Visual Acuity
- #12 visual next acuit*
- #13 MeSH descriptor Macular Degeneration
- #14 macula* next degenerat*
- #15 eye* or vision or ophthalmic or glaucom* or cataract* or presbyop*
- #16 (#10 OR #11 OR #12 OR #13 OR #14 OR #15)
- #17 (#4 AND #9 AND #16)

Appendix 2. MEDLINE search strategy

1. randomized controlled trial.pt.
2. (randomized or randomised).ab,ti.
3. placebo.ab,ti.
4. dt.fs.
5. randomly.ab,ti.
6. trial.ab,ti.
7. groups.ab,ti.
8. or/1-7
9. exp animals/
10. exp humans/
11. 9 not (9 and 10)
12. 8 not 11
13. exp vision screening/
14. exp vision tests/
15. ((vision or visual\$) adj5 (screen* or assess* or test* or diagnos* or surveill*)).tw.
16. or/13-15
17. exp aged/
18. "Aged, 80 and over"/
19. exp health services for the aged/
20. (old\$ adj5 (age\$ or people or person\$)).tw.
21. (geriatric\$ or elderly or senior\$).tw.
22. or/17-21
23. exp eye diseases/
24. exp visual acuity/
25. exp macular degeneration/
26. macula\$ degenerat\$.tw.
27. (eye\$ or vision or ophthalmic or glaucom\$ or cataract\$ or presbyop\$).tw.
28. or/23-27
29. 16 and 22 and 28

30. 12 and 29

The search filter for trials at the beginning of the MEDLINE strategy is from the published paper by Glanville et al ([Glanville 2006](#)).

Appendix 3. EMBASE search strategy

1. exp randomized controlled trial/
2. exp randomization/
3. exp double blind procedure/
4. exp single blind procedure/
5. random\$.tw.
6. or/1-5
7. (animal or animal experiment).sh.
8. human.sh.
9. 7 and 8
10. 7 not 9
11. 6 not 10
12. exp clinical trial/
13. (clin\$ adj3 trial\$).tw.
14. ((singl\$ or doubl\$ or trebl\$ or tripl\$) adj3 (blind\$ or mask\$)).tw.
15. exp placebo/
16. placebo\$.tw.
17. random\$.tw.
18. exp experimental design/
19. exp crossover procedure/
20. exp control group/
21. exp latin square design/
22. or/12-21
23. 22 not 10
24. 23 not 11
25. exp comparative study/
26. exp evaluation/
27. exp prospective study/
28. (control\$ or prospectiv\$ or volunteer\$).tw.
29. or/25-28
30. 29 not 10
31. 30 not (11 or 23)
32. 11 or 24 or 31
33. exp vision test/
34. ((vision or visual\$) adj5 (screen* or assess* or test* or diagnos* or surveill*)).tw.
35. or/33-34
36. exp aged/
37. exp senescence/
38. exp elderly care/
39. (old\$ adj5 (age\$ or people or person\$)).tw.
40. (geriatric\$ or elderly or senior\$).tw.
41. or/36-40
42. exp eye disease/
43. exp visual acuity/
44. exp retina macula degeneration/
45. macula\$ degenerat\$.tw.
46. (eye\$ or vision or ophthalmic or glaucom\$ or cataract\$ or presbyop\$).tw.
47. or/42-46

48. 35 and 41 and 47

49. 32 and 48

Appendix 4. UK Clinical Trials Gateway search strategy

(screen% OR test% OR assess%) AND (vision)

Appendix 5. PubMed search strategy

((old age*) OR (geriatric* OR elderly OR senior*)) AND (screening* OR assessment* OR diagnoses OR diagnosis OR diagnosing OR test OR tests OR testing) AND (eye* OR cataract* OR glaucom* OR vision* OR presbyop*) AND (randomized controlled trial [pt] OR controlled clinical trial [pt] OR randomized controlled trials [mh] OR random allocation [mh] OR double-blind method [mh] OR single-blind method [mh] OR clinical trial [pt] OR clinical trials [mh]) OR ("clinical trial" [tw]) OR ((singl* [tw] OR doubl* [tw] OR trebl* [tw] OR tripl* [tw]) AND (mask* [tw] OR blind* [tw])) OR (placebos [mh] OR placebo* [tw] OR random* [tw] OR research design [mh:noexp] OR comparative study [mh] OR evaluation studies [mh] OR follow-up studies [mh] OR prospective studies [mh]) NOT (animals [mh] NOT human [mh])

WHAT'S NEW

Last assessed as up-to-date: 23 April 2008.

Date	Event	Description
9 May 2008	New search has been performed	Electronic searches have been updated and one new study is awaiting assessment
23 April 2008	Amended	Converted to new review format.

HISTORY

Protocol first published: Issue 1, 1998

Review first published: Issue 3, 1998

Date	Event	Description
2 March 2006	New citation required and conclusions have changed	Substantive amendment

CONTRIBUTIONS OF AUTHORS

Conceiving the idea for the review: SI

Developing the review: LS

Undertaking manual searches for trials: LS

Assessing quality of trials: LS, SI

Extracting data: LS, LI

Analysing data: LS

Writing the review: LS

Advising on the review: IS

Updating the review: LS

DECLARATIONS OF INTEREST

None known.

SOURCES OF SUPPORT

Internal sources

- London Academic Training Scheme, UK.

External sources

- Medical Research Council, UK.

INDEX TERMS

Medical Subject Headings (MeSH)

*Mass Screening; Community Health Services; Vision Disorders [*prevention & control]

MeSH check words

Aged; Humans