

Educational outreach visits: effects on professional practice and health care outcomes (Review)

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ABSTRACT

Background

Outreach visits have been identified as an intervention that may improve the practice of health care professionals, in particular prescribing. This type of 'face to face' visit has been referred to as university-based educational detailing, public interest detailing, and academic detailing.

Objectives

To assess the effects of outreach visits on improving health professional practice or patient outcomes.

Search strategy

We searched MEDLINE up to March 1997, the Research and Development Resource Base in Continuing Medical Education, and reference lists of related systematic reviews and articles.

Selection criteria

Randomised trials of outreach visits (defined as a personal visit by a trained person to a health care provider in his or her own setting). The participants were health care professionals.

Data collection and analysis

Two reviewers independently extracted data and assessed study quality.

Main results

Eighteen studies were included involving more than 1896 physicians. All of the outreach visit interventions consisted of several components, including written materials and conferences. Reminders or audit and feedback complemented some visits. In 13 studies, the targeted behaviours were prescribing practices. In three studies, the behaviours were preventive services, including counselling for smoking cessation. In two studies, the outreach visits were directed toward improving the general management of common problems encountered in general practice, including asthma, diabetes, otitis media, hypertension, anxiety, and acute bronchitis. All studies examined physician behaviour and in three studies other health professionals such as nurses, nursing home attendants or health care workers were targeted. Positive effects on practice were observed in all studies. Only one study measured a patient outcome. Few studies examined the cost effectiveness of outreach.

Authors' conclusions

Educational outreach visits, particularly when combined with social marketing, appear to be a promising approach to modifying health professional behaviour, especially prescribing. Further research is needed to assess the effects of outreach visits for other aspects of practice and to identify key characteristics of outreach visits that are important to its success. The cost-effectiveness of outreach visits is not well evaluated.

PLAIN LANGUAGE SUMMARY

Educational visits to health care providers can reduce inappropriate prescribing

An outreach visit is a personal visit to a health care provider in his or her own setting. It is also called 'detailing', and is a strategy commonly used by pharmaceutical companies. The review found that educational outreach visits combined with social marketing strategies appears to change professional practice, especially prescribing. The effects are small to moderate, although potentially important.

BACKGROUND

Educational outreach visits have been identified as an intervention that has the potential to change health professional practice, particularly prescribing by physicians (Soumerai 1990; Soumerai 1989). The term outreach visit is used to describe a personal visit by a trained person to a health provider in his or her own setting. This type of 'face to face' visit has been referred to as university-based educational detailing, public interest detailing, and academic detailing.

OBJECTIVES

To determine the effectiveness of educational outreach visits in improving health professional practice and health care outcomes.

The following questions and hypotheses are addressed:

Are educational outreach visits effective in improving the practice of health professionals or health care outcomes?

1. Educational outreach visits (including educational materials or conferences for all comparisons) are more effective than no intervention (+/- educational materials or conferences).

2. Educational outreach visits combined with other complementary interventions including reminders, audit and feedback, use of local opinion leaders, marketing strategies or patient-mediated interventions are more effective than no intervention.

How do educational outreach visits compare with other interventions and under what circumstances are educational outreach visits most likely to be effective?

3. Educational outreach visits combined with other complementary interventions including reminders, audit and feedback, marketing strategies or patient-mediated interventions are more effective than educational outreach visits alone.

4. Educational outreach visits are more effective than audit and feedback.

Can educational outreach visits be made more effective by modifying how they are done?

5. Educational outreach visits using patient-related content are more effective than using performance summaries.

6. Educational outreach visits using an influential source are more effective than educational outreach visits using any other source. The authors must specifically mention that the source was influential.

7. Using more than one educational outreach visit is more effective than using only one visit.

8. The effects of educational outreach visits decrease over time.

CRITERIA FOR CONSIDERING STUDIES FOR THIS REVIEW

Types of studies

Randomised controlled trials (RCT)

Types of participants

Health care providers responsible for patient care. Studies that included only students were excluded.

Types of intervention

Outreach visits: defined as use of a trained person who meets with providers in their practice settings to provide information with the intent of changing the provider's performance. The information given may include feedback about performance.

Types of outcome measures

Objectively measured provider performance in a health care setting or health care outcomes. Studies that measured knowledge or performance in a test situation only were excluded.

SEARCH METHODS FOR IDENTIFICATION OF STUDIES

See: methods used in reviews.

This review builds upon previous work in this area (Davis 1992; Davis 1995; Oxman 1995; Thomson 1995). We searched MEDLINE from January 1966 to March 1997 without language restrictions. These search terms were used: Education, Professional (nonmh), all academic and all detail: (tw), all outreach and all visit: (tw), clinical competence (mh); combined with these methodological terms: Clinical Trial (pt), Random

allocation (mh), Randomized Controlled Trials (mh), Double-Blind Method (mh), Single-Blind Method (mh), Placebos (mh), all random: (tw). The Research and Development Resource Base in Continuing Medical Education (RDRB/CME) (Davis 1991) was also searched. The reference lists of related systematic reviews and all articles obtained have been reviewed. The review will be updated using the EPOC register (see SPECIALISED REGISTER under GROUP DETAILS).

METHODS OF THE REVIEW

Two reviewers (MAT and ADO) independently selected the trials included in the review. Disagreements were resolved by discussion.

The quality of all eligible trials was assessed using the criteria described by the EPOC group (see EDITORIAL INFORMATION under GROUP DETAILS for METHODS USED IN REVIEWS). Two reviewers (MAT and NF, EH or AO) independently assessed the quality of each trial. Any discrepancies were resolved by discussion.

Data extraction was completed by two reviewers (MAT and NF, EH or AO) independently using a checklist developed by EPOC (see EDITORIAL INFORMATION under GROUP DETAILS for METHODS USED IN REVIEWS). We have not yet contacted all of the corresponding authors to verify the results of the data extraction process and collect missing information.

We used the following definitions for interventions other than outreach:

Educational materials: distribution of published or printed recommendations for clinical care, including clinical practice guidelines, audio-visual materials and electronic publications. The materials may have been delivered personally or through mass mailings.

Conferences: participation of health care providers in conferences, lectures, workshops or traineeships outside the providers' practice settings.

Local opinion leaders: use of providers nominated by their colleagues as 'educationally influential'. The investigators must explicitly state that the opinion leaders were identified by their colleagues.

Patient mediated interventions: any intervention aimed at changing the performance of health care providers indirectly by providing information, prompts, or support to the patient; eg direct mailings to patients, patient counselling delivered by others, clinical information collected directly from patients and given to the provider, materials given to patients or placed in waiting rooms.

Audit and feedback: any summary of clinical performance of health care over a specified period of time. The summary may also include recommendations for clinical action. The information may be given in a written, verbal or electronic format.

Reminders: any intervention, manual or computerised, that prompts the health care provider to perform a clinical action.

Marketing: use of personal interviewing, group discussion ('focus groups'), or a survey of targeted providers to identify barriers to change and subsequent design of an intervention that addresses identified barriers.

Local consensus processes: inclusion of participating providers in discussion to ensure that they agreed that the chosen clinical problem was important and the approach to managing the problem was appropriate.

The primary analysis that was planned was a comparison of the mean proportion (per provider) of times performance was correct (as determined by the investigators) for each patient or episode of care. However, in practice, important differences in study participants, interventions and outcomes among the included trials and missing data restricted the application of this analysis for published trials.

For each study, we reported the main results in natural units in the results table. For continuous variables, we calculated post-intervention raw mean differences and 95% confidence limits and p values (as calculated by the investigators unless noted) where available. We also attempted to summarise the relative percentage difference attributable to the intervention (difference between the post-intervention experimental and control group means divided by the post-intervention control group mean x 100). For dichotomous variables, we reported risk differences, relative risks, relative risk differences (1-relative risk) and 95% confidence limits. We adhered to the convention of reporting outcomes as unfavourable events, which means that a risk ratio less than unity signifies a reduction in unfavourable events (Sinclair 1994). In the text, we reported relative percentage differences for continuous variables and relative risk differences for the dichotomous variables and p values or 95% confidence intervals when available. No studies were excluded because of insufficient data in the published report.

For studies where the unit of allocation and analysis were different, eg the unit of allocation was the practice and the unit of analysis was the patient, we attempted to account for this by recalculating results using the appropriate unit of analysis providing sufficient data were present. Where this was not possible, we reported the results but made a notation in the results table.

DESCRIPTION OF STUDIES

Characteristics of the providers

The providers were mainly primary care physicians practising in community settings (see Included Studies Table). In three trials, the providers also included other health professionals such as nurses and nursing assistants in a nursing home setting (Avorn 1992), pharmacists/owners and counter attendants (Ross-Degnan 1996a) and generic health care workers (Santoso 1996). Ten trials

were based in North America, four were located in Europe, two in Indonesia and two in Australia.

Participants were selected in a variety of ways. In three trials participants were randomly selected. Cockburn and colleagues (Cockburn 1992) and Berings et al (Berings 1994) reported that physicians were randomly selected from a register of family/general physicians. Santoso (Santoso 1996) stated that health centres were randomly selected from specific districts. de Burgh et al (de Burgh 1995) used both a random sample and purposive cluster sample to ensure representativeness. In another trial (Feder 1995), all practices in a specific area were invited to participate. In two trials (Putnam 1985; Rabin 1994), the physicians were volunteers. In three trials, the physicians were high prescribers of targeted drugs (Avorn 1983; Avorn 1992; McConnell 1982). In a further three trials (Raisch 1990; Steele 1989; Stergachis 1987), participants were members of a health maintenance organisation, health care centre or clinic. In the five remaining trials, the selection process for participants was unclear.

Targeted behaviours

In 13 trials, the behaviours were prescribing practices. Two trials were targeted at reducing benzodiazepine use (Berings 1994; de Burgh 1995) and in four trials, inappropriate antibiotics were targeted (Avorn 1983; McConnell 1982; Ross-Degnan 1996a; Santoso 1996). Newton-Syms and colleagues (Newton-Syms 1992) and Stergachis et al (Stergachis 1987) attempted to reduce the use of non steroidal anti-inflammatory medication. A range of different prescribing behaviours was targeted in the remaining trials including anti-psychotic drugs for nursing home residents (Avorn 1992) and cholesterol lowering drugs for patients with hypercholesterolaemia (Diwan 1995). In three trials, the behaviours were preventive services including counselling for smoking cessation. In two trials, the behaviour was the general management of a variety of common problems encountered in general practice, eg asthma, diabetes, otitis media, hypertension, anxiety, and acute bronchitis.

Characteristics of the interventions

All of the outreach visit interventions consisted of several components including written materials and educational meetings. Some visits were augmented by reminders (Dietrich 1992; Steele 1989) or audit and feedback (McConnell 1982; Putnam 1985; Stergachis 1987). In 13 trials, the content included information about appropriate indications and alternative prescribing strategies. For example, Steele and colleagues (Steele 1989) targeted high cost drugs (diltiazem, ranitidine, atenolol, hydrochlorothiazide/triamterene, captopril) and provided suggestions for less costly drugs (verapamil, cimetidine, metoprolol, propranolol, hydrochlorothiazide, enalapril). In five trials, the content was related to appropriate screening or counselling practices (Cockburn 1992; Dietrich 1992; Rabin 1994), or appropriate management (Feder 1995; Putnam 1985). In five trials, the information given to the participants was based on some form of social marketing strategy

(Avorn 1983; Avorn 1992; Ross-Degnan 1996a; Santoso 1996; Soumerai 1993). For these trials, the design and content of the intervention were based upon factors influencing prescribing in a similar group of prescribers. Another component of this approach was delivery of the content by a credible 'messenger'. In two of these trials, the messenger was a clinical pharmacist and in two trials, it was a physician-educator. In the trial by Ross-Degnan (Ross-Degnan 1996a), the educators were described as 'Ministry of Health personnel'.

The messenger varied in the remaining trials. In one trial, it was a member of the 'Professional Services Review Organisation' (McConnell 1982) and in another, it was a project facilitator (Dietrich 1992). In the remaining trials, the messenger was either the investigator or assumed to be the investigator.

The frequency of the visits varied. In five trials (McConnell 1982; Putnam 1985; Rabin 1994; Raisch 1990; Soumerai 1993), the visits took place only once. In six trials (Avorn 1983; Avorn 1992; Cockburn 1992; Dietrich 1992; Diwan 1995; Feder 1995), two to four visits were made and in one trial, the visits took place weekly for seven months (Steele 1989). Ross-Degnan and colleagues (Ross-Degnan 1996a) reported that pharmacists/owners received personal visits and these were followed by group sessions lasting two days for counter attendants. Diwan (Diwan 1995) and Santoso (Santoso 1996) also used group sessions so that all prescribers in a centre could attend. In the trial by Stergachis et al (Stergachis 1987), the actual number of visits was unclear, but likely occurred at least weekly for six months.

Barriers to change

In five of 18 trials (Avorn 1983; Avorn 1992; Ross-Degnan 1996a; Santoso 1996; Soumerai 1993), one or more barriers to change were identified and the interventions were designed to address these barriers. The barriers to change were patient expectations (such as the perceived desire for a prescription), information management (including the inability to recall pertinent information) and administrative constraints (such as lack of time).

Strength of evidence for the recommended changes

For nine of 18 trials, the published report did not contain sufficient information to determine if recommendations for the desired change in behaviour were based upon sound evidence of their effectiveness. Cockburn (Cockburn 1992) and Stergachis (Stergachis 1987) referenced at least one randomised controlled trial. Avorn (Avorn 1992) reported that they had conducted systematic reviews of the literature but did not provide a reference for this.

METHODOLOGICAL QUALITY

There is some risk of bias in all of the studies. For example only five of 18 studies adequately concealed allocation. For the remaining trials, adequacy of concealment could not be determined from

the published reports. Even after randomisation, there remained potentially important baseline differences in six of 18 studies. Results from these studies were not adjusted for baseline differences because of the risk of introducing bias with such adjustments. Outcomes were assessed blindly in nine of 18 studies, with the remainder assessed as not done or not clear from available reports. Follow-up of professionals was generally good, with all but three studies following up at least 80% of the subjects randomised.

In six of 18 studies the unit of randomisation was different from the unit of analysis. Unless the unit of analysis makes practical sense and is demonstrated to be sufficiently independent by estimating the intra cluster variability, increasing the number of subjects in this way will increase artificially the statistical precision of the results. No study with different units of allocation and analysis provided estimates of intracluster variability.

RESULTS

Literature Search

The search strategy using the text words all academic and all detail: combined with the methodological terms yielded five trials. The remaining trials were located from electronic searches using the text word clinical competence, from reviewing reference lists or from experts in the field. Six studies (see Excluded Studies Table) were excluded from the review because the method of allocation to experimental and control groups was not randomised, thereby introducing the possibility of selection bias.

Comparisons

Comparison 1.

Outreach visits (including educational materials or conferences) are more effective than no intervention (+/- educational materials or conferences).

We located three trials for the first comparison (Data Table 1). Newton-Syms et al (Newton-Syms 1992) studied the effectiveness of a single outreach visit and educational materials compared to a no intervention control group of general practitioners in the United Kingdom in an effort to encourage rational prescribing of non-steroidal anti-inflammatory agents. They reported that the intervention was effective (50% relative improvement, $p < 0.001$), resulting in increased use of ibuprofen but there was no evidence of an effect for piroxicam or indomethacin. Overall, there was a decrease in the average prescribing cost in the intervention group.

Berings and colleagues (Berings 1994) studied the effect of one educational visit by a specially trained general practitioner and educational materials compared to a no intervention control group to reduce benzodiazepine prescribing amongst general practitioners in Belgium. They reported that the intervention group prescribed 24% fewer packages of benzodiazepine than the control group ($p < 0.05$, based on pre/post changes between experimental

and control groups). In contrast, when outreach visits were compared to educational materials alone, the improvement was only 4% (significance not reported).

Outreach visits to groups of physicians were compared to no intervention in an attempt to improve prescribing of lipid lowering drugs for patients with hyperlipidaemia seen in primary care (Diwan 1995). For women between the ages of 30 to 65 years, there was 50% relative improvement in the number of prescriptions per month per health centre and a 27% relative improvement for men in favour of the intervention group. Standard deviations were not reported, therefore confidence intervals and p values could not be calculated. The authors also reported that the pre-post change for women in the intervention group was statistically different from the change in the control group ($p = 0.03$, based on a regression analysis). The pre-post difference in prescribing for men was not statistically significant between the two groups.

Comparison 2.

Outreach visits combined with other complementary interventions including reminders, audit and feedback, use of local opinion leaders, marketing strategies or patient-mediated interventions are more effective than no intervention.

Thirteen trials compared outreach visits plus additional interventions such as social marketing techniques (five trials), audit and feedback (three trials), reminders (three trials), and patient-mediated interventions (two trials) to no intervention. In seven of nine trials aimed at improving prescribing practices, there were significant effects in favour of the experimental group (1%-45% relative improvement) (see Data Table 2).

In five trials, outreach visits were combined with social marketing techniques (Avorn 1983; Avorn 1992; Ross-Degnan 1996a; Santoso 1996; Soumerai 1993). Avorn and Soumerai (Avorn 1983) reduced the use of propoxyphene, cerebral and peripheral vasodilators and cephalexin in physicians identified as high prescribers. They reported a relative improvement of 15% per physician per nine months ($p = 0.001$, based on pre/post changes between experimental and control groups). In a follow-up report, these authors conducted an economic analysis of the 1983 study. They reported that the outreach visits in addition to printed materials were cost-effective (Soumerai 1986) and the benefit-to-cost ratio was projected to be even greater if high prescribers were targeted and the interventions were extended beyond Medicaid. Avorn and colleagues (Avorn 1992) reduced the use of psychoactive drugs in nursing homes. A psychoactive drug index was used where residents were assigned one point for any of seven indicators of potentially inappropriate drug use. The authors reported a risk reduction from pre to post intervention of 0.37 (95% CI 0.08 to 0.67 $p = 0.02$). They also measured cognitive function (six variables) in patients. There did not appear to be any overall adverse effects. In the third trial by the same group (Soumerai 1993), the authors reduced the use of red blood cell transfusions. The relative reduction in the mean percentage of non-compliant transfusions

was 46% for surgeons but there was no evidence of an effect on transfusions ordered by medical physicians. The authors reported that the reduction from pre to post intervention for surgeons was statistically significant ($p = 0.006$).

Santoso (Santoso 1996) compared two interventions (outreach visits or a formal seminar) to a non-intervention control to improve drug use in the management of acute diarrhoea in children. They reported that outreach visits caused a 24% relative reduction in antimicrobial use compared with the control group ($p < 0.001$, based on pre/post changes between groups). There was a 40% relative reduction in the use of antidiarrhoeals compared to the control group. The authors also reported that the seminar resulted in significantly greater changes from the baseline period than the outreach group. The use of oral rehydration agents was not significantly improved after either intervention (9% reduction). The authors found that the outreach visits were less costly than the seminar (\$0.77 US versus \$3.30 US per participant). Ross-Degnan and colleagues (Ross-Degnan 1996a) reported that outreach visits to pharmacists/owners, coupled with a small group session with counter attendants increased sales of oral hydration salts by 40% ($p < 0.05$) and reducing antidiarrhoeal sales by 35% ($p < 0.05$) for the treatment of diarrhoea.

There were two trials where outreach visits were combined with audit and feedback (McConnell 1982; Putnam 1985). McConnell (McConnell 1982) reported that eight of 17 experimental providers continued to prescribe tetracycline for upper respiratory infections while 15 control providers continued to do so. The relative risk reduction was 50%, $p < 0.01$.

Putnam and Curry (Putnam 1985) reported an 8% improvement ($p = 0.07$) in the care provided to patients in family practice when optimal criteria for care were considered and a 22% improvement ($p = 0.001$) when only essential criteria were used. Optimal criteria 'incorporated the physicians' consensus about the elements of optimal care for a given condition'. Essential criteria were defined as those elements of care that would 'allow precise specification of a condition and elements of treatment known to be effective in producing desired results'. There were no significant differences between the experimental and control groups in the performance of a concealed problem (urinary tract infection). The process of care for this problem was measured without the knowledge of the participants to determine if the effect of the intervention was generalisable beyond the problems targeted for improvement. The authors also reported that there was no significant effect of participation in the selection of the audited conditions when either optimal or essential criteria for care were considered (12% and 4% improvement respectively in favour of the control group). When physicians participated in the development of criteria for the audit, there was a 32% improvement using criteria for optimal care ($p = 0.02$) and nonsignificant 10% improvement using essential care criteria.

Stergachis and colleagues (Stergachis 1987) attempted to reduce the use of high cost non-steroidal anti-inflammatory medications (piroxicam), and increase the use of ibuprofen and salicylates by providing clinical pharmacy services in a health maintenance organisation. The pharmacists provided advice to physicians and patients and reviewed patient records. They also provided individual and weekly sessions on drug use. The relative difference in the mean number of prescriptions of piroxicam was in favour of the control group (38%, $p = \text{NS}$). A similar result was found for ibuprofen with a 9% difference in favour of the control group. However, the authors reported that there was a significant difference (70% improvement) in favour of the experimental group for the number of prescriptions of salicylates. 95% CI's and p values could not be calculated from the data presented. The authors reported that the intervention was not cost-effective.

Educational outreach visits combined with reminders were used in two trials (Dietrich 1992; Steele 1989). Dietrich (Dietrich 1992) reported improvement in the delivery of six (mammography, breast self-examination, clinical breast examination, faecal occult blood testing, advice to quit smoking, advice to increase dietary fibre) out of 10 preventive care services (9% to 20% relative improvement). Steele (Steele 1989) found an 11% reduction ($p = 0.02$) in the mean cost of a prescription per month. These authors also reported that the savings were approximately \$478 US per physician.

Rabin (Rabin 1994) found that more physicians conducted risk questioning (68% relative improvement, $p = 0.02$) and provided risk advice (27%, $p = 0.61$). In this trial, outreach visits were combined with a patient-mediated intervention (patient education materials) for physicians who counselled patients at high risk to develop sexually transmitted diseases.

de Burgh and colleagues (de Burgh 1995) also investigated the effectiveness of outreach visits to reduce benzodiazepine prescribing in general practitioners in Australia. In the primary analysis, the relative difference between the experimental and control groups for either patients diagnosed with anxiety (13%) or insomnia (1.2%) was not statistically significant.

Comparison 3.

Outreach visits combined with other complementary interventions including reminders, audit and feedback, marketing strategies or patient-mediated interventions are more effective than outreach visits alone.

There were no trials comparing outreach visits plus additional interventions to outreach visits alone.

Comparison 4.

Outreach visits are more effective than audit and feedback.

One trial compared outreach visits to audit and feedback. Steele (Steele 1989) compared outreach visits plus a reminder to audit and feedback plus a reminder. The reminders were handwritten patient-specific prescribing suggestions that were placed on each

patient's medication list. The relative difference in the mean cost per prescription was 11.2% ($p=0.02$) in favour of the outreach visits plus reminder group.

Comparison 5.

Outreach visits using patient-related content are more effective than using performance summaries for content.

There was one trial that compared two different types of content. Raisch (Raisch 1990) compared the use of case studies to the use of statistical information from a drug use review to improve prescribing of anti-ulcer agents. There was a 9% relative reduction in inappropriate prescribing per practitioner per one month in favour of the group receiving case scenarios. In this trial, the authors reported that both groups combined were significantly different from the control (no intervention) group; however, the control group was not randomly allocated.

Comparison 6.

Outreach visits using an influential source are more effective than outreach visits using any other source. The authors must specifically mention that the source was influential.

There were no direct comparisons.

Comparison 7.

Using more than one outreach visit is more effective than using only one outreach visit.

There were no direct comparisons.

Comparison 8.

The effects of outreach visits decrease over time after they are stopped.

Only one trial reported results from an additional period of post-intervention follow-up (Raisch 1990). At the end of the one month follow-up period, the performance of both intervention groups deteriorated. The group that received the visit using case scenarios was slightly worse than the group that received statistical information.

Other comparisons

Cockburn (Cockburn 1992) studied the effects of outreach visits compared to visits by a 'friendly' courier to office staff with the goal of increasing the use of a smoking cessation kit. In one visit, the kit was personally demonstrated to general practitioners by an educational facilitator. In the other intervention, the kit was personally delivered to receptionists by a courier. The relative risk reduction (in favour of the group receiving the demonstration) of not using at least one component of the kit was 0.55 (95% CI 0.28 to 1.07). The authors reported that this type of visit was costly (\$A142 per practitioner compared to \$A14 for the courier).

DISCUSSION

When outreach visits are combined with additional interventions, they appear to be effective. In 12 of 13 trials of combined inter-

ventions, there were positive effects in favour of the intervention group (15-68% relative improvement). In particular, there is evidence from five trials in different health care settings that using outreach visits in combination with a social marketing approach (Soumerai 1990) can be effective, especially when targeted at high prescribers.

We located three trials where outreach visits alone were compared to a no intervention control group. In all three trials, outreach visits were effective in reducing inappropriate prescribing. The relative improvement ranged from 24% to 50%. There are limited or no data to address our other questions. We found no trials comparing outreach visits plus additional interventions to outreach visits alone and only one trial comparing outreach visits to audit and feedback (Steele 1989). We could not locate any trials that examined whether outreach visits can be made more effective by modifying how they are done.

The importance of the number of outreach visits is not clear. In these trials, the frequency of the visits varied from once to weekly visits for seven months. Steele and colleagues (Steele 1989) reduced prescribing costs after seven months of weekly visits by clinical pharmacists. They reported that the visits were cost effective and saved \$478 per physician after accounting for the salaries of the pharmacists. In contrast, interventions consisting of only one or two visits also had positive effects (Avorn 1983; Berings 1994; McConnell 1982; Newton-Syms 1992; Putnam 1985). Because follow-up was short in most trials, it remains uncertain whether and how performance deteriorates over time. In one of the excluded studies (Ray 1985), the authors reported that there were continued reductions in inappropriate prescribing two years after the outreach visit.

Only one trial considered patient outcomes (Avorn 1992). The authors concluded that reducing the use of antipsychotic drugs in nursing home residents did not adversely affect the overall behaviour and level of functioning although some negative changes were reported.

Five controlled studies were excluded because the method of allocation was not randomised (Schaffner 1983; Ray 1985 (follow-up to Schaffner 1983); Ray 1986; Ray 1987; Ray 1993; Ross-Degnan 1996b). The targeted behaviour in all five studies was appropriate prescribing. In four out of five studies, outreach visits were effective in reducing inappropriate prescribing.

Four types of outreach visits are described in the included studies. The goal of the first two types is to attempt to influence a change in practice through persuasion. The aim of the third type is to change behaviour by streamlining office procedures in the practice setting. In the fourth type, the participants used practice enabling strategies such as role-play with simulated patients to develop skills.

The first type of outreach visit is based upon the work of Soumerai and Avorn (Soumerai 1990) and uses an eight step social mar-

keting approach to behaviour change. Trials using this approach are Avorn 1983; Avorn 1992; Ross-Degnan 1996a; Santoso 1996; Soumerai 1993. The first step in the approach may be a key component and appears to be consistent across other models of behaviour change. It consists of interviews to assess the motivation for current practice and barriers to change. Similarly, Green et al (Green 1988) have described the need for educational diagnosis prior to the design of an intervention. Prochaska et al (Prochaska 1992) have also commented on the importance of determining the individual's stage in the change process and matching the intervention to the stage. Other steps in the social marketing approach are: developing programs for specific physician targets and their 'opinion leaders'; developing objectives; establishing credibility; encouraging physician participation; using concise educational materials; repeating key messages; and ideally providing reinforcement through subsequent visits (Soumerai 1990). Since outreach visits are costly, it would be useful to know which components contribute to its effectiveness. For example, identifying and addressing barriers to change could be accomplished by an intervention other than an outreach visit.

The second type of outreach (for example, (McConnell 1982; Putnam 1985)) also involves persuasion but an assessment of barriers to change is not specifically reported. The third type of outreach visit may not use persuasion per se, but may decrease administrative barriers for example, by streamlining office procedures for preventive care services (Dietrich 1992). In the fourth type, the emphasis appears to be on the development of skills. Participants have the opportunity to practice skills and obtain feedback from standardised patients in the practice setting (Rabin 1994). This process may facilitate a change in performance if a lack of skills is a barrier to change.

Only three studies included any data to indicate the efficiency of outreach visits, and only one included a full economic analysis of available options.

AUTHORS' CONCLUSIONS

Implications for practice

The evidence presented here supports the use of educational outreach visits combined with additional interventions to reduce inappropriate prescribing by physicians. The cost-effectiveness of this approach in different circumstances and health care settings is unclear.

- The effects are small to moderate, but potentially of practical importance. It is not known how performance deteriorates over time and whether subsequent visits are cost-effective. Longer term performance should be monitored.

- The preliminary interviews in the social marketing approach may be important in identifying barriers to change. This process needs to be fully described so that others might replicate it.
- Outreach visits are costly. However, savings may outweigh costs if targeted at inappropriate prescribing and the effects are enduring (Soumerai 1986).

Implications for research

The effectiveness of outreach visits requires further evaluation in different settings and contexts.

- The social marketing approach appears promising, and deserves further development and evaluation.
- Investigators should consider varying the characteristics of outreach visits such as the number of visits.
- Performance should be measured over time to determine if deterioration occurs.
- Cost-effectiveness needs to be determined.
- The unit of allocation should be the same as the unit of analysis and sample sizes should be estimated taking this into account.
- There should be adequate reporting of follow-up and blinding of the outcome measure. The strength of evidence for the desired change in performance should be clearly stated.

POTENTIAL CONFLICT OF INTEREST

None known.

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T A B L E S**Characteristics of included studies**

Study	Avorn 1983
Methods	RCT Randomisation concealment: NOT CLEAR Follow up: providers: DONE patients: DONE Blinded assessment: DONE Baseline: NOT DONE for print only group, DONE for outreach group Reliable outcomes: DONE Protection against contamination: DONE
Participants	435 US physicians, high prescribers of 3 drugs Proportion of eligible providers who participated: [92% had at least one academic detailing visit] Community based care, academic/teaching setting NOT CLEAR
Interventions	1. Outreach visits + marketing + educational materials 2. Educational materials 3. No intervention control
Outcomes	Professional practice: Number of prescriptions/items of specified drugs Patient: NONE
Notes	
Allocation concealment	B – Unclear

Study	Avorn 1992
Methods	RCT Randomisation concealment: NOT CLEAR Follow up: providers: DONE (prescribing) patients: NOT DONE Blinded assessment: prescribing NOT CLEAR, patient status DONE Baseline: NOT CLEAR Reliable outcomes: NOT CLEAR Protection against contamination: DONE
Participants	US physicians, nurses and nursing aids and assistants prescribing psychoactive drugs for 823 patients in 6 stratified pairs of nursing homes Proportion of eligible providers who participated: NOT CLEAR

Characteristics of included studies (Continued)

	Nursing home care, academic/teaching status NOT CLEAR
Interventions	1. Outreach visits + distribution of educational materials + conferences + marketing 2. No intervention control
Outcomes	
Notes	
Allocation concealment	B – Unclear

Study	Berings 1994
Methods	RCT Randomisation concealment: NOT CLEAR Follow up: providers: DONE patients: NOT CLEAR Blinded assessment: NOT CLEAR Baseline: DONE Reliable outcomes: NOT CLEAR Protection against contamination: NOT CLEAR
Participants	128 Belgian general practitioners encouraged to reduce benzodiazepine prescribing Proportion of eligible providers who participated:28% Community-based care,academic/teaching status: NOT CLEAR
Interventions	1. Outreach visits + distribution of educational materials 2. No intervention control
Outcomes	Mean number of packages of benzodiazepines per 100 patient contacts with prescription Patient:NONE
Notes	
Allocation concealment	B – Unclear

Study	Cockburn 1992
Methods	RCT Randomisation concealment: NOT CLEAR Follow up: providers: DONE patients: NOT CLEAR Blinded assessment: NOT CLEAR Baseline: NOT DONE Reliable outcomes: NOT CLEAR Protection against contamination: NOT CLEAR
Participants	272 physicians in Australian GP/family practices, encouraged to provide patients with smoking cessation information Proportion of eligible providers who participated: NOT CLEAR Community based care, academic/teaching status NOT CLEAR
Interventions	1. Outreach visits (to providers) + distribution of educational materials 2. Outreach visits (to receptionists) + distribution of educational materials + reminders 3. Distribution of educational materials + reminders
Outcomes	Professional practice: Number of physicians using at least one resource Number of resources used overall (help cards, contract cards, quits pack, self-help books) Patient: NONE
Notes	
Allocation concealment	B – Unclear

Characteristics of included studies (Continued)

Study	Dietrich 1992
Methods	RCT Randomisation concealment: NOT CLEAR Follow up: providers: DONE patients: DONE Blinded assessment: NOT CLEAR Baseline: NOT CLEAR Reliable outcomes: NOT CLEAR Protection against contamination: DONE
Participants	98 physicians in 98 US practices providing cancer screening for 2595 patients Proportion of eligible providers who participated: NOT CLEAR Community based care, non-academic/teaching status
Interventions	1. Outreach visits + reminders + conferences 2. Outreach visits + reminders 3. Conferences + distribution of educational materials 4. No intervention control
Outcomes	Professional practice: Proportion of preventive care services offered Mammograms (age 50 or over) Clinical breast examination Breast self-examination recommended Cervical cytology (no hysterectomy) Stool occult blood Digital rectal examination Sigmoidoscopy Recommendation to reduce fat Recommendation to increase fibre Smokers advised to quit Patient:NONE
Notes	
Allocation concealment	B – Unclear

Study	Diwan 1995
Methods	RCT Randomisation concealment: DONE Follow up: providers: DONE patients: NOT CLEAR Blinded assessment: DONE Baseline: NOT DONE Reliable outcomes: NOT CLEAR Protection against contamination: DONE
Participants	Physicians in 134 Swedish family practices encouraged in appropriate use of lipid lowering drugs for 1308 patients Proportion of eligible providers who participated: NOT CLEAR Community based care, non academic/teaching status
Interventions	1. Outreach visits and distribution of educational materials 2. No intervention control
Outcomes	Professional practice: Number of prescriptions Mean number of prescriptions per month, per practice by age and sex

Characteristics of included studies (Continued)

	Patient: NONE
Notes	
Allocation concealment	A – Adequate

Study	Feder 1995
Methods	RCT Randomisation concealment: NOT CLEAR Follow up: providers: DONE patients: DONE Blinded assessment: NOT DONE* Baseline: NOT DONE Reliable outcomes: NOT CLEAR Protection against contamination: DONE
Participants	39 physicians in 24 UK inner city general practices encouraged to comply with guidelines for the management of asthma and diabetes Proportion of eligible providers who participated: 55% Community-based care, non-academic/teaching status
Interventions	1. Outreach visits + distribution of educational materials (guidelines) plus reminders for asthma management 2. Outreach visits + distribution of educational materials (guidelines) plus reminders for diabetes management Note one group served as the control for the other group
Outcomes	Professional practice: Mean percentage of patients receiving appropriate care for asthma and diabetes Diabetes variables: fundoscopy blood glucose weight blood pressure smoking habit feet examination HbA1 recorded Asthma variables: smoking habit inhaler technique checked peak flow prophylaxis occupation symptom review drug prescribing Patient: NONE
Notes	* Prompts (stamps) were used in the medical records of the intervention group only thereby resulting in a difference in how information was collected before and after the intervention ** Note one group served as the control for the other group
Allocation concealment	B – Unclear

Study	McConnell 1982
Methods	RCT Randomisation concealment: NOT CLEAR Follow up: providers: DONE patients: DONE Blinded assessment: DONE

Characteristics of included studies (Continued)

	Baseline: NOT DONE Reliable outcomes: DONE Protection against contamination: NOT CLEAR
Participants	35 US physicians prescribing tetracycline for upper respiratory infection in Medicaid patients Proportion of eligible providers who participated: 22% (responsible for 62% of all prescriptions) Care setting NOT CLEAR, academic/ teaching setting NOT CLEAR
Interventions	1. Outreach visits (including audit and feedback & educational materials) 2. No intervention control
Outcomes	Professional practice: Number of physicians prescribing tetracycline for upper respiratory tract infection Mean number of prescriptions per prescriber Patient: NONE
Notes	
Allocation concealment	B – Unclear

Study Newton-Syms 1992

Methods	RCT Randomisation concealment: DONE Follow-up: providers DONE patients N/A Blinded assessment: DONE Baseline: DONE Reliable outcomes: DONE Protection against contamination: DONE
Participants	318 UK general practitioners encouraged to alter prescribing of non-steroidal anti-inflammatory drugs Proportion of eligible providers who participated: 75%* Community based care, academic/teaching status NOT CLEAR
Interventions	1. Outreach visits + distribution of educational materials 2. No intervention control
Outcomes	Median prescribing index*
Notes	* Proportion in the intervention group. The control group did not receive any notification of the study ** ratio of the cost of prescribing the recommended NSAID to the cost of more expensive NSAIDs plus the recommended NSAID
Allocation concealment	A – Adequate

Study Putnam 1985

Methods	RCT Randomisation concealment: NOT CLEAR Follow up: providers: NOT CLEAR patients: NOT CLEAR Blinded assessment: NOT CLEAR Baseline: NOT CLEAR Reliable outcomes: DONE Protection against contamination: NOT CLEAR
Participants	16 physicians from Canadian practices, providing treatment for 5 conditions Proportion of eligible providers who participated: NOT CLEAR Community based care, academic/teaching status NOT CLEAR
Interventions	1. Outreach visits + audit and feedback + local consensus processes + educational materials

Characteristics of included studies (*Continued*)

	2. No intervention control
Outcomes	Professional practice: Mean compliance with criteria Patient: NONE
Notes	
Allocation concealment	B – Unclear

Study **Rabin 1994**

Methods	RCT Randomisation concealment: DONE Follow up: providers: NOT DONE patients: N/A Blinded assessment: DONE Baseline: NOT DONE Reliable outcomes: NOT CLEAR Protection against contamination: NOT CLEAR
Participants	194 US physicians given information advice about the prevention of sexually transmitted diseases; 194 episodes of care Proportion of eligible providers who participated: 60% Community based care, non-academic/teaching status
Interventions	1. Outreach visits + patient mediated intervention + distribution of educational materials (including audio) 2. Distribution of educational materials (including audio) 3. No intervention control
Outcomes	Professional practice: Risk questioning of patients about: Condom use Number of sexual partners. Advice to use condoms Advice to limit number of sexual partners Patient: NONE
Notes	
Allocation concealment	A – Adequate

Study **Raisch 1990**

Methods	RCT Randomisation concealment: DONE Follow up: providers: DONE patients: DONE Blinded assessment: DONE Baseline: NOT DONE Reliable outcomes: NOT DONE Protection against contamination: NOT CLEAR
Participants	24 US physicians, nurses and physician assistants prescribing anti ulcer drugs for outpatients in 187 episodes of care Proportion of eligible providers who participated: NOT CLEAR Community based care, university/teaching setting: NOT CLEAR
Interventions	1. Outreach visits + distribution of educational materials (vivid condition) 2. Outreach visits + distribution of educational materials (non vivid condition) 3. No intervention control (non randomised)

Characteristics of included studies (Continued)

Outcomes Professional practice:
Inappropriate prescribing per practitioner
Cost of inappropriate prescribing per practitioner
Patient:NONE

Notes

Allocation concealment A – Adequate

Study **Ross-Degnan 1996b**

Methods RCT
Randomisation concealment: NOT CLEAR
Follow up: providers: DONE
patients: N/A
Blinded assessment: DONE
Baseline: DONE
Reliable outcomes: DONE
Protection against contamination: DONE

Participants Pharmacists and counter attendants in 87 private pharmacies in Indonesia encouraged to provide appropriate therapy for patients with acute diarrhoea
Proportion of eligible providers who participated: NOT CLEAR (see notes)
Community-based care, non academic/teaching status

Interventions 1. Outreach visits + marketing + distribution of educational materials + patient-mediated intervention
2. No intervention control

Outcomes Professional practice:
Mean percentage of patient visits receiving oral rehydration solution
Mean percentage of patient visits receiving antidiarrhoeals
Mean percentage of patient visits receiving antimicrobials

Patient: NONE

Notes In this paper, two studies were reported, one in Indonesia and one in Kenya. Only the Indonesian study is included in this review. See excluded trials table. The outcome was measured using surrogate patients. The proportion of eligible providers was scored as not clear because we could not determine how many pharmacies were in the original sampling frame. The authors used a purposive sample of 87 pharmacies.

Allocation concealment B – Unclear

Study **Santoso 1996**

Methods RCT
Randomisation concealment: NOT CLEAR
Follow up: providers: DONE
patients: DONE
Blinded assessment: NOT CLEAR
Baseline: DONE (oral hydration, antimicrobials, polypharmacy) NOT DONE (antidiarrhoeals)
Reliable outcomes: NOT CLEAR
Protection against contamination: DONE

Participants Medical and non-medical prescribers in 90 health centres in 6 districts in Indonesia encouraged to provide appropriate management for patients with acute diarrhoea
Proportion of eligible providers who participated: 100%
Community-based care, academic/teaching status: NOT CLEAR

Interventions 1. Outreach visits + marketing + distribution of educational materials
2. Conferences + distribution of educational materials

Characteristics of included studies (Continued)

	3. No intervention control
Outcomes	Professional practice: Mean percentage of patients prescribed oral rehydration solution Mean percentage of patients prescribed antimicrobials Mean percentage of patients prescribed antidiarrhoeals Mean number of drugs per case Patient: NONE
Notes	
Allocation concealment	B – Unclear

Study	Soumerai 1993
Methods	RCT Randomisation concealment: NOT CLEAR Follow up: providers: DONE patients: NOT CLEAR Blinded assessment: NOT DONE Baseline: NOT DONE Reliable outcomes: DONE Protection against contamination: NOT CLEAR
Participants	Physicians from 4 US hospitals providing 1449 episodes of care for selected surgical and medical patients requiring transfusions Proportion of eligible providers who participated: 100% Inpatient care, mixed academic/teaching settings
Interventions	1. Outreach visits + distribution of educational materials + conferences + marketing 2. No intervention control
Outcomes	Professional practice: Number of transfusions undertaken that met explicit criteria Patient: NONE
Notes	
Allocation concealment	B – Unclear

Study	Steele 1989
Methods	RCT Randomisation concealment: DONE Follow up: providers: DONE patients: DONE Blinded assessment: DONE Baseline: NOT DONE Reliable outcomes: DONE Protection against contamination: NOT CLEAR
Participants	34 physicians in 1 US hospital encouraged to use efficient prescribing practices for outpatients. Proportion of eligible providers who participated: 100% Outpatient care, university based/teaching setting
Interventions	1. Outreach visits + reminders 2. Audit and feedback + reminders 3. No intervention control
Outcomes	Professional practice: Mean responses to written suggestions Mean cost per prescription fill rate

Characteristics of included studies (Continued)

Mean number of prescriptions
Patient:NONE

Notes

Allocation concealment A – Adequate

Study Stergachis 1987

Methods RCT
Randomisation concealment: NOT CLEAR
Follow up: providers: NOT CLEAR
patients: DONE
Blinded assessment: DONE
Baseline: DONE for salicylates, NOT DONE for piroxicam, ibuprofen
Reliable outcomes: DONE
Protection against contamination: NOT CLEAR

Participants 17 family physicians in 1 US HMO encouraged to reduce use of NSAIDs (piroxicam)
Proportion of eligible providers who participated: NOT CLEAR
Community based care, academic/teaching status NOT CLEAR

Interventions 1. Outreach visits (included audit and feedback, conferences)
2. Patient-mediated interventions
3. No intervention control

Outcomes Professional practice:
Mean number and cost of prescriptions
Patient:NONE

Notes

Allocation concealment B – Unclear

Study de Burgh 1995

Methods RCT
Randomisation concealment: NOT CLEAR
Follow up: providers: DONE
patients: DONE
Blinded assessment: NOT CLEAR
Baseline: DONE for new anxiety diagnoses; NOT DONE for new insomnia diagnoses
Reliable outcomes: NOT CLEAR
Protection against contamination: DONE

Participants 286 Australian general practitioners encouraged to reduce benzodiazepine prescribing
Proportion of eligible providers who participated: 45%
Community based care, academic/teaching status NOT CLEAR

Interventions 1. Outreach visits + distribution of educational materials + patient mediated intervention
2. No intervention control

Outcomes Professional practice:
Mean prescribing rate per 100 diagnoses
Patient: NONE

Notes

Allocation concealment B – Unclear

Characteristics of excluded studies

Study	Reason for exclusion
Ray 1985	Follow up to 1993 study
Ray 1986	Allocation to intervention was not randomised
Ray 1987	Allocation to intervention was not randomised
Ray 1993	Allocation to intervention was not randomised
Ross-Degnan 1996a	Allocation to intervention was not randomised
Schaffner 1983	Allocation to intervention was not randomised

ANALYSES

Comparison 01. effect of outreach visits versus no intervention

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 results			Other data	No numeric data

Comparison 02. effect of outreach visits plus complementary interventions versus no intervention

Outcome title	No. of studies	No. of participants	Statistical method	Effect size
01 results			Other data	No numeric data

INDEX TERMS

Medical Subject Headings (MeSH)

*Education, Medical, Continuing; Health Personnel [*education]; *Outcome Assessment (Health Care); Patient Compliance; Physician's Practice Patterns; Professional Practice [*standards]

MeSH check words

Humans

COVER SHEET

Title	Educational outreach visits: effects on professional practice and health care outcomes
Authors	O'Brien MA, Oxman AD, Davis DA, Haynes RB, Freemantle N, Harvey EL
Contribution of author(s)	Information not supplied by author
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What's New	Information not supplied by author
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Date new studies found but not yet included/excluded	Information not supplied by author
Date new studies found and included/excluded	Information not supplied by author
Date authors' conclusions section amended	Information not supplied by author
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Analysis 01.01. Comparison 01 effect of outreach visits versus no intervention, Outcome 01 results

GRAPHS AND OTHER TABLES

results

Study	Outcome measurement	Comparison	Effect on practice	Effect on patient	Notes
Berings 1994	Reducing the use of benzodiazepines		Outreach (44) vs no intervention (41) Outreach (44) vs educational materials (43)	Outreach vs no intervention Mean number of packages per 100 patient contacts=10.8 (6.3) vs 14.2 (5.6) Mean difference=3.4, authors report p<0.01 based on post-hoc pair wise comparison by Duncan's multiple range test Relative improvement= 24% Outreach vs educational materials Mean number of packages per 100 patient contacts=10.8 (6.3) vs 11.2 (5.4) Mean difference=0.4 Relative improvement= 4%	
Diwan 1995	Improve prescribing of lipid lowering drugs	Outreach vs no intervention	Mean prescriptions per month per health centre Women:0.30 vs 0.20, Mean difference= 0.10 (p = 0.03, based on pre/post changes between exp & control groups) Relative improvement= 50% Men:0.33 vs 0.26 Mean difference= 0.07 Relative improvement= 27%	Not done	
Newton-Syms 1992	Reducing the use of NSAID's	Outreach vs no intervention	Median prescribing index Ibuprofen: 0.24 vs 0.16 Difference= 0.08, authors report p<0.001 Relative improvement= 50% Piroxicam: 0.09 vs 0.09 Difference= 0	Not done	The PI is the ratio of the cost of prescriptions for the recommended NSAID to the cost of prescriptions for other (more expensive) NSAIDs Plus the recommended NSAID. The PI can vary from 0

results (Continued)

Study	Outcome measurement	Comparison	Effect on practice	Effect on patient	Notes
			Indomethacin: 0.10 vs 0.12 Difference= -0.02, authors report p=NS Relative difference= -16.7%		to 1 with 1 representing 100% prescribing of the recommended drug.

Analysis 02.01. Comparison 02 effect of outreach visits plus complementary interventions versus no intervention, Outcome 01 results

results

Study	Outcome measurement	Comparison	Effect on practice	Effect on patient	Notes
Avorn 1983	Reducing the use of propoxyphene, cerebral & peripheral vasodilators, cephalixin	Outreach visits + marketing + educational materials (n=141) versus no intervention (n=140)		Mean number units (capsules or tablets) per physician per 9 months:4174 vs 4921 Mean difference= 747, 95% CI not available, authors reported p=0.0001 Relative Difference= 15.2%	Not done
Avorn 1992	Reducing the use of psychoactive drugs in nursing home residents	Outreach visits + educational materials + conferences + marketing (n=6 nursing homes) versus no intervention (n=6 nursing homes)	Mean psychoactive drug use score per 1 month:1.36 vs 1.60 Mean difference = 0.24 (authors reported a mean difference in risk reduction pre to post intervention = 0.37 95% CI 0.08 to 0.67 p=0.02) Relative improvement = 15%	Number of patients with deteriorated function who received antipsychotics Mental Status 15/39 (38%) vs 24/43 (56%) Risk difference (95%CI) 0.17 (-0.04 to 0.37) RR=0.69 (0.41 to 1.09) RRR=0.33 (-0.09 to 0.60) Memory 11/36 (31%) vs 21/39 (54%) Risk difference= 0.23 (0.01 to 0.44) RR=0.57 (0.31 to 0.98) RRR=0.43 (0.02 to 0.69) Anxiety 13/28 (46%) vs 12/34 (35%) Risk difference= -0.11 (-0.35 to 0.13) RR=1.32 (0.72 to 2.41) RRR=-0.32 (-1.41 to 0.28) Depression 15/27 (56%) vs 9/33 (27%) Risk difference= -0.28 (-0.50 to -0.03) RR=2.04 (1.08 to 3.96) RRR=-1.04 (-2.96 to -0.09) Behaviour 32/71 (45%) vs 25/65 (38%)	RR = Risk Reduction RRR = Relative Risk Reduction

results (Continued)

Study	Outcome measurement	Comparison	Effect on practice	Effect on patient	Notes
Dietrich 1992	Improving the delivery of 10 preventive services for cancer detection	Outreach visits + reminders (n=24) versus no intervention (n=24) Outreach visits + conferences + reminders (n=26) versus no intervention (n=24)	Mean* percentage of eligible patients per practice receiving services per 12 months:64.4 vs 51.6 Mean difference= 12.8, 95% CI -1 to 26.6 p=0.07 Relative improvement= 24.4% Mean* percentage of eligible patients per practice receiving services per 12 months:61.3 vs 51.6 Mean difference= 9.7, 95% CI -4.8 to 24.2 p=0.18 Relative improvement= 18.8% * calculated by reviewer	Risk difference= -0.07 (-0.23 to 0.10) RR=1.17 (0.79 to 1.76) RRR=-0.17 (-0.76 to 0.21) Sleep 9/26 (35%) vs 7/28 (25%) Risk difference= -0.1 (-0.34 to 0.15) RR=1.38 (0.62 to 3.16) RRR=-0.38 (-2.16 to 0.38) (authors also reported function for patients receiving benzodiazepines)	
Feder 1995	Improving the management of diabetes and asthma	Outreach visits + educational materials (guidelines for diabetes (n=12 practices)) + reminder (prompt) versus outreach	Mean percent* of patients receiving care according to guidelines: Diabetes (7 variables) (95% CI**)	Not done	*weighted by number of patients sampled in practice. Physicians were prompted to record data in the intervention group (see

results (Continued)

Study	Outcome measurement	Comparison	Effect on practice	Effect on patient	Notes
		visits + educational materials (n=12 practices (guidelines for asthma)) + reminder (prompt)	funduscopy 38.1 vs 20, difference**: 17.6 (6.9 to 33.9) Relative improvement= 88% blood glucose 75.2 vs 57.8, difference: 20.2 (6.4 to 33.9) Relative improvement= 34.9% weight 68.1 vs 40, difference: 26.5 (7.7 to 45.4) Relative improvement= 66.3% blood pressure 79.5 vs 58.3, difference: 18.1 (2.8 to 33.4) Relative improvement= 31% smoking habit 62.4 vs 31.7, difference: 25.5 (8.7 to 42.3) Relative improvement= 80.4% feet examination 51.8 vs 27.2, difference: 24.7 (7.1 to 42.3) Relative improvement= 90.8% HbA1 recorded 48.1 vs 30, difference: 13.8 (1.2 to 26.3) Relative improvement= 46% Asthma (6 variables)		included studies table. ** reported by authors

results (Continued)

Study	Outcome measurement	Comparison	Effect on practice	Effect on patient	Notes
			smoking habit 48.9 vs 47.6, difference: 5.6 (-17.2 to 28.3) Relative improvement= 11.8%		
			inhaler technique 22.8 vs 10, difference: 12.9 (1.9 to 23.9) Relative improvement= 129%		
			peak flow 41.7 vs 39.5, difference: 0.7 (-15.2 to 16.7) Relative improvement= 1.8%		
			prophylaxis 58.3 vs 51.9, difference: 2.7 (-24.4 to 19.7) Relative improvement= 5.2%		
			occupation 28.9 vs 16.7, difference: 12.6 (-4.9 to 30.2) Relative improvement= 75.4%		
			symptom review 57.2 vs 56.2, difference: 1.0 (-13.8 to 15.9) Relative improvement= 1.8%		
			Median ratio of cost of prophylaxis/cost of bronchodilator prescriptions: 1.43 (1.1 to 1.55) vs 1.06 (0.99 to 1.29)		

results (Continued)

Study	Outcome measurement	Comparison	Effect on practice	Effect on patient	Notes
McConnell 1982	Reducing the use of tetracycline for upper respiratory tract infection	Outreach + audit and feedback + educational materials (n=17) vs no intervention (n=16)	<p>Absolute difference=0.37 p=0.03 Relative improvement=34.9%</p> <p>Experimental vs control 8/17 (47%) vs 15/16 (94%) physicians continuing to prescribe tetracycline Risk difference = 0.47, 95% CI 0.17 to 0.70 RR = 0.50, 95% CI 0.28 to 0.78 RRR = 0.50, 95% CI 0.22 to 0.72 Mean number prescriptions of tetracycline per 6 months: 1.76 vs 3.25 Mean difference= 1.4, 95% CI -0.39 to 3.4 p = 0.11(calculated by reviewers); authors report p<0.05 based on analysis of covariance Relative improvement=45.8%</p>	Not done	
Putnam 1985	Improving the management of acute bronchitis, headache, otitis media, hypertension, urinary tract infection	Outreach visits + audit and feedback (n=8) versus no intervention (n=8)	<p>Mean index of change for optimal criteria for care: data not reported Mean difference = 0.08 (authors report p=0.07) Mean index of change for essential criteria for care: data not reported Mean difference = 0.22 (authors report p=0.001)</p>	Not done	Relative improvement unable to be calculated

results (Continued)

Study	Outcome measurement	Comparison	Effect on practice	Effect on patient	Notes
Rabin 1994	Improving the delivery of preventive services for sexually transmitted diseases	Outreach visits + educational materials + patient mediated intervention (n=71) versus no intervention (n=65) Outreach visits + educational materials + patient mediated intervention (n=71) versus educational materials (n=58)	<p>Mean* percent conducting risk questioning:37.4 vs 22.3</p> <p>Mean difference= 15.1, 95% CI 2.3 to 27.9 p=0.02</p> <p>Relative improvement= 67.7%</p> <p>Mean* percent providing advice:45.7 vs 36</p> <p>Mean difference= 9.7, 95% CI -31.8 to 51.1 p=0.61</p> <p>Relative improvement= 26.9%</p> <p>*calculated by reviewer</p> <p>Mean* percent conducting risk questioning:37.4 vs 31</p> <p>Mean difference= 6.4%, 95% CI -7.7 to 20.6 p=0.35</p> <p>Relative improvement= 20.6%</p> <p>Mean* percent providing advice:45.7 vs 37.3</p> <p>Mean difference= 8.4%, 95% CI -31.7 to 48.3 p= 0.65</p> <p>Relative improvement= 22.5%</p> <p>*calculated by reviewer</p>	Not done	
Ross-Degnan 1996b	Improving the management of acute diarrhoea	Outreach visits + marketing + patient-mediated intervention + educational materials (n=42 pharmacies) versus no intervention control (n=41 pharmacies)	<p>Mean percent of patient visits receiving oral rehydration solution:74% vs 53%</p> <p>Mean difference= 21%, 95% CI 3% to 39%</p> <p>Relative improvement= 39.6%</p>	Not done	

results (Continued)

Study	Outcome measurement	Comparison	Effect on practice	Effect on patient	Notes
Santoso 1996	Improving the management of acute diarrhoea	Outreach visits + marketing + educational materials (n=2 districts) versus no intervention control (n=2 districts)	<p>Mean percent of patient visits receiving antidiarrhoeals: 37% vs 57%</p> <p>Mean difference= 20%, 95% CI 3% to 39%</p> <p>Relative improvement= 35.1%</p> <p>Mean percentage of patient visits receiving anti microbials: authors reported that baseline use was already low (2%)</p> <p>Comparison 1</p> <p>Mean percent of patients prescribed oral rehydration solution:77.3% (3.6)*vs 71.1% (3.9)</p> <p>Mean difference=6.2, authors report $p>0.1$**for pre-post changes between groups</p> <p>Relative improvement= 8.7%</p> <p>Mean percent of patients prescribed antimicrobials:60.4% (2.9) vs 79.3% (4.8)</p> <p>Mean difference= 18.9,authors report $p<0.001$ for pre-post changes between groups</p> <p>Relative improvement: 23.8%</p>	Not done	<p>*numbers in brackets= standard error of mean</p> <p>**possible unit of analysis error</p> <p>***the authors also reported that the reduction in antidiarrhoeal use was significantly greater in the group receiving the educational meeting compared to the group receiving the outreach visit.</p>

results (Continued)

Study	Outcome measurement	Comparison	Effect on practice	Effect on patient	Notes
			<p>Mean percent of patients prescribed antidiarrhoeals:12.5% (3.3) vs 20.7% (4.1) Mean difference= 8.2, p value not reported for this comparison Relative improvement= 39.6%</p>		
			<p>Mean number of drugs per case:3.7 (0.1) vs 3.9% (0.2) Mean difference=0.2, authors report p=NS for pre-post changes between groups Relative improvement= 5.1%</p>		
			<p>Comparison 2 Mean percent of patients prescribed oral rehydration solution:77.3% (3.6)*vs 71.5% (4.3) Mean difference=5.8, authors report p>0.1** for pre-post changes between groups Relative improvement= 8.1%</p>		
			<p>Mean percent of patients prescribed antimicrobials:60.4% (2.9) vs 72.3% (3.6) Mean difference= 11.9,authors report p<0.001 for pre-post changes between groups</p>		

results (Continued)

Study	Outcome measurement	Comparison	Effect on practice	Effect on patient	Notes
Soumerai 1993	Reducing the use of red blood cell transfusions	Outreach visits + educational materials + conferences + marketing (n=2 hospitals) versus no intervention (n=2 hospitals)	<p>Relative improvement: 17.0%</p> <p>Mean percent of patients prescribed anti-diarrhoeals: 12.5% (3.3) vs 27.0% (4.3)</p> <p>Mean difference = 14.5, p < 0.01 for pre-post changes between groups***</p> <p>Relative improvement = 53.7%</p> <p>Surgeons: Mean percent non-compliant transfusions per 6 months: 24 vs 44 Mean difference = 20, 95%CI not reported p = 0.006 reported by authors for difference in change scores Relative difference = 45.5%</p> <p>Mean percent compliant transfusions per 6 months: 43 vs 32 Mean difference = 11, 95%CI not reported, p = 0.03 reported by authors for difference in change scores Relative difference = 34.4%</p> <p>Physicians: Mean percent non-compliant transfusions per 6 months: 32 vs 32 Mean difference = 0, 95%CI and p value not reported</p>	Not done	

results (Continued)

Study	Outcome measurement	Comparison	Effect on practice	Effect on patient	Notes
Steele 1989	Reducing outpatient prescribing costs	Outreach visits + reminders (n=11) versus no intervention(n=10)	<p>Relative difference= 0%</p> <p>Mean cost per prescription: \$5.14 vs \$5.79</p> <p>Mean difference= \$0.65, 95% CI 0.17 to 1.12 p= 0.02</p> <p>Relative Difference= 11.2%</p>	Not done	
Stergachis 1987	Reducing the use of high cost NSAIDs (piroxicam)	Outreach visits + conferences + audit and feedback + patient mediated intervention (n=9) versus no intervention (n=8)	<p>Mean number prescriptions per 1000 enrollees per physician:</p> <p>Piroxicam 55 vs 40</p> <p>Mean difference = -15, 95% CI -31.1 to 61.1 p=0.50 (control better)</p> <p>Relative difference = -37.5% (control better)</p> <p>Ibuprofen 183 vs 202</p> <p>Mean difference = -19, 95% CI -118.6 to 80.6 p= 0.69 (control better)</p> <p>Relative difference = -9.4% (control better)</p> <p>Salicylates 213 vs 125</p> <p>Mean difference = 88, 95% CI could not be calculated</p> <p>Relative improvement = 70.4%</p>	Not done	
de Burgh 1995	Reducing the use of benzodiazepines	Outreach plus educational materials plus patient mediated intervention (139) vs no intervention (136)	<p>Benzodiazepine prescribing rate per 100 diagnoses</p> <p>Anxiety: 46.6 vs 53.8</p> <p>Mean difference= 7.2, authors report p=NS</p> <p>Relative improvement= 13%</p> <p>Insomnia*: 87.4 vs 88.5</p>	Patient not done	There was a 20% decline in the rate of diagnosis for insomnia. This could have introduced a bias toward underestimating the effect of the intervention since this decline was greater in the intervention group and

results (Continued)

Study	Outcome measurement	Comparison	Effect on practice	Effect on patient	Notes
			<p>Mean difference= 1.1, authors report p=NS Relative improvement= 1.2%</p> <p>Insomnia diagnoses All benzodiazepine prescriptions (odds ratios) 0.46 vs 0.61 Odds ratio= 0.52 95%CI 0.21 to 1.27</p> <p>Initial benzodiazepine prescriptions (odds ratio) 1.04 vs 1.23 Odds ratio= 0.47 95% CI 0.16 to 1.39</p> <p>New diagnoses of anxiety Initial benzodiazepine prescribing rate per 100 encounters: 22.5 vs 28.4 Difference= 5.9, authors report odds ratio 0.75, 95% CI 0.26 vs 2.15</p> <p>New diagnoses of insomnia Initial benzodiazepine prescribing rate per 100 encounters: 48.3 vs 64.3 Difference= 16, authors report odds ration 0.21, 95% CI 0.05 to 0.85</p>		<p>may reflect an effect of the intervention.</p>