Local opinion leaders: effects on professional practice and health care outcomes (Review)

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ABSTRACT

Background
Clinical practice is not always evidence-based and, therefore, may not optimise patient outcomes. Opinion leaders disseminating and implementing 'best evidence' is one innovative method that holds promise as a strategy to bridge evidence-practice gaps.

Objectives
To assess the effectiveness of the use of local opinion leaders in improving the behaviour of health care professionals and patient outcomes.

Search strategy
We searched MEDLINE, Health Star, SIGLE and the Cochrane Effective Practice and Organisation of Care Group Trials Register. We did not apply date restrictions to our search strategy. Searches were last updated in February 2005. In addition, we searched reference lists of all potential studies that were identified.

Selection criteria
Studies eligible for inclusion were randomized controlled trials that used objective measures of performance/provider behaviour and/or patient health outcomes.

Data collection and analysis
Two reviewers extracted data from each study and assessed its methodological quality. We calculated the absolute difference in the risk of 'non-compliance' with desired practice, adjusting for baseline levels of non-compliance where these data were available.

Main results
Twelve studies met our eligibility criteria. The adjusted absolute risk difference of non-compliance with desired practice varied from -6% (favouring control) to +25% (favouring opinion leader intervention). Overall, the median adjusted risk difference (ARD) was 0.10 representing a 10% absolute decrease in non-compliance in the intervention group.

Authors' conclusions
The use of local opinion leaders can successfully promote evidence-based practice. However the feasibility of its widespread use remains uncertain.

PLAIN LANGUAGE SUMMARY

This summary of a Cochrane review presents what we know from research about the effect of opinion leaders to promote evidence based practice. The review shows that

• Opinion leaders promote evidence based practice. These results are based on moderate quality evidence.
• It is not clear whether the effect will occur in clinics and other settings, since most of the studies were in hospitals. It is not known if opinion leaders have certain professional or personality traits that affect whether they are successful or not. More also needs to be known specifically about what opinion leaders do and how they do it.

Who are opinion leaders and how could they promote evidence based practice?
Opinion leaders are people who are seen as likeable, trustworthy and influential. Because of their influence, it is thought that opinion leaders may be able to help and persuade health care providers to use evidence when treating and managing patients.

There are many ways to identify who are the opinion leaders in a hospital or clinic. There are also many ways opinion leaders can help or persuade people to change. For example, opinion leaders could provide one-to-one or small group teaching, visits to a visit the whole community or go to the health care providers' offices. Opinion leaders could also provide informal education or formal education as lectures. It is not clear what are the best ways to do it.

What are the results of this review?
Some studies tested whether opinion leaders alone could promote evidence based practice. Other studies tested opinion leaders along with other ways, such as reminders, audit and feedback, distributing education materials or seminars. Most tried to change the behaviours of doctors. Most studies were in the United States and also in hospitals. Studies lasted about 2 to 15 months.

Benefits of opinion leaders
Opinion leaders promote evidence based practice. This result is based on moderate quality evidence.

Opinion leaders identified by asking people "who are the opinion leaders?" on a questionnaire are more likely to change behaviour than opinion leaders that are identified by asking people to judge others who were pre-selected as opinion leaders.

BACKGROUND

The translation of evidence into clinical practice is often slow, unpredictable and incomplete. Studies have estimated that between 30% to 40% of patients do not receive treatment that accords with research evidence. Further, 20% of patients receive treatments that are proven to be detrimental (Schuster 1998; Grol 2001).

There is significant interest in devising innovative methods to promote knowledge transfer of evidence into practice and ultimately improve patient health care (Grol 1999). Social Learning Theory hypothesizes that individuals perceived as 'credible', 'likeable' and 'trustworthy' are likely to be persuasive agents of behavioural change. Such 'opinion leaders' may play a key role in assisting individuals to identify the evidence underpinning best practice and to facilitate behaviour change. Opinion leaders are those perceived by their colleagues as "educationally influential" (Rogers 1976). Opinion leaders have been applied in different clinical disciplines such as surgery, obstetrics, neurology, general medicine, nursing and infection control (Gifford 1999; Thomson 1999; Ryan 2002).

Theoretically, opinion leaders use a range of interpersonal skills to achieve the desired behavioural change. However, there is considerable variation in the types of educational initiatives opinion leaders use to implement best practice. Informal one to one teaching, community out-reach education, small group teaching, academic detailing and preceptorships are examples of strategies used by opinion leaders for disseminating and implementing evidence-based practice (Thomson 1999; Ryan 2002). Opinion leaders have also used formal strategies, such as delivering didactic lectures. Education delivered informally is a key ingredient in marketing and innovation diffusion (Rogers 1976). However, it is unclear whether education delivered by opinion leaders in an informal way is more persuasive compared with formal strategies. Formalising the educational process may produce more diverse results than those in which the role of opinion leaders is allowed to be self-directed (Thomson 1999; Ryan 2002). In a recent study, Ryan 2002 reported that opinion leaders may be less influential when their role is formalised through mail-outs, workshops or teaching rounds.

Another key question is whether the process by which opinion leaders are selected affects the success or otherwise of educational initiatives. Methods used to identify opinion leaders can be broadly classified into four categories: the observation method, the self-designating method, the informant method and the sociometric method (Rogers 1995). The observation method employs an independent observer to identify opinion leaders amongst a group of professionals interacting with one another in a work context. The self-designating method requires that members of a professional network report their own roles as opinion leaders. The informant method relies on asking individuals to identify those individuals who act as principle sources of influence. Via a standardised, self-reported questionnaire, the sociometric method asks members of a network to judge individuals according to the extent to which they are educational influential, knowledgeable and humanistic. Methods used to select opinion leaders have not been consistent

across studies. Moreover, different methods result in different individuals being identified as opinion leaders (Grimshaw 2000). The question of whether any one method is more likely to identify opinion leaders that are more effective in promoting knowledge transfer remains open to empirical assessment.

Thompson O'Brien et al (Thomson 1999) previously reported a Cochrane systematic review evaluating the effectiveness of opinion leaders in promoting knowledge transfer. The authors concluded that "using local opinion leaders results in mixed effects on professional practice … further research is required to determine … in which circumstances they (OL) are likely to influence the practice of their peers". However, variables modifying the effectiveness of opinion leaders as educational agents have yet to be identified.

We report an update of the previous Cochrane review to determine the effectiveness of the use of local opinion leaders targeted at changing the behaviours of professionals and improving the health care outcomes of their patients. Our updated review uses revised methods of the Cochrane Effective Practice and Organisation of Care Group (Grimshaw 2003) and extends the earlier review by Thompson O'Brien et al (Thomson 1999) by aiming to identify variables which are associated with the effectiveness of opinion leader-run educational interventions. Specifically, we sought to assess whether the educational process used by opinion leaders (formal or informal) was associated with the successful uptake of best practice. We further sought to determine whether the methods researchers used to identify opinion leaders impact more or less effectively on behavioural change.

OBJECTIVES

We addressed the following questions and comparisons:

Is the use of a local opinion leader effective in improving the behaviour of health care professionals and patient outcomes? Groups were compared as follows:
(1) The use of local opinion leaders compared to no intervention (review objective 1).
(2)The use of local opinion leaders compared to a single intervention (review objective 2).
(3)The use of local opinion leaders plus a single intervention compared to the same single intervention (review objective 3).
(4)The use of local opinion leaders as part of multiple interventions compared to no intervention (review objective 4).
The interventions included audit and feedback, reminders, formal continuing education (lectures, rounds, and conferences), outreach visits, marketing strategies, local consensus processes or patient mediated interventions. We define multiple interventions as including two or more interventions and where one of the interventions is opinion leaders.
(5)The effect of the use of local opinion leaders was evaluated according to the method used by researchers to identify opinion leaders (review objective 5). There are four defined methods used to identify opinion leaders. These are:
(i) Sociometric method;
(ii) Informant method;
(iii) Self designating method; and
(iv) Observation method.
(6) Whether the effect of the use of local opinion leaders varies according to the educational methods used by opinion leaders to encourage knowledge translation (review objective 6). We compared informal education (for example, one to one teaching) versus formal education (for example, community out-reach education, small group teaching, academic detailing, and preceptorships).
(7) Whether study quality was a modifier (review objective 7).

CRITERIA FOR CONSIDERING STUDIES FOR THIS REVIEW

Types of studies

The present review included studies that described randomized controlled trials as such studies represent the optimal design for evaluating knowledge transfer strategies (Eccles 2003).

Types of participants

Healthcare professionals in charge of patient care.

Types of intervention

Investigators have employed diverse processes to identify local opinion leaders. We defined local opinion leaders as those that are identified by one the following methods:
(i) Sociometric method
(ii) Informant method
(iii) Self designating method
(iv) Observation method.
We excluded studies that did not utilise any of the above methods.

Types of outcome measures

Only studies objectively measuring professional performance in a healthcare setting and/or patient outcomes were included. Studies measuring knowledge or performance in a test situation only were excluded.

SEARCH METHODS FOR IDENTIFICATION OF STUDIES

See: methods used in reviews.

MEDLINE (1966-), Health Star (1975-) and SIGLE were searched using the OVID interface from the date of their inception up to February 2005 (MEDLINE search strategy Table 06). There were no language restrictions.

In addition, *The Cochrane Library* and the Cochrane Effective Practice and Organisation of Care (EPOC) Trials Register was

searched by EPOC's Trial Search Co-ordinator (Jessie McGowan) for additional studies. The EPOC Trials Register is built by searching the following databases monthly for studies that meet the EPOC inclusion criteria: MEDLINE (1966-), Health STAR (1975 -), EMBASE (1980 -), and CINAHL (1982 -). The contents lists of several key journals are also scanned (Medical care, BMJ, JAMA, Lancet, Annals of Internal Medicine). The Cochrane Central Register of Controlled Trials (CENTRAL) database in *The Cochrane Library* is searched every three months. If articles are confirmed to be within the EPOC's scope, the studies are added to the Trials Register.

The first author also read through reference lists of included trials to identify any additional studies.

METHODS OF THE REVIEW

The principal reviewer (GD) screened the titles and abstracts of retrieved studies. All citations that appeared to evaluate opinion leaders in randomized controlled trials were retrieved. Where there was any doubt about a study's eligibility, GD and JG assessed each study for eligibility independently and resolved discrepancies via discussion.

Two reviewers (GD and MG) extracted data. Each reviewer also assessed the risk of bias of studies using a modified version of the data extraction checklist developed by the EPOC Group (Table 07). Extraction was not blinded as there is no evidence to support the assumption that blinding reduces bias in assessing quality criteria (Berlin 1997). The following variables were extracted from each study: study information, design, characteristics of participants, method of identifying local opinion leaders (sociometric, informant, self-designating, observation) duration of intervention, outcomes assessed and 'risk of bias' criteria and study results.

The adequacy of the following six 'risk of bias' criteria were considered: (1) randomization and allocation concealment; (2) blinding or objective assessment of primary outcomes; (3) completeness of follow up of healthcare professionals; (4) balance of baseline measures; (5) protection against contamination; and (6) reliability of primary outcome measures. Studies achieved a 'low' risk of bias score if the first three quality measures were judged as 'adequate', and where there was no concern on the last three quality items. A score of moderate or high risk of bias was assigned to studies that scored inadequate on 'one to two' or 'more than two' criteria, respectively (Jamtvedt 2006). Studies that use cluster randomization scored adequate on protection against contamination and on concealment of allocation. No studies were excluded because of poor methodological quality. We compared results between studies considered as having either low or moderate risk of bias with studies judged to be at 'high' risk of bias.

Any study identified as potentially eligible after reviewing its title and abstract but subsequently excluded is documented in the 'Characteristics of excluded studies' table.

Characteristics of opinion leaders were categorised according to factors that we hypothesised could influence their effectiveness. These factors are as follows:

- Method used to identify opinion leaders (sociometric method, informant method, self-designating method or observation method).

- Educational strategies used to promote knowledge transfer into clinical practice (informal education i.e. one to one teaching, versus formal education i.e. community out-reach education, small group teaching, academic detailing, preceptorships etc).

We report the primary results for each study in natural units extracted from the table of results presented in articles. We report adjusted risk differences for dichotomous outcomes. As clinically significant differences in baseline measures between groups were identified, we adjusted for baseline compliance with evidence-based practice to calculate an adjusted risk difference (ARD) for our primary analysis. Calculation of the adjusted risk difference was computed as follows:
adjusted risk difference (ARD) = [risk of non-compliance (intervention - control) pre-intervention] - [risk of non-compliance (intervention - control) post-intervention].
This method of calculating the ARD has been used previously (Jamtvedt 2006), and is adopted by the Cochrane EPOC group as standard methodological practice. For continuous outcomes, we calculated post intervention raw mean differences. When necessary, results were approximated from graphical representations of results.

For studies reporting more than one primary outcome measure, we used the primary measure named by the author. Where primary outcomes were not named, we calculated the adjusted risk difference for all outcomes and then identified the value that represented the median adjusted risk difference. In the result tables, we tabulated the median adjusted difference risk of the primary outcome for studies that reported odd number of primary outcomes. On the other hand, for studies that reported even number of primary outcomes we averaged the two middlemost adjusted risk difference of the primary outcomes to calulate the median study ARD.

The hypothesised direction of effect differed between studies as some hypothesised that an increase in a behavioural outcome represented 'compliance' with evidence-based practice, whilst in others, a decrease in behaviour was considered 'compliant'. To avoid confusion, the effect size had been standardised so that a positive difference between post-intervention percentages represented an outcome that represented a decrease in non-compliance with 'best practice'.

Analyses of studies using cluster randomization that do not account for the design effect risk inflating the type 1 error-rate and result in artificially narrow confidence intervals (Ukoumunne 1999). Hence, we did not report P-values or confidence intervals for cluster randomized trials not accounting for the design effect.

To assess heterogeneity, we prepared tables, forest plots and stock plots (displaying: maximum, median and minimum ARD for each comparison). To determine the validity of performing a quantitative synthesis, we examined the plot for variations in the effect size of studies grouped according to potential effect modifiers. However, heterogeneity was evident precluding meta-analyses. Subgroup and sensitivity analyses were performed descriptively by examining the median adjusted risk difference.

DESCRIPTION OF STUDIES

A total of 241 non-duplicate citations were identified from electronic databases (MEDLINE, Health Star, and EPOC Trials Register). Reference lists and expert contacts yielded an additional 4 citations, for a total of 245 records (See Figure 01). After screening all titles and abstracts of retrieved studies, 33 studies met the initial selection criteria. One of these studies was a duplicate publication (Seto 1991). Thirty two studies were obtained for full text review. Twenty of these studies were excluded. Reasons for exclusions are reported in the Characteristics of excluded studies table. The remaining 12 studies met our inclusion criteria (Characteristics of included studies table). Eight of the 12 trials were analysed previously by Thomson O'Brien (Thomson 1999) and will be described in the present report.

Characteristics of setting and professionals
Nine trials were based in the United States, two in Canada, and one in China (Hong Kong). Eight of the 12 trials evaluated interventions delivered in hospitals, while four described interventions delivered in outpatient clinics.

Physicians were targeted in nine trials, nurses in two trials and one trial targeted physicians, nurses and midwives. In all trials the opinion leaders delivered educational initiatives to members of their own healthcare profession.

In 10 trials, opinion leaders were identified by the sociometric method in which healthcare professionals were asked to complete a self-administered questionnaire to identify educationally influential colleagues (Thomson 1999). Nine trials reported using a version of a questionnaire developed by Hiss and colleagues (Hiss 1978). Response rates identifying opinion leaders via the sociometric questionnaire were reported for five studies. In these five studies, response rates varied between 38 to 67%. Two trials identified opinion leaders via the informant method. The remaining trial (Sisk 2004) described two methods: the informant method and the sociometric method (Coleman 1966) (e.g. "If you wish to discuss practice questions with other clinicians in your hospital, on whom would you most likely call?").

Targeted behaviours
Targeted behaviours involved the general management of a clinical problems as follows: rheumatoid arthritis care (Stross 1980), chronic obstructive pulmonary disease care (Stross 1983), osteoarthritis care (Stross 1985), vaginal delivery post caesarean section (Lomas 1991), urinary catheter care (Hong 1990), labour and delivery care (Hodnett 1996), cancer pain management (Elliott 1997), myocardial infarction treatment (Soumerai 1998), antenatal corticosteroids for foetal maturation (Leviton 1999), unstable angina (Berner 2003), breast cancer surgical treatment (Guadagnoli 2000) and breast feeding (Sisk 2004).

Characteristics of intervention
The use of a local opinion leader was the only intervention in four trials. In eight trials, local opinion leaders were supplemented by other interventions such as audit and feedback, chart reminders, educational materials, seminars and lectures. Interventions ranged in duration from 2 to 15 months. In nine studies, interventions were delivered over a period of 6 to 12 months.

Stross and colleagues published three trials comparing the effect of local opinion leaders with standard dissemination (i.e. no intervention control group). In the first trial (Stross 1980), the opinion leaders disseminated their knowledge via informal contact with colleagues as well as formal talks. In the second trial (Stross 1983), half of the contact between opinion leaders and their colleagues were informal and half were formal. The opinion leaders had significant contact with community's primary care physicians (69%) and with physicians during the study period. The third trial reported by Stross et al (Stross 1985) did not describe the educational activities of opinion leaders.

Hong et al (Hong 1990) assessed the effectiveness of two interventions involving opinion leaders. The first consisted of an opinion leader only intervention. Opinion leader activities were mainly centered on conducting tutorials on their own nursing ward. The second group received an in-service 30 minute lecture in addition to the demonstration tutorials delivered by opinion leaders. The trial reported by Hong et al included a group of clinicians randomised to standard dissemination.

Lomas et al (Lomas 1991) randomised clinicians to one of three groups. One group of clinicians received an opinion leader intervention and to receive written educational materials. In this trial, opinion leaders were involved in informal and formal educational sessions, sending out educational materials and hosting a community meeting with recognised experts in obstetric medicine. A second group of clinicians were randomised to receive audit and feedback about hospital rates regarding different modes of labour delivery. A third group of clinicians received standard dissemination.

Hodnett and colleagues (Hodnett 1996) employed local opinion leaders but did not report their activities. The use of local opinion leader intervention was compared to standard dissemination.

In the trial by Elliott and colleagues (Elliott 1997), opinion leaders were involved in community based task forces, didactic programs and outreach activities. Televised community programs were also held in two of the three communities studied. The comparison control group was standard dissemination.

Soumerai et al (Soumerai 1998) randomised clinicians to receive an opinion leader intervention or audit and feedback of in-hospital drug usage. The authors reported that their opinion leader intervention was combined with the dissemination of educational materials. The opinion leaders worked with small groups of colleagues via informal and formal consultations. In addition, they worked to institute system changes through implementing protocols.

Guadagnoli et al (Guadagnoli 2000) reported that the intervention group received a performance feedback report and were educated by an opinion leader. The opinion leader conducted mainly slide presentations at grand rounds and disseminated educational materials. The control group received the performance feedback report.

Leviton et al. (Leviton 1999) used an opinion leader, chart reminder system and feedback to convey their recommendation of antenatal corticosteroid use for foetal maturation. The local opinion leaders in the trial were involved mainly in informal activities such as group discussions. The intervention group was compared with a standard dissemination control.

Two intervention groups were reported in the trial by Berner et al (Berner 2003): (1) traditional health care quality improvement program (HCQIP) based mainly on hospital specific feedback data and (2) local opinion leaders in addition to the HCQIP program. In this trial, the educational activities of the opinion leaders were not clearly reported. However, the authors stated that the opinion leaders received standardised educational materials (PowerPoint presentations, guidelines) and feedback data to help them educate their colleagues. A standard dissemination control group was included in this study.

In a study by Sisk et al (Sisk 2004), hospitals were randomized to receive standard dissemination or an opinion leader led intervention to improve breast feeding rates. Opinion leaders engaged in formal educational activities and utilised feedback data on their hospital rates of breastfeeding.

METHODOLOGICAL QUALITY

One study was judged to be of 'low' risk of bias. The risk of bias of three studies was considered 'moderate', while eight studies were judged to have a high 'risk of bias' (Table 01). Twelve studies used clustered randomization, but only four trials described the randomization process. There was adequate follow up of healthcare professionals in six trials. Primary outcomes were assessed blindly in only two trials, while it was unclear in nine trials and inadequate in one trial. Five studies did not account for the design effect of cluster randomization.

RESULTS

Comparisons

There were 64 outcomes from 12 studies. The estimate of effects varied across and within studies. The adjusted risk difference of non-compliance with desired practice varied from -6% (favours control) to +25% (favours treatment) absolute decrease in non-compliance. Overall, the median ARD for the 12 studies was 0.10. This presents a 10% absolute decrease in non-compliance in the intervention group.

Review objective 1

Opinion leaders compared to no intervention (Table 02)

Four studies yielded 38 outcomes between the effect of opinion leaders and no intervention (Stross 1980; Stross 1983; Stross 1985; Hodnett 1996). All four trials were considered to be of 'high' risk of bias. All four studies used the Hiss questionnaire to identify opinion leaders.

Stross and colleagues published three trials evaluating an opinion leader intervention. In those three trials, the unit of randomization was the community. However, the analysis was done at the patient level. The reported "P values" are erroneous given that the intra-class correlation was not considered during analysis and that the author calculated the P values from pre-post differences rather than between group differences. The fourth trial carried out by Hodnett and colleagues (Hodnett 1996) assessed two primary outcomes: rates of epidural anaesthesia and amount of time nurses spent providing support to labouring women. None of these primary outcome variables demonstrated a statistically significant change in favour of the experimental group.

Thirty-eight comparisons were based on dichotomous outcomes and one on a continuous outcome. The adjusted risk difference (ARD) of non-compliance with desired practice varied from -0.06 (favours control group) to +0.12 (favours intervention). The median ARD for the four studies was 0.07 indicating a 7% absolute decrease in non-compliance due to the opinion leader intervention.

Review objective 2

Opinion leaders alone compared to a single intervention (Table 03)

Four outcomes from two studies were included here. The comparison included standardised lectures and audit and feedback. One study (Lomas 1991) was judged to be of 'low' risk of bias and employed opinion leaders who had been identified by the sociometric

method. The second trial (Hong 1990) identified opinion leaders by the informant method. This study was judged to be susceptible to a 'moderate' risk of bias.

In the trial by Lomas and colleagues (Lomas 1991), the ARD of non-compliance for trial of labour post caesarean section demonstrated a significant statistical improvement due to the use of local opinion leaders (ARD = +0.17) when compared with audit and feedback. However, the Lomas study did not account for clustered randomization in their analysis. Hong et al (Hong 1990) demonstrated an absolute improvement of + 0.12 in incorrect urinary catheter practices after nurses attended tutorials led by a local opinion leader when compared to standardised lectures. Overall, the adjusted risk difference (ARD) of non-compliance with desired practice for the studies comprising this comparison ranged from +0.12 to +0.17. The median ARD for the two studies was +0.14.

Review objective 3

Opinion leaders with one additional intervention compared to the additional intervention only (Table 04)

Fourteen outcomes from five trials were included in this assessment. The comparisons included standardised lectures (Hong 1990), distribution of educational materials (Lomas 1991) and audit & feedback (Soumerai 1998; Guadagnoli 2000; Berner 2003). All comparisons had dichotomous outcomes. The comparisons included 103 hospitals. One study was judged to be of 'low' risk of bias (Lomas 1991), two were considered to be of 'moderate' risks of bias (Hong 1990; Soumerai 1998) and two were of 'high' risk of bias (Guadagnoli 2000; Berner 2003)

In the trial by Berner et al (Berner 2003), the local opinion leaders groups demonstrated a significant improvement in two of the five primary outcomes when compared to the audit and feedback group only: anti-platelet medication within 24 hours (+0.24) and heparin use (+0.22). Guadagnoli et al (Guadagnoli 2000) reported that the rate of women who stated that their surgeon did not discuss treatment options for early breast cancer prior to surgery improved significantly over time in the treatment (33% to 17%) and control (31% to 13%) group. However, the degree of change did not demonstrate a statistically significant difference between groups. Soumerai and colleagues (Soumerai 1998) assessed the care of eligible patients receiving highly effective (aspirin, beta-blockers and thrombolytics) and ineffective treatment (Lidocaine) for acute myocardial infarction. The median ARD for ASA and beta-blockers were +0.16 (P = 0.04) and +0.13 (P = 0.02) respectively. There was no change in thrombolytic use, and the use of Lidocaine declined in both the control and treatment group.

Overall, the adjusted risk difference of non-compliance with desired practice ranged from +0.02 to +0.25. The median ARD for the five trials was +0.09 indicating a 9% absolute decrease in non-compliance due to the use of opinion leader intervention.

Review objective 4

Opinion leaders as part of multiple interventions compared to no intervention (Table 05)

Eight outcomes from four trials provided data for this comparison. The use of local opinion leaders were combined with audit and feedback (Berner 2003); chart reminders, performance feedback and grand rounds (Leviton 1999), formal meetings, audit and feedback and distribution of educational materials (Sisk 2004); community outreach meetings, local TV program (2/3 cities), community task forces and didactic educational programs (Elliott 1997). The studies involved a total of 6 communities and 66 hospitals. Three studies were of 'high' risk of bias while the one study (Leviton 1999) was of 'moderate' risk of bias.

The ARD of non-compliance with desired practice ranged from +0.01 to +0.14. The median ARD for the three trials was +0.06. In one study judged to be at 'high' risk of bias, Sisk (Sisk 2004) reported no improvement in the mothers' intention to breast feed with an adjusted odds ratio of 0.95 (95% confidence interval (CI) 0.86 to 1.05) favouring the intervention. The primary author, J. Sisk, was contacted to gain access to the primary data in order to calculate the ARD. However, no data had been received at the time of writing.

In another 'high' risk of bias study, Elliott et al (Elliott 1997) used community outreach activities combined with opinion leaders to improve cancer pain management. They reported no statistically significant improvement in the prevalence of pain or pain intensity score. In one 'moderate' risk of bias study (Leviton 1999), the percentage of patients receiving antenatal corticosteroids for foetal maturation improved significantly between the intervention and control group (ARD 0.14; P value < 0.01).

Review objective 5

Effects of opinion leaders identified by different methods

In the present review, nine studies used the sociometric (Stross 1980; Stross 1983; Stross 1985; Lomas 1991; Hodnett 1996; Elliott 1997; Soumerai 1998; Guadagnoli 2000; Berner 2003), while two studies used the informant method to identify opinion leaders (Hong 1990; Leviton 1999). One study used both methods (Sisk 2004).

We report the effect of opinion leaders identified by different methods classified according to each of the four a-priori group comparisons.

Comparison one: Opinion leaders only compared with no intervention. All studies included used the sociometric method.

Comparison two: Opinion leaders compared to a single intervention. The study by Lomas used the sociometric method. Its adjusted risk difference was +0.17. On the other hand, Hong used the informant method reporting an adjusted risk difference was +0.11.

Comparison three: Opinion leaders plus a single intervention compared to the same single intervention. Four studies (Berner 2003;

Guadagnoli 2000; Soumerai 1998; Lomas 1991) used the sociometric method to identify opinion leaders, while Hong et al used the informant method. The effects of the four studies (13 comparisons) varied from 0.02 to +0.11 (median +0.08). In contrast, the trial by Hong et al yielding only one comparison, the ARD for non-compliance was +0.25.

Comparison four: Opinion leaders as part of multiple interventions. Leviton and colleagues used the informant method to identify opinion leaders (median ARD +0.14), while Berner et al and Elliott et al used the sociometric method. The median ARD was +0.035 for both these studies. The remaining trial (Sisk 2004) described two methods: the informant method and the sociometric method (Coleman 1966) ("If you wish to discuss practice questions with other clinicians in your hospital, on whom would you most likely call?"). The median ARD for the last trial was not available.

Review objective 6

Educational methods used by opinion leaders

We had also aimed to identify whether opinion leaders were more or less effective depending on whether education was delivered formally or informally. Due to limited amount of detail, most studies could not be reliably categorised according to the educational method opinion leaders used.

Review objective 7

Risk of bias

In those studies judged to be as having a 'low' to 'moderate' risk of bias, the median adjusted risk difference in outcomes varied from +0.085 to +0.25. For studies at a high risk of bias, the adjusted risk differences were smaller (range: -0.06 to + 0.12).

We also addressed the effect of risk of bias for each reviewer objective. For studies comparing use of local opinion leaders versus no intervention (reviewer objective 1) and those comparing the use of local opinion leaders alone versus a single intervention (reviewer objective 2), all available studies were judged to be at the same risk of bias. Hence, no comparison regarding studies risk of bias could be done. For each a-priori comparison where the median adjusted risk difference according to the extent of bias (low to moderate versus high risk of bias) could be addressed, the results were as follows:

- Reviewer objective 3: The use of local opinion leaders with one additional intervention compared to the additional intervention only: +0.11 versus +0.045.
- Reviewer objective 4: The use of local opinion leaders as part of multiple interventions compared to no intervention: +0.14 versus +0.035.

DISCUSSION

We conducted a systematic review to evaluate the effectiveness of opinion leaders to disseminate and implement evidence-based medicine. A previous review (Thompson 2000) of eight randomized controlled trials had reported mixed results. Our review included 12 randomized controlled trials (Figure 02). Four trials compared opinion leaders alone to a no intervention control group. Three of these trials (Stross 1980; Stross 1983; Stross 1985) directed to primary care practitioners did not account for the design effect in their analysis. The fourth trial (Hodnett 1996) demonstrated no decrease in behavioural outcomes assessed for improving obstetric care of labouring women. The authors of the trial suggested that differing cultural norms in nursing practice compared with medical practice may account for their non-significant findings.

When opinion leader interventions were compared to audit and feedback (Lomas 1991) or to standardized lectures (Hong 1990), the opinion leader intervention was more effective in promoting evidence-based practice. The median absolute decrease in non-compliance associated with the opinion leader intervention was 14%.

Five of the 12 trials included comparisons of opinion leaders combined with a single intervention to the single intervention alone. In these studies, the median absolute decrease in non-compliance associated with the opinion leader intervention for the five trials was 9%.

Five studies included comparisons of multifaceted interventions with no intervention. The interventions included audit and feedback, educational materials, chart reminders, community outreach, formal meetings, grand rounds and local TV programs. The median absolute decrease in non-compliance associated with the opinion leader intervention was 6%.

In the present systematic review, one trial was judged to be of 'low' risk of bias, three trials were of 'moderate' risk of bias and eight trials scored 'high' risk of bias. We documented variations in the adjusted risk difference within and across studies according to the methodological quality of studies. However, studies of moderate to low risk of bias accounted for higher effectiveness of the opinion leader intervention.

The sociometric method was the most common method for identifying opinion leaders. Most commonly, this method involved the distribution of a self-reported questionnaire to members of a professional group. The questionnaire asks respondents to rate individuals according to the extent to which they are educational influential, knowledgeable and humanistic. However, the sociometric method may be prone to incomplete identification of opinion leaders within a community if only a select number of those asked to identify opinion leaders respond. For example, in the ten trials which used the sociometric method, responses to surveys ranged from between 38% to 67%. It is therefore unclear whether the opinion leaders identified in studies with low response rates had the potential to influence non responding study participants. The results of trials employing the sociometric method varied from no

effect to a statistically significant effect. Two trials used the informant method. Both of these trials demonstrated a statistically significant effect. However, we were unable to determine the superiority of this approach given the small number of trials employing the informant method.

We also sought to identify variables associated with the effectiveness of opinion leaders. We hypothesised that informal methods of delivering education would be more conducive to successful dissemination of new innovations. However, we found that most studies lacked the necessary information to reliably categorise them according to the educational method used by the local opinion leaders. Hence, there is insufficient evidence to confirm Ryan et al's opinion (Ryan 2002) who reported that formalisation of the opinion leaders role seems to diminish the influence of opinion leaders. The type of education used (formal or informal) may, however, account for much of the variability that seems to affect the effectiveness of an opinion leader intervention.

This systematic review has important limitations. The role of the opinion leaders was not clearly described in most trials and only two trials specified the frequency of the activities that were deployed. While we demonstrated an effect of opinion leaders, the results varied across trials and also within trials where multiple outcomes were assessed. One obvious problem with interventions utilising opinion leaders is that of replication. Individuals selected as opinion leaders may significantly differ in their approach to teaching and in their personal and professional characteristics. Such factors may be difficult to describe and may not be consistent across individuals selected as educationally influential. It is therefore difficult to conclude with any degree of confidence what attributes make an opinion leader effective. Moreover, estimates of effect of the different comparisons were not pooled because of heterogeneity. This heterogeneity is likely due to the differences in outcomes and how they were measured, the type of clinicians and the clinical condition studied.

All 12 trials were cluster randomized controlled trials. Seven analysed results appropriately at the cluster level or by considering the intra-cluster correlation when the analysis was conducted using data from individual patients.
Recent work by Doumit et al (Doumit 2006) revealed some worrisome findings regarding how one characterises and classifies individuals as 'opinion leaders'. The author demonstrated that individual local opinion leaders identified by sociometric method pioneered by Hiss cannot be reliably identified across time. Only 8% and 18% of local opinion leaders identified by pathologists and general surgeons were re-identified again after a 2 years period. Furthermore, Doumit et al (Doumit 2006) showed that local opinion leaders identified by employing Hiss's instrument tended to be disease specific. This finding suggests that different 'opinion leaders' will be required to effect change on outcomes for interventions designed to target multiple or complex medical conditions that require multidisciplinary expertise. Overall, these findings indicate that it is often difficult to reliably define and identify opinion leaders.

In a previous Cochrane systematic review evaluating the effectiveness of opinion leaders in promoting knowledge transfer (Thomson 1999), Thompson O'Brien et al, concluded that "using local opinion leaders results in mixed effects on professional practice". The present review supports this finding as some studies did not demonstrate a reduction in non-compliance with desired practice. However, this review reports an overall median adjusted risk difference in non-compliance of 0.10 representing a 10% absolute decrease in non-compliance in the intervention group. Hence, the use of opinion leaders can successfully promote evidence-based practice.

AUTHORS' CONCLUSIONS

Implications for practice

Opinion leader interventions appear to reduce non-compliance with desired practice. The effectiveness of opinion leaders as a strategy appears comparable to other strategies used to disseminate and implement evidence-based practice in health care (Grimshaw 2006). When compared with findings from a systematic review of implementation strategies, our results demonstrate that opinion leaders appear comparable to the distribution of educational materials, audit and feedback, multifaceted interventions involving educational outreach in reducing non-compliance. In contrast, the effect sizes we report in this review appear smaller than those associated with reminder systems. However, identifying opinion leaders can be labour intensive, and issues regarding the reliability and validity of identifying option leaders (Doumit 2006) might limit the wider use of opinion leaders as a knowledge transfer intervention.

Implications for research

Overall, only 12 studies were identified. Further research should be directed at:

- Identifying the context in which opinion leaders are more effective. Most studies located for this review were conducted in hospital centres. It is unclear whether these findings will generalise to other settings.
- Assessing whether the method by which opinion leaders are identified is associated with the effectiveness of opinion leader interventions. Our results tentatively suggest that opinion leaders identified by the informant method are more likely to influence their peers than opinion leaders identified by the sociometric method. More broadly, studies have yet to relate specific personal and professional attributes of opinion leaders to the effectiveness of opinion leader-led interventions.
- The actual activities and delivery of education by opinion leaders need to be explicated. More details on what opinion leaders

do and how they do it would allow for replication across studies and contexts. Future trials testing the educational method used by opinion leaders, i.e. informal versus formal are warranted.

- Trials comparing interventions that are identical across experimental arms except for the use of opinion leaders would represent the 'gold standard' experiment with which to test the effectiveness of opinion leaders as a strategy for implementation of best practice.

FEEDBACK

Study inaccurately summarised

Summary

Ellen Hodnett commented that her study had been inaccurately summarised and pointed out the necessary corrections.

Author's reply

These have now been incorporated into the review.

Contributors

Ellen Hodnett

POTENTIAL CONFLICT OF INTEREST

None known.

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** Indicates the major publication for the study*

TABLES

Characteristics of included studies

Study	**Berner 2003**
Methods	Overall risk of bias: HIGH 21 hospitals
Participants	21 hospitals Country: US Type of targeted behaviour: general management of a problem (unstable angina)
Interventions	Intervention 1. Local Opinion Leaders + Audit & Feedback 2. Audit & Feedback Method of OL' identification: Sociometric Proportion of Social Network that nominated OL: NOT CLEAR OL disseminated information: Formal (Conferences, Educational material); Informal: NOT CLEAR Control Standard dissemination
Outcomes	Adherence to unstable angina guidelines
Notes	
Allocation concealment	B – Unclear

Study	**Elliott 1997**
Methods	Overall risk of bias: HIGH
Participants	Physicians (73% - primary care specialists, 22% surgeons, 5% medical sub-specialists) and nurses (75% hospital setting) from 6 communities Country: US Type of targeted behaviour: general management of a problem (cancer care)
Interventions	Intervention Local Opinion Leaders + community outreach meetings + local TV program (2/3 communities) Method of OL identification: Sociometric Proportion of Social Network that nominated OL: NOT CLEAR OL disseminated information: Informal & Formal (Conferences, Educational material) Control Standard dissemination
Outcomes	Health professional outcomes: physicians & nurses knowledge and attitudes scores about cancer pain management (CPM). Patient outcome: pain intensity score, pain prevalence.
Notes	
Allocation concealment	B – Unclear

Characteristics of included studies (*Continued*)

Study	**Guadagnoli 2000**
Methods	Overall risk of bias: HIGH
Participants	Surgeons from 28 academic/community hospitals Country: US Type of targeted behaviour: general management of a problem (breast cancer surgical care)
Interventions	Intervention Local Opinion Leaders + performance feedback Method of OL identification: Sociometric Proportion of Social Network that nominated OL: 50% OL disseminated information: formal (grand rounds & dissemination of graphical material). Informal: NOT CLEAR Control Performance feedback (distributing performance reports that contained data on the outcomes of interest).
Outcomes	Proportion of women who reported that their surgeons did not discuss surgical options prior to surgery for stage I or II breast cancer. Proportion of women who underwent breast conserving surgery.
Notes	
Allocation concealment	B – Unclear

Study	**Hodnett 1996**
Methods	Overall risk of bias: HIGH
Participants	Nurses from 20 community & teaching hospitals. Country: Canada Type of targeted behaviour: general management of a problem (labour & delivery care)
Interventions	Intervention Local Opinion Leaders Method of OL identification: Sociometric Proportion of social network that nominated OL: NOT CLEAR OL disseminated information: NOT CLEAR Control Standard dissemination
Outcomes	Health professional outcomes: amount of time nurses spent providing support to labouring women. Patient outcomes: rates of epidural anaesthesia.
Notes	
Allocation concealment	A – Adequate

Study	**Hong 1990**
Methods	Overall risk of bias: MODERATE
Participants	220 nurses from 6 medical & surgical wards in a teaching hospital. Country: China (Hong Kong) Type of targeted behaviour: general management of a problem (proper use of urinary catheter)
Interventions	Intervention 1. Local Opinion Leaders + standardised 30 minutes lectures 2. Local Opinion Leaders Method of OL identification: Informant Proportion of Social Network that nominated OL: N/A OL disseminated information: Formal (Small group demonstration tutorials) Control Standardised 30 minutes lectures

Characteristics of included studies (*Continued*)

Outcomes	Proportion of nurses' actions meeting local guidelines for urinary catheter care.
Notes	
Allocation concealment	A – Adequate

Study	**Leviton 1999**
Methods	Overall risk of bias: MODERATE
Participants	Obstetricians from 27 tertiary care hospitals. (One hospital withdrew post randomization) Country: US Type of targeted behaviour: general management of a problem (foetal maturation)
Interventions	Intervention Local Opinion Leaders + audit & feedback + chart reminder + clinical guideline + grand round. Method of OL identification: Informant Proportion of social network that nominated OL: N/A OL disseminated information: Informal Control Standard dissemination of clinical guideline
Outcomes	Appropriate use of antenatal corticosteroids for foetal maturation
Notes	
Allocation concealment	A – Adequate

Study	**Lomas 1991**
Methods	Overall risk of bias: LOW
Participants	76 physicians (family physicians & obstetricians) from 16 community hospitals. Country: Canada Type of targeted behaviour: general management of a problem (obstetrical care)
Interventions	Intervention 1. Local Opinion Leaders + distribution of educational materials. 2. Audit & feedback + distribution of educational material Method of OL identification: Sociometric Proportion of social network that nominated OL: 65% OL disseminated information: Informal & Formal. Control Distribution of educational material
Outcomes	Health professional outcomes: mean percent of women offered a trial of labour. Patient outcomes: mean percent of women underwent a trial of labour and vaginal births.
Notes	
Allocation concealment	A – Adequate

Study	**Sisk 2004**
Methods	Overall risk of bias: HIGH
Participants	Obstetricians, family practitioners and nurse midwives from 18 hospitals. Country: US Type of targeted behaviour: mothers' intention to breast feed during the early postpartum period.
Interventions	Intervention Local Opinion Leaders + audit & feedback + formal meetings + printed educational material. Method of OL identification: both sociometric (Coleman et al. - If you wish to discuss practice questions with other clinicians in your hospital, on whom would you most likely call?) and Informant (OL in the study were nominated also by the obstetric nurse-manager).

Characteristics of included studies (*Continued*)

	Proportion of social network that nominated OL: 56% OL disseminated information: Formal Control Standard dissemination
Outcomes	Mothers' intention to breast feed
Notes	
Allocation concealment	B – Unclear

Study	**Soumerai 1998**
Methods	Overall risk of bias: MODERATE
Participants	37 hospitals. 2938 patients. Country: US Type of targeted behaviour: general management of a problem myocardial infarction)
Interventions	Intervention Local Opinion Leaders + distribution of educational materials. Method of OL identification: Sociometric Proportion of social network that nominated OL: 38% OL disseminated information: Informal & Formal (conferences, clinical practice guidelines, audit & feedback) Control Audit & feedback
Outcomes	Eligible patients receiving drugs for treatment of acute myocardial infarction.
Notes	
Allocation concealment	B – Unclear

Study	**Stross 1980**
Methods	Overall risk of bias: HIGH
Participants	Primary care practitioners from 6 community hospitals. 62 inpatients and 112 outpatients. Country: US Type of targeted behaviour: general management of a problem (rheumatoid arthritis care)
Interventions	Intervention Local Opinion Leaders Method of OL identification: Sociometric Proportion of social network that nominated OL: NOT CLEAR OL disseminated information: NOT CLEAR Control Standard dissemination
Outcomes	Proportion of patients receiving appropriate care for rheumatoid arthritis.
Notes	
Allocation concealment	B – Unclear

Study	**Stross 1983**
Methods	Overall risk of bias: HIGH
Participants	Physicians from 16 community hospitals. 510 patients. Country: US Type of targeted behaviour: general management of a problem (treatment of chronic obstructive pulmonary disease)
Interventions	Intervention

	Local Opinion Leaders Method of OL identification: Sociometric Proportion of social network that nominated OL: NOT CLEAR. OLs had contact with 69% (160/233) of primary practitioners & 83% with MD that cared for the intervention group. OL disseminated information: informal education (50%) & formal consultations (50%). Control Standard dissemination
Outcomes	Proportion of patients receiving appropriate care for COPD.
Notes	
Allocation concealment	B – Unclear

Study	**Stross 1985**
Methods	Overall risk of bias: HIGH
Participants	Primary care practitioners from 6 community hospitals. 114 inpatients and 472 outpatients. Country: US Type of targeted behaviour: general management of a problem (osteoarthritis care)
Interventions	Intervention Local Opinion Leaders Method of OL identification: Sociometric Proportion of social network that nominated OL: NOT CLEAR OL disseminated information: NOT CLEAR Control Standard dissemination
Outcomes	Proportion of patients with osteoarthritis receiving appropriate care for 6 treatment variables and for 3 total hip arthroplasty variables.
Notes	
Allocation concealment	B – Unclear

Characteristics of excluded studies

Study	**Reason for exclusion**
Closs 1999	Method of opinion leaders identification unclear.
Denton 2001	Method of opinion leaders identification unclear.
Doyne 2004	Method of opinion leaders identification unclear.
Dranitsaris 2001	Method of opinion leaders identification unclear.
Elliott 2001	Primary outcome measured knowledge and attitude.
Gifford 1999	Primary outcome measured knowledge.
Harbarth 2002	Method of opinion leaders identification unclear.
Heller 2001	Unspecified opinion leader identification method.
Mant 1999	Opinion leaders not idenified by peers.
Mehta 2002	Opinion leaders not identified by peers.
Nicolas 1996	Not RCT.
Nilsson 2001	Method of opinion leaders identification unclear.
Obua 2004	Unspecified opinion leader identification method.
Ofman 2003	Unspecified opinion leader identification method.

Characteristics of excluded studies (*Continued*)

Rubenstein 1999	Used expert opinion leaders.
Schectman 2003	Intervention does not involve opinion leaders.
Searle 2002	Improper opinion leader identification method.
Seto 1991	Duplicate publication.
Shafer 2002	Intervention does not involve opinion leaders.
Stevenson 2004	Primary outcome measured attitude.
Weingarten 1993	No formal process of identifying opinion leaders identified.

ADDITIONAL TABLES

Table 01. Risk of bias of included trials

Study	Allocation conceal.	Follow-up (prof)	Follow-up (patient)	Blinded assessment	Baseline measure	Reliable primary out	Protection contamin.	Summary
Stross 1980	NOT CLEAR	NOT CLEAR	NOT DONE	NOT CLEAR	DONE	NOT CLEAR	DONE	HIGH
Stross 1983	NOT CLEAR	NOT CLEAR	DONE	NOT CLEAR	NOT DONE	NOT CLEAR	DONE	HIGH
Stross 1985	NOT CLEAR	NOT CLEAR	NOT CLEAR	NOT CLEAR	DONE	NOT CLEAR	DONE	HIGH
Hong 1990	DONE	DONE	DONE	NOT CLEAR	DONE	NOT DONE	DONE	MODER-ATE
Lomas 1991	DONE	DONE	NOT CLEAR	NOT CLEAR	DONE	DONE	DONE	LOW
Hodenett 1996	DONE	DONE	N/A	DONE	NOT DONE	NOT CLEAR	DONE	HIGH
Elliott 1997	NOT CLEAR	DONE	NOT DONE	NOT DONE	DONE	DONE	DONE	HIGH
Soumerai 1998	NOT CLEAR	DONE	N/A	DONE	DONE	DONE	DONE	MODER-ATE
Leviton 1999	DONE	DONE	DONE	NOT CLEAR	DONE	NOT CLEAR	DONE	MODER-ATE
Guadagnoli 2001	NOT CLEAR	N/A	NOT DONE	NOT CLEAR	DONE	DONE	DONE	HIGH
Berner 2003	NOT CLEAR	NOT CLEAR	N/A	NOT CLEAR	DONE	DONE	DONE	HIGH
Sisk 2004	NOT CLEAR	NOT CLEAR	NOT DONE	NOT CLEAR	DONE	NOT CLEAR	DONE	HIGH

Table 02. Opinion leaders alone compared to no intervention

Study	Med Eff Outcome	# participant (hosp)	Control - non comp	Int - non compliance	Median ARD (P value)
Hodnett 1996	Care provided to women in labour (epidural anaesthesia)	NOT CLEAR (20)	Pre: N/A; Post: 50.6%	Pre: N/A; Post 56.2%	-0.056 (P>0.05 *)
Stross 1985	Care of patients with osteoarthritis. i) Patients not receiving ASA. ii) Patients with no Post op complications.	48(6)	i) Pre: 9/18; Post: 13/18. ii) Pre 14/18; Post 14/18.	i) Pre: 14/23; Post: 24/30. ii) Pre: 21/23; Post: 28/30.	0.033 (*) (P-value not reported due to unit of analysis error). i) ARD 0.031, ii) ARD 0.035
Stross 1983	Care of patients with COPD. i) Patients not receiving single agent bronchodilators. ii) Patients not referred to respiratory therapy.	510 (16)	i) Pre: 152/237; Post: 132/221. ii) Pre: 206/237; Post 188/221.	i) Pre: 123/227; Post: 104/289. ii) Pre: 181/227; Post: 201/289.	0.11 (*) (P-value not reported due to unit of analysis error). i) ARD 0.14. ii) ARD 0.08.
Stross 1980	Care of patients with rheumatoid arthritis (No Medications).	62 (6)	Pre: 17/34 Post: 10/18	Pre: 9/33 Post: 6/29.	0.12 (*) (P-value not reported due to unit of analysis error).

*: P value reported by author

Table 03. Opinion leaders compared to a single intervention

Study	Med Eff Outcome	2nd gp intervention	# part (hosp)	Control - non comp	Int - non compliance	Median ARD (P Value)
Lomas 1991	Women with previous caesarean section who underwent a trial of labour	Audit and feedback	1972 (16)	Pre: N/A; Post: 411/524	Pre: N/A; Post: 457/739	0.17 (P-value not reported due to unit of analysis error)
Hong 1990	Incorrect practices of nurses of patients with a urinary catheter.	Standardised lecture	204 (1)	Pre: N/A; Post: 36/75	Pre: N/A; Post: 46/129	0.12 (P-value not reported due to unit of analysis error).

Table 04. Opinion leaders plus one intervention compared to the intervention only

Study	Med Eff Outcome	2nd gp intervention	# part (hosp)	Control - non comp	Int - non compliance	Median ARD (P value)
Berner 2003	Eligible patients with unstable angina who did not received Beta Blockers medication during hospitalisation.	Audit and feedback	2210 (21)	Pre: N/A; Post: -3.1%	Pre: N/A; Post: +4.0%	0.071 (P = 0.6 *)
Guadagnoli 2001	Women who reported that their surgeon did not discuss treatment options for early breast cancer prior to surgery.	Performance feedback	1264 (28)	Pre: 31%; Post: 13%	Pre: 33%; Post: 17%	0.02 (P>0.05 *)
Soumerai 1998	Improving care for patients post acute myocardial infarction. i) Eligible patients not receiving B-blockers. ii) Ineligible patients not receiving Lidocaine.	Audit and feedback	1807 (30)	i) Pre: 40%; Post: 22%. ii) Pre: 75%; Post: 88%	i) Pre: 51%; Post: 20% ii) Pre: 81% Post: 90%.	0.085. i) ARD 0.13 (P = 0.02 *). ii) ARD 0.04 (P = 0.29*).
Lomas 1991	Women with previous history of caesarean section who did not undergo vaginal birth.	Distribution of educational material	1972 (16)	Pre: N/A; Post: 1054/1233	Pre: N/A; Post: 552/739	0.11 (P-value not reported due to unit of analysis error).
Hong 1990	Incorrect practices of nurses of patients with a urinary catheter.	Standardised lectures	126 (1)	Pre: N/A; Post: 36/75	Pre: N/A; Post: 12/51	0.25 (P-value not reported due to unit of analysis error).

*: P value reported by author

† Incorrect level of analysis. Intra-cluster factor not accounted

Table 05. Opinion leaders as part of multiple interventions compared to no intervention

Study	Outcome	Add Intervention	# part (hosp)	Control - non comp	Int - non compliance	Median ARD (P Value)
Sisk 2004	Mothers' intention to breast feed	Audit & feedback + printed educational material	NOT CLEAR (18)	Pre: N/A; Post: N/A	Pre: N/A; Post:N/A	N/A
Berner 2003	Eligible patients with unstable angina who did not received antiplatelet medication at discharge	Audit and feedback	2210 (21)	Pre: 68.3%; Post: 71.6%	Pre: 69%; Post: 71.3%	0.01 (P >0.05 *) (extrapolated from graph)
Leviton 1999	Patients not receiving antenatal corticosteroids	Audit & feedback + chart reminder + grand round.	3239 (27)	Pre: 65.8%; Post: 42.6%	Pre: 67.4%; Post: 30.6%	0.14 (P <0.01 *)
Elliott 1997	Cancer pain management - pain prevalence	Community outreach meetings + local TV (2/3 communities)	NOT CLEAR (6)	Pre: 113/314 Post: 125/320	Pre:131/314; Post: 125/320	0.06 (P <0.37 *)

*: P value reported by author

Table 06. MEDLINE search strategy

Search strategy

1 exp education/ (375865)
2 Professional Practice/ (10736)
3 Professional Role/ (1551)
4 professional$.tw. (76843)
5 education$.tw. (156193)
6 or/1-5 (499671)
7 exp leadership/ (14071)
8 opinion leader$.tw. (264)
9 influential$.tw. (3601)
10 or/7-9 (17840)
11 6 and 10 (5509)
12 clinical trial.pt. (395456)
13 random allocation/ (52042)
14 randomized controlled trials/ (35292)
15 double-blind method/ (79747)
16 single-blind method/ (8569)
17 placebos/ (23321)
18 all random$.tw. (297934)

Table 06. MEDLINE search strategy (*Continued*)

Search strategy

19 or/12-18 (595810)
20 11 and 19 (173)

Table 07. Data extraction checklist

Data collection

Name of reviewer:
Date:
Study reference
Trial Identifier:
Author:
Title of paper:
Full Reference:
1. Inclusion criteria
1.1 Study design
RCT designs: YesNo
If "Yes" what (i.e. Cluster, parallel ...)? ·····
1.2 Methodological inclusion criteria
a) The objective measurement of performance/provider behaviour or health/ patient outcome/s
b) Relevant and interpretable data presented or obtainable
N.B. A study must meet the minimum criteria for EPOC scope, design, and methodology for inclusion in EPOC reviews. If it does not, COLLECT NO FURTHER DATA.
2. Interventions
2.1 Type of intervention (state all interventions for each comparison/study group)
a) Group 1:
b) Group 2:
c) Group 3:
Interventions are:
Opinion leader +/- (audit & feedback, reminders, outreach visits, academic detailing, marketing strategies ….etc).
2.2 Method of Identification of opinion leaders
a)Sociometric method
If yes what is the percentage of network coverage obtained for opinion leaders during the identification process (i.e. survey)? ·····
b)Informant method
c)Self designating method
d)Observation method
e)Other methods: ·····
If other method used than exclude study.
2.3 Duration of the interventions:
a) Group 1:
b) Group 2:
c) Group 3:
2.4 Control(s)
3. Type of Targeted Behaviour (state more than one where appropriate)
a)
b)
c)

Table 07. Data extraction checklist (*Continued*)

Data collection

4. Participants
4.1 Characteristics of participating providers
a) Profession
b) Level of training
c) Clinical specialty
Primary Care: ·····
Specialist: ·····
d) Age
Mean: ·····
Score not clear if data not available.
e) Time since graduation (or years in practice)
4.2 Characteristics of Participating patients
a) Clinical problem (ex Hypertension ..)
b) Age
b) Gender
d) Ethnicity
e) Other (specify) ·····
4.3 Number of patients included in the study (i.e. patients that entered the study)
Not clear if information not available
a) Episodes of care
b) Patients
c) Providers
d) Practices
e) Hospitals
f) Communities or regions
5. Setting
a) Reimbursement system
b) Location of Care
c) Academic status
Teaching centres (University Hospitals) vs. community centres.
d) Country
e) Proportion of eligible providers (or allocation units) who participated in the study.
6. Methods
a) Unit of allocation
b) Unit of analysis
c) Power calculation
Score DONE if study has sufficient statistical power to detect clinically important effects as statistically significant and record power.
7. Quality criteria
7.1 Selection Bias:
a) Study described as randomized (i.e. randomly, random, randomization)
Method to generate sequence of randomization described
YesNo
If yes, it is
AppropriateInappropriate
b) Concealment of allocation:
Yes No
7.2 Detection Bias (blinding):
Score DONE if the authors state explicitly that the primary outcome variables were assessed blindly OR the outcome variables are objective,

Table 07. Data extraction checklist (*Continued*)

Data collection

a)Was the study described as blind?
Non: ·····Single Blind:····Double Blind:·····
Is the method of blinding adequate?
Yes No
b) Objective assessment of primary outcome(s):
YesNo
7.3 Attrition Bias - differential loss of subjects from groups:
a) Follow-up of professionals
Description of withdrawals and dropouts
Are the numbers and the reasons for withdrawal in group stated?
Yes No
Score DONE if outcome measures obtained for 80-100% of subjects randomised or for patients who entered the trial
b) Follow-up of patients or episodes of care
Score DONE if outcome measures obtained for 80-100% of subjects randomised or for patients who entered the trial
7.4 Baseline measurements
Score DONE if performance or patient outcomes were measured prior to the intervention and no substantial differences were present across study groups.
7.5 Reliable primary outcome measure(s)
Score DONE if two or more raters with at least 90% agreement or kappa greater than or equal to 0.8 OR the outcome is obtained from some automated system
7.6) Protection against contamination
Score DONE if allocation was by community, institution or practice and it is unlikely that the control received the intervention
7.5 Overall Quality score
a) High (Adequate scores on 7.1.b, 7.2.a & b, 7.3.a, & no concern on 7.4): ·····
b) Moderate (One or two criteria scores inadequate except 7.1.a): ·····
c) Low (Two or more criteria score inadequate except 7.1.a): ·····
8. Prospective identification by investigators of barriers to change
Investigators identified specific barriers to change in the target population, which were addressed by the intervention (Information management, Clinical uncertainty, Sense of competence, Perceptions of liability, Patient expectations, Standards of practice, Financial disincentives, Administrative constraints, Other)
9. Intervention
9.1 Characteristics of the intervention
a) Evidence base of recommendation
Score DONE if recommendations appear to be based on good evidence
b) Purpose of recommendations
(Appropriate management, Cost containment, other).
9.2 Nature of desired change
(Initiation of new management, stopping introduction of new management, Reduction of established management, Increase established management, Cessation of established management, Modification of established management)
9.3 Method that opinion leaders use to transfer evidence based medicine:
a) Informal education (informal one to one teaching): ·····
Versus
b) Formal education: ·····
(Conferences, community outreach education, academic detailing, Dissemination of clinical practice guidelines, small group teaching…Etc).
9.5 Intervention based upon implementation of clinical practice guidelines
9.6 Clinical practice guidelines developed through formal consensus process
9.9 Timing
a) Proximity to clinical decision-making

Table 07. Data extraction checklist (*Continued*)

Data collection

a) Group 1:
b) Group 2:
c) Group 3:
b) Frequency/number of intervention events
a) Group 1:
b) Group 2:
c) Group 3:
c) Duration of intervention
a) Group 1:
b) Group 2:
c) Group 3:
9.10 Setting of intervention
(In practice setting, not in practice setting)
9.11 Source of funding
(Governmental organisation, Commercial organisation, Health-care provider organisation, Voluntary Body…..).
9.12 Ethical approval
10 Outcomes
10.1 Description of the main outcome measure(s).
a) Health professional outcomes/process measures
b) Patient outcomes
10.2 Length of time during which outcomes were measured after initiation of the intervention.
a) Group 1:
b) Group 2:
c) Group 2:
9.3 Length of post- intervention follow-up period.
a) Group 1:
b) Group 2:
c) Group 2:
9.4 Identify a possible ceiling effect:
For example, there was little room for improvement in provider performance, because it was adequate without the intervention (based on baseline measurements or control group performance).
a) Identified by investigator
b) Identified by reviewer
11. Results
State the results as they will be entered in the review, and describe how these were calculated (e.g. relative percentage differences attributable to the intervention).
a) Group 1:
b) Group 2:
c) Group 2:

GRAPHS AND OTHER TABLES

This review has no analyses.

INDEX TERMS

Medical Subject Headings (MeSH)

Evidence-Based Medicine; *Leadership; Physician's Practice Patterns; *Policy Making; Professional Practice [*standards]; Quality of Health Care; Randomized Controlled Trials

MeSH check words

Humans

COVER SHEET

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GRAPHS AND OTHER TABLES

Figure 01. Study flow diagram

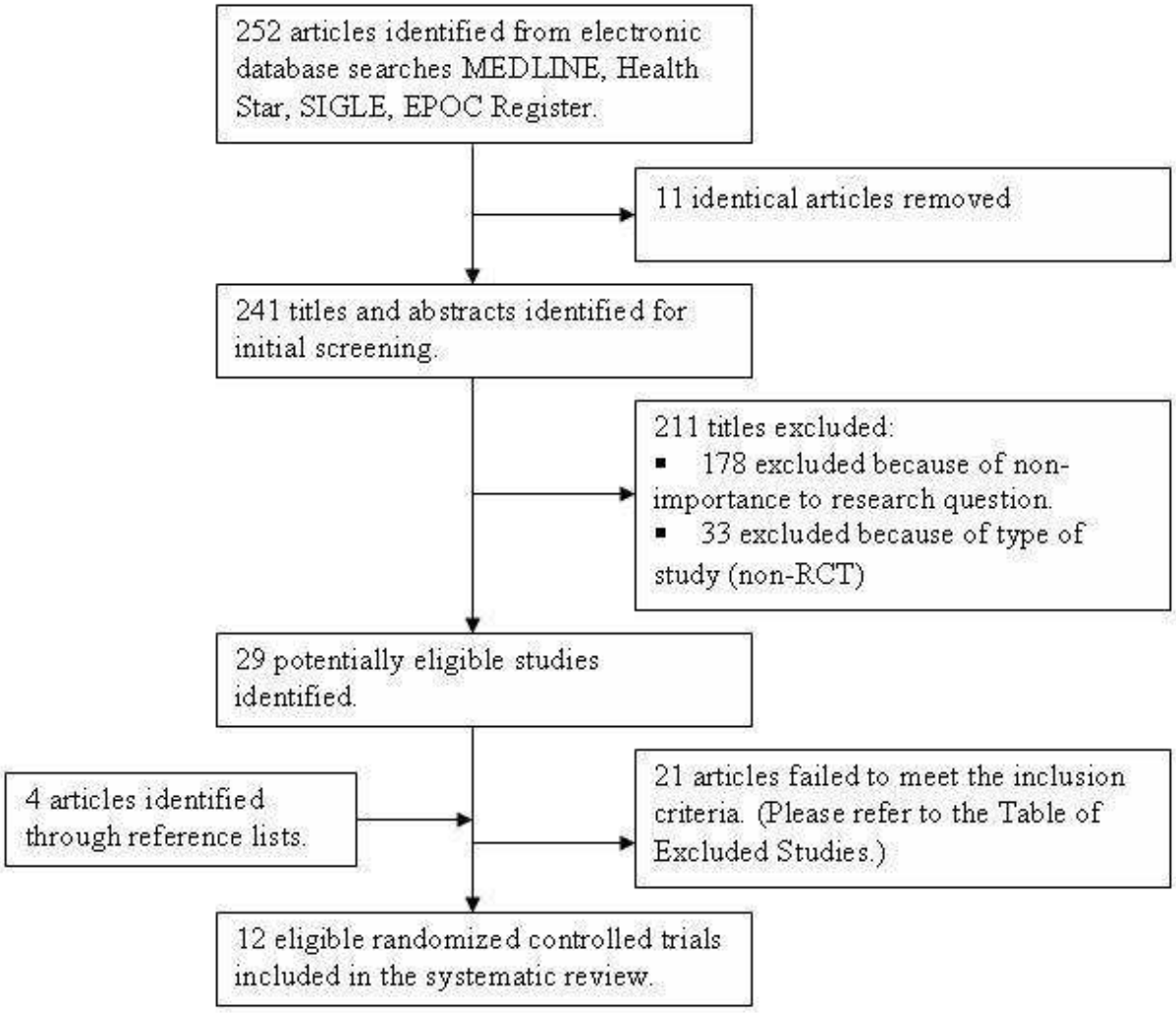

Figure 02. Study flow diagram