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# Effective Health Care

Bulletin on the effectiveness of health service interventions for decision makers

## Getting evidence into practice

Unless research-based evidence and guidance is incorporated into practice, efforts to improve the quality of care will be wasted. Implementing evidence may require health professionals to change long-held patterns of behaviour.

- If the current goal to improve clinical effectiveness is to be achieved then it is essential that there are routine mechanisms by which individual and organisational change can occur.
- Whilst individual beliefs, attitudes and knowledge influence professional behaviour, other factors including the organisational, economic and community environments of the practitioner are also important.
- Any attempt to bring about change should first involve a 'diagnostic analysis' to identify factors likely to influence the proposed change. Choice of dissemination and implementation interventions should be guided by the 'diagnostic analysis' and informed by knowledge of relevant research.
- A range of interventions have been shown to be effective in changing professional behaviour in some circumstances. Multi-faceted interventions targeting different barriers to change are more likely to be effective than single interventions.
- Successful strategies to change practice need to be adequately resourced and require people with appropriate knowledge and skills.
- Any systematic approach to changing professional practice should include plans to monitor and evaluate, and to maintain and reinforce any change.

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# A. Background

A central theme of current UK health policy is quality.[1–3] For example *The New NHS: Modern, Dependable* states that 'The new NHS will have quality at its heart.'[1] The introduction of clinical governance gives all health organisations a statutory duty to seek quality improvements.[2–5]

While quality is a term which, in relation to health services, often defies precise definition, a key component is effectiveness:[6] doing more good than harm. The current emphasis in the NHS on evidence-based health care and clinical guidelines aims to promote effectiveness and thereby improve quality. But this is likely to be achieved only if relevant research findings and valid guideline recommendations are appropriately incorporated into practice. Often this will necessitate a change in behaviour on the part of relevant health professionals so that practices deemed by good research evidence to be less effective or cost-effective are replaced by those shown to be more effective.

Health professionals and policy makers have access to a large volume of research evidence and guidance relevant to clinical effectiveness, including publications such as *Effective Health Care* bulletins,[7] electronic databases such as the Cochrane Library,[8] and the output of specific policy initiatives such as the National Cancer Guidance Series.[9] In addition, new developments such as the National Institute of Clinical Excellence (NICE) will be producing guidance for the NHS, including topics within the new National Service Frameworks. Unless the various recommendations arising from these developments are incorporated into practice, the efforts of such initiatives will be wasted. This may require practitioners to change long-held patterns of behaviour.

Achieving such change can be difficult. The complexity of changing behaviour is well recognised, for example in relation to lifestyle modification among the general population. In his model of professional behaviour change, Lomas identified a wide range of factors that can influence practice including the organisational, economic and community environments of the health professional.[10]

The naïve assumption that when research information is made available it is somehow accessed by practitioners, appraised and then applied in practice is now largely discredited. Whilst knowledge of a practice guideline or a research based recommendation may be important, it is rarely, by itself, sufficient to change practice. The literature on persuasive communication and advertising makes a distinction between communications that increase awareness and those that actually bring about changes in behaviour.[10] This distinction is helpful in understanding that dissemination and implementation may be considered as a spectrum of activity, where dissemination involves raising awareness of research messages and implementation involves getting the findings of research adopted into practice.

This bulletin approaches changing professional practice from a range of different perspectives, including research evidence from empirical studies of behaviour change; theoretical evidence from models of behaviour change derived from psychology, marketing and health promotion; and insights from case studies which have attempted to change professional practice within the NHS.

The literature concerned with changing professional practice is vast, and it has not been possible to summarise all the relevant material in a single bulletin, particularly with respect to theoretical models and insights from case studies. This *Effective Health Care* bulletin is based on information selected to give a range of helpful and relevant advice to those involved in changing practice.

# B. Research evidence

This section summarises the results of an overview of systematic reviews of different dissemination and implementation interventions (see Appendix A for details of methods and Appendix B for a glossary of terms). This overview is based on 44 systematic reviews,[11–54] and updates an earlier overview of 18 systematic reviews[55]. Tables 1–3 summarise the methods, results and authors' main conclusions of the included reviews. The findings are highlighted in the following sections.

***B.1 Reviews of broad strategies:*** Fifteen reviews focused on broad strategies (involving a variety of interventions targeting a variety of behaviours)[15,17,19–21,24,34,36,39,46,50–54] (See Table 1).

Continuing medical education (CME): Davis et al[19] identified 99 studies involving 160 comparisons of CME interventions. Single interventions likely to be effective included educational outreach, opinion leaders, patient-mediated interventions and reminders. Multi-faceted interventions and studies which assessed potential barriers to change and used the information to inform the development of the intervention were more likely to be successful.

Dissemination and implementation of guidelines: A review of 19 studies of passive dissemination of consensus-derived recommendations for practice concluded that there was little evidence that passive dissemination alone resulted in behaviour change.[36] Another review based on 23 studies assessing the factors influencing compliance with guideline recommendations found that compliance was lower for recommendations that were more complex and less easy to pilot.[24] A previous *Effective Health Care* bulletin including 91 studies[21]

**Table 1** Summary of systematic reviews of the effects of broadly defined implementation strategies on professional practice

**Key:** RCT= Randomised controlled trial; CCT = Controlled clinical trial; CA = Controlled after; UA = Uncontrolled after; BA = Before/after; CBA = Controlled before/after; XS = Cross sectional; ITS = Interrupted time series; QS = Quality score

| Authors and Focus | Inclusion criteria | Main results | Main conclusions |
|---|---|---|---|
| Bertram 1977 [17]<br><br>Effectiveness of CME | Study designs: Any study design<br>Participants: Practising physicians<br>Intervention: Any evaluation<br>Outcomes: Not explicitly stated<br>Period: Not explicitly stated<br>Other: Only English language studies included | 5 studies met the inclusion criteria. 4 of 10 record studies targeting physician behaviour reported improvements.<br>4 studies targeting patient health status had unclear results.<br>Statistical significance of findings unclear. | Cannot make firm conclusions regarding effectiveness of CME. Generalisation hindered by inadequate evaluation of methods, insufficient programme description, lack of defining terms and incomparability among the CME programmes.Need for further research to adequately investigate importance of physician behaviour and patient health status. QS=3 |
| Lloyd 1979 [34]<br><br>Effectiveness of CME | Study designs: Not explicitly stated (CA, RCT, CBA, BA, XS)<br>Participants: Physicians who have completed undergraduate and graduate medical education<br>Intervention: CME<br>Outcomes: Physician competence (knowledge, attitudes), performance and patient health status<br>Period: 1960 – 1977 | 7 studies met the inclusion criteria. 13 of 22 assessing competence observed improvements: 10 of these 13 reported significant improvements (including 1 of 2 RCT and 2 of 4 CBA). 11 of 26 studies assessing performance observed significant improvements (including 2 of 2 RCT and 2 of 6 CBA). 4 of 4 assessing patient health status observed improvements: 2 reported significant improvements (including 1 of 1 RCT). | About half of the studies reported demonstrable improvements in competence, performance or patient health status. Methodological shortcomings of studies make it impossible to conclude that the improvements were caused by CME. Further research and development of CME is required. The definition of CME should be broadened to include interventions to change provider performance. QS=3 |
| Beaudry 1989 [15]<br><br>Effectiveness of CME | Study designs: RCT, CBA<br>Participants: Not explicitly stated (physicians)<br>Intervention: CME<br>Outcomes: Physician knowledge and performance, patient health status<br>Period: 1931 – 1986 | 63 studies met the inclusion criteria. 41 studies reported sufficient data to calculate effect sizes for 282 outcomes. CME showed a 'strong' effect on knowledge (effect size 0.79) and a 'moderate' (not statistically significant) effect on performance (effect size 0.55) and health status (effect size 0.37). | There are important inadequacies in the design and reporting of evaluations of CME programmes and cross-study comparisons are difficult, limiting conclusions about the impact of specific characteristics of CME. These results must be interpreted cautiously and do not imply any normative standards for overall programme performance. QS=5 |
| Lomas 1991 [36]<br><br>Impact of dissemination of consensus recommendations | Study designs: Not explicitly stated (ITS, BA, XS)<br>Participants: Physicians<br>Intervention: Dissemination of consensus recommendations<br>Outcomes: Physician behaviour or percent conformity with consensus recommendations<br>Period: 1980 – 1991 | 19 studies met the inclusion criteria. 6 of 10 that used actual practice data found no impact, 2 found minor impact and 2 found major impact. Only one study using self-report showed a major impact. Statistical significance of findings unclear. | Existing evaluations have found little or no evidence that dissemination of consensus recommendations alone lead to action. QS=3 |
| Waddell 1991 [50]<br><br>Effectiveness of continuing education on nursing practice | Study designs: Not explicitly stated (unable to determine designs included)<br>Participants: Not explicitly stated (nurses)<br>Intervention: Continuing nursing education interventions<br>Outcomes: Practice-related behaviours<br>Period: Not explicitly stated | 34 studies met the inclusion criteria.<br>Education positively affects nursing practice. The average member of an intervention group performed as well as, or better than, 77% of the members of control groups.<br>Findings that related to mediating effects were inconclusive. | The overall effect supports the hypothesis that continuing education positively affects nursing practice. There was a greater likelihood of effect when learners were from the same practice environment and planned their continuing education activities accordingly. QS=2 |
| Grilli 1994 [24]<br><br>Relationship between compliance rates and the subject of practice guidelines | Study designs: Not explicitly stated (CBA, XS included)<br>Participants: Providers<br>Intervention: Not explicitly stated (publication or dissemination of guidelines developed by official organisations)<br>Outcomes: Compliance rates with guidelines<br>Period: 1980 – 1991<br>Other: Studies of locally developed guidelines and trials of implementation strategies excluded. English language studies only | 23 studies with 143 recommendations addressing 70 different aspects of medical practice met the inclusion criteria. The overall mean compliance rate was 55%.<br>High complexity recommendations had significantly lower compliance rates. Highly trialable recommendations had significantly higher compliance rates. There was no significant difference in compliance between recommendations with high versus low observability. | There was a high degree of variation in reported compliance rates and a low average compliance rate.<br>High complexity/low triability recommendations may require more active dissemination activities to predispose practitioners to change their behaviour than low complexity/high trialability recommendations where efforts can focus more quickly on enabling change at the local level. QS=6 |
| Effective Health Care 1994 [21]<br><br>Effectiveness of strategies for implementing clinical practice guidelines | Study designs: RCT, CBA, ITS<br>Participants: Medical staff<br>Intervention: Guideline dissemination and/or implementation strategies<br>Outcomes: Process of care or patient outcome<br>Period: 1976 – 1994 | 91 studies met the inclusion criteria.<br>81 of 87 studies reported significant improvements in adherence to recommendations of practice guidelines.<br>12 of 17 that reported patient outcome also reported significant improvements. | Properly developed guidelines can change clinical practice and may lead to changes in patient outcome.<br>Guidelines are more likely to be effective if they take into account local circumstances, are disseminated by an active educational intervention, and implemented by patient specific reminders.QS=5 |
| Davis 1995 [19]<br><br>Effectiveness of CME | Study designs: RCT, CCT<br>Participants: Health professionals<br>Intervention: Educational intervention<br>Outcomes: Objective measurement of physician performance or health outcomes<br>Period: 1975 – 1994 | 99 studies met the inclusion criteria comprising 160 comparisons. Improvements in at least one major endpoint in physician performance or patient outcome of care were identified in 66% of comparisons. Single strategies likely to be effective included educational outreach, opinion leaders, patient mediated interventions and reminders. Multi-faceted interventions were more likely to be successful. Studies which undertook a needs analysis to inform the development of the interventions appeared more likely to be positive. | Widely used CME delivery methods such as conferences have little direct impact on improving professional practice.<br>CME providers seldom use more effective methods such as systematic practice-based interventions and outreach visits. QS=5 |
| Oxman 1995 [39]<br><br>Effectiveness of interventions to improve delivery of health care services | Study designs: RCT<br>Participants: Health care providers<br>Intervention: 10 interventions to improve delivery of health care services<br>Outcomes: Objective assessment of provider performance or health outcome<br>Period: 1970 – 1993 | 102 studies met the inclusion criteria. Dissemination-only strategies such as mailed, unsolicited materials or conferences used alone resulted in little or no change in behaviour. More complex interventions ranged from ineffective to highly effective, but effects were most often moderate. | There are no magic bullets for improving the quality of health care, but there is a range of interventions available that, if used appropriately, can lead to important improvements in professional practice and patient outcomes. QS=5 |
| Yano 1995 [53]<br><br>Effectiveness of programmes to enhance quality and economy of primary care | Study designs: Not explicitly stated (included RCT and other unspecified designs)<br>Participants: Primary care professionals, students, patients<br>Intervention: Primary care programmes, defined as 'a set of specific activities designed to address one or more primary care goals on a system or practice wide basis'<br>Outcomes: 14 primary care goals<br>Period: 1980 – 1992 | 36 studies were included from a total of 72 identified studies meeting the inclusion criteria. Programmes to improve preventive services, management/co-ordination of care, appropriate use of services and to reduce physician ordered services were largely successful. Programmes to improve patient outcome, access, efficiency, to decrease costs/charges and to shift care from inpatient to outpatient settings were sometimes successful. Programmes to improve continuity of care, comprehensiveness of care, technical aspects of care, humanistic process, physical environment were largely unsuccessful. | Successful programmes were identified although there are 'significant gaps in our knowledge of how to improve aspects of care'. Primary care practices can implement several programmes to improve prevention and access and to reduce costs and use of unnecessary services. QS=3 |

**Table 1** Continued

| Authors and Focus | Inclusion criteria | Main results | Main conclusions |
|---|---|---|---|
| Davis 1997 [20]<br><br>Effectiveness of strategies for implementing clinical practice guidelines | Study designs: Not clear (RCT were 'emphasised')<br>Participants: Not explicitly stated (Practising clinicians)<br>Intervention: Guideline implementation strategies<br>Outcomes: Not clear (studies with objective measures of provider behaviour or health status were 'emphasised')<br>Period: 1990 – 1996 | Unclear how many trials met the inclusion criteria.<br>Weak interventions included didactic traditional CME and mailings; moderately effective interventions included audit and feedback; relatively strong interventions included reminder systems, academic detailing and multiple interventions. | Future implementation strategies should be based upon an understanding of the forces and variables influencing practice and through the use of methods that are practice- and community-based rather than didactic. QS=3 |
| Worrall 1997 [52]<br><br>Effectiveness of introduction of clinical practice guidelines on patient outcomes in primary care | Study designs: RCT, CCT<br>Participants: Primary care professionals<br>Intervention: Guideline dissemination and/or implementation strategies<br>Outcomes: Patient outcomes<br>Period: 1980 – 1995 | 13 studies met the inclusion criteria.<br>5 studies observed statistically significant improvements in patient outcomes of care. | There is little evidence that use of guidelines improves patient outcomes in primary medical care. Research is needed to determine whether the newer, evidence based CPGs have an effect on patient outcomes. QS=4 |
| Zwarenstein 1997 [54]<br><br>Effectiveness of interventions to improve nurse-doctor collaboration | Study designs: RCT, CBA, ITS<br>Participants: Doctors and nurses in primary or secondary care<br>Intervention: Interventions to improve collaboration between doctors and nurses sharing care of patients<br>Outcomes: Objectively measured attitudes and behaviour or any direct effects upon patient care<br>Period: Not explicitly stated (Medline search completed in 1996) | No studies met the inclusion criteria. | No reliable evidence of effect is available. Need to research the barriers to collaboration and the effectiveness of interventions designed to improve collaboration. The possibility of inadequate indexing in bibliographic databases acknowledged.<br>QS=6 |
| Wensing 1998 [51]<br><br>Effectiveness of interventions to implement guidelines or innovations in general practice | Study designs: RCT, CCT, CBA<br>Participants: General practitioners<br>Intervention: Any intervention to improve professional practice<br>Outcomes: Provider behaviour<br>Period: 1980 – 1994 | 61 studies met the inclusion criteria.<br>*Single interventions*<br>8 of 17 studies of information transfer observed improvements.14 of 15 studies of information linked to performance observed improvements. 3 of 5 studies of learning through social influence observed improvements. 3 of 3 studies of management support observed improvements.<br>*Multi-faceted interventions*<br>8 of 20 studies of information transfer with information linked to performance observed improvements. 7 of 8 studies of information transfer with learning through social influence observed improvements. 6 of 7 studies of information transfer with management support observed improvements. 3 of 3 studies of information linked to performance with learning through social influence observed improvements. 5 of 6 studies of use of more than 3 interventions observed improvements. | Strategies combining more interventions may be more expensive but also more effective. All interventions show considerable variation in their effectiveness. The combination of information transfer and learning through social influence or management support can be effective and so can reminders or feedback. Need for more research to determine if other interventions are effective. QS=5 |
| Thomas 1999 [46]<br><br>Effectiveness of introducing clinical practice guidelines targeting nursing, midwifery and professions allied to medicine (PAMS) | Study designs: RCT, CBA, ITS<br>Participants: Professions allied to medicine<br>Intervention: Guideline dissemination and/or implementation strategies<br>Outcomes: Objective measure of professional performance or patient outcomes<br>Period: 1975 – 1996 | 18 studies met the inclusion criteria.<br>9 studies on guidelines plus dissemination and/or implementation strategy versus no guideline were included. 3 of 5 showed a significant effect on the process of care. 6 of 8 showed significant findings for some outcomes of care. 3 studies considered the effect of guidelines and dissemination and/or implementation strategy versus another such strategy were included but reported mixed findings. 6 studies looked at the role of substitution and found no difference. | There is some evidence that guideline-driven care can be effective. There is insufficient evidence to determine the effectiveness of different dissemination and implementation strategies. It is difficult to draw firm conclusions as a consequence of poor methods in primary research. There is insufficient evidence to determine if the effects could be sustained. More research is needed to determine the effectiveness of strategies in relation to PAMS. QS=7 |

has evaluated the introduction of guidelines. It concluded that guidelines can change clinical practice and were more likely to be effective if they took account of local circumstances, were disseminated by active educational interventions and were implemented using patient-specific reminders.

There was inconclusive evidence about whether guidelines developed locally were more likely to be effective than those developed nationally.

A review of 102 studies of interventions to improve the delivery of health care services found that dissemination-only activities resulted in little or no change in behaviour and that more complex interventions, whilst frequently effective, usually produced only moderate effects.[39]

The authors concluded that there are 'no magic bullets'; there are a range of interventions that if used appropriately are effective under some circumstances, but none is effective under all circumstances. More recently, a review of 61 studies of the effectiveness of introducing guidelines in primary care showed that multi-faceted interventions tended to be more effective but may be more expensive.[51] Finally, a review evaluating the introduction of guidelines targeting nursing, midwifery and the professions allied to medicine identified 18 studies (generally of poor quality).[46] There was insufficient evidence to determine the effectiveness of different strategies, although a number of studies did suggest that guidelines could be used to support the extension of nursing roles.

### *B.2 Reviews of interventions to improve specific behaviours:*

Fourteen reviews focused on interventions targeting specific behaviours[11,23,26–31,33,35,37,42–44] (see Table 2).

#### Interventions to improve preventive care:

A review of 32 studies evaluating interventions to improve preventive care found that 28 out of 31 reported significant improvements

**Table 2** Summary of systematic reviews of the effects of implementation strategies targeting specific behaviours

| Authors and Focus | Inclusion criteria | Main results | Main conclusions |
|---|---|---|---|
| Lomas 1988 [35]<br><br>Educational and administrative strategies to promote preventive care | Study designs: RCT<br>Participants: Physicians in practice or training<br>Intervention: Educational and administrative strategies to improve performance of physicians with (preventive care) recommendations<br>Outcomes: Physician performance or patient outcome<br>Period: 1975 – 1987 | 32 studies met inclusion criteria. 28 of 31 observed significant improvements in practitioner performance. 4 of 13 studies observed significant improvements in patient outcomes. | Many dissemination and application tactics in common use merit further rigorous testing or abandonment, particularly patient-centred strategies. Because of the complexity of the determinants of clinical practice, simple solutions are unlikely. Those who promulgate practice recommendations should ensure dissemination and application of their recommendations. QS=3 |
| Soumerai 1989 [44]<br><br>Improving drug prescribing in primary care | Study designs: RCT, CBA, ITS, BA, UA<br>Participants: Physicians<br>Intervention: Non regulatory, non commercial programmes to improve drug prescribing<br>Outcomes: Drug prescribing<br>Period: 1970 – 1988<br>Other: Non English language studies, reports of pure regulatory interventions and changes in financial incentives to patients were excluded | 44 studies met inclusion criteria. 85% of inadequately controlled studies reported positive findings, compared to 55% of well-controlled studies. Dissemination of printed educational materials alone reported to be ineffective in all adequately controlled studies, whereas every uncontrolled study reported positive effects. | Mailed educational materials alone may change knowledge or attitudes, but had little or no detectable effect on actual prescribing behaviour. Few well-controlled studies have documented the effectiveness of group education. Ongoing feedback may be effective in improving certain types of prescribing practices, such as use of generic drugs in academic settings. Brief one-to-one educational outreach visits are effective in substantially reducing inappropriate prescribing. QS=3 |
| Gurwitz 1990 [27]<br><br>Impact of interventions to improve drug prescribing and utilisation in the nursing home | Study designs: RCT, CCT, CBA, ITS, BA<br>Participants: Not explicitly stated (physicians and nursing staff)<br>Intervention: Interventions to change drug prescribing or utilisation in nursing homes<br>Outcomes: Changes in drug prescribing and/or utilisation<br>Period: Not explicitly stated | 16 studies met inclusion criteria.<br>Mixed effects (mainly positive) were observed for all types of interventions. Results of single randomised trial of educational outreach were positive. | Little evidence available from adequately controlled studies. Research needed on clinical outcomes and cost-effectiveness of interventions. QS=3 |
| Gyorkos 1994 [28]<br><br>Interventions to improve immunisation coverage | Study designs: Studies comparing one or more interventions RCT, CCT, 'Cohort'<br>Participants: Human population in developed countries<br>Intervention: Delivery methods to improve immunisation<br>Outcomes: 'No restriction was placed on the type of outcome measure' (immunisation coverage)<br>Period: 1979 – 1992<br>Other: Only studies in French and English included | 54 studies met the inclusion criteria. Largest improvements in influenza immunisation coverage resulted from interventions aimed at hospitalised patients. Both client- and system-oriented interventions targeted at high risk hospitalised patients can achieve high coverage rates for pneumococcal immunisation. One study reported on Hepatitis B immunisation coverage. The generalisability to other populations was very limited. Studies of system-oriented interventions reported larger improvements than studies of client-oriented interventions for MMR. | Many factors affect improvements in immunisation coverage, including characteristics of the target populations, baseline coverage rate, vaccine efficacy, and the knowledge, attitudes and practice of local health care providers. Variation in these determinants limits the generalisability of results from individual studies. QS=5 |
| Mandelblatt 1995 [37]<br><br>Effectiveness of interventions to improve physician screening for breast cancer | Study designs: RCT, CCT<br>Participants: Physicians<br>Intervention: Interventions to enhance physician behaviours regarding breast cancer screening<br>Outcomes: Not explicitly stated<br>Period: 1980 – 1993<br>Other: Studies from USA only | 20 studies met inclusion criteria.<br>Successful interventions included reminder systems, audit and feedback. Limited evidence that physician and patient education were successful in community based settings only. | Physician based interventions can be effective in increasing screening use.<br>QS=5 |
| Anderson 1996 [11]<br><br>Review of techniques to improve prescribing behaviour | Study designs: RCT<br>Participants: Not explicitly stated (community physicians)<br>Intervention: Interventions to improve prescribing behaviour<br>Outcomes: Not explicitly stated<br>Period: Not explicitly stated | 9 studies met inclusion criteria. Printed educational materials alone do not improve practice. Interventions combining education and feedback were found to be more effective. Educational strategies involving face-to-face contact between the expert and physician were successful. Feedback including specific recommendations for change in the use of medications were more successful than a description of current practice. | Specific educational and feedback strategies can improve quality of care. Results are limited due to the lack of data found on patient outcomes. Need for further research on office-based prescribing and on providing information on drugs to patients. QS=2 |
| Snell 1996 [42]<br><br>Effectiveness of interventions to increase screening rates for breast, cervical and colorectal cancer | Study designs: Not explicitly stated (unable to determine designs included)<br>Participants: Physicians and patients in primary care<br>Intervention: Interventions to increase cancer screening rates<br>Outcomes: Not explicitly stated (appointments scheduled and kept, adherent patients)<br>Period: 1989 – 1994 | 38 studies met inclusion criteria. Effect size decreased as the number of interventions targeting patients increased. As number of interventions increased so did the effect size when targeting physicians. A combination of during and outside visit interventions led to a greater effect size in physicians. | Multi-faceted approaches were more effective at changing physician behaviour. Not clear which patient focused interventions were most effective. Physician and patient interventions were equally successful, no added benefit of targeting both. Focused approaches were more effective than the scattergun approach. QS=3 |
| Hanson 1997 [29]<br><br>Effectiveness of clinical interventions designed to change care at the end of life | Study designs: RCT, CCT, CBA, BA<br>Participants: Patients near the end of life and physicians<br>Intervention: Interventions to change patient experiences and/or physician practices<br>Outcomes: Not explicitly stated (patient preferences, pain control, use of life sustaining treatments and medical costs)<br>Period: 1990 – 1996<br>Other: Only studies in USA considered | 16 studies met inclusion criteria. 6 of 8 studies (3 out of 5 RCT) of patient targeted interventions (usually written materials and/or discussions with professional or patient representative) to increase the use of advanced directives or proxy measures reported an increase in documentation of patient treatment preferences. 5 of 5 non randomised studies of physician targeted interventions ('sophisticated educational or motivational techniques') to improve recording of advanced directives or use of patient preferences and change in life-sustaining treatments reported positive results. 3 of 3 studies targeted at physician and patient demonstrated an increased expression of patient preference but showed no effect on the use of life-sustaining treatments or other outcome measures. | Several interventions were found to increase the use of patient treatment preferences in end of life care. The success varied with respect to patient characteristics and the educational technique used. Educational approaches must be creative and complemented by motivational and organisational strategies to change physician behaviour. QS=3 |

**Table 2** Continued

| Authors and Focus | Inclusion criteria | Main results | Main conclusions |
|---|---|---|---|
| Hulscher 1998 [31]<br><br>Effectiveness of alternative interventions to improve the delivery of preventive care | Study designs: RCT, CBA, ITS<br>Participants: Primary care professionals<br>Intervention: Any professional, organisational, financial or regulatory intervention<br>Outcomes: Objectively measured professional performance or patient outcomes<br>Period: 1966 – 1995 | 58 studies met inclusion criteria.<br>*Single interventions*<br>5 of 8 studies of education observed significant improvements. 1 of 3 studies of individual instruction observed significant improvements. 2 of 4 studies of feedback observed significant improvements. 9 of 13 studies of physician reminders observed significant improvements. A small difference was found to favour organisational interventions and no evidence of effect was found on the effect of financial or regulatory interventions.<br>*Multi-faceted interventions*<br>9 of 23 studies of interventions including feedback observed significant improvements. 17 of 17 studies including physician reminders observed significant improvements. Other combinations produced mixed results. | Multi-faceted interventions including reminders resulted in the greatest improvement in effectiveness but may incur greater cost. Need for further research to determine what elements of interventions work, why and at what cost. QS=7 |
| Grimshaw 1998 [26]<br><br>Effectiveness of interventions to improve general practitioner outpatient referrals | Study designs: RCT, CBA, ITS<br>Participants: Not explicitly stated (primary care physicians)<br>Intervention: Interventions to influence the quality or quantity of outpatient referral<br>Outcomes: Objectively measured provider performance or patient outcomes<br>Period: 1966 – 1995 | 4 studies met inclusion criteria. Mixed results were found. Training plus structured assessment cards, and joint consultation sessions were effective. Development and dissemination of local consensus guidelines and the introduction of fundholding in UK primary care were found to have no effect. | Difficult to draw firm conclusions on the basis of this review as a result of the limited number of rigorous studies identified. Further research is needed on interventions designed to improve the referral process.<br>QS=5 |
| Solomon 1998 [43]<br><br>Effectiveness of interventions to modify physician testing behaviour | Study designs: RCT, CBA, BA<br>Participants: Physicians<br>Intervention: Any intervention that attempted to modify physician testing behaviour<br>Outcomes: Resource utilisation<br>Period: 1966 – 1998<br>Other: English language studies only | 49 studies met inclusion criteria.<br>76% of interventions reported reduced volume and/or charges for tests targeted.<br>15 of 21 studies aimed at one behavioural factor were successful. 24 of 28 studies aimed at more than one behavioural factor were successful. | Interventions promoting more than one behavioural factor were most successful. Primary data of low quality hence conclusions are weak. Further research should incorporate relevant behavioural change models. QS=5 |
| Gill 1998 [23]<br><br>Effectiveness of interventions to improve prescribing behaviour | Study designs: RCT, CBA<br>Participants: Physicians<br>Intervention: Professional interventions<br>Outcomes: Not explicitly stated (prescribing behaviour)<br>Period: Not explicitly stated | 79 studies met inclusion criteria. 53 single intervention studies and 22 multi-faceted intervention studies. 51% of interventions changed prescribing behaviour in comparison to the control group. Multi-faceted interventions had some effect on changing prescribing behaviour. | No clear differences between approaches. Multi-faceted approaches are most promising. QS=3 |
| Lancaster 1998 [33]<br><br>Training health professionals in smoking cessation | Study designs: RCT<br>Participants: Health care professionals<br>Intervention: Training interventions to provide smoking cessation interventions<br>Outcomes: Process variables and rates of abstinence<br>Period: Not explicitly stated | 9 studies met inclusion criteria. Training providers can significantly improve the odds of their patients quitting smoking (OR 1.48, 95% CI: 1.20–1.83). Use of reminders in addition to training had a statistically significant effect in two studies (OR 2.37, 95% CI: 1.43–3.92) and addition of nicotine gum may also improve the impact of training. | Training health professionals to provide smoking cessation interventions had a measurable effect on professional performance. There was also a modest effect on patient outcome. QS=5 |
| Harvey 1999 [30]<br><br>Effectiveness of interventions that affect the management of obesity or patient outcomes | Study designs: RCT, CCT, CBA, ITS<br>Participants: Health professionals; overweight and obese patients<br>Intervention: Any professional targeted intervention<br>Outcomes: Objectively measured provider performance or patient outcomes<br>Period: 1966 – 1998 | 12 studies met inclusion criteria. 4 studies of interventions to improve the management or organisation of care versus usual care, 2 had mixed results. 8 studies of different organisational interventions had inconclusive findings. | Difficult to provide recommendations for improving obesity management due to limited evidence of poor methodological quality. Need for further research to identify cost-effective strategies for improving the management of obesity and to identify if benefits lead to long term improvements in health outcomes. QS=7 |

in the process of care and four out of 13 reported significant findings in the outcome of care.[35] Another review including 58 studies of interventions to improve preventive care in primary care settings concluded that multi-faceted interventions, including reminders, resulted in the greatest improvement in effectiveness but may incur greater cost.[31]

Various client and system interventions were found to improve immunisation coverage in a review of 54 studies.[28] A review of the effectiveness of training professionals about smoking cessation found that such training had a small to modest effect on smoking cessation rates.[33] In a review of 20 studies of interventions to improve mammography, reminder systems and audit and feedback were generally effective.[37] Additionally, a review of 38 studies of interventions to increase screening rates for breast, cervical and colorectal cancer, concluded that multi-faceted interventions were most effective, and focused approaches were more effective than a scattergun approach.[42]

**Interventions to improve prescribing:** A review of 44 studies of interventions to improve prescribing found that mailed educational materials alone were generally ineffective, educational outreach approaches and ongoing feedback were generally effective and there was insufficient evidence to determine the effectiveness of reminder systems and group education.[44]

The review also found that poorly controlled studies were more likely to report significant results compared to adequately controlled studies, thereby emphasising the need for rigorous evaluations of dissemination and implementation strategies. A more recent review of nine RCTs found that feedback which included specific recommendations was more likely to change behaviour than general feedback on current behaviour.[11] Additionally, a review of 79 studies found that multi-faceted interventions were more likely to be successful than single interventions.[23]

**Interventions to improve other behaviours:** A review of interventions to improve out-patient referrals

identified four studies which showed mixed effects and concluded that it was difficult to draw any firm conclusions on the basis of the evidence.[26] In a review of 46 studies of interventions to modify test-ordering behaviour, multi-faceted interventions which targeted more than one behavioural factor were more likely to be effective.[43]

***B.3 Reviews of specific interventions***: Fifteen reviews focused on the effectiveness of specific interventions[12–14,16,18,22,25,32,38,40,41,45,47–49] (See Table 3).

Dissemination of educational materials: A review of 11 studies evaluating the effects of disseminating educational materials, including clinical practice guidelines, audio-visual materials and electronic publications, found no statistically significant improvements in practice.[22]

Educational outreach: In a review of 18 studies evaluating the effectiveness of educational outreach visits, the authors concluded that this appears to be a promising approach for modifying professional behaviour, especially prescribing.[47] This method is particularly effective when combined with Social Marketing[47] (see Section C). Most of this research is from North America and its generalisability to UK settings and other types of behaviour is unclear. A number of ongoing trials will provide rigorous evidence about the effectiveness of this approach in the UK (see the National Research Register for details).[56]

Local opinion leaders: A recent review of eight studies found that using local opinion leaders resulted in mixed effects on practice and that further research was required before the widespread use of this intervention could be justified.[49]

Audit and feedback: One review of 26 studies found that feedback was less effective than reminders for reducing diagnostic test ordering.[18] Another reviewed 12 evaluations of physician profiling (defined as peer comparison feedback) and observed statistically significant improvements in 10 studies, but the effects were small.[13] The review concluded that peer comparison alone is unlikely to result in substantial quality improvement or cost-control and may be inefficient. A third review identified 13 studies which compared audit and feedback to a no-intervention control group; eight studies reported statistically significant changes in favour of the experimental group on at least one major outcome, but the effects were small to moderate.[48] The review concluded that audit and feedback can be effective in improving performance, in particular for prescribing and test ordering, although the widespread use of audit and feedback was not supported.

Reminders (manual or computerised): A review of 68 studies found that the use of computer-based decision support systems can lead to improvements in decisions on drug dosage, the provision of preventive care, and the general clinical management of patients, but not in diagnosis.[32]

Other interventions: One review of 30 studies looking at the effects of computers on primary care consultations observed that immunisation, other preventive tasks and other aspects of performance improved.[45] However, consultation time lengthened and there was a reduction in patient initiated social contact. A review of 98 studies of computerised information systems found that different information interventions including provider and patient prompts, computer-assisted patient education and computer-assisted treatment planners improved care.[14]

In a review of six studies examining the effects of feeding back cost information to GPs, significant increases in generic prescribing, reduced prescribing costs and test ordering were observed.[16] A review of 17 studies examining the effects of the mass media on health services utilisation suggested that mass media campaigns had an effect on health services utilisation.[25] In a review of the clinical application of continuous quality improvement (CQI) programmes, 43 single site studies (41 of which used an uncontrolled before and after design) and 13 multi site (12 of which used a cross sectional or uncontrolled before and after design) were identified.[41] The results from the uncontrolled and cross sectional studies suggested that CQI was effective, whereas the three randomised studies observed no effect. The predominance of uncontrolled study designs makes it difficult to attribute any observed effect to CQI.

Most of the reviews suggested that a variety of interventions may lead to change in different settings. Given the complexity of changing behaviour, no 'magic bullets'[39] exist that could be reliably expected to change practice in all circumstances and settings (see Box 1). The reasons why interventions work in some circumstances but not in others are often unclear, but insights can be gained from relevant theoretical models of behaviour change.

**Box 1** Research findings on professional behaviour change

- Most interventions are effective under some circumstances, none is effective under all circumstances
- Interventions based on assessment of potential barriers are more likely to be effective
- Multi-faceted interventions targeting different barriers to change are more likely to be effective than single interventions
- Educational outreach is generally effective in changing prescribing behaviour in North American settings. Ongoing trials will provide rigorous evidence about the effectiveness of this approach in UK settings
- Reminder systems are generally effective for a range of behaviours
- Audit and feedback, opinion leaders and other interventions had mixed effects and should be used selectively
- Passive dissemination when used alone is unlikely to result in behaviour change. However, this approach may be useful for raising awareness of research messages

**Table 3** Summary of systematic reviews of the effects of specific implementation strategies on professional practice

| Authors and Focus | Inclusion criteria | Main results | Main conclusions |
|---|---|---|---|
| Mugford 1991 [38]<br><br>Effectiveness of audit and feedback | Study designs: RCT, CCT, CBA, BA<br>Participants: Not explicitly stated (clinicians)<br>Intervention: Information feedback<br>Outcomes: Not explicitly stated<br>Period: Not explicitly stated | 36 studies met inclusion criteria. Information feedback most likely to influence clinical practice if part of a strategy to target decision-makers who had already agreed to review their practice. A more direct effect was discernible if the information was presented close to the time of decision making. | Information feedback 'necessary but not sufficient in the process of maintaining high quality clinical care'. The use of information in the audit process should be critically evaluated. QS=3 |
| Buntinx 1993 [18]<br><br>Effectiveness of feedback and reminders on diagnostic and preventive care in ambulatory care | Study designs: RCT, CCT, CBA, BA<br>Participants: Physicians in ambulatory care<br>Intervention: Feedback and reminders<br>Outcomes: Number and costs of diagnostic tests ordered, compliance with guidelines<br>Period: 1983 – 1992 | 27 studies met inclusion criteria; 1 study subsequently excluded. 8 studies evaluated the impact of interventions on reducing tests/costs. 2 of 2 RCT assessing reminders and 5 of 6 studies (including 1 of 1 RCT) assessing feedback observed significant reductions. 14 studies evaluated impact of interventions on adherence to guidelines: 5 of 7 studies (including 4 of 4 RCT) assessing reminders and 5 of 9 studies (including 3 of 4 RCT) observed significant improvements. | Feedback and reminders may reduce the utilisation of diagnostic tests, and may improve conformity to standards of performance of doctors. Reminders appear to exert greater effect than classical methods of feedback. QS=5 |
| Austin 1994 [12]<br><br>Effectiveness of reminders on preventive care | Study designs: RCT<br>Participants: Physicians<br>Intervention: Reminders<br>Outcomes: Process and outcome of care<br>Period: Not explicitly stated | 10 studies met inclusion criteria. 4 studies in 2 areas (cervical screening and tetanus immunisation) provided sufficient data for meta-analysis: OR:1.18 (95% CI 1.02 – 1.34) for cervical screening and 2.82 (95% CI 2.66 – 2.98) for tetanus immunisation. | Reminders may increase provision of preventive care services. QS=3 |
| Sulivan 1995 [45]<br><br>Effectiveness of computers on primary care consultations | Study designs: 'Prospective studies' no further details given RCT, CCT, CBA, BA<br>Participants: Doctors or nurses in primary care settings<br>Intervention: Computer system to support either routine practice or a specific research project<br>Outcomes: Consultation process, doctors' task performance and patient outcomes<br>Period: Not explicitly stated | 30 studies met inclusion criteria. Most studies showed a neutral or positive effect when computers were used. Immunisation rates improved by 8–18%, other preventive tasks improved by up to 50%. Consultation time may lengthen up to 90 seconds. A reduction in patient initiated social contact may occur. An increase in clinical performance by the physician may also occur. | Computers in consultation may improve clinician performance but may increase the length of consultation. Need for further research on outcomes of care for patients. Need for rigorous research to evaluate the effectiveness of existing consultations using computers for clinicians, support staff and patients. QS=4 |
| Balas 1996 [13]<br><br>Effectiveness of physician profiling (peer comparison feedback) | Study designs: RCT<br>Participants: Not explicitly stated (clinicians)<br>Intervention: Peer comparison feedback<br>Outcomes: Frequency of targeted clinical activity or procedure<br>Period: Not explicitly stated | 12 studies met inclusion criteria. 10 of 12 studies observed significant effects on various clinical procedures; $p < 0.05$ using a vote counting method; $z = 1.98$ $p < 0.05$ using a z Transformation method (based on 8 trials); and OR of 1.09 (CI: 1.05–1.14) based on a meta-analysis of 5 trials. Subgroup analyses of studies focusing on test ordering and prescribing were non-significant. | Peer comparison alone is unlikely to result in substantial quality improvement or cost-control. Potential cost saving of profiling is unlikely to exceed the cost of profiling for most clinical procedures. Need for further evaluation of more substantive feedback and other methods to improve health care quality and control costs. QS=6 |
| Balas 1996 [14]<br><br>Efficacy of computerised information systems | Study designs: RCT<br>Participants: Not explicitly stated (patients and providers)<br>Intervention: Computerised information<br>Outcomes: Process or outcome of care<br>Period: Not explicitly stated | 98 studies involving 100 comparisons met inclusion criteria. 3 comparisons excluded due to poor quality.76 of 97 comparisons observed improvements (significance not reported). 10 of 14 comparisons observed improvements in morbidity, physiologic or psychological patient outcomes. No differences across main site categories (outpatient primary care, speciality care and inpatient care group). Provider prompts, computer assisted treatment planners, and interactive patient/education therapy and patient prompts had statistically significant effects ($p < 0.05$) using the vote counting method. | Four generic information interventions (provider prompts, computer assisted treatment planners, interactive patient education therapy and patient prompts) can improve quality of care. Computer systems should incorporate these effective information strategies. QS=3 |
| Freemantle 1996 [22]<br><br>Effectiveness of printed educational materials | Study designs: RCT, CBA, ITS<br>Participants: Health care professionals<br>Intervention: Distribution of published or printed recommendations for clinical care, delivered by hand or through personal or mass mailings<br>Outcomes: Objectively measured professional performance or patient health outcome<br>Period: Not explicitly stated | 11 studies met inclusion criteria. 9 of 9 studies assessing effect of printed educational materials versus no intervention found no statistically significant improvements in practice. 1 of 6 studies observed improvements in care when educational materials combined with another intervention were compared to educational materials alone. | Printed educational materials alone were found to have a small impact on practice. Additional interventions may increase changes in practice but it is unclear from this review which interventions are most cost-effective in different circumstances. Need for further research on the cost-effectiveness of comparing printed educational materials with more active interventions. QS=6 |
| Shea 1996 [40]<br><br>Effectiveness of computer-based reminder systems on preventive care | Study designs: Ambiguous RCT and 'studies with concurrent controls that also reported comparisons with historical controls'<br>Participants: Not explicitly stated (physicians and patients)<br>Intervention: Computer-based reminder systems<br>Outcomes: Provision of six preventive practices (vaccination, breast cancer screening, colorectal cancer screening, cervical cancer screening, cardiovascular risk reduction, other preventive services)<br>Period: 1966 – 1995 | 16 studies met inclusion criteria. Computer reminders increased provision of four preventive practices separately and all practices combined (OR 1.77 95% CI: 1.38 – 2.27). Manual reminders increased provision of four preventive practices separately and all practices combined (OR 1.57 95% CI: 1.20 – 2.06). Computer plus manual reminders increased provision of preventive practices separately for all preventive practices (OR 2.23 95% CI: 1.67 – 2.98). No significant difference found between computer and manual reminders. | Manual and computer reminders separately can increase the use of preventive services. A combination of manual and computer reminders is more effective than either individual intervention.<br>Need to overcome technical issues before the widespread use of computer generated reminders can be recommended. QS=4 |
| Beilby 1997 [16]<br><br>Effectiveness of providing costing information to reduce costs by changing GP behaviour | Study designs: RCT, CCT, ITS<br>Participants: GPs<br>Intervention: Distribution of costing information to GPs (either as a stand alone or part of a multi-faceted intervention)<br>Outcomes: Objective measurement of health provider performance, clinical care or patient specific criteria<br>Period: 1980 – 1996. | 6 studies met inclusion criteria. 2 of 2 studies observed significant increases in generic prescribing or significant reductions in prescribing costs. Printed newsletters and non-commercial drug information less effective than educational outreach. 3 of 3 studies observed significant reductions in test ordering. 1 of 1 study observed non-significant reductions on visits to specialists, medical procedures and ambulatory care charges. | The provision of costing information can change GP behaviour in all service areas. Sustainability of these changes and linking of cost savings to health outcomes have not been well studied. QS=3 |
| Thomson 1997 [47]<br><br>Effectiveness of outreach visits | Study designs: RCT<br>Participants: Health care providers<br>Intervention: Outreach visits defined as a personal visit by a trained person to a health care provider in his or her own setting<br>Outcomes: Objective measurement of health professional practice or patient outcomes<br>Period: 1966 – 1997 | 18 trials met inclusion criteria. 3 of 3 trials observed significant improvements compared to no intervention. 12 of 13 trials comparing outreach plus a complementary intervention with no intervention observed significant improvements. 1 of 1 trial found that outreach was more effective than audit and feedback. 1 of 1 study observed outreach using patient related content to be more effective that patient related summaries for content. 1 of 1 found that effects decrease over time. | Effect sizes of outreach visits small to moderate. Support found for the use of educational outreach visits combined with additional interventions to reduce inappropriate prescribing. Cost-effectiveness of outreach visits unclear. Need to monitor long-term performance of effectiveness of outreach visits. More research required into the effectiveness of outreach visits in different settings and contexts. QS=7 |

**Table 3** Continued

| Authors and Focus | Inclusion criteria | Main results | Main conclusions |
|---|---|---|---|
| Grilli 1998 [25]<br><br>Effectiveness of mass media on the utilisation of health services by professionals, patients or the public | Study designs: RCT, CCT, CBA, ITS<br>Participants: Health care providers, patients and the general public<br>Intervention: Interventions based on use of mass media targeted at the population level aiming to promote or discourage use of health care<br>Outcomes: Objective measures of direct impact on health services utilisation<br>Period: Not explicitly stated | 17 studies met inclusion criteria. 16 reported that mass media was effective; statistically significant findings were only observed in 7 studies following re-analysis. Standardised effect size based on meta-analysis was -1.54 (95% CI:-1.12 to -1.97) for planned mass media campaigns (14 studies) and -1.24 (95% CI: -0.84 to -1.57) for unplanned media coverage (3 studies). | Mass media campaigns may have a positive influence upon the manner in which health services are utilised although current research has methodological limitations. QS=5 |
| Thomson 1998 [48]<br><br>Effectiveness of audit and feedback | Study designs: RCT, CCT<br>Participants: Health care providers<br>Intervention: Audit and feedback<br>Outcomes: Objective measurement of health professional practice or patient outcomes<br>Period: 1966 – 1997 | 37 studies met inclusion criteria. 8 of 13 trials observed significant improvements compared to no intervention. 10 of 15 trials found audit and feedback including educational materials significantly more effective than no intervention or educational materials alone. 6 of 11 trials found significant but modest effects in favour of audit and feedback as part of a multi-faceted intervention as opposed to no intervention. 5 trials reported mixed results for the short and longer-term effects of audit and feedback. 4 trials found little additional benefit of combining audit and feedback with other interventions. 2 of 3 trials found that reminders were more effective than audit and feedback for preventive services. | Audit and feedback can be effective in improving performance, in particular for prescribing and test ordering, although effects are generally small to moderate. Review does not support widespread use of audit and feedback which should be targeted where it is likely to effect change and not be used generally for all problems. Not possible to determine the optimal characteristics of feedback. Further research needs to consider effectiveness of combining audit and feedback with other interventions such as reminders, using rigorous designs and better quality reporting. QS=7 |
| Hunt 1998 [32]<br><br>Effectiveness of computer-based clinical decision support systems (CDSS) | Study designs: RCT, CCT<br>Participants: Health professionals in clinical practice or postgraduate training<br>Intervention: CDSS<br>Outcomes: Clinician performance and/or patient outcomes<br>Period: 1974 – 1998 | 68 studies met inclusion criteria. 9 of 15 studies observed significant improvements in drug dosing. 1 of 5 studies observed significant improvements in diagnosis. 14 of 19 studies observed significant improvements in preventive care. 29 studies evaluated the effects of CDSSs on other aspects of medical care: 19 of 26 observed significant improvements in practitioner performance; and 4 of 7 observed significant improvements in patient outcomes. | Need for larger trials of CDSSs as they are improving. Ambulatory care services and clinics should consider opportunities to acquire preventive care reminder systems. Reasonable to consider using a CDSS to effectively titrate potentially toxic intravenously administered medications but need larger confirmatory trials. QS=6 |
| Shortell 1998 [41]<br><br>Effectiveness of the clinical application of continuous quality improvement (CQI) | Study designs: Not explicitly stated (single site BA and multi site RCT included)<br>Participants: Not explicitly stated<br>Intervention: CQI<br>Outcomes: Not explicitly stated<br>Period: 1991 – 1997 | 55 studies met inclusion criteria. 43 single site studies; most showed positive results apart from the 2 RCT and 2 other studies that showed no improvements in care. 13 multi-site studies; most found positive results. The RCT found no impact. 3 multi-site studies are currently in progress. | Single site study design makes it difficult to discern if effects are attributable to CQI. Possible that effects are overstated due to publication bias. Quality and outcomes of care can be improved and certain efficiencies achieved. Need physician involvement, individual practitioner feedback and a supportive organisational culture. Characteristics of the target condition, lack of physician buy-in, poor dissemination and vague diffuse feedback to practitioners can affect the effectiveness of CQI. QS=4 |
| Thomson 1999 [49]<br><br>Effectiveness of using local opinion leaders | Study designs: RCT<br>Participants: Health care providers<br>Intervention: Local opinion leaders<br>Outcomes: Objective measures of provider performance or health care outcomes.<br>Period: 1966 – 1998 | 8 studies met inclusion criteria. 6 of 7 trials observed improvements in process of care, however these were only statistically significant in 2 trials. 1 of 3 trials observed significant improvements in patient outcome. 2 trials found local opinion leaders to be significantly more effective than group audit and feedback. | Using local opinion leaders results in mixed effects on professional practice; not always clear what they do and replicable descriptions are needed. Further research required to determine if opinion leaders can be identified and in which circumstances they are likely to influence the practice of their peers. QS=7 |

# C. Theoretical models

Models of change can be used both to understand the behaviour of health professionals and to guide the development and implementation of interventions intended to change behaviour. The following section summarises a selection of relevant models and approaches. Some are concerned purely with behaviour, illuminating individual reactions to changing circumstances, others focus on beliefs and attitudes, yet others map a variety of social and economic influences in the environment.

***C.1 Learning theory:*** Learning theory offers an explanation of how behaviour is maintained and changed.[57] It can be used to promote change by modifying factors which control behaviour. The probability of behaving in a particular way tends to increase when that behaviour is followed by positive consequences (i.e. reinforcement). Behaviour which is followed by negative consequences such as the withdrawal of reinforcement, is likely to decrease. The effectiveness of reinforcing factors depends on how desirable they are, which reflects the degree to which the individual is motivated to gain them. There is little chance of behaviour change if the individual lacks this motivation. Interventions based on the principles of learning theory have been used to change practice, for example through audit and feedback, fee-for-service or lower insurance premiums. It is unlikely that such approaches will work in all situations. However, reinforcement of desired actions, combined with identification and removal of reinforcers that sustain undesirable behaviour, could help to promote change.

***C.2 Social cognition models:*** In contrast to learning theory, where the influence of the individual's environment is important, social cognition models see factors such as beliefs, attitudes and intentions as central influences in shaping behaviour.[58]

In particular three sets of beliefs have emerged as important in determining behaviour:[59]

- perceived benefits weighed against perceived barriers, for example improved patient outcomes versus costs associated with change

- perceptions about the attitudes of important others to the behaviour
- self-efficacy, or the belief in one's ability to perform a particular behaviour.

Modifying these factors represents an important route to influencing the behaviour of health professionals.

A refinement of social cognition models are stage models of behaviour,[60-62] which describe the factors thought to influence change in different settings. Individuals are thought to pass through a sequence of stages and the kinds of interventions needed at different stages will vary. Such an approach can be applied to the types of change required for the adoption of evidence-based health care. Using planned interventions, the stages can be negotiated in sequence and change secured.

One stage model[60] suggests that in the first stage, *precontemplation*, no reason for change has been given. Very basic information about research-based recommendations would be required at this stage, to facilitate transition to the *contemplation* stage. This is an interactive period where information is needed about what change might mean. This could, for example, take the form of explanation of potential benefits to patients if the recommendations were to be adopted. This is followed by the *preparation* stage, where, for example, health professionals might learn how to access evidence or plan for the practical application of intended behaviour change by altering the clinic format. If this stage goes well, it will be followed by *action*. In the final stage, the new behaviour is *maintained*, perhaps through regular reminders.[63]

The stages of change approach suggests that it is important to target specific groups and work closely with them to discover their needs, barriers and drivers for change, rather than adopting blanket organisational policies.[64]

Other approaches based on receptivity to change include, for example, one put forward by Rogers[65] where individuals are classified as *innovators, early adopters, early majority, late majority* and *laggards* depending upon how quickly they change their behaviour. Again, what is stressed is that a variety of techniques will be required to secure change as groups differ in the degree to which they are prepared to change. They may also perceive different benefits and barriers, and have differing resources. An effective strategy must allow for such differences.

***C.3 Models of organisational change:*** Models outlined above focus on the individual. However, organisational contexts also play a part in the change process. Like individuals, organisations are also thought to move through a series of stages in the process of change. For example, an early model still in use today suggests three stages: *unfreezing* of old behaviours or practices, i.e. a recognition that the old way of doing things is no longer sustainable, *changing* to a new position, maybe through exposure to new information and *refreezing* of new attitudes, practices or policies through reinforcement and support.[66] Other issues considered to be central to the process of organisational change are context (why and when change should occur), process (how change will be secured) and content (what change will occur).[67] This approach emphasises the complexities of organisations, and the need to take account of the internal and external environments.[68]

***C.4 Using theory within a planning framework:*** Theories of change may be most useful and effective when they are integrated within a comprehensive planning framework. Two frameworks that use a systematic approach to changing practice are Social Marketing[69] and PRECEDE-PROCEED,[70] both of which have been used for the development, implementation and evaluation of interventions to change health behaviours.

Social Marketing: Social Marketing provides a framework for identifying factors that drive change.[69] Success is viewed as likely only when the needs, perceptions and requirements of the target group are determined and satisfied through the design and implementation of appropriate interventions.

Social Marketing is a model consisting of six stages. The first involves planning and strategy, including research with the target group and assessment of the resources available for the intervention. Stage two is selecting the relevant channels and materials for intervention. The structure of the programme is specified along with relevant outcomes. The target group is also 'segmented' at this stage to create homogeneous sub-groups; for example, based on individuals' motivation for change. Stage three involves developing and piloting materials with the target audience so as to determine their relevance, comprehensibility, and likely impact. Stages four and five are implementation and evaluation, where effectiveness is assessed in terms of whether and how the intervention is meeting its objectives. In the final stage feedback is used to refine the intervention.

PRECEDE-PROCEED: The model outlines the steps which should *precede* an intervention and gives guidance on how to *proceed* with the implementation and its subsequent evaluation.[70]

The PRECEDE stages are concerned with problem specification and identification of factors that contribute to it. Priorities for intervention are selected by rating predisposing, enabling and reinforcing factors in terms of importance and amenability to change. Predisposing factors provide the motivation for change and include attitudes, beliefs, and perceptions. Enabling factors

allow the motivation for change to be realised and usually include resources, facilities, and skills. Reinforcing factors encourage change through rewards or incentives, including positive feedback.[71] The PROCEED stages are concerned with the implementation and evaluation of the intervention. Evaluation should cover the extent to which the intervention was implemented according to the protocol and its impact on predisposing, enabling and reinforcing factors, as well as actual behaviour change.

Using a framework to plan a programme of change forces each step in the process to be specified:

i) the need for change or problem specification
ii) characteristics of the target group and the environment that are likely to predispose, enable and reinforce change
iii) characteristics of the interventions that are most likely to promote change
iv) the expected association between the intervention, factors influencing behaviour, and actual behaviour change.

# D. Practical and organisational issues

***D.1 Resistance to change:*** The reasons why valid research-based recommendations and clinical guidance are not routinely adopted into practice are often complex. Managers who understand why change is resisted may be better able to deal with it constructively.[72]

Information problems: Ineffective or absent communication about evidence-based health care is widespread.[73] In addition, health professionals may not believe the research evidence as it is presented. They may have other information which suggests the contrary (e.g. patient preferences) and, unlike randomised controlled trials or systematic reviews, they will inevitably focus more upon the individual patient than upon the group.

Individual decision-making: Groups of health professionals make different decisions to those of individuals. Although a group may agree, for example, to keep test-ordering to a set protocol, a doctor faced with an individual patient will tend to err on the side of caution or rely on personal experience.[74]

Decision-making is often affected by the severity of the potential outcomes in comparison to the anticipated regret for different pathways not taken.[75] Thus a doctor might be less likely to prescribe HRT (or a patient to use it) if he or she considers the cancer risk greater and more worrying than the risk of osteoporosis or coronary heart disease.

Effects of stress: Stress levels are unusually high in health professionals;[76] this can reduce the ability to change practice. Ignoring the difficulties within the job or expecting change with often fewer resources, will create additional stress and can lead to resentment which in turn may fuel resistance.

One of the greatest barriers to change is the difficulty of getting the right groups and individuals to work together.[64] This can be due to stress, which encourages withdrawal, but also to lack of time and resources and difficult geography.

Persistence of the status quo: Finally, there is a natural tendency to return to previous practice patterns without constant motivation and reminders.[63,77]

***D.2 Case Studies:*** With the development of clinical governance, all NHS Trusts and Primary Care Groups are required to have a clinical governance lead reporting to the Chief Executive who is accountable for quality.[1,4] However, the success of clinical governance may depend on the development within NHS organisations of routine mechanisms for promoting individual and organisational change – something the majority do not currently have.

Within the UK, there are a number of projects which have sought to change professional practice in specific organisations and health care settings. This section presents three well known programmes[78–80] as case studies (see Box 2) and observes common issues and themes from their experiences of generating change. Many of the issues highlighted will be familiar to NHS staff already involved in clinical effectiveness initiatives.

**Box 2** Case studies

**Framework for Appropriate Care Throughout Sheffield (FACTS)**
Launched in 1994, FACTS aimed to create a reproducible, cost-effective and quality-controlled framework for changing clinical behaviour across Sheffield. This project was intended to ensure that general practices deliver effective care in three linked clinical areas: aspirin, anti-coagulation and statins.[78]

**Front-Line Evidence Based Medicine Project**
The Front-Line EBM Project was a three year exploratory study conducted with 20 hospital teams from 12 specialties in 14 hospitals in North Thames. Its aim was to assess whether it was feasible for hospital doctors to use databases and apply research evidence in the context of their routine clinical practice, and to identify key barriers to such use.[79]

**Promoting Action on Clinical Effectiveness (PACE)**
Launched in 1995, PACE was a national three year programme involving 16 local projects within Health Authorities and NHS Trusts tackling a range of clinical conditions. The programme had three linked objectives: to demonstrate effective implementation of evidence-based practice; to develop and support a national network of individuals interested in clinical effectiveness; and to disseminate lessons from local projects.[80]

Identifying local priorities for change: Experience from both FACTS and PACE suggests that implementation strategies need to be tailored to the local context; no single approach will have universal applicability. Decision-makers need to take account of more than just effectiveness and cost effectiveness. A wide range of factors should be considered, including the

organisational, educational, economic and community environments of the health professional.[10] Consideration should also be given to whose behaviour any implementation programme is seeking to change, as well as to beliefs, attitudes, and knowledge which shape readiness to change.[60]

The characteristics of the area selected for change may also raise issues such as whether the change delivers a relative advantage, whether it will be compatible with current beliefs or working practices, whether it will be complex and whether it can be piloted.[81] FACTS found that getting agreement that a topic was worth considering for change can depend on a number of complex, implicit judgements (see Box 3). Social Marketing emphasises planning and strategy as an essential first stage. The process of analysing the local context is likely to increase the chance of selecting a change which has a reasonable chance of success. At the very least such analysis will indicate whether further preparation is necessary or indeed whether change is actually possible in practice.

**Box 3** Getting agreement

**Getting agreement that a topic is worth tackling depends on:**

- whether the issue is perceived as a significant problem by those who have to change
- the extent to which it ties in with national policy and whether it will be supported by those charged with the task of implementing national policy
- whether all the major problems associated with the change can be solved
- whether there are key individuals or organisations who are strongly opposed to the change
- the nature of vested interests, either in the proposed change or the status quo
- the resource implications of change
- whether there is a significant gap between what people say publicly about the change and what they are actually prepared to do

**Exploring barriers to change:** Theories of change suggest that individuals and organisations differ in their receptivity to change and perceive different benefits and barriers to change. Requiring others to change demands an understanding of the problems they face. To identify the opportunities and barriers presented by the change programmes, FACTS carried out extensive discussions with members of the health authority, departments of public health and general practice, the local medical committee, local consultants and GPs perceived as particularly influential or with a particular interest in the field. Thus, the key constituencies were given the opportunity to influence the way in which the change programme was implemented.

In the Front-Line Project, one of the objectives was to assess whether it was feasible for hospital doctors to use evidence-based findings on a regular basis in clinical practice. The main barriers cited by participants were: inadequate access to information; insufficient time and money for clinical teams to acquire new skills; low levels of baseline skills in critical appraisal and computer use amongst staff; problems associated with medical and nursing hierarchies; perceived threats to medical autonomy; and lack of relevant evidence.

The resource implications of any proposed change programme can be substantial and consideration needs to be given to the service and resource consequences of any proposed change. The PACE experience has re-affirmed that change can be expensive, requiring a significant amount of resources and time. PACE projects received a grant (£30,000 over two years) to support the work, but this represented a small proportion of the costs involved. For example, the grant given for one project was estimated as representing about 20% of the total costs of the project.

Barriers to change can be formidable but change models suggest that implementation programmes can be successful if they use interventions and activities that reduce restraining forces.[68] Restraining forces which are likely to require resolution include: increased workload, lack of time, poor communication, traditional working practices, and individual and organisational resistance to change.[64]

**Incentives for change:** Learning Theory's emphasis on the effects of environmental influences on behaviour suggests that strategies for change should provide mechanisms that reinforce desired behaviour. Incentives for change can include: financial reward, resource reallocation, education and training, performance feedback, and empowerment. It is clear from the Front-Line experience that programmes involving incentives should be negotiated and agreed within the local context, as imposed programmes can easily undermine enthusiasm and motivation for change.

**Gaining commitment and building coalitions:** Implementation programmes often demand complementary and simultaneous change across several organisations. For example, a district-wide programme of prompted shared care for people with diabetes might need a high proportion of practices, hospital teams, podiatrists and opticians to change in particular ways if the programme is to make a reasonable return on the resources invested in it. Such widespread change seems to need to secure the support of a strong coalition of key players if it is to succeed. However, success will also be dependent on whether members of the coalition are personally committed to the process of change. In the Front-Line project, people who were volunteered by their managers rather than putting themselves forward invariably dropped out. Only those who had a personal commitment to the project from the outset saw it through.

Securing support and commitment may appear to require consensus amongst those involved. However, what is actually required may be endorsement. The distinction is subtle but can be important. Endorsement is more inclusive yet less demanding than consensus –

it allows the possibility of disagreeing with parts of a proposal but still approving and supporting it overall. In the case of the FACTS project, consultants were happy to endorse the principle of anticoagulation use as the responsibility of primary care but did not necessarily want to become party to consensus about how the service should be organised.

**Effective communication:** The success of any implementation programme is often dependent on effective communication, not only of what the programme seeks to achieve but also why and how the change is to be achieved. Communicating the what, why and how across a range of individuals and agencies requires that messages are tailored to suit the audience. When communicating with different constituencies, it is important to focus on the issues that are relevant to the audience, to use types of media which they can access and understand, and to use communication channels with which they are familiar and comfortable. For example, FACTS found that a single side of A4 was best for communicating the main messages to GPs.

Communicating more directly with audiences can raise practical issues. Many clinicians see meetings as intrusions into their daily workload. Since change is likely to involve at least some meetings, the PACE experience suggests that, wherever possible, existing communication systems should be used and additional meetings should be avoided.

**Supporting/managing change:** Support is essential for individuals and agencies involved in bringing about change. In the Front-Line Project, a major barrier to change was the low level of baseline skills in critical appraisal and computer use amongst participating staff, compounded by lack of time and resources for staff to acquire these skills.

From the PACE experience, supporting and managing change may involve a range of activities including: considering piloting strategies locally before they are 'rolled out'; engaging the support of local clinical leaders to actively promote the project; supporting multi-disciplinary team development – for example to secure a common understanding of respective roles; provide training opportunities taking account of the pressures on clinicians and local services; encouraging clinicians to review and change their practice; building time into local project meetings for reflection and open discussion of successes (and failures) of the work.

The PACE experience also suggests that change programmes require sound project management, with carefully developed objectives and a realistic timetable, if implementation is to be successful.

**Monitoring change:** There can be practical difficulties in capturing and assembling suitable data from data systems which enable clinical staff to routinely review the quality of their current practice. PACE suggests that discussions early in the project timetable should be arranged to allow agreement on what to measure and on ways to capture relevant data.

# E. Conclusion

This overview of empirical research, theoretical perspectives and insights from practical experience offers guidance on bringing about change. Whilst the research base is incomplete, it is possible to make informed judgements on how best to influence the behaviour of health professionals.

It is clear that any attempt to change should use a systematic approach and involve strategic planning. Any proposed change – for example, the implementation of a clinical guideline – would first involve a period of 'information and diagnostic analysis' to inform the development of an appropriate dissemination and implementation strategy. The methods used to undertake a 'diagnostic analysis' are likely to vary according to prevailing circumstances but they involve a combination of routine data analysis, specific surveys and interviews and informed judgement. From material presented in this bulletin such an analysis might include:

1. identification of all groups involved in, affected by or influencing the proposed change(s) in practice
2. assessment of the characteristics of the proposed change that might influence its adoption
3. assessment of the preparedness of the health professionals to change and other potentially relevant internal factors within the target group
4. identification of potential external barriers to change
5. identification of likely enabling factors, including resources and skills.

Once completed the results of the 'diagnostic analysis' can be used to inform the design and content of the dissemination/implementation strategy. The choice of appropriate dissemination and implementation interventions should also be guided by knowledge of relevant research. Once chosen, dissemination and implementation interventions should be fully co-ordinated.

Dissemination activities by themselves are unlikely to lead to changes in behaviour. However, this should not be taken to mean that raising awareness of the messages underpinning proposed changes is unimportant. Whilst the relationship between knowledge and behaviour is rarely linear, awareness of 'the message' still plays an important part in the process.

Behaviour change is complex and, whilst dissemination and implementation strategies may draw upon interventions that have been evaluated in empirical research

(e.g. reminders, educational outreach), other more diffuse interventions which have yet to be evaluated may also be necessary. Successful strategies are likely to be broad-based and multi-faceted. They are also likely to have significant costs attached to them and will need to be adequately resourced. In the course of changing behaviour, a wide range of people may be involved, including health professionals, managers, policy makers and the public. The roles of various participants should be identified and steps taken to ensure that appropriate training is provided. Successful change is unlikely to occur unless people with necessary skills and knowledge exist to lead and apply all components of dissemination and implementation strategies.

Finally, any systematic approach to changing behaviour should include plans to monitor and evaluate the degree to which the proposed change is achieved, together with methods to maintain and reinforce any change.

# F. Further research

Whilst there has been an increased interest in research into promoting behavioural change among health professionals, considerable gaps in knowledge still exist. With respect to dissemination there is uncertainty about the relative effectiveness of different formats and media in improving the knowledge of health professionals. The complex relationship between knowledge, beliefs, attitudes and actual behaviour change also remains unclear. Future research into effective dissemination should seek to ensure that activities are assessed against appropriate outcomes, for example knowledge, beliefs and attitudes. Since research has indicated that dissemination activities are relatively ineffective in directly changing clinical practice, it would seem more beneficial to assess dissemination against outcomes that such activity might realistically be expected to influence.

With respect to implementation, the ultimate aim is to develop an empirical basis for choosing interventions in the face of specific barriers and circumstances. This will require a mixture of both qualitative and quantitative methods in order to assess not just the effectiveness of interventions but gain understanding of the process of professional behaviour change. In order to tailor dissemination/implementation activities to particular sets of circumstances a range of issues need to be addressed including the development of valid and reliable methods of identifying barriers to change and the cost-effectiveness of different interventions used.

Finally, greater insight is needed into the personal skills and attributes that influence the effectiveness of individuals involved in changing behaviour. Such knowledge will be necessary to enhance the training of NHS staff with a responsibility for promoting clinical effectiveness within their organisation.

## Appendix A – Research methods for Section B

To summarise the findings of published systematic reviews of professional behaviour change interventions.

Inclusion criteria – *Type of study*: systematic reviews (defined as reviews that report explicit selection criteria). *Types of participants*: health professionals. *Types of intervention*: any interventions to improve professional performance. *Types of outcome*: measures of professional performance or patient outcomes.

Reviews not reporting explicit selection criteria, which focused on the methodological quality of published studies, published bibliographies, bibliographic databases and registers of projects on dissemination activities were excluded. Where systematic reviews had been updated by the same group of authors, only the most recently published review was considered.

Search strategies – Electronic databases were searched including Medline, Healthstar, Cochrane Library including DARE (the full search strategy is available from the editorial base of EPOC). In addition, the list of included reviews was circulated to the EPOC electronic discussion list to identify any omitted potentially relevant reviews.

Methods of overview – Two reviewers independently assessed the quality of identified reviews and extracted data about the focus, inclusion criteria, results and conclusions of the review. A previously validated checklist (including nine criteria scored as *done, partially done* and *not done* and one summary criterion scored on a 1–7 scale) was used to assess quality.[82,83] Disagreements between reviewers were resolved by consensus. If one of the authors of this overview was involved in an included review, they did not participate in the appraisal of that review. Data were reported in three evidence tables (Tables 1–3) and analysed qualitatively to identify broad conclusions across the included reviews.

## Appendix B – Glossary of terms:

Educational outreach – using a trained person to meet with health professionals in their practice settings and provide information with the intent of changing their performance.

Local opinion leaders – usually people nominated by their colleagues as educationally influential.

Multi-faceted interventions – involving two or more interventions targeting different barriers to change.

Patient-mediated interventions – attempts to change the performance of health professionals by giving specific information to patients.

PRECEDE-PROCEED: Predisposing, reinforcing and enabling, causes in educational diagnosis and evaluation. Policy, regulatory and organisational constructs in educational and environmental developments.

Reminders – any intervention, manual or computerised, that prompts the health professional to perform a patient-specific clinical action.

# References


1. Department of Health. *The new NHS: modern dependable.* London: Stationery Office, 1997.
2. Scottish Office. *Designed to care: renewing the NHS in Scotland.* Edinburgh: Stationery Office, 1997.
3. Welsh Office. *NHS Wales: putting patients first.* London: Stationery Office, 1998.
4. Secretary of State for Health. *A first class service: quality in the new NHS.* London: Stationery Office, 1997.
5. Scally G, Donaldson L. Clinical governance and the drive for quality improvement in the new NHS in England. *BMJ* 1998;317:61-5.
6. Maxwell R. Perspectives in NHS Management. *BMJ* 1984;288:1470-2.
7. NHS Centre for Reviews and Dissemination. *Effective Health Care.*
8. The Cochrane Library. Update Software, Oxford, 1999.
9. National Cancer Guidance Group. *Guidance on commissioning cancer services (sites covered to date: Breast (1996); Colorectal (1997); Lung (1998), and Gynaecological (forthcoming)).* London: NHS Executive: Department of Health.
10. Lomas J. Retailing research: increasing the role of evidence in clinical services for child birth. *Milbank Q* 1993;71:439-75.
11. Anderson GM, Lexchin J. Strategies for improving prescribing practice. *CMAJ* 1996;154:1013-7.
12. Austin SM, Balas EA, Mitchell JA, et al. Effect of physician reminders on preventative care: meta-analysis of randomised clinical trials. *Proc Annu Symp Comput Appl Med Care* 1994:121-4.

13. Balas EA, Boren SA, Brown GD, et al. Effect of physician profiling on utilisation. *J Gen Intern Med* 1996;11:584-90.
14. Balas EA, Austin SM, Mitchell J, et al. The clinical value of computerised information services: a review of 98 randomized clinical trials. *Arch Fam Med* 1996;5:271-8.
15. Beaudry JS. The effectiveness of continuing medical education: a quantitative synthesis. *J Contin Educ Health Prof* 1989;9:285-307.
16. Beilby J, Silagy CA. Trials of providing costing information to general practitioners: a systematic review. *Med J Aust* 1997;167:89-92.
17. Bertram DA, Brooks-Bertram PA. The evaluation of continuing medical education: a literature review. *Health Education Monographs* 1977;5:330-62.
18. Buntinx F, Winkens R, Grol R, et al. Influencing diagnostic and preventative performance in ambulatory care by feedback and reminders. A review. *Fam Pract* 1993;10:219-28.
19. Davis DA, Thomson MA, Oxman AD, et al. Changing physician performance: a systematic review of the effect of continuing medical education strategies. *JAMA* 1995;274:700-5.
20. Davis DA, Taylor-Vaisey A. Translating guidelines into practice. A systematic review of theoretic concepts, practical experience and research evidence in the adoption of clinical practice guidelines. *CMAJ* 1997;157:408-16.
21. Effective Health Care. *Implementing clinical guidelines: can guidelines be used to improve clinical practice?* Leeds: University of Leeds, 1994.
22. Freemantle N, Harvey EL, Wolf F, Grimshaw JM, Grilli R, Bero LA. Printed educational materials to improve the behaviour of health care professionals and patient outcomes (Cochrane Review). In: *The Cochrane Library,* Issue 1, 1999. Oxford: Update Software.
23. Gill PS, Makela M, Vermeulen KM, et al. *Changing doctor prescribing behaviour: a review,* 1998.
24. Grilli R, Lomas J. Evaluating the message: the relationship between compliance rate and the subject of practice guideline. *Med Care* 1994;32:202-13.
25. Grilli R, Freemantle N, Minozzi S, Domenighetti G, Finer D. Impact of mass media on health services utilisation (Cochrane Review). In: *The Cochrane Library,* Issue 1, 1999. Oxford: Update Software.
26. Grimshaw JM. Evaluation of four quality assurance initiatives to improve out-patient referrals from general practice to hospital [PhD Thesis]. University of Aberdeen, 1998.
27. Gurwitz JH, Soumerai SB, Avorn J. Improving medication prescribing and utilisation in the nursing home. *J Am Geriatr Soc* 1990;38:542-52.
28. Gyorkos TW, Tannenbaum TN, Abrahamowicz M, et al. Evaluation of the effectiveness of immunisation delivery methods. *Can J Public Health* 1994;85:S14-30.
29. Hanson LC, Tulsky JA, Danis M. Can clinical interventions change care at the end of life? *Ann Intern Med* 1997;126:381-8.
30. Harvey EL, Glenny A, Kirk SFL, Summerbell CD. Improving health professionals' management and the organisation of care for overweight and obese people (Cochrane Review). In: *The Cochrane Library,* Issue 1, 1999. Oxford: Update Software.
31. Hulscher M. Implementing prevention in general practice: a study on cardiovascular disease [PhD Thesis]. University of Nijmegen, 1998.
32. Hunt DL, Haynes RB, Hanna SE, et al. Effects of computer-based clinical decision support systems on physician performance and patient outcomes. A systematic review. *JAMA* 1998;280:1339-46.
33. Lancaster T, Silagy C, Fowler G, Spiers I. Training health professionals in smoking cessation (Cochrane Review). In: *The Cochrane Library,* Issue 1, 1999. Oxford: Update Software.
34. Lloyd JS, Abrahamson S. Effectiveness of continuing medical education: a review of the evidence. *Eval Health Prof* 1979;2:251-80.
35. Lomas J, Haynes. A taxonomy and critical review of tested strategies of the application of clinical practice recommendations: from "official" to "individual" clinical policy. *Am J Prev Med* 1988;2:77-94.
36. Lomas J. Words without action? The production, dissemination, and impact of consensus recommendations. *Annu Rev Public Health* 1991;12:41-65.
37. Mandelblatt J, Kanetsky PA. Effectiveness of interventions to enhance physician screening for breast cancer. *J Fam Pract* 1995;40:162-71.
38. Mugford M, Bandfield P, O'Hanolon M. Effects of feedback of information on clinical practice: a review. *BMJ* 1991;303:398-402.
39. Oxman AD, Thomson MA, Davis DA, et al. No magic bullets: a systematic review of 102 trials of interventions to improve professional practice. *CMAJ* 1995;153:1423-31.
40. Shea S, DuMouchel W, Bahamonde L. A meta-analysis of 16 randomised controlled trials to evaluate computer-based clinical reminder systems for preventative care in the ambulatory setting. *J Am Med Inform Assoc* 1996;3:399-409.
41. Shortell SM, Bennett CL, Byck GR. Assessing the impact of continuous quality improvement on clinical practice: what will it take to accelerate progress. *Milbank Q* 1998;76:1-37.
42. Snell JL, Buck EL. Increasing cancer screening: a meta analysis. *Prev Med* 1996;25:702-7.
43. Solomon DH, Hashimoto H, Daltroy L, et al. Techniques to improve physicians uses of diagnostic tests. *JAMA* 1998;280:2020-7.
44. Soumerai SB, McLaughlin TJ, Avorn J. Improving drug prescribing in primary care: a critical analysis of the experimental literature. *Milbank Q* 1989;67:268-317.
45. Sullivan F, Mitchell E. Has general practitioner computing made a difference to patient care? A systematic review of published reports. *BMJ* 1995;311:848-52.
46. Thomas L, Cullum N, McColl E, Rousseau N, Soutter J, Steen N. Clinical guidelines in nursing, midwifery and other professions allied to medicine (Cochrane Review). In: *The Cochrane Library,* Issue 1, 1999. Oxford: Update Software.
47. Thomson MA, Oxman AD, Davis DA, Haynes RB, Freemantle N, Harvey EL. Outreach visits to improve health professional practice and health care outcomes (Cochrane Review). In: *The Cochrane Library,* Issue 1, 1999. Oxford: Update Software.
48. Thomson MA, Oxman AD, Davis DA, Haynes RB, Freemantle N, Harvey EL. Audit and feedback to improve health professional practice and health care outcomes (Parts I & II) (Cochrane Review). In: *The Cochrane Library,* Issue 1, 1999. Oxford: Update Software.
49. Thomson MA, Oxman AD, Haynes RB, Davis DA, Freemantle N, Harvey EL. Local opinion leaders to improve health professional practice and health care outcomes (Cochrane Review). In: *The Cochrane Library,* Issue 1, 1999. Oxford: Update Software.
50. Waddell DL. The effects of continuing education on nursing practice: a meta-analysis. *J Contin Educ Nurs* 1991;22:113-8.
51. Wensing M, Van der Weijden T, R G. Implementing guidelines and innovations in general practice: which interventions are effective. *Br J Gen Pract* 1998;48:991-7.
52. Worrall G, Chaulk P, Freake D. The effects of clinical practice guidelines on patient outcomes in primary care: a systematic review. *CMAJ* 1997;156:1705-12.
53. Yano EM, Fink A, Hirsch SH, et al. Helping practices reach primary care goals. Lessons from the literature. *Arch Intern Med* 1995;155:1146-56.
54. Zwarenstein M, Bryant W, Bailie R, Sibthorpe B. Interventions to change collaboration between nurses and doctors (Cochrane Review). In: *The Cochrane Library,* Issue 1, 1999. Oxford: Update Software.
55. Bero LA, Grilli R, Grimshaw JM, et al. Closing the gap between research and practice: an overview of systematic reviews of interventions to promote the implementation of research findings. *BMJ* 1998;317:465-8.
56. National Research Register. Oxford: Update Software, 1999.
57. Skinner BF. *Science and human behaviour.* New York: Macmillan,1953.
58. Conner M, Norman P. The role of social cognition in health behaviours. In: Conner M, Norman P, editors. *Predicting health behaviour.* Buckingham: Open University Press, 1996.
59. Marteau TM, Sowden AJ, Armstrong D. Implementing research findings into practice: beyond the information deficit model. In: Haines A, Donald A, editors. *Getting research findings into practice.* London: BMJ Books, 1998.
60. Prochaska JO, DiClemente CC. Stages and processes of self-change in smoking: toward an integrative model of change. *J Consult Clin Psychol* 1983;51:390-5.
61. Schwarzer R, Fuchs R. Self-efficacy and health behaviours. In: Conner M, Norman P, editors. *Predicting health behaviour.* Buckingham: Open University Press, 1996.
62. Weinstein ND. The precaution adoption process. *Health Psychol* 1988;7:355-86.
63. Schwartz LM, Woloshin S, Welch HG. Trends in diagnostic testing following a national guidelien for evaluation of dyspepsia. *Arch Intern Med* 1996:156;873-5.
64. Firth-Cozens J. Health promotion: changing behaviour towards evidence-based health care. *Qual Health Care* 1997;6:205-11.
65. Rogers E. *Diffusion of Innovations.* New York: Free Press, 1983.
66. Lewin K. Field theory and learning. In: Cartwright D, editor. *Field theory in social science: select theoretical papers.* New York: Harper Collins, 1951.
67. Pettigrew AM, Ferlie E, McKee L. *Shaping strategic change.* London: Sage, 1992.
68. Garside P. Organisational context for quality: lessons from the fields of organisational development and change management. *Qual Health Care* 1998;7:S8-S15.
69. Kotler P. Social marketing of health behaviour. In: Frederiksen LW, Solomon LJ, Brehony KA, editors. *Marketing health behaviour: principles, techniques and applications.* New York: Plenum Press, 1984.
70. Green LW, Kreuter MW, Deeds SG, et al. *Health education planning: a diagnostic approach.* California: Mayfield Publishing Company, 1980.
71. Green LW, Kreuter M. *Health promotion planning: an educational and environmental approach.* London: Mayfield Publishing Company, 1991.
72. Kanter RM. *The change masters,* Simon & Schuster, 1983.
73. NHS Executive NY. *Information needs assessment report.* Durham: NHS Executive, 1996.
74. Wouters WM, Timmermans DR, Kievit J. Financial limits to care; a survey among physicians. *Ned Tijdschr Geneeskd* 1997;141:206-10.
75. Col NF, Eckman MH, Karas RH, et al. Patient-specific decisions about hormone replacement therapy in postmenopausal women. *JAMA* 1997;277:1140-47.
76. Borrill CS, Watt TD, West MA. *Mental health of the workforce in NHS trusts. Interim report to the National Health and Safety Executive, Northern and Yorkshire Region Research and Development Division.* Durham: NHS Executive, 1996.
77. Sutton S. The past predicts the future: interpreting behaviour-behaviour relationships in social psychological models of health behaviour. In: Rutter DR, Quine L, editors. *Social psychology and health: European perspectives.* Aldershot: Avebury, 1994.
78. Eve R, Golton I, Hodgkin P, et al. *Learning from FACTS: lessons from the framework for appropriate care throughout Sheffield (FACTS) project.* Sheffield: University of Sheffield, 1997.
79. Donald A. *The frontline evidence based medicine project: final report.* London: NHSE North Thames Regional Office, 1998.
80. Dunning M, Abi-Aad G, Gilbert D, et al. *Experience, evidence and everyday practice.* London: King's Fund Publishing, In press.
81. Stocking B. Promoting change in clinical care. *Qual Health Care* 1992;1:56-60`.
82. Oxman AD, Guyatt GH. The science of reviewing research. *Ann N Y Acad Sci* 1993;703:123-31.
83. Oxman AD. Checklists for review articles. *BMJ* 1994;309:648-51.

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