

Implementing guidelines and innovations in general practice: which interventions are effective?

MICHEL WENSING

TRUDY VAN DER WEIJDEN

RICHARD GROL

SUMMARY

Background. It is crucial that research findings are implemented in general practice if high-quality care is to be achieved. Multifaceted interventions are usually assumed to be more effective than single interventions, but this hypothesis has yet to be tested for general practice care. This review evaluates the effectiveness of interventions in influencing the implementation of guidelines and adoption of innovations in general practice.

A systematic literature study was carried out using MEDLINE searches for the period from January 1980 until June 1994, and 21 medical journals were searched manually. Randomized controlled trials and controlled before and after studies (with pre- and post-intervention measurements in all groups) were selected for the analysis. Clinical area, interventions used, methodological characteristics and effects on clinical behaviour were noted independently by two researchers using a standardized scoring form.

Of 143 studies found, 61 were selected for the analysis, covering 86 intervention groups that could be compared with a control group without the intervention. Information transfer alone was effective in two out of 18 groups, whereas combinations of information transfer and learning through social influence or management support were effective in four out of eight and three out of seven groups respectively. Information linked to performance was effective in 10 out of 15 groups, but the combination of information transfer and information linked to performance was effective in only three out of 20 groups.

Some, but not all, multifaceted interventions are effective in inducing change in general practice. Social influence and management support can improve the effectiveness of information transfer, but information linked to performance does not necessarily do so. The variation in the effectiveness of interventions needs further analysis.

Keywords: guidelines; implementation strategies.

Introduction

SINCE 1990, at least 19 reviews of change implementation in clinical practice have been published.¹⁻¹⁹ This topic is clearly important because the implementation of research findings and guidelines for good practice is essential if high-quality health

care is to be achieved.²⁰ Although the reviews available provide insight into the effectiveness of different interventions, it is not clear to what extent the results are relevant to general practice. This knowledge is necessary because general practice differs from other types of health care in its focus and structure,²¹ although there are also variations between countries in this respect.

Nevertheless, the particular characteristics and specific problems found in general practice can influence the implementation of guidelines and innovations. For instance, the wide variety of symptoms and diseases seen in general practice (as a result of the general accessibility of primary health care) inhibits a strong focus on one particular guideline or innovation. General practitioners (GPs) often allow themselves to be guided by the symptoms and problems presented rather than actively searching for diseases, so the patients' influence on the clinical process can be strong. The general practice is a smaller health care organization than the hospital, and this factor has an effect on the professional network of, and communication between, clinicians.

However, what has become clear from the reviews available is that not all interventions to induce change achieve the intended results. Change is a stepwise process, in which several barriers have to be removed.¹⁰ For change to be successful, it is necessary for the target group of clinicians to have the knowledge, skills, and motivation needed to adopt a practice. In addition, it is important that practical and organizational conditions make the new behaviour possible and that colleagues, patients, and others accept it. Interventions to induce change should focus on the removal of these barriers, support the process of change, and consolidate the new practice.

The important question is which interventions are effective and which are not. Several reviews suggest that combinations of interventions are more effective than single ones,^{4,5,10,19} but this hypothesis needs further testing, particularly in general practice. What are the effects of different single and multifaceted interventions to implement guidelines or innovations in general practice? To answer this research question, we carried out a systematic literature review, first comparing different single interventions with no intervention, then comparing different multifaceted interventions with no intervention. The evidence was assessed according to the methodological quality, distinguishing between randomized controlled trials and controlled before and after studies.

Method

For this review, literature searches performed for an earlier review¹⁸ were updated and extended to the period from January 1980 to June 1994. To collect studies, three strategies were applied: a MEDLINE search; manual searches in 21 scientific journals; and a check of references in studies. Studies were included if one or more interventions were used to improve professional behaviour in general practice and if the effect on actual behaviour was measured.

For each study, one author (MW) noted which interventions were applied, which type of professional behaviour was studied, and which research design was applied. For further analysis, a

M Wensing, PhD, research fellow; T van der Weijden, MD, research fellow; and R Grol, PhD, professor of general practice, Centre for Quality of Care Research (WOK), University of Nijmegen and University of Maastricht, The Netherlands.
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selection of 'best evidence' studies was made, including randomized controlled trials and controlled before and after studies. For each of the selected studies, two authors (MW and TW) independently noted the interventions used and the characteristics of the studies (see Table 2) on a standardized scoring form. Differences in scoring were discussed, and full agreement was reached. Descriptive overviews of the studies were made using the scoring forms.

Some studies included more than one intervention group or condition that was compared with a control group or condition. Thus, the unit of analysis in part of the analysis was not at the level of the studies, but at the level of the intervention groups or conditions. For the analysis of the effectiveness of intervention, groups or conditions were selected that could be compared with a control group (no or minor intervention). For each of these groups, the change between pre- and post-intervention measurements was established. If more than one outcome measure was used, the range of changes as well as the range of pre-intervention measurements was noted. In randomized controlled trials including no pre-intervention measurements, the post-intervention differences between groups after intervention was noted. In addition, the significance of the differences was noted (considering *P* values less than 0.05 as significant).

Given the wide range of outcome measures, it was impossible to find a standardized outcome measure that could be compared across all studies and would allow statistical pooling. In order to summarize the results for each type of intervention, the intervention groups were divided into three categories: effective (better results compared with control group/condition for most or all outcome measures); partly effective (better results for some outcome measures but not for all of them); and ineffective (no better results for most or all outcome measures). However, the results of this analysis of aggregate data should be treated cautiously.²²

Results

Descriptive overview of the studies

In total, 143 studies were included.²³⁻¹⁶⁶ Of these, 39 (27%) studies were randomized controlled trials²³⁻⁶¹ and 22 (15%) were

controlled before and after studies.⁶²⁻⁸³ These 61 'best evidence' studies were selected for the analysis of the effectiveness of the interventions. The remaining studies⁸⁴⁻¹⁶⁶ were non-randomized controlled trials that did not perform pre-intervention measurement in intervention or control groups (13 studies, 9%) or which did not include a control group at all (67 studies, 47%). Most of the 143 studies focused on prevention (48, 34%). Of the other studies, 24 (17%) focused on improving diagnostic performance, 29 (20%) on therapy, 32 (22%) on combinations of these clinical areas, and 10 (7%) on other aspects of professional behaviour (such as recording routines or consultation skills).

Table 1 shows which interventions were studied in general practice. The interventions most frequently studied were the dissemination of educational materials (38%), small group education (38%), audit and feedback (32%), and reminders (27%). Interventions that were very rarely studied were financial incentives (5%), rules and obligations (1%), and patient-mediated interventions (1-6%). The proportions of the different types of interventions studied were similar among the 'best evidence' studies and among all studies taken together. Table 1 also shows that many interventions were applied in different clinical areas, but that reminders were most often used for influencing prevention and that peer review groups were often used for changing therapeutic routines.

The 61 'best evidence' studies were from the United States (US) (*n* = 33), United Kingdom (UK) (*n* = 10), Canada (*n* = 6), and several other countries (*n* = 12). Table 2 provides an overview of the methodological characteristics of these 61 studies. The duration of the intervention varied widely; the median duration was 6 months. The number of physicians in each study varied from six to 642; the median was 72 physicians. Most studies included only experienced professionals working in different practices. In half of the studies, subgroup or multivariate analyses were performed to determine the influence of physician, patient, or organization characteristics. To measure the effect of the interventions, different outcome measures were used. In only eight studies (13%) were patient outcomes also measured. In more than half of the studies, the post-intervention measurement was simultaneous (i.e. was carried out during the intervention

Table 1. Interventions in all (*n* = 143) and in 'best evidence' studies (*n* = 61) (absolute numbers, percentages in brackets).

	All studies (<i>n</i> = 143)	'Best evidence' studies (<i>n</i> = 61)					
		Total	Diagnostics (<i>n</i> = 13)	Therapy (<i>n</i> = 14)	Prevention (<i>n</i> = 16)	Combination (<i>n</i> = 16)	Other (<i>n</i> = 2)
Information transfer							
Reading materials	54 (38)	28 (46)	8 (13)	4 (7)	7 (12)	9 (15)	-
Group education	54 (38)	22 (36)	3 (5)	5 (8)	7 (12)	6 (10)	1 (2)
Patient education	6 (4)	3 (5)	-	1 (2)	2 (3)	-	-
Information linked to performance							
Feedback	46 (32)	22 (36)	5 (8)	4 (7)	5 (8)	7 (12)	1 (2)
Reminders	38 (27)	12 (20)	1 (2)	1 (2)	6 (10)	4 (7)	-
Patient reminders	8 (6)	2 (3)	-	-	2 (3)	-	-
Learning through social influence							
Individual instruction	23 (16)	14 (23)	3 (5)	4 (7)	5 (8)	2 (3)	-
Peer review groups	16 (11)	9 (15)	1 (2)	4 (7)	-	2 (3)	2 (3)
Patient reports	2 (2)	-	-	-	-	-	-
Management support							
Resources	30 (21)	12 (20)	2 (3)	3 (5)	5 (8)	2 (3)	-
Incentives	7 (5)	3 (5)	-	1 (2)	-	1 (2)	1 (2)
Rules, obligations	1 (1)	-	-	-	-	-	-
Patient incentives	1 (1)	-	-	-	-	-	-

Table 2. Characteristics of the 'best evidence' studies ($n = 61$) (absolute numbers, percentages in brackets where not indicated otherwise).

Characteristic	Categories	Number and percentage of studies (if not indicated otherwise)
Duration of the intervention	Mean/median (min-max)	38/26 weeks (1-260) 7 (14%) = 1 week
Number of physicians in the study	Mean/median (min-max)	124/72 physicians (6-642)
Type of physicians	Only experienced physicians Only physicians in vocational training Experienced and in training	42 (69) 8 (13) 11 (18)
Intervention group	From same practice/organization From different practices/organizations	12 (20) 49 (80)
Controlled analysis	Physician characteristics Patient characteristics Organization characteristics Several characteristics None	15 (25) 9 (15) 2 (3) 5 (8) 30 (49)
Outcome measures for professional behaviour	Percentage of patients 'reached' Compliance with protocol/index Medical production/costs Specific activities	11 (18) 20 (33) 20 (33) 20 (33)
Other outcome measures included	Physician knowledge/skills Patient outcomes	8 (13) 8 (13)
Moment of first post-intervention measurement	During/directly after intervention Longer after intervention (follow-up) Mean number of months Unknown	35 (57) 21 (36) 2.4 months 5 (8)
Follow-up measurements	Yes	11 (18)

period) or was performed immediately after the intervention period. In only 11 studies (18%) were follow-up measurements carried out.

Single interventions versus no intervention

The 61 'best evidence' studies (randomized controlled trials or controlled before and after studies) included 153 groups or conditions, of which 86 received an intervention aimed at changing professional behaviour that could be compared with a control group or condition that received no intervention. (Details of the 61 'best evidence' studies can be obtained from the authors.) Table 3 summarizes the results.

The effectiveness of information transfer varied. In eight out of 17 groups, the intervention was effective or partly effective, whereas no effects were found in the remaining nine groups. The two interventions that were effective comprised a combination of different interventions for information transfer, including small-group continuing medical education (CME), educational materials, and patient education in one of the studies.⁷⁰ Many ineffective interventions involved the dissemination of educational materials or the provision of a short educational programme.

The provision of information linked to performance proved to be effective in 10 out of 15 groups and partly effective in four other groups. In addition, most of these interventions were studied in randomized controlled trials. Many of these studies focused on preventive screening or on test ordering for diagnosis or monitoring.

Most learning through social influence consisted of individual instruction. This method proved to be effective in two groups and partly effective in three other groups. The use of peer review

groups was not found to be effective in two groups.

Well-designed trials of management support were rarely found. Three such trials that were found examined fundholding in UK practices, and the interventions proved to be effective or partly effective.

Multifaceted interventions versus no intervention

The combination of information transfer and information linked to performance proved to be effective or partly effective in eight intervention groups but ineffective in 12 other groups. Both effective and ineffective interventions were studied in randomized controlled trials in a little more than half of the cases. All effective interventions focused on prevention or test ordering, whereas some of the ineffective interventions focused on other clinical areas, such as establishing psychiatric diagnoses, prescribing, or a combination of different aspects of ambulatory care.

The combination of information transfer and learning through social influence was effective in four groups and partly effective in three other groups. In most of these cases individual instruction was included. In one group, including peer review groups, no effects were found.⁸⁰ The combination of information transfer and management support proved to be effective in three groups and partly effective in three other groups. In one group, no effects were found. The management interventions in the groups that proved to be effective varied from recruiting a prevention nurse to providing services at low costs.

The combination of information linked to performance and learning through social influence was used in three groups, one of which reported positive effects on professional routines. In all

Table 3. Summary of effectiveness ($n = 86$ groups from $n = 61$ 'best evidence' studies).

	Effective	Partly effective	Not effective
Information transfer	2	6	9
Information linked to performance	10	4	1
Learning through social influence	2	3	2
Management support	1	2	–
Information transfer and information linked to performance	4	4	12
Information transfer and learning through social influence	4	3	1
Information transfer and management support	3	3	1
Information linked to performance and learning through social influence	1	2	–
Three or four different interventions	5	–	1

groups, a combination of peer review groups and feedback was used. Combinations of information linked to performance and management support were not found.

Finally, most interventions consisting of a combination of three or more interventions proved to be effective. All interventions included information transfer, supplemented with a variety of other types of interventions.

Discussion

The hypothesis that multifaceted interventions are more effective than single interventions was partly supported by the results of the analyses. Single interventions using information transfer were less effective than combinations of information transfer and learning through social influence or management support. Combinations of three or four different interventions were effective in most situations. These findings support our hypothesis. The results suggest that transfer of knowledge and skills is necessary but, in many situations, insufficient to achieve change in practice routines. Other barriers that may prohibit change include an inadequate practice organization, lack of time, negative financial incentives, negative attitudes in colleagues, or resistance from patients. Social influence and management support may help to remove these barriers.

On the other hand, single interventions using feedback were more often effective than combinations of feedback and information transfer. This result contradicts the findings of Davis and colleagues,⁴ who found that interventions using 'predisposing' (information transfer) and 'reinforcing' factors (feedback) had positive effects on physician performance in most studies.⁵ This result may be explained by the fact that the effectiveness of feedback is dependent on the clinical area. Feedback was particularly effective in influencing prevention and test ordering, where conditions for successful feedback may be better.⁵ For instance, physicians may recognize more easily that their performance in these areas needs improvement. A different explanation for this finding could be that different feedback was used in single and multifaceted interventions. Grimshaw and Russell⁷ suggested that patient-specific feedback and reminders are probably more effective than general feedback and reminders. Single feedback interventions often consisted of decision support systems that provided patient-specific reminders or feedback at the time of the consultation. The multifaceted interventions often included general feedback or reminders.

The specific characteristics of general practice outlined in the Introduction may influence the effectiveness of interventions. For example, many GPs work in small practices with relatively little contact with colleagues outside their practice. Therefore, interventions using well-respected colleagues or groups of colleagues for the dissemination and implementation of guidelines

and innovations may be particularly effective in general practice. Patient-mediated interventions, such as the use of patient reports or patient feedback to induce changes, are also promising in general practice settings. It is usually the patient who makes the first contact with a clinician, which gives more opportunities for influencing the delivery of care. However, insight into the effectiveness of using social influence from colleagues or patients is limited. Management support can offer a valuable contribution to information transfer. Many GPs work in small practices, without extensive support staff, so practical help and financial support can be useful in achieving change. However, the use of incentives, regulations, or contracts has been studied only rarely.

Some limitations of the review should be mentioned. Literature searching was extensive, but not exhaustive, so relevant studies may be lacking. Most studies were from the US, the UK, or Canada, so the results may not be generalizable to other countries. The classification of interventions as single or multifaceted was sometimes problematic, because some concrete interventions may have different components. For instance, individual instruction may have elements of information transfer, feedback, and social influence. A problem was that interventions for the implementation of guidelines or innovations were often poorly described. In order to avoid subjective interpretations, we used a standardized list of concrete interventions, developed in earlier work,^{10,19} which refers to interventions described in publications.

The methodological quality of studies in this area is problematic. Only 61 out of 143 studies were considered to be of acceptable quality. A specific problem is the unit of analysis, which should be the clinician, practice, or clinic in many of these studies. However, the analysis was often at the level of the patients, not taking into account that patients are clustered within practices. This may lead to bias in the results, in particular reliability intervals that are too narrow. A limitation of a number of studies was that they measured clinical practice only during or directly after the intervention, although maintenance of new practice routines is often particularly difficult. Finally, many studies used several outcome measures, so it was often difficult to assess the effectiveness of the intervention. In addition, the outcome measures in the studies differed widely, so comparisons were difficult. Standardization of outcome measures in this research area is urgently needed.

It is important to analyse the resources needed for applying specific interventions, which include time and effort from clinicians and those who implement the guideline or innovation. For instance, provision of reading materials or group education requires relatively little effort to reach a large number of clinicians. This is an important advantage in general practice, as physicians often work in geographically scattered practices. This advantage has to be balanced against the effectiveness of these

strategies. Interventions combining more strategies may be more expensive but also more effective.

This review demonstrated that all interventions show considerable variation in their effectiveness. There are no 'magic bullets' to achieve change.¹⁴ Nevertheless, it can be concluded that the combination of information transfer and learning through social influence or management support can be effective, and so can reminders or feedback. Other interventions may also be effective, but most of them have been studied very infrequently. Information transfer is probably always needed at some point in the process of implementing change, but more interventions are usually needed to achieve real changes in the practice routines of clinicians.

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Address for correspondence

Dr M Wensing, Centre for Quality of Care Research, University of Nijmegen, PO Box 9101, 6500 HB Nijmegen, The Netherlands.