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DISSEMINATING PRACTICE GUIDELINES TO PHYSICIANS

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DISSEMINATING PRACTICE GUIDELINES TO PHYSICIANS

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Foreword

The document “Disseminating Practice Guidelines to Physicians” was produced as part of the project « Au cœur de la vie » designed by the National Public Health Institute of Quebec and the Public Health Directorate of Montréal.

« Au cœur de la vie » is the Quebec Heart Health Dissemination project targeting first line health professionals to increase health promotion and prevention efforts for cardiovascular health using evidence-based practice guidelines. It is funded by the Canadian Institutes for Health Research and the Quebec Ministry of Health and Social Services. It will be implemented in collaboration with the Public Health Directorates of Centre du Québec, Montréal, Outaouais and Quebec City as well as with participating CLSCs. It is also a partnership with the Association des CLSC/CHSLD du Québec and the Quebec Heart and Stroke Foundation.

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Objectives

> Disease can never be conquered, can never be quelled by emotion's wailful screaming or faith's cymballic prayer. It can only be conquered by the energy of humanity and the cunning in the mind of man. In the patience of a Curie, in the enlightenment of a Faraday, a Rutherford, a Pasteur, a Nightingale, and all other apostles of light and cleanliness, rather than of a woebegone godliness, we shall find final deliverance from plague, pestilence, and famine.
>
> **Sean O'Casey** (1884–1964), Irish dramatist. *Inishfallen, Fare Thee Well,* vol 1., title chapter (1949).

The overall objective of this study is to provide insight into clinical practice guidelines, their development and their implementation. The main focus was the conduction of a thorough literature review of all issues related to dissemination of clinical practice guidelines to physicians, and their eventual use. Implementation of interventions targeted to physicians is generally poor. Factors that result in this prevalent situation are reviewed, as are potentially constructive implementation strategies, models and theories. A summary of practical approaches for best practice guideline dissemination to physicians is provided.

Clinical Best-Practice Guidelines

What are Clinical Practice Guidelines?

An enormous amount of attention has been devoted to clinical guidelines in the past ten years, highlighted by the three monographs on guidelines produced by the Institute of Medicine in the United States between 1990 and 1995.[1-3] The definition of guidelines in these monographs has been widely accepted.[4] Clinical guidelines are defined as "systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances."[1-5] Their successful implementation should improve quality of care by decreasing inappropriate variation and expediting the application of effective advances to everyday practice.[5-7]

There has long been a clamour for an understanding of what works and what does not work to improve physician performance, as part of overall health-quality improvement.[8-12] In the past year, MEDLINE searches conducted by Smith[8] listed 4127 publications since 1966 under the publication category *practice guideline*, 3969 of which were published since 1989. Practice guidelines continue to be a burgeoning phenomenon, with over 2000 in the United States alone.[13,14] The need for guidelines and their effective dissemination arises from a generally perceived need to reduce the variability of medical care and to improve the efficiency, effectiveness, and appropriateness of care.

Origins of Clinical Practice Guidelines

Guideline development in general has accelerated markedly since the mid-1980s. Medical associations and governmental agencies in the United States, Canada, Australia, Great Britain and Italy, among others, have formed co-ordinating bodies to disseminate knowledge about guideline development, diffusion, dissemination, and implementation.[15-21] The movement to develop and disseminate clinical practice guidelines is rooted somewhat in the need to curtail or restrict practice variation in the United States health care system and is clearly linked to the evidence-based medicine movement.[19,22-26] The clinical practice guidelines movement has evolved form being haphazard and irregular, to being well integrated into the thinking of practising clinicians and professional clinical organisations.

In acknowledgement of the significant role that quality of care initiatives, especially clinical practice guidelines, may play in Canadian health care, the Canadian Medical Association established a Quality of Care Committee in 1990 and subsequently facilitated the development of the National Partnership for Quality in Health (NAPAQH) and 2 national consensus conferences on the clinical practice guidelines process.[19,27-29]

Development of Clinical Practice Guidelines

The production of clinical practice guidelines has several components, outlined in previous NAPAQH guideline conferences (Table 1).[19,30] First, a local group or, more often, a national body decides to develop guidelines in a clinical area in which there is a demonstrated need for such guidelines. Second, data are synthesised from research information and relevant practice patterns by searching the literature (including existing guidelines) and then weighing the strength of the evidence from the resulting trials or studies. Third, these data are further reviewed, appraised, distilled and collated as guidelines; that is, as recommendations about strategies for investigation and management.[19,30]

Table 1 – Steps in the Development of Clinical Practice Guidelines
Select clinical problem
Rank in order of priority
Define and refine the problem
Frame the clinical problem
Synthesise data
Search the literature
Develop consensus
Develop guidelines
Iterate and reiterate
Distribute to a sample of clinicians
Endorse guidelines (sponsoring body)
Disseminate guidelines
Encourage implementation of guidelines
Monitor and evaluate impact

(adapted from Davis et al., 1997)

Fourth, the sponsoring organisation and other interested organisations then endorse the guidelines. Fifth, clinical practice guidelines are disseminated, usually by traditional means such as mailing them to members or publishing them in recognised professional clinical journals. Sixth, various groups or individual practitioners may attempt to implement the guidelines more actively, through various, often multiple, strategies to assist, convince or otherwise influence physicians, patients and their caregivers. Finally, the guidelines are subjected to re-appraisal, evaluation and reiteration of the process.[19,30]

Each step in the development of clinical practice guidelines is crucial, and can involve potential pitfalls. The steps can be divided into two general groups. One conglomerate defines the scientific validity and reliability of the guidelines (**content**), while the other determines their use in decision making in clinical practice (**dissemination & implementation**). We shall see that both groups are of enormous importance, and can both be subject to obstacles.

Obstacles In Clinical Practice Guidelines

Guideline Content

The increase in the number of clinical guidelines produced and published in different countries has stimulated discussion on their value. How good are they? Are they based on the best scientific evidence available? How effective are they in normal clinical practice?[31]

Reports critiquing the validity of randomised trials, meta-analyses, diagnostic test studies, and economic evaluations have challenged researchers to improve the conduct of their studies and encouraged readers to interpret them carefully.[32-36] Does the clinical practice guideline industry measure up to these contemporary standards? Most guidelines outline their rational, specify the benefits and harms of health practices, and cite their evidentiary sources. However, guidelines much less often describe how the evidence was found, how its worth was judged, and how diverse sources of evidence were combined to formulate recommendations.[32,37]

Discerning guideline readers want to determine whether appropriate methods were used to adduce the research evidence and whether the research the evidence supports the recommendations. However, users cannot help but notice that guideline developers must often reckon with research that is modest in rigor, discordant or non-existent. Although most guidelines are an amalgam of evidence and expert opinion, methods of integrating knowledge and experience into guidelines, particularly when data are sparse, are neither as mature or as transparent as methods of incorporating research results. Several major medical organisations, including the American Medical Association (AMA), the Institute of Medicine (IOM), and the aforementioned Canadian Medical Association, have carefully formulated methodology for developing scientifically sound guidelines.[1,37-41] Table 2, on the following page, summarises these methodological standards.

In the 1999 study by Shaneyfelt et al. evaluating 279 clinical practice guidelines published from 1985 to 1997, only 7.5% described formal methods to combine evidence and expert opinion.[37] No guideline in the study met all 25 criteria summarised in Table 2. The study exposes the diversity of guideline methodologies, raises fundamental questions about whether the proposed "quality" criteria are necessary or equally appropriate for all guideline topics, and is a clarion call for greater transparency of guideline reporting and more rigorous peer review.[32]

Table 2 – Methodological Standards for Clinical Practice Guidelines
Guideline Development and Format
Purpose of the guideline is specified
Rationale and importance of the guideline are explained
The participants in the guideline development process and their areas of expertise are specified
Targeted health problem or technology is clearly defined
Targeted patient population is specified
Intended audience or users of the guideline are specified
The principal preventive, diagnostic or therapeutic options available to clinicians and patients are specified
The health outcomes are specified
The method by which the guideline underwent external review is specified
An expiration date or date of scheduled review is specified
Evidence Identification and Summary
Method of identifying scientific evidence is specified
Time period from which evidence is reviewed is specified
The evidence used is identified by citation and referenced
Method of data extraction is specified
Method for grading or classifying the scientific evidence is specified
Formal methods of combining evidence or expert opinion are used and described
Benefits and harms of specific health practices are specified
Benefits and harms are quantified
The effect on health care costs from specific health practices is specified
Costs are quantified
Formulation of Recommendations
The role of value judgments used by the guideline developers in making recommendations is discussed
The role of patient preferences is discussed
Recommendations are specific and apply to the stated goals of the guideline
Recommendations are graded according to the strength of the evidence
Flexibility in the recommendations is specified

(adapted from Shaneyfelt et al., 1999)

Further to the trials and tribulations of developing scientifically valid and reliable clinical practice guidelines rests the second chapter of the fate of clinical practice guidelines: **dissemination and implementation**. It is the objective of this paper to focus on this second chapter in the life of clinical practice guidelines.

Guideline Dissemination and Implementation

It is now widely understood that the findings of research do not flow simply and automatically from the literature into routine clinical practice. It is much less widely recognised how resistant this problem is to any simple solution. The traditional assumption of continuing professional development – that conscientious practitioners would keep themselves "up to date with the literature" – has long since become untenable.[42] Worse, evidence is accumulating that the many attempts to take the

literature to practitioners through mechanisms such as clinical guidelines may not be adequate either.[42]

Despite widespread dissemination of clinical practice guidelines, adherence to them during patient care is often low, making this a major research, clinical and public health concern.[43]This failure has frustrated clinicians interested in improving their own practices, policy makers, administrators, leaders in managed care, quality assurance, those interested in health-care policy, researchers in this area and organisations funding quality-improvement efforts.[8,44-46] The Agency for Health Care Research and Quality is rethinking its guideline development effort, becoming a clearinghouse rather than developer of guidelines, after a multi-million-dollar effort, 16 published evidence-based guidelines, and little evidence of influence on behaviour.[47] The Agency for Health Care Policy and Research (AHCPR) smoking cessation guideline published in 1996 has been widely disseminated, but the current level of physicians' implementation of it in real-world settings is less than optimal.[43] Since the dissemination of the AHCPR guideline, physician reports indicate that < 50% of smokers are counselled for cessation during office visits.[48]

Eddy[49] pointed out in 1982 that although medicine places a high priority on the scientific basis of practice, there is relatively little effort devoted to translating science into practice. The situation has not changed significantly since he made this point, despite rapid increases in the number of guidelines released. Recently, Bero et al. summarised the literature on the question of whether guidelines can lead to changes in the process and outcome of care.[50] This was done on behalf of the Cochrane Effective Practice and Organisation of Care Review Group through a systematic review of all good systematic reviews on the topic.[50,51] They concluded that "it is striking how little is known about the effectiveness and cost-effectiveness of interventions that aim to change the practice or delivery of health care."[50,51] Their review confirms that passive dissemination of information is generally ineffective by itself, no matter how important the issue, and that multifaceted interventions seem to be more effective than the single interventions that have received most of the attention of researchers thus far.

Despite the fact that 74% of Americans reported visiting a physician during the preceding year, they are receiving disease prevention services at levels much lower than recommended by national advisory groups such as the United States Preventive Services Task Force.[52] The National Cancer Institute (NCI) has published a set of Working Guidelines for Early Cancer Detection, yet millions of Americans fail to obtain screening in accordance with these recommendations. The gap between prevention guidelines and practice is considerable. Some of the discrepancy is attributable to patients' failure to seek preventive services and the reluctance of third-party payors to reimburse for preventive services. Another important factor is the failure of health professionals to follow recommended guidelines of preventive care. For example, the 1989 American Cancer Society (ACS) survey indicated that 78% of physicians reported following or exceeding the guidelines for breast physical exams, only 37% adhered to mammography guidelines, 55% for the Pap test, and 48% for digital rectal exams.[52] Moreover, physicians' self-reports may overestimate their degree of adherence with the guidelines.[52]

Williamson et al. found that one fifth to one half of primary care practitioners in the United States were not aware of or were not using new evidence about six common procedures.[53] Similarly, in a systematic review of randomised controlled trials, Lau et al. found overwhelming evidence for the use of thrombolytic therapy in patients who had suffered myocardial infarction; however, these findings were often not reflected in the recommendations by experts in textbooks or review articles, or in practice.[54-56] These and other studies reflect shortcomings in the management of health science information by physicians and other health care professionals as well as other constraints on the use of research evidence.[49,57,58]

Have these shortcomings in the use of research evidence and the practice of evidence-based medicine dissuaded physicians from utilising these techniques? What are general practitioners' perceptions on the route to evidence based medicine? In 1997-98, McColl et al. addressed these questions in a survey of 452 general practitioners in the Wessex region of south England. Respondents mainly welcomed evidence based medicine and agreed that its practice improves patient care.[59] The major perceived barrier to practising evidence based medicine was lack of personal time. Respondents thought the most appropriate way to move towards evidence based general practice was by using evidence based guidelines or proposals developed by colleagues. McColl et al. concluded that promoting and improving access to summaries of evidence, rather than teaching all general practitioners literature searching and critical appraisal, would be the more appropriate method of encouraging evidence based general practice. General practitioners who are skilled in accessing and interpreting evidence should be encouraged to develop local evidence based guidelines and advice.[59]

Physicians' fervour, generated by keen interest in evidence based practice, has not dissuaded them from using these techniques, but rather persuaded them to exploit the availability of research resources such as clinical best-practice guidelines. We have discussed the history behind the obstacles in clinical guideline dissemination and implementation, as well as provided several disappointing examples of such pitfalls. How can we improve the dissemination and implementation of such guidelines? What alternatives have been used in the past? Can we learn from barriers discovered in previous dissemination attempts? As a starting point from which to answer these complex questions, we will attempt to define the complex abstract coined by the term "dissemination".

Dissemination and Implementation

How do we Define "Dissemination"?

Several authors define dissemination as a communication of information so that clinicians can improve their knowledge or skills.[15,19] It is an active process, as opposed to diffusion, and it targets specific clinician groups.[15,19] Although this definition seems intuitively simple and appealing, its application is far from effortless. Using this definition, theories and models aimed at changing clinician behaviour for the purpose of improving their knowledge and skills, have evolved over several decades. A review of these theories and models provides important conceptual insight on the road to achieving our primary objective, and is a necessary stepping stone before examining the practical utility of the above definition.

Models and Theories of Physician Behaviour Change

Theories from social and behavioural science can provide an important contribution to the process of developing a conceptual framework for improving use of clinical practice guidelines and clinician performance.[60] A physician's background, ethics, and beliefs strongly mould his or her opinion and influence his or her practice behaviour.[8] It is a worthwhile sidebar to assess these features of physician behaviour.

Features of Physician Behaviour

Physicians are generally highly ethical and professional. Most have sworn to the Hippocratic Oath, and, as patients, they have expected and likely observed high standards of conduct from their own physicians. But several special features of a physician's background make practice behaviour complex.

First, physicians in practice generally have already had their behaviour changed significantly, and have been exposed to countless guidelines, both formal (written) and informal (verbal), as part of their medical school and residency training. In total, they have had an average of 20 years of prior education and training to influence their practice behaviour during medical school.[8] Later during residency training, program directors and department chiefs serve as thought leaders by design. During this time, residents may cite guidelines by speciality physician societies, in order to more strongly ingrain norms of practice behaviour. Also during residency training, a physician's individual mentors, supervisors and peers seek to mould his or her practice behaviour. Repetitive assessment of values, attitudes and skills forms a part of this training, and thus, while some physician behaviours are cognitive and not habitual, other are well-ingrained reflexes that resist distortion.[8,61,62]

Once physicians enter practice, there is an abundance of educational opportunities competing for their attention. Physicians' mailboxes are choked with fliers advertising continuing medical education courses, and written, audio and video courses to complete at home by mail or on the internet, in hopes that they capture physicians' limited time for interventions to improve their performance.[8] As human beings, physicians are motivated by multiple interests: the patient's, the society's, the payer's, and their own. Physicians must balance their multiple motivations with a professional ethos that demands accountability, competence, if not perfect performance, maintenance of requisite knowledge and skills, and willingness to admit ignorance and ask for help. Since a variety of forces set, and later influence, normative patterns of practice behaviour, researchers have been unable to formulate a unifying theory of physician behaviour change, applicable and successfully proven among physicians in practice.[8,63] However, psychologists, sociologists, educators and health professionals alike have offered several important theories and models that apply to efforts to improve physician performance.

Theories, Models, and Approaches

At least 20-25 systematic literature reviews on implementing guidelines, research findings, and changes in clinical practice have been published since 1991. Some have analysed over 100 different trials, and a variety of strategies.[64] The results are not straightforward. Several authors have underlined the importance of studying the theories underlying these different strategies.[64-68] In 1997, Richard Grol[64] published an overview of approaches and strategies in the British Medical Journal; this overview has become a cornerstone in the field of evidence in changing clinical practice over the past 3 years, and warrants review.

Richard Grol: Beliefs and Evidence in Changing Clinical Practice

Table 3, on the following page, summarises the approaches described by Grol.[64] Educational approaches consider that change is driven by an internal striving for professional competence; an intrinsic motivation to grow. Strategies based on these approaches focus on this intrinsic motivation and include promoting learning from experience, problem-based learning, small-group interactive learning and local consensus processes.[8,64,69,70] These strategies often aim to give the target group the feeling that they own the change process.

Epidemiological approaches see humans as rational beings who make decisions on the basis of balancing rational arguments. If doctors do not take recent research findings into account, then they probably lack convincing information on good care. The main strategies in this approach are to summarise the scientific literature and to develop evidence based guidelines. Credibility is important. The evidence should be sound, the guidelines valid, the procedure for developing the guidelines explicit and rigorous, and the organisation which sets the guidelines credible.[71] The value of these approaches is in their emphasis on a sound proposal for change, as well as in summarising the available evidence for busy practitioners.[72] In 1998, Grol et al. studied 61 general practitioners in the Netherlands to determine which attributes of clinical practice guidelines influence their use.[31] Controversial

recommendations were followed in 35% of clinical decisions, and non-controversial recommendations in 68% of decisions. Vague and non-specific recommendations were followed in 36% of decisions and clear recommendations in 67% of decisions. Finally, evidence based recommendations were used more than recommendations for practice that were not based on research evidence.[31] Although we have addressed issues of guideline content and dissemination separately in this paper, the influence of valid content on dissemination and implementation should not be ignored.

Table 3 – Theories, Models and Approaches to Changing Clinical Practice

	Approach	Theories	Focus	Interventions, Strategy
Focus on internal processes	Educational	Adult learning theories	Intrinsic motivation of professionals	Bottom up, local consensus development. Small group interactive learning. Problem-based learning.
	Epidemiol-ogic	Cognitive theories	Rational information seeking and decision making	Evidence-based guideline development. Disseminating research findings through courses, mailing, journals.
	Marketing	Health promotion, innovation, and social marketing theories	Attractive product adapted to needs of target audience	Needs assessment, adapting change proposal to local needs. Stepwise approach. Various channels for dissemination (mass media and personal).
Focus on external influences	Behavioral	Learning theory	Controlling performance by external stimuli	Audit and feedback. Reminder systems, monitoring. Economic incentives, sanctions.
	Social interaction	Social learning and innovation theories, social influence/power theories	Social influence of significant peers/role models	Peer review in local networks. Outreach visits (academic detailing), individual instruction. Opinion leaders. Influencing key people in social networks. Patient-mediated interventions.
	Organiza-tional	Management theories, system theories	Creating structural and organizational conditions to improve care	Reengineering care process. Total quality management/continuous quality improvement approaches. Team building. Enhancing leadership. Changing structures, tasks.
	Coercive	Economic, power, and learning theories	Control and pressure, external motivation	Regulations, laws. Budgeting, contracting. Licensing, accreditation. Complaints/legal procedures.

(adapted from Grol, 1997)

Marketing approaches focus on the development and marketing of an attractive product or message, which is adapted to the needs of the target group and helps members of that group solve their problems or achieve their goals. These approaches assume that there are different subgroups in the target audience (innovators, early adopters, late adopters).[73,74] Innovation

theories, communication theories, health promotion theories and social marketing theories propose such approaches and usually see change as a stepwise process: drawing attention to the message, increasing the understanding of the message, influencing acceptance of the message, changing practice, and maintaining the change.[70,74-77] The message has to be spread through a variety of channels: person-to-person, networks of professionals and mass media. The strength of multiple channels lies in emphasising the need to adapt change proposals to the characteristics of the different target groups of clinicians and in addressing their particular needs and perceived barriers to change.

Behavioural approaches are based on classical theories of conditioning and controlling behaviour. Human behaviour is seen as primarily influenced by stimuli before or after a specific action. The main strategies fitting into these approaches are reviewing performance and providing feedback to care providers, giving reminders, and providing incentives or sanctions related to specific actions. Evidence supporting the effectiveness of these strategies has been found in many studies, particularly when feedback and reminding are continuous and directly connected to the patient contact.[71,78]

Social influence approaches emphasise that learning and change is often achieved as a result of the influence of, and interactions with, social networks. The opinions, feedback or pressure coming from significant individuals in a social network have a substantial impact on whether new scientific findings are adopted. [79-83] Strategies that are accordant with these approaches include the use of opinion leaders to diffuse information across a social network, outreach visits or academic detailing by respected peers or experts, peer review in small local groups or teams, and demonstration of new performance by colleagues.[82] Patient-mediated interventions that provide information to patients with the intention of changing provider behaviour may also be considered social influence interventions. The utility of social influence approaches lies in the emphasis on professional communication. Most providers constantly look to each other for approval, support, information, and feedback, and most are sensitive to what successful role models say or do.[83]

Organisational approaches do not focus on individual performance, but on creating the necessary conditions for change. Lack of good quality of care is basically seen as a system failure. New thinking on quality improvement relies on experiences from industry and on different management theories.[84] So far there has been little scientific evidence on the effectiveness of these strategies, but experience in many health care settings is very positive.[85] Their value can particularly be seen in the emphasis on organisational and structural factors hindering change and in seeing care provision as a series of interrelated actions in which different people depend on each other.[84,85] In September 2000, Solberg's review of guideline implementation trials stressed how there has been little attention to the impact of practice systems or organisational support of clinician behaviour,

the process by which change is produced, or the role of the practice environmental context within which change is being attempted.[51] In highlighting a recent supplement called *Organisational Change: The Key to Quality Improvement*,[86] Koeck states that "a student of management and organisation theory could only be stunned by how little the efforts to improve quality have learnt from current thinking in management theory and from the experience of other industries".[87] This article reinforces the central thrust of the ideas of experienced implementation experts in various Minnesota medical groups about guideline implementation.[4] They identified 87 factors that had an important effect on implementation efforts, most of them related to their medical group organisation.[4]

Coercive approaches focus on pressure and control as a method for change. Developing laws and regulations, licensing and accreditation, budgeting and contracting, utilisation review with financial consequences, complaints procedures, and legal pursuits all fit well into these approaches. They may be effective because of perceived negative consequences (learning theories) or because of perceived power and authority. Their value lies in the fact that many care providers are stuck in fixed habits and routines. Some pressure from outside may be decisive in implementing and maintaining a desired change.[64,70]

The proposals in Richard Grol's 1997 paper have since been expanded upon by several authors in attempts to provide a conceptual framework for guideline dissemination and implementation. The construction of Grol's "foundation" was a crucial step in integrating theories from a wide-range of fields, for the purposes of health care. Grol's proposals encompass the gamut of possibilities for changing clinical practice. In order to effectively manage change in clinical practice, let us review the conceptual frameworks for clinical practice guideline dissemination and implementation that have been proposed since Grol.

Conceptual Framework

In 1999, Moulding et al. reviewed several systematic reviews of the evidence relating to clinical practice guideline adoption and summarised 8 key theoretical concepts for encouraging and maintaining guideline adoption.[60] These key concepts, found in table 4, are extrapolates of Grol's theories. In view of the efficacy of multifaceted strategies, careful planning of a range of dissemination and implementation interventions appropriate to the clinical setting and particular

Table 4 – Theoretical Concepts for Encouraging Guideline Adoption

1. Behaviour change is a process
2. Change agents must identify with clinicians' concerns
3. It is important to assess stage of readiness to change and the specific nature of barriers to change
4. Multiple change strategies are more effective than single ones
5. Clinician education must include a focus on knowledge, attitudes, and skill development
6. Educative strategies must be interactive and participatory
7. Social influence can be powerful behaviour change facilitator or inhibitor
8. Environmental support is crucial to the initiation and maintenance of change

(adapted from Moulding et al., 1999)

guideline is important. Theory from social and behavioural science further the understanding of the interplay of factors which influence practitioners to use guidelines, and help to explain why some dissemination and implementation strategies are more effective than others. [60] Moulding et al. identified these relevant theoretical concepts and applied these ideas to assessing strategies for dissemination and implementation of clinical practice guidelines in order to create a conceptual framework aimed at enhancing the effective use of such strategies. This framework draws upon five bodies of social and behavioural theory, and is the first described in the literature. The five bodies include:

1. Diffusion of innovation theory
2. Transtheoretical model of behaviour change
3. Aspects of health education theory
4. Social influence theory
5. Social ecology

A brief review of each theory is warranted before discussing the conceptual framework proposed by Moulding et al. in 1999, and the very recent adaptations proposed since then.[60]

Diffusion of Innovation Theory

Diffusion of innovation theory derives from communication theory, and describes the process by which and innovation is communicated through certain channels over time to members of a social system. [88] Four stages of adoption of innovation are identified: the knowledge stage involves learning about the innovation; the persuasion stage involves the individual forming positive or negative attitudes about the innovation; the individual then tests the acceptability of the innovation in the decision stage; the final stage is characterised by adoption or rejection of the innovation. Five different "adopter" categories are identified in the theory: early innovators, early adopters, early majority, late majority and late adopters.[60,88]

Transtheoretical Model of Behaviour Change

The transtheoretical model of behaviour change, often referred to as the "readiness to change" model, is a well recognised behaviour change theory that has demonstrated its reliability and effectiveness in improving physicians' practice.[89,90] Prochaska and DiClemente suggest that behaviour change is a continual process made up of five main stages: pre-contemplation, contemplation, preparation, action and maintenance.[90] Moving through pre-contemplation to contemplation stages involves changing knowledge and attitudes. Moving from contemplation to preparation and action phases involves changes in emotional processes, positive beliefs about self efficacy to undertake the change, and the development of necessary skills. Progression to the maintenance phase involves restructuring the environment in which the behaviour occurs, and providing social support and rewards systems.[60,90]

Health Education Theory

A central tenet of health education theory, and a concept which is incorporated into the transtheoretical model, is that behaviour change cannot take place without attention to gaps in both knowledge and skills.[76] Green et al. argue that a careful assessment must be made of individuals' educational needs in these terms before behaviour change can occur.[76] Another tenet of health education theory is that the positive impact of education is proportional to the degree of active rather than passive participation of the learner, and early theory has been expanded to take into consideration policy, regulatory, and organisational influences. Thus educative processes need to incorporate interactive, participatory elements as well as information provision.[76] Teaching which encourages problem based learning is an example of an interactive approach to developing clinical and diagnostic skills in medicine, and self directed, "evidence-based" approaches to clinical teaching appear to be sustainable over time.[60,91]

Social Influence Theory

Social influence theory emphasises the role of others in decision making about behaviour, postulating that factors such as custom, habit, assumptions, and beliefs of peers and prevailing practices and social norms shape the interpretation of information provided through education.[80] These customs can alter over time and between different locations, so in-depth local knowledge is important in making assessments of potential social barriers to guideline adoption. There is growing interest in the ways in which medical culture determines clinicians' beliefs, and how this, in turn, influences practice. For example, the humanistic values of medicine may conflict with the scientific emphasis of evidence-based care. Haines and Rogers argue that a culture of evidence-based practice needs to be developed within the wider context of other important values in medicine, in particular the humanistic values which emphasise holistic, patient centred care, and which draw on the personal and subjective experience of the patient.[92] Nevertheless, the extent to which these values are constructed dichotomously in medicine may function as an obstacle to clinicians attempting to improve their practice.[60,80,92]

Social Ecology Theory

The environmental context within which clinicians practice is a key determinant of guideline adoption. Behavioural theory such as operant conditioning emphasises the importance of the environmental context of behaviour, suggesting that environmental cues and reinforcements are central in encouraging and maintaining behaviour.[93] The limitation of this approach, however, lies in its tendency to situate the individual as a passive recipient of external source of feedback. More recent health promotion theory focuses on the interrelationship between individuals and their physical and sociocultural environments. Stokols uses a "social ecological" perspective to describe the process whereby environments influence individual behaviour and, in turn, individuals modify and influence their environments.[94] Within this approach, interactions are characterised by cycles of mutual influence, where environments have an impact on behaviour, and individuals alter their environments through both individual and collective action.[94] A synergistic approach which emphasises multilevel interventions to support change is central to this approach. Thus, behaviour change is more likely to occur and be maintained through complementary social and environmental changes and, in turn, changes in the beliefs and behaviour of individuals strengthens support for social and environmental change.[60,93,94]

Moulding et al.'s Conceptual Framework

Based on the above review of behaviour change theory, Moulding et al. drew from their key theoretical concepts for encouraging guideline adoption (Table 4) to develop a five step conceptual framework for successful guideline dissemination and implementation (Table 5).[60] The framework incorporates the

Table 5 – The Five Steps
1. Assessment of practitioner's stage of readiness to change
2. Assessment of specific barriers to guideline use
3. Determination of appropriate level of intervention
4. Design of dissemination and implementation strategies
5. Evaluation of the implementation strategies

(adapted from Moulding et al., 1999)

notion of pre-intervention needs assessment, as well as drawing on the concept of targeting strategies to the individual/group or population level of intervention.[57] The five main steps defined by the model are summarised as follows:

- Step 1: Assessment of practitioners' stage of readiness to change will help to ensure an appropriate mix of dissemination and implementation strategies.

- Step 2: Assessment of the specific nature of competency based, social, and organisational barriers to guideline use will further ensure that appropriate strategies are selected.

- Step 3: It is important to make an assessment of which level of intervention – individual/group or population – best addresses identified barriers and clinicians' stage of readiness to change, before designing dissemination and implementation programs.

- Step 4: Strategies can be selected and designed on the basis of the above assessment.

- Step 5: Evaluating the effectiveness of the implementation strategies in changing physician behaviour is a vital component of the process.60

Building upon Moulding et al.'s strategies, Solberg et al. conducted a study published in the April, 2000 issue of the *Journal on Quality Improvement* involving experienced guideline implementers.[4] This very recent study expands on Moulding's concepts, and provides further insight into the dissemination and implementation process.

Solberg et al.'s Conceptual Framework

Solberg et al. identified 12 people with extensive experience in leading clinical guideline implementation who were thought to have particularly keen insight into the process. They were interviewed to generate variables they considered important, as well as strategies they considered effective when used appropriately. A modified nominal group / Delphi process was then used for rating these variables and strategies, and the reactions of international experts were obtained to add perspective to this information.[4] Eighty seven variables and 25 strategies were identified, clustering in 6 categories. A conceptual framework for the variables and strategies was defined and is presented on the previous page, in Figure 1.

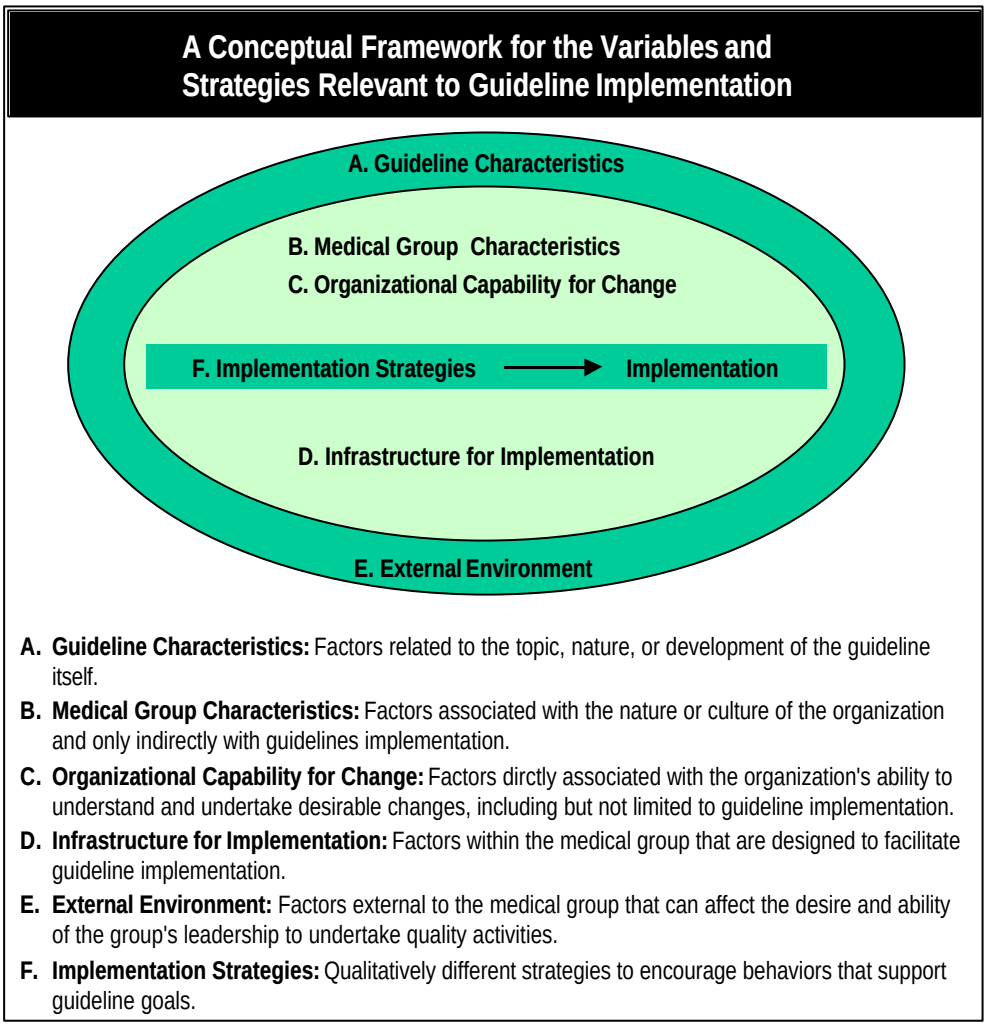

Figure 1 - Conceptual Framework for the Variables and Strategies Relevant to Guideline Implementation (reproduced from Solberg et al., 2000).

All six categories were considered to be important, key or essential by the experienced implementers. Implementation efforts focussing on the individual physician with a single strategy were unlikely to be successful. Rather, Solberg et al. conclude that implementation efforts must use multiple strategies that take account of multiple characteristics of the guideline, practice organisation, and external environment.[4] The addition of the medical group component in Solberg et al.'s framework is an important addendum to Moulding et al.'s original work. Both Moulding et al. and Solberg et al.'s models / frameworks are at the cutting edge of dissemination technology and embody decades of evidence in this field. However, it is useful to note that there are several other novel models that have yet to become 'main stream', or validated, but that may also reveal useful approaches. One such model is proposed by Wyszewianski et al. [95]

Novel Conceptual Frameworks: Wyszewianski et al.

In May, 2000, Wyszewianski et al. proposed a theoretical framework that involves dividing clinicians into 4 categories on the basis of their responses to new information about the effectiveness of clinical strategies. Similarly, the universe of practice change strategies is divided into knowledge-oriented and behaviour-oriented methods. Specific combinations of these strategies that are likely to be consistently effective for each of the 4 categories of clinicians, are presented.[95]

The four general categories of clinicians distinguished are:

1. *Seeker*: The quintessential seeker actively reads professional journals and frequently uses electronic repositories of information. This clinician typically takes an evidence-based perspective on the literature. They are as quick to abandon accepted practices when research finds them wanting, as they are to adopt new ones when presented with sound evidence in their favour.[95]

2. *Receptive*: The prototypical receptive clinician is inclined to change practice in response to new information, as long as it comes from a source that indicates scientific and clinical soundness.[95]

3. *Traditionalist*: Like the receptive clinician, the typical traditionalist clinician relies on authoritative sources for guidance on whether to make changes in clinical practice in response to new information. However, because their learning style is based primarily on training and personal clinical experience, traditionalists focus on the clinical skill, experience and authority of the advocates for change, in contrast with the receptive clinician's greater concern with scientific arguments.[95]

4. *Pragmatist*: The pragmatist is a busy clinician whose concern with new information is its practicality. Any call for the pragmatist to alter some aspect of practice must be placed in the context of the many competing and often conflicting demands made by patients, colleagues, employees and hospitals.[95]

The two general categories of practice change strategies are:

1. *Knowledge-oriented*: These strategies are purely educational interventions epitomised by traditional continuing medical education programs.

2. *Behaviour-oriented*: These interventions are non-educational strategies intended to alter behaviours, typified by incentive and penalties. This group is further subdivided into:

    a) *Facilitative*: Facilitative behavioural strategies are used to remove barriers that stand in the way of a clinician's adoption of new approaches to care.

    b) *Directive*: Directive behavioural strategies are aimed at inducing clinicians to make changes in their practices.[95]

Figure 2 details the framework combining practice change strategies with physician type.

The Importance (and Common Examples) of Types of Interventions Most Likely to Be Effective in Changing the Practice Patterns of the 4 Different Type of Clinicians

Type of intervention	Type of Clinician			
	Seeker	**Receptive**	**Traditionalist**	**Pragmatist**
Knowledge-Oriented	Crucial • Journal articles • Scientific meetings • Guidelines	Important • Continuing medical education • Guidelines from scientifically sound sources	Important • Academic detailing • Interventions from clinically credible sources	Helpful • Concise, bottom-line information from scientifically credible source
Behavior-Oriented				
Facilitative	Helpful • Removing major obstacles	Important • Removing obstacles • Supportive mechanisms	Important • Removing obstacles • Supportive mechanisms (reminders, feedback)	Crucial • Removing obstacles
Directive	Not important • Rewards	Somewhat Important • Rewards • Penalties • Real-time reinforcement	Important • Rewards • Penalties • Real-time reinforcement	Crucial • Strong incentives to learn, and to change • Strong incentives to overcome any remaining barriers

Figure 2 - Interventions in Changing Clinician Practice Patterns, versus Four Different Types of Clinicians (reproduced from Wyszewianski et al., 2000).

Inasmuch as Wyszewianski et al.'s framework is novel and not yet evaluated in a practical setting, it revolves around similar concepts first described by Grol and provides new theories which may themselves be practical. In all models and frameworks that we have discussed so far, issues of **barriers** to dissemination and implementation have arisen as central dogma in this process. As wel**l**, examples of **practical** dissemination strategies have been touched upon throughout. Let us now dissect and investigate the 'barrier' issue, before lending to the issues of practical strategies, their definitions, and their evaluations.

Barriers to Physician Adherence to Practice Guidelines

As exemplified in an earlier section of this report, there is unequivocal evidence that obstacles do presently exist in the dissemination and implementation of practice guidelines. As stressed in all theoretical frameworks and models, removing barriers to change in individual physicians is crucial for the success of a practical dissemination strategy. What are these barriers? How are they defined? Have they been investigated?

In 1999, Cabana et al. reviewed barriers to physician adherence to practice guidelines.[5] Their overall objectives were to provide knowledge that could help developers of guidelines, practice directors, and health care service researchers design effective interventions to change physician practice. They conducted a systematic review of 76 articles in the literature from 1966 to 1998. Articles identified included those focused on clinical practice guidelines, practice parameters, clinical policies, national recommendations and consensus statements. A ***barrier*** was defined as any factor that limits or restricts complete physicians adherence to a guideline.[5] The authors noted that after classifying barriers into 3 common themes, 7 general categories emerged. The barriers affected physicians *knowledge* (lack of awareness, lack of familiarity), *attitudes* (lack of agreement, lack of self-efficacy, lack of outcome expectancy, inertia of previous practice), or *behaviour* (external barriers).[5] Figure 3 summarises these barriers. Each barrier holds specific importance when thinking about practical designs for interventions.

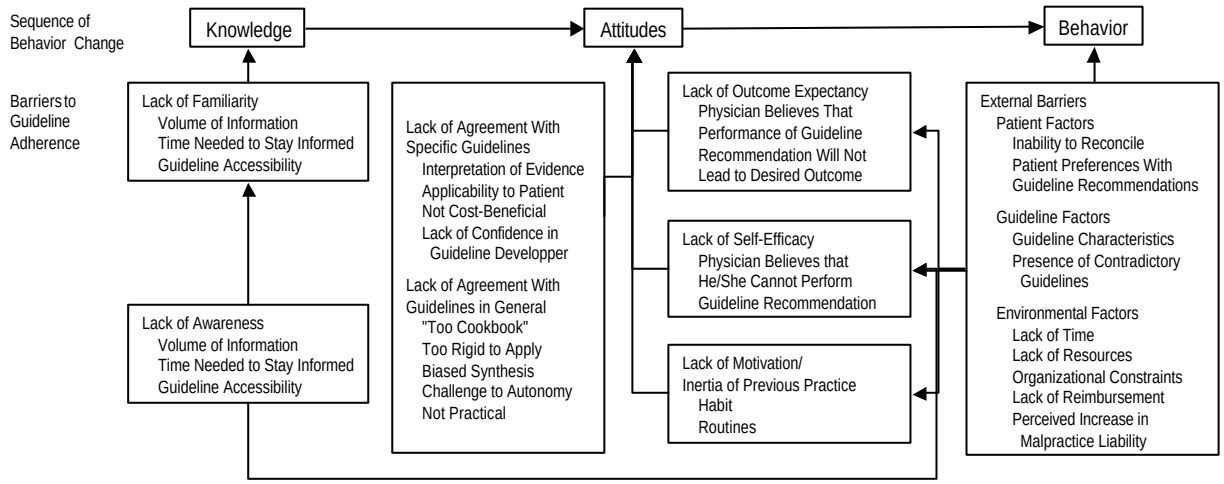

Figure 3. Barriers to Physician Adherence to Practice Guidelines in Relation to Behaviour Change (reproduced from Cabana et al., 1999).

Let us define and review each barrier in order to distil the important features that should be retained.

1. *Lack of Awareness*: The expanding body of research makes it difficult for any physician to be aware of every applicable guideline and critically apply it into practice.[5,96,97]

2. *Lack of Familiarity*: Casual awareness does not guarantee familiarity of guideline recommendations and the ability to apply them correctly. Lack of familiarity is more common than lack of awareness.[5,98-100]

3. *Lack of Agreement*: Physicians may not agree with a specific guideline or the concept of guidelines in general. Although physicians commonly indicate a lack of agreement when asked about guidelines in theory, when asked about specific guidelines, physician lack of agreement is less common.[101] As such, physician attitudes to guidelines in general should be interpreted with caution when applied to specific guidelines.[5]

4. *Lack of Self-efficacy*: Self-efficacy is the belief that one can actually perform a behaviour. It influence whether a behaviour will be initiated and sustained, despite poor outcomes.[78] For example, higher self-efficacy in prescribing cholesterol-lowering medications was associated with physicians initiating therapy consistent with national guidelines.[102] Low self-efficacy due to a lack of confidence in ability or a lack of preparation may lead to poor adherence. A majority of surveys that reported this barrier involved preventive health education and counselling, which suggests that poor self-efficacy may be a common barrier to adherence for such guidelines.[5]

5. *Lack of Outcome Expectancy*: Outcome expectancy is the expectation that a given behaviour will lead to a particular consequence.[78] If a physician believes that a recommendation will not lead to an improved outcome, the physician will be less likely to adhere. An important reason for physician non-adherence is a belief that the physician will not succeed.[103-105] Although counselling may increase a population's smoking quit rate from 3% to only 5%,[106] given smoking prevalence even this small change is enormously beneficial.[107] However, since physicians see patients individually, they may not discern success at the population level. Overlooking population-level successes can negatively influence outcome expectancy and lead to non-adherence. Again, the majority of surveys reporting lack of outcome expectancy, such as those reporting lack of self-efficacy, involved preventive health counselling and education guidelines.[5]

6. *Inertia of Previous Practice*: Physicians may not be able to overcome the inertia of previous practice, or they may not have the motivation to change. The readiness for change model, developed by Prochaska and DiClemente,[90] and previously discussed in this paper, describes behaviour change as a continuum of steps that include pre-contemplation, contemplation, preparation, action, and maintenance and was applied to physician attitudes toward cancer

screening guidelines. The results suggest that close to half of physicians surveyed were in a pre-contemplation stage and not ready to change behaviour (i.e., adopt guideline recommendations).[108] The change process model described by Geertsma et al.[109] also suggests similar constructs, i.e., a priming phase and the need for an initial force for change, be it professional, personal, and/or social.[5]

7. *External Barriers*: Appropriate knowledge and attitudes are necessary but not sufficient for adherence.[110] A physician may still encounter barriers that limit his/her ability to perform the recommended behaviour due to patient, guideline, or environmental factors. External barriers that limit the ability to perform a recommended behaviour are distinct from lack of self-efficacy. For example, well-trained physicians confident about their counselling skills can still be affected by external barriers (time limitations, lack of a reminder system) that prevent them from adhering to a counselling guideline. However, the persistence of these barriers may also eventually affect physicians' self-efficacy, outcome expectancy, or motivation.[5]

8. *Guideline-Related Barriers*: Guidelines recommending elimination of an established behaviour may be more difficult to follow than guidelines that recommend adding a new behaviour.[111] Trialability of a guideline and its complexity are also described as significant predictors of adoption.[112,105] *Trialability* is "the degree to which an innovation may be experimented with on a limited basis."[5,73]

9. *Patient-Related Barriers*: The inability to reconcile patient preferences with guideline recommendations is a barrier to adherence.[113] Patients may be resistant or perceive no need for guide-line recommendations. In addition, a patient may perceive the recommendation as offensive or embarrassing.[5]

10. *Environmental-Related Barriers*: Adherence to practice guidelines "may require changes not under physician control, such as acquisition of new resources or facilities."[114,115] Many factors described as barriers, such as lack of a reminder system, lack of counselling materials, insufficient staff or consultant support, poor reimbursement, increased practice costs, and increased liability, may also be factors beyond physician control.[5]

To summarise, we have thoroughly explored barriers related to physician adoption of guidelines, as well as addressing conceptual and theoretical models for guideline dissemination and implementation. Practical methods of applications of these theories have been briefed as examples throughout the review of models and barriers. Let us now revisit and define them more systematically. Using knowledge we have gleaned from models and barriers, practical strategies, their definitions, and their evaluations of effectiveness will be explored.

Practical Strategies

Moving out of Theory and into the Real World

Attempts to change clinical practice tend to be successful only to the extent that they recognise and engage actively with the real world in which clinicians operate, whether or not they do so explicitly. The real world of clinical decision making is, of course, a complex, often contradictory and changing one in which the interaction between clinician and patient may be the simplest, and least contradictory element.[42] The following Figure 4 gives an indication of the more significant features of the environment into which research findings are released with the expectation of influencing practice.[42]

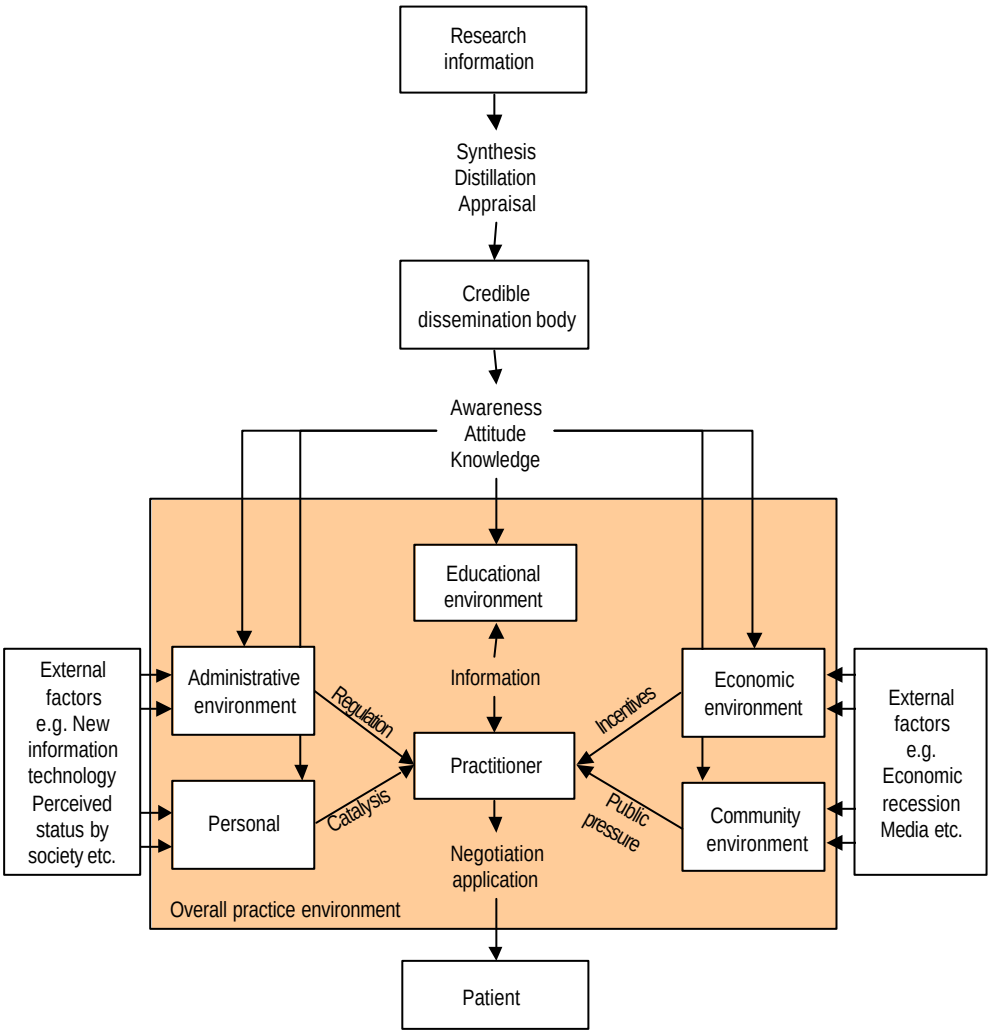

Figure 4. The Real World Encountered by Physicians (reproduced from Eve et al., 1996).

Interventions: Which ones Work?

There is a wide range of practical strategies used to disseminate guidelines to physicians in the hopes of promoting adoption and change. Several reviews of reviews have appeared in the past decade that qualify these strategies. Recent papers of this nature have looked at hundreds, if not thousands of previous studies, in total, including randomised clinical trials and meta-analyses of such trials. We will now define, and review the successes and failures of each of these methods, using the most recent reviews and studies available in the literature. Interventions will be classified as:

1. Consistently effective
2. Variable effectiveness
3. Little or no effect

This classification system has been used by several authors and provides a consistent, valid and reliable measurement approach.[8,19,50,58,70] The papers prepared by these authors constitute the most recent review literature presently available. The classifications presented by each paper are consistent throughout, reflecting the nature of reviewing similar literature. The reasoning and results behind each classification for each strategy will be discussed, and any deviations amongst the five reviews will be addressed. Individual studies referenced by these reviews will also be discussed when more specific information is found to be useful.

Audit and Feedback

Audit and feedback is defined as any summary of clinical performance of health care over a specified period, with or without recommendations for clinical action. The information may have been obtained from medical records, computerised databases, patients, or by observation.[58]

This strategy is considered to be an intervention of variable effectiveness.[8,19,50,58,70] Balas et al., in a meta-analysis of randomised clinical trials, reported that audit and feedback had a statistically significant but minimal effect on utilisation of practice guidelines. Two Cochrane reviews conducted by Thomas O'Brien et al. revealed that audit and feedback can sometimes be effective, in particular prescribing and test ordering situations.[116,117] However, the effects appeared to be small to moderate, and the authors concluded that this approach should not be relied upon solely.[116,117] Robinson suggested that the timing of the feedback is important: it is more effective when given concurrently than when given later and retrospectively.[118]

Academic Detailing / Educational Outreach

Academic detailing / educational outreach is defined as the education of an individual physician by a health care professional or trained individual, usually in the physician's practice setting, and most often in the area of prescribing.[19,58] The information given may include feedback on the provider's performance.[19,58]

This strategy is considered to be a consistently effective intervention.[8,19,50,58,70] Outreach visits were effective in reducing inappropriate prescribing, and to a lesser extent, increasing the delivery of preventive services.[119] Reductions of 12% to 49% in inappropriate prescriptions as a result of academic detailing were reported in four studies.[120-123] Cummings et al. reported the effectiveness of detailing in smoking cessation.[124] Dietrich et al. reported increases in the delivery of ten preventive services.[83] Putnam and Curry demonstrated a moderate, statistically significant effect of outreach visits combined with audit on essential elements in the management of five common conditions in family practice.[125] Finally, Nardella et al. used a modification of academic detailing, in which the study investigators met with and persuaded surgeons to reduce their use of laboratory investigations around the time of operations.[126] The educational effort was extensive, and the authors reported a significant reduction in test ordering and a substantial cost saving as a result. However, Thomson O'Brien et al. stress that few studies examined the overall cost-effectiveness of outreach.[119]

Local Opinion Leaders

Local opinion leaders are defined as clinicians identified by their colleagues in the community as being respected clinicians, effective communicators, and educationally influential.[19,58]

This strategy is considered to be an intervention of variable effectiveness.[8,19,50,58,70] The effectiveness of opinion leaders ranges from non-significant to substantial. Stross et al. found some improvement in the quality of care of patients with arthritis and respiratory disease.[127-129] Lomas et al. demonstrated a substantial increase in the number of trials of vaginal delivery after previous caesarean section in hospitals in which a local opinion leader was used.[45,81] However, it is not always clear what local opinion leaders do, and replicable descriptions are needed.[130]

Patient-Mediated Interventions

Patient-mediated interventions are defined as any intervention aimed at changing the performance of health care providers, for which information was sought from or given directly to patients by others (i.e. direct mailings to patients, patient counselling delivered by others, clinical information collected directly from patients and given to the provider).[58]

This strategy is considered to be an intervention of variable effectiveness.[8,19,50,58,70] Several patient-based educational interventions, especially those involving patient education materials, have been reported to be effective in implementing clinical practice guidelines concerning diabetes mellitus management,[131] preventive strategies[132] and smoking cessation.[106,133,134] Katon et al. described an intervention that aided the implementation of clinical practice guidelines concerning the management of depression, through the creation of patient education materials.[135] This intervention increased the number of outpatient visits and improved patients' compliance with drug therapy. However, other patient-mediated strategies, which made use of information derived from patients through questionnaires or interviews,

demonstrated mixed results.[136] It is likely that the effectiveness of patient-mediated interventions varies with the target condition and behaviour; the willingness, confidence and ability of patients to raise clinical effectiveness issues with health care professionals; and the willingness of health care professionals to engage patients in decision making.[70]

Local Consensus Processes

Local consensus processes are defined as the inclusion of participating providers in discussion to ensure agreement that the chosen clinical problem is important and the approach to managing it appropriate.[50]

This strategy is considered to be an intervention of variable effectiveness.[8,19,50,58,70] The importance of local consensus processes is not clear. For example, Putnam et al. demonstrated a moderate effect on performance of a local consensus process for generating criteria for optimal care, but did not find a significant effect of such a process for essential care.[125] There is also conflicting evidence about whether guidelines developed by the end users (local guidelines) are more likely to be effective than guidelines developed without involvement of the end users (national guidelines).[70]

Educational Materials

Educational materials are defined as the passive distribution (i.e. targeted mailing) of published or printed recommendations for clinical care, including clinical practice guidelines, audio-visual materials and electronic publications.[58,70]

This strategy is considered to be an intervention that has little or no effect.[8,19,50,58,70] Most studies that used printed materials only[122,137] failed to demonstrate changes in performance or health outcome, a finding that has also been associated with the distribution of guidelines.[81] The effects of printed educational materials compared with no active intervention appear small and of uncertain clinical significance.[138]

Reminders

Reminders are defined as any intervention (manual or computerised) that prompts the health care provider to perform a clinical action. Examples include concurrent or inter-visit reminders to professionals about desired actions such as screening or other preventive services, enhanced laboratory reports or administrative support (i.e. follow-up appointment systems or stickers on charts).[58]

This strategy is considered to be a consistently effective intervention.[8,19,50,58,70] Reminders, which prompt health care professionals to perform a patient-specific clinical action, are generally effective across a range of clinical behaviours.[139] Dartnell et al. described a successful intervention involving posters and pocket-sized laminated cards to augment dissemination of anticoagulation guidelines on hospital wards.[140] Emslie et al. showed that a structured infertility-management reminder sheet improved management of this disorder by general practitioners in the UK.[123]

Haynes et al.,[141] and Johnston et al.[142] showed that reminders were effective on both the process of care and on improving performance. The introduction of computer information systems to support practice also appears to be generally effective.[143] Shea et al. noted that computer-based reminders improved prevention services, such as cardiovascular risk reduction, in the ambulatory care setting.[144] Finally, Demakis et al. revealed that computerised reminder systems operating in multiple Veterans' Affairs (VA) ambulatory care clinics improved resident physician compliance with standards of ambulatory care.[145]

Continuing Medical Education (CME)

Continuing medical education is a catch-all term describing the gamut of activities used to maintain physician competence. They include formal conferences, courses, lectures, symposia, rounds, workshops, small-group discussions and traineeships.[19,58] It is useful to divide CME activities into didactic educational interventions and interactive educational interventions in order to assess their utility as dissemination strategies.

1. *Didactic*: This strategy is considered to be an intervention that has little or no effect.[8,19,50,58,70] Reflecting the diffusion-only characteristics of unsolicited printed materials, those conferences, rounds and workshops during which no explicit effort is made to determine practice needs or to facilitate practice change, failed to demonstrate change in performance or health outcome.[58] Browner et al. found little or no improvement in cholesterol management after a 3-hour seminar, even when enhanced by follow-up meetings and printed material.[146] In 1995, Davis et al. noted that widely used, traditional, didactic CME delivery methods such as conferences have little direct impact on improving professional practice.[147] In 1999, Davis et al.'s review of a number of well-conducted trials again revealed that didactic sessions did not appear to be effective in changing physician performance.[148]

2. *Interactive*: This strategy is considered to be a consistently effective intervention.[19,50,70] Interactive CME sessions that enhance participant activity and provide the opportunity to practice skills, can effect change in professional practice and, on occasion, health care outcomes.[148] They are likely to be especially effective if they are used to challenge negative attitudes of professionals or teach new skills to professionals.[70] Karuza et al. found that CME involving a small-group process and chart review led to an increased rate of influenza vaccination among elderly patients.[149]

Economic Incentives & Legal Regulations

Economic incentives are defined as overall physician compensation, or reimbursement incentives for particular procedures. These incentives include capitation, salary, fee-for-service, and target payments. Legal incentives include regulation by accreditation or licensing bodies, and governmental agencies.[19]

There is insufficient information to classify these strategies.[8]. There are very few studies that have investigated these methods.[150,151] Robinson reported that, although few trials employ financial incentives to affect outcomes, many "naturalistic experiments" (i.e. comparison of physicians' practice patterns under fee-for-service systems and under managed care systems) confirm the effect of compensation on clinical behaviour.[118] Fairbrother et al. showed that bonuses sharply and rapidly increased immunisation coverage in medical records; however, much of the increase was the result of better documentation.[152,153] Hickson et al. demonstrated in a pediatric clinic that fee-for-service physicians scheduled and saw more patients than did salaried physicians, but the difference was because fee-for-service physicians saw more well patients than salaried physicians.[154] Hillman et al. found that financial incentives did not improve physician compliance with cancer screening guidelines for women > 50 years old in a Medicaid HMO.[155]

Regulatory bodies have shown their ability to affect adoption of clinical practice guidelines by clinicians.[156] Adherence to guideline standards may be the basis of accreditation for hospitals as well. In the US, the Joint Commission on the Accreditation of Healthcare Organisations has selected some clinical practice guideline measure – for example, the rate of caesarean section after previous vaginal birth – to assist in the accreditation process.[157]

Multifaceted Interventions

Multifaceted interventions are defined as any intervention that includes two or more of the interventions described above.

This strategy is considered to be a consistently effective intervention.[8,19,50,58,70] Programs or strategies that involve 2 or more interventions appear to have more impact on physician behaviour and health care outcomes, than single interventions.[50,58,147] Given that there are often multiple barriers to implementation of research findings, it is not surprising that multifaceted interventions are more likely to be effective.[158]

Table 6 summarises the strategies that we have discussed, along with their utility profiles. The evaluation of these strategies provides an evidenced-based approach to decisions concerning which methods to use for intervention. Another important feature that should not be forgotten when developing such interventions, is the format in which physicians themselves prefer clinical practice guidelines to be disseminated.

Table 6 – Dissemination of Guidelines to Health Professionals
Consistently Effective Interventions
Educational outreach visits
Reminders
Interactive educational meetings
Multifaceted interventions
Interventions of Variable Effectiveness
Audit and feedback
Local opinion leaders
Local consensus process
Patient-mediated interventions
Interventions with Little or No Effect
Educational materials
Didactic educational meetings

What Format do Physicians' want their Guidelines to Come In?

In 1997, Hayward et al. conducted a self-administered survey of a random sample of over 1800 Canadian physicians, to assess their preferences regarding clinical practice guidelines.[159] They found that user friendliness of the guideline format was very important to the physicians. The preferred formats identified as most useful were pocket cards, concise pamphlets and journal article summaries.[32,159] More discursive formats, as well as workshops and computer databases were not considered useful.[32,159-161]

In response to Cabana et al.'s article, Dahlberg stresses that the most important barrier to following clinical practice guidelines is that most are simply not concise enough.[162] Dahlberg continues: "Instead of, or perhaps in addition to, a 40- or 50-page discussion of all contingencies in the management of a particular disease, why can't there be a 1-page summary … Practising physicians need a checklist to carry in our heads, if we are to change our habits."[162]

In August, 2000, the American College of Chest Physicians published a position statement detailing their work on translating guidelines into clinical practice.[163] These recommendations stressed the need for quick reference guides, such as pocket guides, and quick executive guideline summaries for clinicians, and also raised the utility of the Internet and the World Wide Web as a venue for publishing guidelines.[163] Because of the rapid advancements in Internet technology, its potential in healthcare is enormous.

Technology & The Internet

Health care reform and restructuring, changes in the scope of and definitions of 'health', 'health care' and 'health research', and a continued emphasis on health promotion, disease prevention and multidisciplinary care, all indicate the need for incorporation of efficient methods for information dissemination, exchange and management.[164] Technology can be a tool to help meet this need, as it can help us disseminate, as well as understand the process of dissemination.[165,166] Rapid advances in, and reduced costs of technology, permit the integration of this tool.[164,167]

The Internet is introducing new ways for humans to interact with machines and to communicate with each other. In health care the Internet is providing unprecedented opportunities to access information, improve decisions, and enhance communication among decision-makers and the people affected by their decisions.[168] However, the Internet is also creating many new problems. Seeking information on the Internet is often time-consuming. Internet users, regardless of their role, background or knowledge, can experience confusion and anxiety because of the virtually unlimited amount of information available, information that is often poorly organised and of highly variable quality and relevance (Figure 5).[169] The Internet can also lead to conflict among decision-makers if they have access to different and contradictory information. A person's health might even be worsened if inaccurate information found on the Internet were used by decision-makers.[168] It is important that the Internet and evidenced-based medicine meet in order to prevent and diffuse such problematic situations.

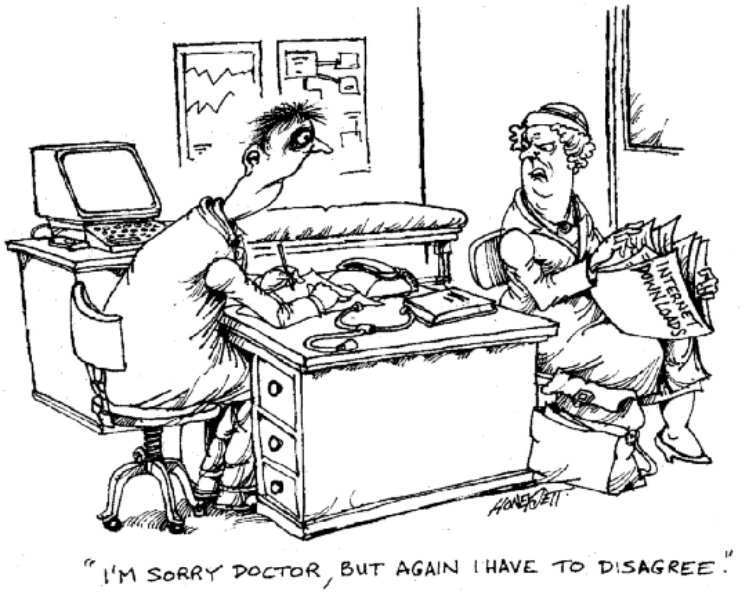

Figure 5. Cartoon of Physician, Patient, and the Internet
(reproduced from Jadad, 1999).

If the Internet and evidence-based decision-making are to reach their full potential and contribute to improvements in health care, a powerful and efficient synergy must develop between them.[168,170-172] The Internet could benefit evidence-based decision-making by giving decision-makers cheap, fast and efficient access to up-to-date, valid and relevant knowledge at the right time, at the right place, in the right amount and in the right format. Conversely, the tools and principles of evidence-based medicine could be used to gain a better understanding of the role of the Internet in health care, helping us to anticipate opportunities and prevent potential problems.[168,173,174]

The Internet can be used as a powerful tool to facilitate the generation, synthesis, dissemination and exchange of research evidence. An archetype that covers all of these potential benefits is the Internet's use by governments and professional organisations to facilitate dissemination of and access to specialised evidence-based guidelines.[168] Good examples are the National Guideline Clearinghouse,[175] an Internet-based public resource that offers access to evidence-based clinical practice guidelines and allows comparisons of recommendations produced by different organisations in North America; the Canadian Medical Association's CPG Infobase,[176] which provides free access to evidence-based guidelines produced in Canada; and the Practice Guidelines Initiative of Cancer Care Ontario,[177] which provides access to evidence-based cancer treatment guidelines produced in Ontario.

Jadad[178] describes 10 key challenges that the Internet must meet in order to allow optimal partnerships to develop between patients and clinicians:

1. Collaboration between consumers and professional organisations
2. Understanding how patients and clinicians use the Internet
3. Systems need to be easy to access and use
4. Rapid access to information
5. Easy access to relevant, ready to use information
6. Integrating information
7. Balancing virtual and face-to-face interactions
8. Redefining the roles of patients and clinicians
9. Balancing privacy and connectivity
10. Ensuring equitable access to technology and information

The Internet has unlocked a new world of dissemination potential towards the primary physician, that should be nurtured. Guidelines for medical and health information sites on the Internet have recently been published, and should be respected in order to provide the most effective dissemination strategy.[179]

Executive Summary & Conclusions

As we go back to the beginning of this paper, it is important to reflect on the objectives that were placed before us. The overall objective was to provide insight into clinical practice guidelines, their development and their implementation. The main focus was the conduction of a thorough literature review of all issues related to dissemination of clinical practice guidelines to physicians, and their eventual use. We offer that the reflections provided herein have done justice to the tasks originally defined. What follows is a summary of the salient points.

An enormous amount of attention has been devoted to clinical guidelines in the past ten years. Clinical guidelines have been defined as "systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances." Their successful implementation should improve quality of care by decreasing inappropriate variation and expediting the application of effective advances to everyday practice. Guideline development in general has accelerated markedly since the mid-1980s. The movement to develop and disseminate clinical practice guidelines is rooted somewhat in the need to curtail or restrict practice variation in the United States health care system, and is clearly linked to the evidence-based medicine movement.

The increase in the number of clinical guidelines produced and published in different countries has stimulated discussion on their value. Reports critiquing the validity of randomised trials, meta-analyses, diagnostic test studies, and economic evaluations have challenged researchers to improve the conduct of their studies, and encouraged readers to interpret them carefully. It is now widely understood that the findings of research do not flow simply and automatically from the literature into routine clinical practice. It is much less widely recognised how resistant this problem is to any simple solution. The traditional assumption of continuing professional development – that conscientious practitioners would keep themselves "up to date with the literature" – has long since become untenable. This failure has frustrated clinicians interested in improving their own practices, policy makers, administrators, leaders in managed care, quality assurance, those interested in health-care policy, researchers in this area and organisations funding quality-improvement efforts. However, physicians' fervour, generated by keen interest in evidence based practice, has not dissuaded them from using these techniques, and as such, dissemination of guidelines remains an important, exploitable research resource.

Dissemination is defined as a communication of information so that clinicians can improve their knowledge or skills. It is an active process, as opposed to diffusion, and it targets specific clinician groups. Although this definition seems intuitively simple and appealing, its application is far from effortless. Using this definition, theories and models aimed at changing clinician behaviour for the purpose of improving their knowledge and skills, have evolved over several decades.

In 1997, Richard Grol published an overview of approaches and strategies in the British Medical Journal; this overview has become a cornerstone in the field of evidence in changing clinical practice. In 1999, Moulding et al. reviewed several systematic reviews of the evidence relating to clinical practice guideline adoption and summarised 8 key theoretical concepts for encouraging and maintaining guideline adoption. These key concepts were extrapolates of Grol's theories. Theory from social and behavioural science furthered the understanding of the interplay of factors which influence practitioners to use guidelines, and helped to explain why some dissemination and implementation strategies are more effective than others. Moulding et al. applied these ideas in order to create a conceptual framework aimed at enhancing the effective use of such strategies. Solberg et al. continued to build upon this framework, and concluded that implementation efforts must use multiple strategies that take account of multiple characteristics of the guideline, practice organisation, and external environment. The derivation of the medical group component in Solberg et al.'s framework was an important addendum to Moulding et al.'s original work.

In 1999, Cabana et al. reviewed barriers to physician adherence to practice guidelines. They extended the theories, models and frameworks mentioned above, to provide practical knowledge that could help developers of guidelines, practice directors, and health care service researchers design effective interventions to change physician practice. The barriers affected physicians' *knowledge* (lack of awareness, lack of familiarity), *attitudes* (lack of agreement, lack of self-efficacy, lack of outcome expectancy, inertia of previous practice), or *behaviour* (external barriers). Each barrier holds specific importance when thinking about practical designs for interventions.

Attempts to change clinical practice tend to be successful only to the extent that they recognise and engage actively with the real world in which clinicians operate, whether or not they do so explicitly. The real world of clinical decision making is, of course, a complex, often contradictory and changing one in which the interaction between clinician and patient may be the simplest, and least contradictory element. There is a wide range of practical strategies used to disseminate guidelines to physicians in the hopes of promoting adoption and change. Several reviews of reviews have appeared in the past decade that qualify these strategies. Recent papers of this nature have looked at hundreds, if not thousands of previous studies, in total, including randomised clinical trials and meta-analyses of such trials. The table on the next page, found in the body of this document, summarises these strategies.

In 1997, Hayward et al. conducted a self-administered survey of a random sample of over 1800 Canadian physicians, to assess their preferences regarding clinical practice guidelines. They found that user friendliness of the guideline format was very important to the physicians. The preferred formats identified as most useful were pocket cards, concise pamphlets and journal article summaries. More discursive formats, as well as workshops and computer databases were not considered useful.

Dissemination of Guidelines to Health Professionals
Consistently Effective Interventions
Educational outreach visits
Reminders
Interactive educational meetings
Multifaceted interventions
Interventions of Variable Effectiveness
Audit and feedback
Local opinion leaders
Local consensus process
Patient-mediated interventions
Interventions with Little or No Effect
Educational materials
Didactic educational meetings

Finally, the Internet is introducing new ways for humans to interact with machines and to communicate with each other. In health care the Internet is providing unprecedented opportunities to access information, improve decisions, and enhance communication among decision-makers and the people affected by their decisions. The Internet can also be used as a powerful tool to facilitate the generation, synthesis, dissemination and exchange of research evidence. An archetype that covers all of these potential benefits is the Internet's use by governments and professional organisations to facilitate dissemination of and access to specialised evidence-based guidelines.

To conclude, best-practice guideline dissemination and implementation is a complex problem that requires a multifaceted approach, using theoretical and practical means, and new technologies, to achieve success.

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