A GUIDE to the development

implementation

How to put the evidence into practice: implementation and dissemination strategies

and

evaluation

of clinical practice

guidelines

NHMRC

National Health and Medical Research Council

How to put the evidence into practice:
implementation and dissemination strategies

Handbook series on preparing clinical practice guidelines

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NHMRC
National Health and Medical Research Council

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CONTENTS

TABLES

PREFACE

Clinical practice guidelines are systematically developed statements that assist clinicians, consumers and policy makers to make appropriate health care decisions. Such guidelines present statements of 'best practice' based on a thorough evaluation of the evidence from published research studies on the outcomes of treatment or other health care procedures. The methods used for collecting and evaluating evidence, and developing guidelines, can be applied to a wide range of clinical interventions and disciplines, including the use of technology and pharmaceuticals, surgical procedures, screening procedures, lifestyle advice, and so on.

In 1995, recognising the need for a clear and widely accessible guide for groups wishing to develop clinical practice guidelines, the National Health and Medical Research Council (NHMRC) published a booklet to assist groups to develop and implement clinical practice guidelines. In 1999 a revised version of this booklet was published called *A Guide to the Development, Implementation and Evaluation of Clinical Practice Guidelines* (NHMRC 1999), which includes an outline of the latest methods for evaluating evidence and developing and disseminating guidelines.

The emerging guideline processes are complex, however, and depend on the integration of a number of activities, from collection and processing of scientific literature to evaluation of the evidence, development of evidence-based recommendations or guidelines, and implementation and dissemination of the guidelines to relevant professionals and consumers. The NHMRC has therefore decided to supplement the information in the guideline development booklet (NHMRC 1999) with a series of handbooks with further information on each of the main stages involved. Experts in each area were contracted to draft the handbooks. An Assessment Panel was convened in June 1999 to oversee production of the series. Membership of the Assessment Panel and the writing group for this handbook are shown at Appendix A.

Each of the handbooks in the series focuses on a different aspect of the guideline development process (review of the literature, evaluation of evidence, dissemination and implementation, consumer publications, economic assessment and so on). This handbook focuses on the vital issue of how to change clinical practice through dissemination and implementation of clinical guidelines or other evidence-based information.

The way in which the guidance provided in this handbook fits into the overall guideline development process recommended by the NHMRC is shown in the flowchart on page vii. Other handbooks that have been produced in this series so far are:

How to Review the Evidence: Systematic Identification and Review of the Scientific Literature

How to Use the Evidence: Assessment and Application of Scientific Evidence

How to Present the Evidence for Consumers: Preparation of Consumer Publications

How to Compare the Costs and Benefits: Evaluation of the Economic Evidence

The series may be expanded in the future to include handbooks about other aspects of the guideline development process, as well as related issues such as reviewing and evaluating evidence for public health issues.

Flow chart showing the clinical practice guidelines development process
(The shaded box shows the stage described in this handbook)
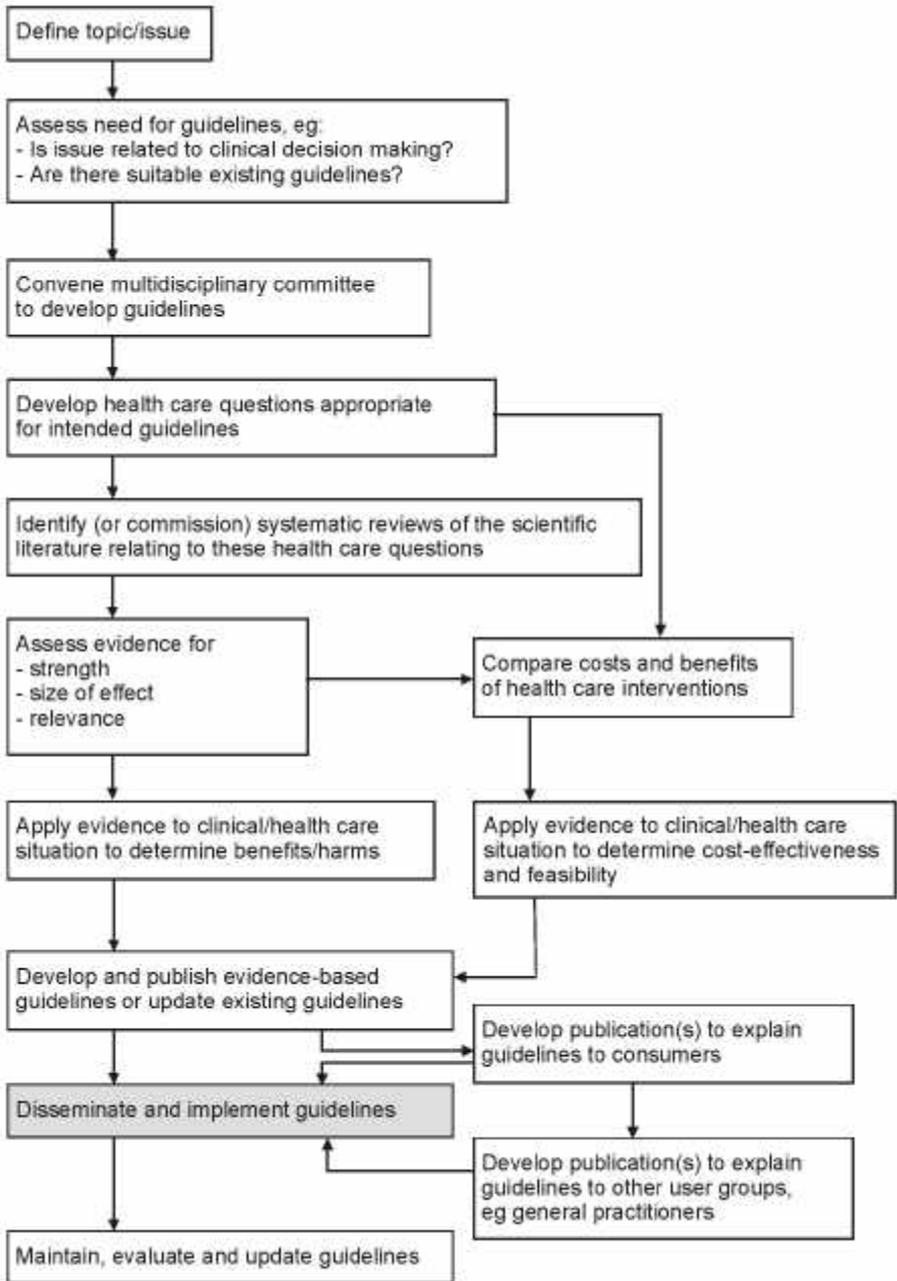
INTRODUCTION

Development of clinical practice guidelines

The process for clinical practice guideline development is described in the National Health and Medical Research Council (NHMRC) publication *A Guide to the Development, Implementation and Evaluation of Clinical Practice Guidelines* (NHMRC 1999). This recommends that guidelines should be developed by a multidisciplinary guideline development committee, the initial task of which is to determine the need for and scope of the guidelines, define the purpose and target audience and identify the health outcomes that will improve as a result of their implementation.

The membership of a guideline development committee will depend on the nature of the particular guidelines being developed but will include clinicians, health professionals, consumers, health policy analysts, economists and regulatory agency representatives, industry representatives and bioethicists (see NHMRC 1999 for a full list and further discussion of the multidisciplinary committee).

While the first role of the guideline development committee may be to assess the evidence relating to the clinical issue that is being considered and prepare evidence-based guidelines, it is clearly vital that the issues of dissemination and implementation are considered from the outset.

Transfer of evidence into practice

The transfer of evidence into practice is often slow. There are countless examples of therapies that have proved effective — citrus juice for scurvy in centuries past (Mosteller 1981), aspirin and thrombolytic therapy for acute myocardial infarction in the 1970s (Antman et al 1992; Campbell et al 1998), anticoagulants for atrial fibrillation in the 1990s (SPAFI 1991; Sudlow et al 1997) — yet their uptake into routine practice has been disastrously slow.

This is not chance. The transfer of research evidence into clinical practice is a difficult task. It does not take place on its own, unless you are prepared to wait for a new generation of clinicians. It requires skill, determination, time, money and planning. For research transfer to occur, an integration of the following elements is desirable (details are given in Appendix C).

1. *Good information* — research results that stand up to critical scrutiny and are synthesised and presented in forms that can be used to solve practical problems.

2. *Good access to information* — dissemination mechanisms and systems that make it easy for users (practitioners, managers, policy makers and consumers) to access information.

3. *Supportive environments* — physical and intellectual environments in which research is valued and uptake of research-based knowledge is supported and encouraged.

4. *Evidence-based promotion of knowledge uptake* — interventions that demonstrably promote the uptake of knowledge and lead to behaviour change.

This handbook has been written to help those involved in the dissemination and implementation of clinical practice guidelines, as well as anyone working within an institution, organisation or group who would like to encourage their colleagues or staff to incorporate evidence into their practice. It provides information to help plan deliberate actions to disseminate and then implement research-based knowledge.

About this handbook

This handbook follows the steps involved in guideline dissemination and implementation by asking the following questions.

- What is the purpose?
- Who can help?
- What is the situation?
- Who should be involved?
- What are the key messages?
- What is the aim?
- Is the available information suitable?
- What are the barriers?
- Are things on track?
- What are the options?
- Which strategies should be used?
- Is support available?
- What would it cost, and is it worth doing?
- Has it worked?

The actions that should result from these questions are illustrated throughout the text by two case studies:

- **Case 1** involves the decline of sudden infant death syndrome (SIDS). It is a good example of how research evidence has led to a change in practice, which in turn has led to an improvement in health outcome. It was a multifaceted, unplanned, uncoordinated and highly successful campaign, and much can be learnt from it.

- **Case 2** involves an examination of the approach to blood transfusions by Royal Melbourne Hospital. It concerned change at a local level, involved fewer people and organisational changes, and had a series of measurable outcomes.

Additional case studies have been included in Appendix G to further illustrate certain features of the process as follows.

- The dissemination and implementation plan developed by the NHMRC National Breast Cancer Centre (NBCC) highlights the extent of planning that is possible, and that may be required, for guidelines with such a broad scope as the management of early breast cancer.

- The study of the pharmaceutical industry gives an anecdotal view from a successful industry of how to influence doctors to change their practice.

- The study of the melanoma guidelines illustrates the cooperation that the medical profession can give and the plans required for evaluation.

Of course, it is not enough to simply ask questions. You will need to provide answers. This handbook has been prepared in a practical and down-to-earth way to help find those answers.

It is worth noting that although the question, 'What are the barriers?' is discussed in Section 8, you will become aware of barriers, whether they be financial, interpersonal or organisational, as soon as you start the project. At each step along the way, barriers will become apparent. Of course, they should be noted, and considered, and dealt with wherever possible.

However, the formal consideration of barriers, and of the methods required to get around them, is best kept until you have assembled a group that is fully representative of all the target audiences. Only at that stage will most of the barriers, not just the obvious ones, become apparent.

This handbook outlines the series of steps involved in planning the process. It offers a range of options among the strategies, encourages innovation and creativity, and discusses how to measure progress. It is not a cookbook, as there is no single way to do anything, even make an omelette, and local conditions vary, so that local solutions are needed.

Methods

Literature review

Two main sources of information have been used in the preparation of this handbook. The first was the systematic review carried out by the Cochrane Collaborative Review Group on Effective Practice and Organisation of Care (EPOC) (Bero et al 1998). The second was a literature search from 1996 (the time of the last EPOC review) to the present. The same search strategy as EPOC was used but, because of the thousands of titles posted, we restricted our search to titles and abstracts only.

Case studies

The study of SIDS was based on an informal literature search, an interview with Ms Kaarene Fitzgerald, Executive Director of the Sudden Infant Death Research Foundation (SIDRF), and personal communications from Associate Professor Michael Frommer and Dr Mark Ragg, who were involved in their bureaucratic and media capacities.

The study of blood product use at the Royal Melbourne Hospital was based on two papers (Metz et al 1995, Tuckfield et al 1997) and an interview with Dr Jack Metz.

The study of the NBCC's plans was based on a draft dissemination and implementation plan prepared by the centre.

The study of the pharmaceutical industry was based on anonymous surveys with two medical directors, two sales managers, and one former and one current public relations consultant involved with the industry.

The study of the melanoma guidelines was based on interviews with Professor Tom Reeve AC, Executive Officer of the Australian Cancer Network, and Professor Bill McCarthy AO, Head of the Melanoma Unit at the Royal Prince Alfred Hospital in Sydney.

1   WHAT IS THE PURPOSE?

You may have developed a clinical practice guideline. You may have been handed an important summary of the results of several studies, such as a meta-analysis. You may have been told about a new evidence-based algorithm that you think would help you and your colleagues deal with a difficult issue. You may have been sent a clinical practice guideline, and be responsible for encouraging its implementation.

The first step in implementing and disseminating clinical practice guidelines is to ask: 'What am I trying to achieve?'.

It is worth taking the trouble to develop a statement of purpose, such as the following examples.

> I would like to ensure that all cardiologists within my clinical unit prescribe antihypertensives according to the latest National Heart Foundation guidelines.

> A new triple vaccine for diphtheria, tetanus and pertussis, with an acellular pertussis component, has been developed. I would like to inform all general practitioners of its existence, and encourage them to use it as recommended by the NHMRC.

> The NHMRC NBCC recommends that breast conservation is as safe and effective as mastectomy for suitable women. I would like to ensure all such women are given the option of breast conservation.

> There is strong evidence that antenatal administration of corticosteroids to the mother in threatened preterm delivery reduces neonatal mortality from respiratory distress syndrome by 40%. I would like to ensure that all women who present to New South Wales hospitals with threatened delivery at 34 weeks gestation or less are offered corticosteroid injections, preferably at least 24 hours before delivery.

Such a statement helps reinforce that the purpose of spreading the news about new evidence is not merely to inform, but to *change practice in line with that evidence*.

2   WHO CAN HELP?

At this stage, we recommend you identify a group of three or four people to drive the implementation and dissemination process along. According to Leape et al (1998), effective teams have representation from three types of expertise within an organisation. These are system leadership, technical expertise and day-to-day leadership.

Choose someone capable of being a system leader. This is someone with enough authority within an organisation to make a change when one is required, and to overcome barriers when identified. This person should have authority — whether formal or moral — in all areas that will be affected by the change. That person may be you, or it may be someone else. It should be a senior person.

Add someone with technical expertise in the subject matter who is enthusiastic about change. If the subject matter is broad, two such people may be needed.

Add a third person who can assume day-to-day leadership of a project. This is someone who has time and enthusiasm to devote to the project, and who has enough influence to encourage action.

This small group will carry out the next few steps until a larger group is formed.

ACTION — Appoint a team of three to four people with relevant expertise

Case study 1: SIDS

Although no single organisation was formed, it is fair to say that leadership was provided by two clinicians involved in research — Professor Terry Dwyer of the Menzies Research Centre in Hobart and Dr Susan Beal of the Adelaide Women's and Children's Hospital — and by Kaarene Fitzgerald who started the Sudden Infant Death Research Foundation.

Case study 2: blood transfusions

Leadership was provided by Dr Jack Metz, head of the department of diagnostic haematology at the Royal Melbourne Hospital. He was supported by the physicians and surgeons on the hospital transfusion committee.

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3   WHAT IS THE SITUATION?

Ideal clinical practice is difficult to achieve. There is always the possibility of improvement. This step aims to identify the difference between what exists and what could be, or between the current and the ideal.

First, this requires an analysis of the difference between the national (or international) situation and the local situation.

The national/international situation is contained in the evidence that you are dealing with, whether that be in the form of clinical practice guidelines, a meta-analysis, an evidence-based protocol, a Cochrane review or something else.

The evidence may show, for example, that according to the World Health Organization (WHO) it is inappropriate for any more than 15% of women to have caesarean sections. The local situation may be that in your district hospital 25% of women have caesarean sections. Or the national situation may be that Australian research has shown that 20% of blood transfusions in a Melbourne teaching hospital are inappropriate. The local situation is that there is no reason to believe that your hospital is any different.

In defining the difference between the research result and the local situation, it helps to develop a formal statement. Typical situation statements may read as follows.

> The WHO recommends that no more than 15% of women have caesarean sections, yet in this hospital the caesarean rate is 25%.

> Australian research has shown that about 20% of blood transfusions are inappropriate, and there is no reason to think our hospital is any different.

> There is uncertainty among doctors about the best way to care for people with a family history of bowel cancer. The National Cancer Control Initiative has produced guidelines that differentiate risk according to family history, and made evidence-based recommendations concerning care.

This situation statement will keep the minds of all involved on the task, which is to improve health outcomes by changing an aspect of clinical practice.

ACTION — Develop a formal situation statement

Case study 1: SIDS

International situation

Since 1969, when SIDS was first defined, it has caused the death of a significant number of Australian babies each year. Evidence has been accumulating since the early 1970s that the sleeping position of an infant was associated with the risk of death (Guntheroth et al 1992). However, there was no consensus that sleeping position was a consistent factor until the late 1980s. According to Dwyer et al (1995), consensus was reached after a number of publications showed that:

- the association was found consistently in retrospective studies (Beal and Finch 1991) and a prospective study (Dwyer et al 1991);

- intercountry comparisons supported the identified association (Beal 1986, Lee et al 1989)

- SIDS mortality had declined following a change in sleeping position of infants in the Netherlands (Engelberts and de Jonge 1990) and elsewhere (Beal 1991).

Local situation

In Australia, because of the fear of the risk of inhaling vomit, parents were advised to place their children face down to sleep.

Case study 2: blood transfusions

Audits of red cell transfusions had identified marked differences in transfusion practices internationally (Metz et al 1995). Blood product use at Royal Melbourne Hospital was inappropriate for 16% of red cell, 13% of platelet and 31% of fresh frozen plasma transfusions (Metz et al 1995).

4   WHO SHOULD BE INVOLVED?

The target audience for a dissemination and implementation strategy is the group of people who have to be influenced if change is to come about (eg stakeholders, or the key players).

Many people automatically think of their own colleagues as the ones who should change if improvement is to take place. But decisions in health care are far more complicated than that, and are influenced by a whole range of cultural, organisational, systemic, educational, interpersonal and individual factors.

Lomas (1997) has recognised that the range of people who need to be influenced is much broader than is usually imagined. He describes five groups of users of research findings, noting that they require different types of information presented in different forms. They are:

- *patients or consumers of health services;*

- *legislative decision makers* — politicians, bureaucrats, and interest groups engaged in developing public policy;

- *administrative decision makers* — managers, executives and board members;

- *clinical decision makers* — individual practitioners caring for patients, and groups developing clinical guidelines and other directives; and

- *industrial decision makers* — including company scientists, corporate executives, computer industry personnel and venture capitalists.

We recommend going through this list carefully and deliberately, and excluding those groups of people who do not need to be influenced for this particular issue. Consumers should be considered a target group for *all* information regarding health. The others involved will vary from situation to situation.

For example, any efforts to reduce the rate of measles would require the cooperation of all those listed above, including company scientists and venture capitalists, who should be informed of potential findings that available vaccines are not ideal.

Efforts to reduce the rate of blood transfusions in one particular hospital would require that fewer people be influenced than in the case of measles vaccine. But if efforts were to be made nationally on the issue, then the list of people involved would expand greatly.

At this point, you have a list of people to be influenced. These are people whose cooperation is required for change to be made successfully. These are the target audiences for the dissemination and implementation of the evidence.

It is important to list all the different target audiences, as there are a range of strategies available, but they will not be suitable for all groups. You will almost certainly have to use different strategies for different groups.

Once the target audiences have been identified, it is time to form a larger committee or working party with representation from consumer groups and all other significant target audiences. For clinical practice guidelines, this larger group may be the clinical guidelines development committee (see Introduction) who is responsible for managing the implementation and dissemination strategies.

It is this group, advised by the smaller group of three or four, who will be responsible for the important decisions from here onwards.

ACTION — Determine target audiences and include representatives of all groups on the committee/working party

Case study 1: SIDS

In the case of SIDS, *everyone* became involved. All five of the groups identified by Lomas (1997) played significant roles.

Case study 2: blood transfusions

This required the involvement of a much smaller number of people — mainly haematology department staff and medical staff. Senior hospital administrators and the chief medical officer were also involved.

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5   WHAT ARE THE KEY MESSAGES?

Most research or evidence uncovers a gap between reality and the ideal. Because of this, there are usually a few key messages that arise from any collation of evidence.

If you have a set of guidelines you want to implement, the key messages are likely to be the key recommendations. Meta-analyses and other forms of evidence also contain key messages.

For example, the NHMRC *Clinical Practice Guidelines for the Management of Early Breast Cancer* (1995) made the point that, based on evidence, breast conservation with radiotherapy is as safe as mastectomy for women with suitable cancers. Although it could not quantify current practice at that stage, it was widely accepted that many women suitable for breast conservation were not offered it. A key message from those guidelines was that women, and their doctors, should be made aware of the evidence regarding the safety of breast conservation.

Similarly, the NHMRC *Clinical Practice Guidelines on Care around Preterm Birth* (1996b) made recommendations based on evidence that maternal corticosteroid treatment should be considered in order to improve neonatal outcome before all births at less than 34 weeks gestation, for all cases of spontaneous and elective preterm birth. A report published in 1996 — on infants born at less than 32 weeks or with a birthweight of less than 1500 grams and admitted to Australian neonatal intensive care units in 1994 — indicated that only two-thirds had been born following antenatal administration of corticosteroids (Donoughue 1996). A key message is that a large proportion of preterm babies born in Australia do not receive the benefit of antenatal corticosteroids, even though corticosteroids reduce the risk of respiratory distress syndrome by about half and of death from it by about 40%.

The messages gained from a piece of evidence, whether it be a set of evidence-based guidelines, a meta-analysis or a Cochrane review, should be listed. The messages may have different target audiences, requiring different strategies. The messages should then be ranked in order of priority, as it may not be possible to take specific actions concerning all key messages.

ACTION — Formulate and prioritise key messages

Case study 1: SIDS

The key message was:

- babies should not sleep prone.

Later on, other key messages were, for example, that:

- babies should not be kept too warm (Ponsonby et al 1993)

- nobody should smoke in a house where a baby lives (Golding 1997).

Case study 2: blood transfusions

The key message was that existing protocols for the use of blood products were not necessarily being followed. These protocols should be followed wherever possible.

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6   WHAT IS THE AIM?

It is important to have a specific achievement in mind. If you do not have a specific objective, it is difficult to maintain your focus on improvement. Also, you will not know whether or not you have done what you set out to do.

Objectives like 'to reduce the number of caesarean sections in this hospital' are too vague. If you reduce the number by one, are you satisfied?

Specific objectives should be set such as the following examples:

> To reduce the proportion of women having caesarean sections in this hospital to 15%.

> To offer blood transfusions only to people whose haemoglobin is at or below 7 grams per 100 mL, or who have symptomatic anaemia.

> To ensure that no woman who has been treated for early breast cancer has computerised tomography scans or magnetic resonance imaging as a form of routine follow-up.

> To increase the proportion of Australian children immunised according to NHMRC guidelines to 90% by the age of six.

> To eliminate the use of nonstandard abbreviations and doses in a hospital prescribing system.

> To ensure that all pregnant women with threatened delivery at 34 weeks gestation or less are offered corticosteroid injections within one hour of admission to hospital.

ACTION — Set specific objectives

Case study 1: SIDS
The objective was to reduce the number of deaths from SIDS by two-thirds.

Case study 2: blood transfusions
The objective was to reduce the number of inappropriate transfusions of blood products to an acceptable level. This was to be below 5% for the use of red cells and platelets, and potentially nil. For fresh frozen plasma, no figure was set, as the correct usage of that product is still uncertain.

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7   IS THE AVAILABLE INFORMATION SUITABLE?

The clinical guidelines that you want to disseminate and implement may be a beautifully produced, comprehensively researched, evidence-based document with 100 pages of text and 300 references. It may have been developed by the most eminent people in that particular field. The 'master document' might be suitable for specialists in that particular area, who need to know everything there is to know on their chosen topic. But it may not suit the great majority of target audiences. A booklet on thyroid surgery would be read, in its entirety, by only a proportion of endocrine surgeons, a smaller proportion of general surgeons, and a minute proportion of general practitioners and members of the public. This is not due to laziness, but to competing interests. Most of the people that you want to inform about thyroid surgery have a lot of other things they need to keep informed about.

Information needs to be tailored to the needs of the target audiences. It may need to be tailored in a number of ways.

Target audiences should be surveyed to find out how they would like information presented. This can be quite informal — simply by asking representatives of various groups what they think.

However, target audiences are not homogeneous internally, any more than they are externally. You may need to produce information at different levels. For example, the NHMRC NBCC has produced two distinct books — *Early Breast Cancer: A Consumer's Guide* and *All About Early Breast Cancer* — for different members of the same target audience. The former contains much of the information contained in *Clinical Practice Guidelines for the Management of Early Breast Cancer,* but from a consumer's perspective. The latter is a simplified version aimed more at patients who prefer to take a less active role in the management of their medical condition. It has a broader range of information, such as women's anecdotes and details of where to get help.

The questions to answer are:

- does the available information satisfy all needs?
- do we need to adapt the guidelines or evidence for local circumstances, and if so, what are we going to do?

There are few reports of adaptation in the literature, but a commonsense approach would be to:

- form a small group to adapt the evidence to meet the needs — in terms of content and format — of the target audience;

- encourage that group to coopt further representatives from the target audience;

- start with a list of questions the target audiences want answered (see the accompanying handbook *How to Present the Evidence for Consumers: Preparation of Consumer Publications*, NHMRC 2000a); these questions will vary greatly from group to group within the target audience; and

- answer those questions in accordance with the evidence.

ACTION — Ensure information suitable for different groups is available

Case study 1: SIDS

Different groups used the evidence in different ways.

- Governments produced advisory notices for their employees, based on the research evidence. They also issued public warnings.

- SIDS organisations produced pamphlets, leaflets, posters and advertisements, as well as more thorough briefing papers for government, media and others.

- Some clinicians read the original papers, while others read secondary sources.

- Parents received verbal, as well as written, advice.

- The media adapted all those forms of information into stories.

Case study 2: blood transfusions

A number of protocols had been established internationally. None of these were judged suitable, and some were out of date. Dr Metz produced new guidelines, based on knowledge of the literature and local conditions. They were circulated for comment to the hospital transfusion committee. Revised guidelines were then circulated throughout the hospital for comment. After further revision, the new guidelines were published on the blood transfusion request form, as well as elsewhere.

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8   WHAT ARE THE BARRIERS?

Any plan has to overcome barriers to its successful implementation. Barriers can be overcome — sometimes easily, sometimes with difficulty. However, it is easier to overcome them if they have been identified systematically. The next step therefore is to identify these barriers.

There are two parts to this. The first is that barriers may occur at different levels. They can occur at the systemic level, at the professional level, at the community level or at the level of the individual consumer.

The second part is that different target groups within these levels face different barriers. Nurses for example, may face problems that are quite different from the problems faced by surgeons, and administrators will have a totally different set of problems.

For example, if you wish to reduce the number of adverse drug events, one effective approach is to introduce standardised abbreviations and dosages, and to withdraw nonstandard dosages from the ward to the pharmacy for mixing there (Leape et al 1998).

Doctors may face certain barriers in implementing such an approach, including:

- a habit, perhaps formed over decades, of using nonstandard abbreviations and dosages;

- a lack of personal knowledge of adverse drug events due to nonstandard abbreviations and dosages;

- an unwillingness to act on the basis of requests from the pharmacy department; and

- time pressures which make them feel they need to use abbreviations, many of which are their own.

Nurses may face barriers such as:

- a conflict between the prescribed medication, and requests from the pharmacy not to dispense medication prescribed inaccurately;

- resentment that the authority to mix drugs on the ward has been removed; and

- frustration that drugs previously available on the ward have been withdrawn to the pharmacy.

Administrators may face barriers such as:

- inability to see there is a problem because adverse drug events are massively under-reported; and

- wariness of challenging doctors, who are traditionally the most powerful group in a hospital, over what appears to be a relatively minor matter.

A variety of strategies may be needed to overcome these sorts of barriers. But first the barriers must be identified and described. They can be assessed through means such as surveys, interviews, or focus groups involving the primary target groups. A range of options exists for eliciting barriers. These have different resource implications and we do not know which is the most appropriate and efficient method. At present local groups have to use their judgment in the choice of methods, based upon skills and resources available. Moulding et al (1999) have suggested that the use of qualitative methods can provide a more detailed and comprehensive picture of the situation.

One such barrier, which we will describe in a little detail, is known as 'readiness to change'. As described by Prochaska and DiClemente (1983), human beings need to warm up to the idea of changing. They describe five stages — precontemplation, contemplation, preparation, action and maintenance. We respond differently to suggestions and strategies at different stages of readiness to change. This model is important because it forms the basis of a practical approach described in Section 11.

ACTION — Identify barriers to implementation

Case study 1: SIDS

Many of the common barriers in health care did not exist for SIDS. Changing sleeping position is an easy change to make. It did not cost money to recommend change. It is an issue of great interest to parents, to the media and to health professionals because it involves babies.

However, barriers still existed, mainly personal ones. Most doctors and nurses had, for years, advised parents to lay their babies face down. It was established procedure in most maternity units. The individuals involved needed to accept that their current practice had not only been shown to be wrong by research, but had been shown to be dangerous.

Case study 2: blood transfusions

The main barrier was that a clinical decision previously left to individual judgment was now the subject of guidelines. That required a change of attitude on the part of some clinicians (J Metz, personal communication).

Other potential barriers included:

- the need for haematology department staff to take on a new role, which involved manually checking each blood product request against the guidelines, and discussing any discrepancies with the requesting doctor; and

- the time and money involved in applying the guidelines (J Metz, personal communication).

9   ARE THINGS ON TRACK?

At this point, it is worth stopping to ask all the previous questions once again. Considering the barriers that you have identified, are all the stakeholders involved? Have you identified all the target audiences? Do you have the right type of people on your committee or working party?

Actually, this review of progress can occur at any point in the process. At all stages, the process has to be checked to see that it is focused, inclusive and heading towards the objective.

ACTION — Review progress

Case study 1: SIDS
Progress in reducing SIDS was reviewed constantly by the leading players and their organisations.

Case study 2: blood transfusions
Progress was reviewed repeatedly by the hospital transfusion committee.

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10 WHAT ARE THE OPTIONS?

Now you are confronted with a series of options. You want people to change behaviour. Do you run a series of lectures? Offer them financial incentives? Threaten punishment if they don't cooperate?

It is impossible to say which strategies should work in which circumstance. There is a reasonable literature to draw on. The Cochrane EPOC group has been established to carry out reviews of interventions designed to improve professional practice and the delivery of effective health services (accessible on the Internet[1]), which are summarised in some detail, with examples, in Appendix D. But this literature is flawed in that it:

- does not explain the context of each strategy, which makes it difficult to assess whether or not a strategy that has worked in one context will work in another;

- derives mainly from North America, so may or may not be applicable in other health care systems;

- generally ignores questions of cost-effectiveness, looking only at effectiveness;

- contains few direct comparisons of different strategies; and

- methodologically, is varied in its strength.

Despite these drawbacks, we have categorised the various strategies into their overall level of effectiveness in Table 10.1.

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[1] www.cochrane.org/cochrane/revabstr/g100index.htm

Table 10.1   Strategies and overall effectiveness

Consistently effective	Variably effective	Little or no effect	Unknown effectiveness
Educational outreach visits	Audit and feedback	Educational materials alone	Financial incentives
Decision-support systems and other reminders	Local opinion leaders	Didactic educational meetings	Administrative interventions
Interactive educational meetings	Local consensus processes		
Multifaceted interventions	Patient-mediated interventions		
Mass media interventions			

Based on Bero et al (1998)

We repeat that this table is a guide, based on imperfect literature. That is not to say that educational outreach visits will always work in all circumstances, or that educational materials alone are always ineffective. Who knows how cost-effective a well-placed pamphlet may be in the right circumstances?

We will describe the series of strategies available for which there is evidence.

10.1   Educational outreach visits

Outreach visits, which are also known as 'academic detailing', are face-to-face visits by trained personnel to clinicians in their practice settings.

The pharmaceutical industry has invested significantly in this approach, and believes it to be worthwhile for influencing prescribing decisions (Thomson et al 1998a, Todd 1995, Chren and Landefeld 1994). It is also used by pharmacists to try to influence prescribers, and was used by the SIDRF to influence midwives about baby sleeping positions (see Section 11). It is used by many people to try to influence politicians, where it is known as lobbying.

The strength of this strategy is its personal nature. While it can be expensive on a large scale, it is affordable and can be effective on a smaller scale.

10.2 Decision-support systems and other reminders

Decision-support systems include anything — manual or automated — that prompts health professionals to perform a clinical action. Examples include:

* reminders about screening;

* laboratory reports where results to note are highlighted;

* follow-up appointment systems; and

* stickers on charts.

Computerised decision-support systems, for example, have led to improvement in doctors' decision making on drug dosage, the provision of preventive care, and the general clinical management of patients, but not in diagnosis (Hunt et al 1998).

The advantage of decision-support and reminders is that they are fairly easy to implement, are available to the clinician at the time required and need not be expensive. However, we still have a lot to learn about how to make best use of them.

10.3 Interactive educational meetings

These involve the active participation of health professionals in workshops, in small-group discussion, in problem-based learning or a range of other approaches. They have become the standard approach for many industries, although they are not yet standard in health.

10.4 Multifaceted interventions

Multifaceted approaches are more effective than single interventions. The research has examined combinations of audit and feedback, reminders, local consensus processes and marketing. It seems logical that any combination of approaches with a consistent message will be more effective than any single approach as they will tap into different parts of the change process (Davis et al 1995).

10.5 Mass media campaigns

Both planned and unplanned approaches can be successful in the mass media, although their effect on health services utilisation may be modest (Grilli et al

1998). The mass media is a means of reaching all target groups at once, as consumers, health professionals, bureaucrats, policy makers and all other target groups read newspapers, listen to the radio and watch television.

There are many different ways to use the mass media, including:

- providing information to a journalist;
- providing a 'photo opportunity';
- having an opinion leader write an article;
- direct access — talkback radio or letters to the editor; and
- advertising.

The media includes national and regional media as well as local, professional and trade media. It can be expensive to approach it formally, using a public relations company, but it can cost as little as one well-placed phone call.

10.6 Audit and feedback

Audit and feedback are a continuing process in which clinical performance over a set period is summarised, and the data are fed back to the clinician (Thomson et al 1998c).There may or may not be recommendations for action, and there may or may not be other data on which to compare the clinician's performance. Audit and feedback are usually cyclical, or recurrent.

According to Greco and Eisenberg (1993), audit and feedback are most successful if the clinician receiving the feedback:

- recognises current practices must change;
- is able to change; and
- can respond to feedback immediately.

10.7 The use of local opinion leaders

Local opinion leaders are people who are trusted by their colleagues to evaluate new medical information and technology in the local context. This context may be hospital-based, regional, state-based or even national.

Local opinion leaders are not necessarily innovators or authority figures, but are approached frequently for clinical advice, have good listening skills, and are perceived as clinically competent and caring (Lomas 1997). Theoretically, they

have the potential to change clinical practice among peers. However, the few randomised controlled trials in this area have shown mixed results.

10.8 Local consensus processes

It is important to involve local health professionals in solving local problems. Local health professionals are aware of barriers that may not be apparent to outsiders, and can tailor solutions, although of course these solutions do not always work.

10.9 Consumer-mediated interventions

Consumer-mediated interventions include anything that aims to change a clinician's behaviour via the consumer. Examples include:

- direct mailing to consumers;

- patient counselling delivered by others;

- clinical information collected directly from consumers and given to the health professional; and

- media campaigns.

These approaches have been used for some time with preventive health care, and are being adopted by other streams of health care.

10.10 Educational materials

Educational materials include recommendations for clinical care (such as clinical practice guidelines or protocols), audiovisual materials, electronic publications and journal articles. They seem to have only a small effect in altering practice, but their cost-effectiveness has not been assessed. Also, they may form a basis for, and background to, a range of other activities.

If you use educational materials, whether in a passive or an interactive form, you will have to decide on the media and formats to be used, taking into account the barriers identified earlier (see Section 8). Do you use print, video, audio, computer-based, Internet-based, or a combination of formats? Will different approaches be needed for different target groups? Some further information about these issues is given in the accompanying handbook *How to*

Present the Evidence for Consumers: Preparation of Consumer Publications (NHMRC 2000a).

10.11 Didactic educational sessions

The standard educational approaches of lectures, personal visits or workshops — sessions in which there is no explicit effort made to change practice — have often failed to change performance or improve health outcomes. However, they may change knowledge, and are relatively cheap and easy to set up.

10.12 Incentives and penalties

Many incentives operate within the health system to influence clinician behaviour, including:

- financial incentives, such as differential fee charges, prospective payment systems, clinical budgeting, the removal of items from reimbursement schedules, and the provision of funds for retraining in specific techniques recommended by guidelines;

- personal satisfaction, compounded by recognition from peers or experts/champions;

- professional incentives, such as accreditation or continuing medical education (CME) points.

- invitations to attend professional conferences (eg doctors are more likely to prescribe a particular drug if they have been on expenses-paid weekend 'seminars' in holiday resorts with their spouses organised by the manufacturers of that drug [Orlowski and Wateska 1992]);

- the possibility of increased protection offered against litigation (NHMRC 1999);

- government regulation; and

- the receipt of personalised, relevant data through the evaluation process.

Clinician behaviour is less likely to change if there are disincentives to do so. Disincentives include:

- extra workload;

- extra time required;

- no extra remuneration, associated with either of the above;

- the need for extra resources; and

- the need for specialised skills and equipment.

Possible disincentives for consumers include cost, complications and the need for travel to specialised centres for treatment.

This area has not been well studied.

10.13 Administrative interventions

Administrative interventions that encourage or force health professionals to change their practices are used widely, but have rarely been evaluated (Greco and Eisenberg 1993). Administrative interventions include:

- the erection of barriers, such as requiring the approval of a specialist for certain tests or drug orders;

- the removal of barriers, such as simplifying an order form;

- incentives, such as providing funds for general practitioners who reach a target immunisation rate;

- sanctions, such as reviews of professional activity by the Health Insurance Commission; and

- price signals, such as the establishment of a common schedule fee for caesarean sections and vaginal deliveries.

Changes in behaviour can also be encouraged by the implementation and enforcement of laws, regulations and institutional policies.

ACTION — Consider the options available

Case studies 1 and 2: SIDS and blood transfusions
The strategies chosen in these cases are given in Section 11.

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11   WHICH STRATEGIES SHOULD BE USED?

There is no single, or simple, answer to the question of which strategy to use. But there are a few general principles that will help.

1. A range of strategies can be used. Some have been tested and are fairly consistently effective, and some have been found wanting. None have been tested in the specific context in which you work.

2. Additional strategies exist within the minds of you and your colleagues — people who know your local situation.

3. There are barriers that impede change. They vary according to local circumstance, and many will be overcome with tailored solutions.

4. Multiple strategies are likely to be more effective than single strategies.

5. Strategies need to be developed for each target group. In some cases, strategies will overlap, but in others, they won't.

11.1   Designing a program

In deciding on which strategies to use, the factors that need to be taken into account are:

*   the overall purpose;

*   the key messages to be conveyed;

*   the target audiences to be reached;

*   the barriers, including the readiness of target groups to change;

*   the budget;

*   the time available;

*   the human and other resources available; and

*   the seriousness of the issue.

It is important to make an assessment of whether it would be most appropriate to target the implementation program at the individual, group or population level (Moulding et al 1999). This assessment should be based on the identified barriers to change and the level of readiness to change. It may be unnecessary to use national opinion leaders if most practitioners are already positive about a

particular guideline. On the other hand, it may be important to work at the local level with specific groups of practitioners where there is less support.

Table 11.1 (developed by Moulding et al 1999) incorporates elements of readiness to change and the level at which interventions should be aimed. It is a useful guide, but is not a prescription.

Table 11.1   Interventions according to the stage of readiness to change model

Stage of readiness to change	Strategies (based on an assessment of barriers to change)	
	Individual/group	Populations
Pre-contemplation/ contemplation	Use of local opinion leaders One-to-one information provision (eg academic detailing) Information provision through traditional workshops/ conferences Small group discussions	Dissemination of clinical practice guidelines through mail, Internet and/or journal publications Adoption of official policy Use of national opinion leaders Raising awareness through media campaigns
	Innovative CME (participatory, facilitation of skills development) Modification of practice environment to enhance decision making Patient education at the clinical level — noninteractive and interactive (ie patient-mediated interventions) Local consensus processes End-user involvement in guideline development/ adaptation Administrative interventions (such as modification of the order form)	Public education through media campaigns Public education through more interactive, community-based education Government regulation
Preparation/ action/ maintenance	Audit and feedback Peer review Administrative interventions (such as order form modification) Computerised record systems Reminder systems	Feedback on practice pattern data Feedback on health outcomes data Mailed reminders to clinicians/patients Media campaigns to maintain awareness

Source: Prochaska and DiClemente (1983)

Lomas (1997) has approached the question of which strategies to use from a different angle. He stressed that clinical decisions are influenced by legislation, regulation, societal attitudes, financial arrangements, personal beliefs, religion, community support, funding arrangements, clinical experience, patient preference and many other factors.

Table 11.2 presents an adaptation of these ideas, summarising the types of information and format preferred by different groups of people. This table should be taken as no more than suggestion, as it does not have a strong base in evidence. At present we do not have much evidence to support the choice of intervention in the presence of barriers. More information on models of behaviour change is given in Appendix E.

Table 11.2   A summary of audience types, their information needs and preferred information formats

Audience	Type of decision maker	Information needs	Preferred format
Legislative	• politician • bureaucrat • interest group	• problem definition • affirmation of assumed causes • policy 'ideas'	• person-to-person • overview in brief memorandum • media
Admin-istrative	• program manager • regional administrator • hospital executive	• program evaluation • practice variation • cost-effectiveness	• special contacts • summary report • dedicated seminar
Clinical	• practitioner • professional society • expert panel member	• effectiveness • ethics • patient preference	• colleagues • action-oriented synthesis
Industrial	• company scientist • corporate executive • venture capitalist	• marketable product	• depends on scientist versus non-scientist
Consumer	• patient • friend/relative • person with chronic illness • well person	• effectiveness • safety • cost	• personal

Source: Adapted from Lomas (1997)

11.2   Putting the program into action

Once a program is designed, of course, it must be put into action. While there are many ways of carrying out plans for change, we recommend a general approach, which is adaptable to many circumstances, and which has been shown to be successful in a range of health care settings. This is the approach used by the Institute for Healthcare Improvement[2] (a Boston-based, independent, non-profit organisation with a mission to accelerate improvement in health care systems in the United States, Canada and Europe by fostering collaborations among health care organisations).

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[2] www.ihi.org

The Model for Accelerating Improvement they use begins with three processes based on three fundamental questions.

- *Setting aims* — what are we trying to accomplish?

- *Establishing measures* — how will we know that a change is an improvement?

- *Developing changes* — what changes can we make that will result in improvement?

A cycle — called the plan–do–study–act (PDSA) cycle — is then used by the team to test and implement changes. The planning stage involves:

- stating the objectives of the cycle;
- making predictions about what will happen and why; and
- developing a plan to test the change.

The doing stage involves:

- carrying out the test;
- documenting the problems and unexpected observations; and
- starting to analyse the data.

The study stage involves:

- completing the data analysis;
- comparing the data to the predictions; and
- summarising what was learned from the test.

The acting stage involves:

- determining what modifications should be made; and
- preparing a plan for the next PDSA cycle.

The next PDSA cycle is then implemented. The team continues to refine the changes by linking PDSA cycles in this way, until the change is ready for broader implementation. The linking of these small change cycles is said to assist in overcoming the natural resistance of an organisation to change.

ACTION — Decide which strategies to use

Case study 1: SIDS

The definitive history of the decline of SIDS has not been written, so it is impossible to assess every attempt that was made to get babies off their abdomens. But it seems fair to say that almost every intervention mentioned in Section 10 or in Table 11.2 was used at some stage.

For example, the Sudden Infant Death Research Foundation and associated groups have been involved in:

- raising money through quite varied means to fund research;
- supporting parents;
- training those involved in dealing with families affected by SIDS, such as ambulance services and police;
- supporting regular national conferences on SIDS;
- supporting the purchase of monitors by hospitals;
- holding information evenings;
- running a range of support groups for parents, grandparents and others;
- holding workshops for health professionals;
- producing pamphlets;
- running television commercials;
- cooperating with television producers;
- cooperating with media requests;
- initiating media stories;
- publishing booklets for SIDS parents;
- producing videos for parents;
- funding the position of paediatric pathologist at the Victorian Institute of Forensic Medicine;
- funding the development and implementation of a national autopsy protocol;
- lobbying government;
- having stands at public events;
- running a telephone information service;
- holding scientific forums to review and monitor risk factors.

Case study 2: blood transfusions

Royal Melbourne Hospital also used a number of strategies to reduce inappropriate transfusions.

It established the scope of the problem (see Section 3) (Metz et al 1995). That study became the basis of a broadly-based audit and feedback approach.

It encouraged all the players to become involved, by forming a committee and sending the draft guidelines out for comment and review, which achieved a form of local consensus.

It had a local opinion leader in Dr Metz.

It used reminders and an administrative intervention by printing the guidelines on the redesigned transfusion request form. The form also contained space for clinical and laboratory data, which the doctor was asked to complete.

The haematology department offered immediate audit and feedback, by discussing with requesting doctors all cases which did not meet the guidelines for transfusion.

It used educational materials, by publishing the guidelines separately, and by publishing the results of its work in Australia's best known medical journal (Metz et al 1995; Tuckfield et al 1997).

12   IS SUPPORT AVAILABLE?

For changes to be made, support must be available at a number of levels. That support may be administrative, it may be financial, it may be material, and it may be moral.

12.1   Systemic support

Funds may be needed to support change. In some cases, ongoing funding will be needed to support and sustain the new practice. Investment in infrastructure development may be needed. In general, a change that requires simple substitution of a similar process or product is less expensive than change requiring new processes or products.

Supplies of materials must be available. For example, a new immunisation policy will not be implemented if the vaccine is not available at the time the policy is released and promoted.

Similarly, if a community awareness program of risk factors for diabetes is promoted, general practitioners should be sent information about the program before it is launched, including information about what tests to order, on whom and how often.

12.2   Professional support

Professional support includes:

- full involvement as early as possible in the dissemination and implementation planning and process;

- the provision of training and education, where required, at an early stage;

- clear policies regarding the practical aspects of any new measure or practice;

- information both to inform the professional, and to allow the professional to deal with consumers' questions;

- cooperation with health educators; and

- feedback on evaluation.

12.3 Consumer support

Consumer support includes:

- the provision of full information — through different media and at different levels, and possibly in different languages — so that consumers can make informed choices; and

- adequate financial support of any new health measure to allow equity of access.

ACTION — Ensure support is available at a number of levels

Case study 1: SIDS

The campaign to reduce the number of deaths from SIDS had support from consumer groups, professionals, government, the public and the media, all of whom contributed to the success of the campaign.

Case study 2: blood transfusions

The Royal Melbourne Hospital ensured support for strategies to reduce inappropriate transfusions by forming a committee involving all the players, and through Dr Metz, who acted as a local opinion leader.

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13   WHAT WOULD IT COST, AND IS IT WORTH DOING?

Having decided on what strategies may be best, it is time to consider the cost. Because costs are so strongly dependent on the local situation, it is difficult to give specific advice on costs of particular interventions. However, there are some general points to consider.

13.1   What is the cost?

If an intervention is totally new, it is necessary to consider its total cost. But more often, you would need to consider how much extra a new intervention would cost over and above existing activity.

For example, if you decided to heavily promote an existing telephone counselling service, you would need only to consider the extra cost this incurs (ie the marginal cost), rather than the overall cost of the service. It is also important to consider the flow-on costs, such as the costs of extra clinical services that might follow from the extra telephone referrals.

In assessing costs, it is also necessary to examine how the intervention is carried out so that waste can be minimised. For example, what is the optimal telephone system to provide for the additional counselling workload expected?

The issues of economic analysis in clinical practice guideline development are discussed in more detail in another handbook in this series (*How to Compare the Costs and Benefits: Evaluation of the Economic Evidence, NHMRC 2000d).*

13.2   Could the money be spent differently?

To achieve the same purpose

This is a question of cost-effectiveness. For example, if you want to improve prescribing habits, would you run a series of seminars or organise academic detailing? It is worth examining the literature about this question, because cost-effectiveness studies have been carried out in many areas.

For another purpose

This is a bigger question. You have already decided what the purpose is. Now is the time to question whether it is worth spending the available funds to achieve

that purpose. Even if the funds are readily available, are there other things you could achieve that might be more worthwhile?

13.3 Equity and continued use of the intervention

It is important to consider equity, that is, will the intervention be available to all who need it? While a discussion of equity is beyond the scope of this document, it is an important principle of Australia's health system, and must be considered.

It is also important to consider whether the intervention is adaptable to new knowledge and changing circumstances. This has important implications for cost.

ACTION — Determine costs and cost-effectiveness of strategies

No information was available on this aspect of the case studies.

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14 HAS IT WORKED?

It is pointless going through the exercise of disseminating evidence unless you sit back, at some stage, and ask whether or not your efforts have been effective as measured against your objective.

There are two parts to evaluation — evaluating the process and evaluating the outcome.

14.1 Evaluating the process

The evaluation should examine whether or not the approaches taken worked technically. For example, if you mailed out 20 000 pamphlets, a random telephone survey of recipients would tell you how many saw the pamphlets, how many opened them and how many read them. It would then be possible to determine if those figures matched the objectives set.

Or, if you used academic detailers, how successful were they in gaining appointments? How long did they spend with each clinician? Did those figures match the objectives set?

Process evaluation is important, because it informs you about your technical efficiency, and reveals technical failings.

But it is a 'surrogate' endpoint only. It tells you nothing about the important question: did anybody's behaviour change?

14.2 Evaluating the outcome

You set out to influence clinical practice and health outcomes on the basis of evidence. The important question is, has it worked?

Evaluating the outcome may be more difficult than evaluating the process. There may be a range of outcomes which could be evaluated.

Have clinicians changed a particular practice? For example, is there a drop in the proportion of women having mastectomy for early breast cancer? Has there been a reduction in the number of preoperative blood tests ordered (the results of which would be available only postoperatively)? Is there an improvement in the immunisation rate in five year old children?

Is there a measurable change in health outcome? Has there been a drop in the number of children with measles per annum? Has the number of postoperative deep vein thromboses dropped? How about the proportion of patients who suffer a second acute myocardial infarction within a year of the first one?

To measure these outcomes requires a fair degree of planning. It also requires a budget and assigned personnel to carry out the task.

ACTION — Evaluate the process and the outcome against the objectives

Case study 1: SIDS

The multifaceted approach to reducing SIDS was successful — deaths declined from 579 in 1986 to 163 in 1997. Thus the objective of reducing deaths from SIDS by two-thirds was achieved.

Case study 2: blood transfusions

Inappropriate transfusions at the Royal Melbourne Hospital reduced significantly after the guidelines had been implemented. The objective of reducing inappropriate transfusions to an acceptable level was achieved in the case of red cells and platelets, although the reduction for fresh frozen plasma was less satisfactory. The hospital team is studying the process of implementing the guidelines to see why the reduction for plasma was less significant.

A more detailed evaluation of these two case studies is contained in Appendix F.

APPENDIX A

MEMBERSHIP OF PRODUCTION TEAM FOR HANDBOOK

NHMRC Assessment Panel

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APPENDIX B

PROCESS REPORT

During the 1997–99 NHMRC triennium the Health Advisory Committee focused its work on the areas of coordination and support rather than on collating and reviewing scientific evidence. However, the committee recognised that a key part of its coordination and support function was to provide a methodology on how to develop evidence-based guidelines.

The NHMRC publication *A Guide to the Development, Implementation and Evaluation of Clinical Practice Guidelines* (NHMRC 1999), which had been produced by the Health Advisory Committee as a resource for people wishing to develop clinical practice guidelines to a standard acceptable to the NHMRC, was revised during 1998. Early in the revision process, the committee realised that there was a need for a number of complementary handbooks to expand on the principles outlined in the document. This complementary series would cover other aspects of the identification, collation and application of scientific evidence. It was envisaged that these handbooks would be of invaluable assistance to agencies wishing to develop clinical practice guidelines of a high standard either independently, or on behalf of the NHMRC.

It was agreed that there would initially be five handbooks in the series:

- how to review the evidence;
- how to use the evidence;
- how to put the evidence into practice;
- how to present the evidence for consumers; and
- how to compare the costs and benefits.

They would be published individually to allow flexibility in their production and revision, as well as to allow any later additions to the series.

Recognising the need for a transparent and competitive process for contracting the services of an expert(s), tenders were sought for the preparation of each handbook. A selection committee was then appointed by the Health Advisory Committee to consider the tenders.

Once the successful tenderers had been contracted to prepare the handbooks, an assessment panel, composed of Health Advisory Committee members, was formed to manage the progress of each project (see Appendix A).

When first drafts of each handbook were received, they were distributed to a small number of experts in that particular field for peer review. The documents were subsequently revised in the light of these comments. A technical writer

was employed to ensure consistency in content and style within and between the handbooks.

The finalised documents were referred, in turn, to the Health Advisory Committee for approval before being forwarded to the NHMRC for endorsement.

APPENDIX C

ELEMENTS OF RESEARCH TRANSFER

The four main elements for effective transfer of research into clinical practice can be summarised as good information; good access to information; supportive environments; and evidence-based promotion of knowledge uptake.

Good information

A prerequisite for the transfer of research-based knowledge into policy and practice is the rigorous review of research results and synthesis of the knowledge itself. Essential components are soundly-based research results, methods of appraising the strength of evidence provided by individual studies, and rigorous methods of summarising the findings of multiple studies to produce conclusions that can be used in real health decisions.

Over the past 10 years, increasing attention has been paid to the critical appraisal and synthesis of research results. The development of methods of systematic review has been accompanied by a proliferation of meta-analyses and systematic review projects. These efforts have generated significant, and rapidly expanding, international databases of research-based evidence that have been rigorously appraised and summarised. Systematic review of the scientific literature and the assessment and application of evidence are the topics of two other handbooks in this series (*How to Review the Evidence: Systematic Identification and Review of the Scientific Literature,* NHMRC 2000b; and *How to Use the Evidence: Assessment and Application of Scientific Evidence,* NHMRC 2000c).

However, the extent to which decision makers use this rigorous evidence, and how they use it, is not known. It appears that clinicians, policy makers and indeed researchers continue to base their knowledge on studies that are methodologically flawed, thereby potentially sustaining inappropriate practice (Haines and Jones 1994).

Related to the exponential growth of evidence is the proliferation of guidelines, especially clinical guidelines. Clinical guidelines are systematically developed statements to assist practitioner decisions about appropriate health care for specific clinical circumstances (Institute of Medicine 1992, NHMRC 1999). Guidelines have been found to enhance the quality and outcomes of clinical care. However, the successful introduction of guidelines is dependent on many factors, including the characteristics of the guidelines (Grol et al 1998), the clinical context and the methods of development, dissemination and implementation.

Good access to information

While the dissemination of research-based knowledge does not, of itself, lead to implementation, new knowledge will not be implemented unless it gets to the people who should have it. The importance of deliberate and planned dissemination efforts is often overlooked. There are recent examples of expert national committees producing and endorsing evidence-based clinical and consumer guidelines that were printed, but left in the warehouse, and therefore did not come to the attention even of leading clinician-managers (Prof D Henderson-Smart, personal communication 1998).

The dissemination process depends upon four lines of deliberate action:

- target groups must be specified;

- the most appropriate media must be determined (eg print or electronic media);

- resources must be allocated for the design, production and distribution of materials; and

- the design, production and distribution process must be managed as a project, with appropriate evaluation and feedback.

When asked about the principal audience for their work, most health researchers include their academic colleagues at the top of the list, followed perhaps by reference to society or decision makers (Lomas 1994). Lomas (1997) has described five groups of users of research findings, noting that they require different types of information in different forms:

- legislative decision makers: politicians, bureaucrats, and interest groups engaged in developing public policy;

- administrative decision makers: managers, executives, and board members;

- clinical decision makers: individual practitioners caring for patients, and groups developing clinical guidelines and other directives;

- industrial decision makers: including company scientists, corporate executives, computer industry personnel, and venture capitalists; and

- patients or consumers of health services.

As noted below, a commitment to information systems is an important element of the organisational environment that supports research transfer. At the simplest level, this means rapid access to computerised databases in settings

such as the ward and the consulting room, and a working knowledge of how to use them (Donald and Haines 1997).

Whatever the future may bring, computerised information is not currently accessible to many clinicians (such as community-based practitioners) and consumers. Lack of access to a computer and the worldwide web should not impede access to evidence on the effectiveness of health care for anyone. The availability of printed materials and telephone-based advice remain very important. Innovations include the provision of dial-up health advice for subscribers to health insurance funds (Poole et al 1993), critical appraisal of patient information literature (Coulter 1998), and the increasing availability of evidence-based guides for consumers that are published alongside guidelines for health professionals (NHMRC 1997, USDHHS AHCPR 1992a, 1992b, 1993).

Supportive environments

Experience from industry and management theory suggests that improvements in clinical practice cannot be achieved merely on demand — system changes are necessary to encourage behaviour change (Berwick 1996). In addition to organisational structures, decision-making processes and resources, system factors include laws, regulations, licensing and accreditation mechanisms, budgeting and contracting, utilisation review, and complaints procedures (Grol 1997). Research transfer is likely to be favoured in organisations where research is valued, there is critical debate of research methods and results, and there is managerial commitment to change (both to effective information systems and to routines that facilitate their use). Information systems comprise much more than just information technology; they include information management and resources, as well as expertise in management and retrieval of information (Gray 1998).

An important element is the relationship between researchers and potential users of research-based knowledge. It is likely that the longstanding cultural divide between researchers, practitioners, and administrators has impeded the transition from publication of research to clinical practice (Haines and Jones 1994, Lomas 1997).

Communication of ideas occurs most effectively between people who share important attributes such as educational level, beliefs, social status, and networks (Lomas 1997). Researchers and decision makers seem to proceed largely independently. Researchers tend to focus more on the assembly and dissemination of results than on the uptake and use of research, while decision makers tend to focus on the applicability of the findings and their relevance to the decision context. A necessary condition for improving the linkage between health research and action is for researchers to understand the needs and decision-making modes of the five potential target groups listed above (Lomas 1997).

Evidence-based promotion of knowledge uptake

The study of effective approaches to changing practitioner behaviour is a growth area for research. While there are some promising techniques (Dunning et al 1997), we are far from knowing what works best at particular times, in particular settings, for particular innovations (Lomas 1997).

A range of interventions to promote the implementation of research knowledge has been tried. These approaches have been underpinned by a number of theoretical perspectives. The main theoretical perspectives are considered briefly, below.

Theories of behaviour change

Adult learning theory/health education theory

Key elements are personal motivation to change and active, rather than passive, participation of the learner. A central tenet of health education theory is that behaviour change requires attention to 'gaps' in both knowledge and skills. Educational programs based on these theories will include interactive elements as well as basic provision of information. Examples include problem-based learning and workshops as opposed to traditional didactic lectures (Lomas 1994, Moulding et al 1999).

Social influence theories

Theories of social influence emphasise that habit, socially accepted norms of appropriateness, and the opinions and attitudes of peers (and clients or patients) may act as barriers and motivators to behavioural change. These theories emphasise that prevailing practices and social norms shape the interpretation of information provided through education and other 'rational' forms of information, such as cost–benefit analyses and evidence of improved outcomes (Lomas 1994, Moulding et al 1999). They focus on the role of social support, peer approval and role models in implementing behaviour change.

Marketing/social marketing theories

Marketing theories place emphasis on developing and 'selling' an attractive product (such as a practice guideline). This product must meet the needs of the target group and help them to achieve their goals (Grol 1997). Emphasis is placed on the source of the communication (such as the quality of the evidence, and/or the reputation of the organisation that developed the product), the channel or medium of presentation (such as an expert in the field), the message content, the characteristics of the target audience, and the setting in which the communication is received (Lomas 1994).

Organisational theory/social ecology theory

These theories focus on the environmental context within which clinicians function as a key determinant of whether innovations are utilised. The emphasis

is on the organisational and structural factors which may hinder or facilitate changes in practice (Grol 1997). Social ecology theory focuses on the interrelationship between individuals and their environment (physical, social and cultural). The environment is seen to influence individual behaviour and, in turn, individuals are seen to modify their environments. Thus, behaviour change is seen to be facilitated through appropriate changes to the environment, and this change in behaviour is seen to reinforce support for environmental changes (Moulding et al 1999).

Behavioural theory

Behavioural theory emphasises the importance of the environmental context in which human behaviour occurs. Environmental cues and reinforcements are seen to be central in encouraging and maintaining behaviour change.

Clearly the theories outlined above are not mutually exclusive. Most overlap to some degree, and many overlap to a large extent. Thus, in practice, many of the approaches to implementation have had overlapping theoretical underpinnings. No single theoretical perspective has been adequately validated by research to inform the choice of implementation strategies. Few authors of systematic reviews of interventions have made a specific attempt to link their findings to theories of behaviour change and, where they have, the findings have often supported several different theories (Grol 1997, Bero et al 1998, Davis et al 1995, Haines and Donald 1998).

APPENDIX D

THE EFFECTIVENESS OF INTERVENTIONS

As indicated in Section 10, it is impossible to be definitive about which interventions — out of all those that attempt to change behaviour — are most effective and which ones are ineffective. This section will describe each type of intervention, summarise the evidence about its effectiveness, and provide one or two examples.

Educational outreach visits

Education outreach involves face-to-face visits by trained personnel to clinicians in their practice settings to provide information about an intervention. Also known as academic detailing, educational outreach can be effective when used alone or in combination with other interventions. It appears to be particularly effective when combined with a social marketing approach that identifies barriers to change. However, much is still unknown about this approach, including the importance of the number of outreach visits, whether and how performance deteriorates over time, and cost-effectiveness in different circumstances and health care settings (Bero et al 1998, Soumerai et al 1998). This type of implementation strategy draws from the theories of social influence, health education and social marketing.

General practitioners (GPs) were the health professionals most commonly targeted in the trials included in a systematic review of this implementation strategy (Thomson et al 1998a), and prescribing was the most commonly targeted behaviour. Information about the effectiveness of outreach visits in other circumstances is limited.

Essential components of educational outreach interventions

Soumerai and Avorn (1990) identified those aspects of educational outreach which they considered to be essential, based on their own experiences, models from the pharmaceutical industry, and research in the fields of adult learning, diffusion of innovations, and social marketing. These included:

- defining the areas to be addressed and the specific behaviours to be encouraged or discouraged;

- understanding the motivations underlying the current behaviour;

- establishing and maintaining a credible identity, both for the outreach program itself and for the individual detailers;

- careful selection and training of detailers; and

- targeting high potential clinicians.

The involvement of local opinion leaders in the design and implementation of the program, offering practical alternatives to current practice, and 'inoculation' against counter-arguments likely to arise during the detailing visit were also seen to be important. Soumerai and Avorn also encouraged academic detailers to relate the message to the specific beliefs, needs, values and interests of the individual clinician by encouraging two-way communication and clinician involvement in the interaction, by repetition of a few key points, and by reinforcing behaviour change (by applauding successes and discussing specific problem cases) in a follow-up visit. They also advocated the use of well-illustrated printed materials that emphasise the key points of the message in a straightforward way. These could be used as a visual aid during the detailing visit and/or as an aid to memory for the clinician after the visit.

Example: smoking cessation in general practice

Cockburn et al (1992) used educational outreach visits in a comparison of approaches for marketing a smoking cessation program to Australian GPs. In their intervention, a smoking cessation kit was personally delivered and demonstrated to GPs by one of two educational facilitators (one with a clinical background as a nurse, and the other as a respiratory physiologist). Both facilitators had received extensive training (involving role-playing) in the use of the kit and the skills necessary for encouraging general practitioners to use it. During the first visit, the rationale for the kit and details on how to use it were explained. The facilitator also asked the GP to identify any reservations he or she might have about using the kit, and suggested ways to overcome these. Six weeks later, the facilitator visited again and encouraged the use of the kit and discussed any problems that had arisen from its use.

When compared to GPs to whom the kit was delivered either by mail or by a courier to the receptionist, GPs who received the kit through the educational facilitator were significantly more likely at follow-up to recall seeing it, to rate the method of delivery as more motivating, to have used one of the intensive intervention components from the kit, to report that they found the kit less complicated, and to report greater knowledge of how to use it. However, there were no differences between the groups in the use of the minimal intervention strategies and in ratings of the overall acceptability of the kit. The cost of the educational facilitator intervention was 24 times that of the mailing approach, and the cost of the courier was twice that of mailing the kit. The authors cautioned that the added benefit in terms of smoking cessation in the patients of GPs where the educational facilitator approach was used would need to be high to justify the expense of such an approach, and did not appear to be cost-effective in this case.

Example: drug therapy decisions

In studies in the United States, Avorn and Soumerai (1983) and colleagues have shown that educational outreach can be effective in improving the quality of

drug therapy decisions by clinicians, and improving the appropriateness of red blood cell transfusions in surgery (Soumerai et al 1993).

In the drug therapy study (Avorn and Soumerai 1983), clinicians were randomised into one of three groups: a control group or one of two intervention groups. Clinicians in one of the intervention groups were provided only with printed educational resources and other information about the study. Clinicians in the second intervention group were provided with the latter, but also received two personal visits from pharmaceutical educators (clinical pharmacists) who were specially trained in the pharmacology of the drugs targeted in the study, as well as in communication techniques. During these visits, the educators reviewed the information in the printed materials provided and encouraged the clinicians to restrain their use of the targeted drugs. Appeals based on fear were avoided, and improvement in the therapy of clinical problems was emphasised above cost considerations. Educators took care to present both sides of controversial issues before making recommendations. The main points were communicated succinctly and graphically, and findings from randomised controlled trials were stressed. In addition, the clinicians were encouraged to discuss their own specific problem cases with the educators.

Clinicians who received the educational outreach visits, as well as printed materials, reduced their prescribing of the targeted drugs by 14% compared with controls (*P*=0.0001). No significant change in behaviour was observed in the group that received only the printed materials. In a follow-up analysis, Soumerai and Avorn (1986) found that projected drug savings remained high after accounting for the cost of the educational outreach program and the use of substitution medications. They suggested that targeting of higher volume prescribers would raise the observed benefit-to-cost ratio substantially, and that net benefits would also increase if quality-of-care considerations were included.

Example: blood transfusion in surgery

In the blood transfusion study (Soumerai et al 1993), the experimental intervention consisted of:

- printed materials which presented the transfusion guidelines in a precise and graphic manner and with appropriate references to the clinical literature;

- a 60-minute group educational presentation at each service; and

- a single 20–30-minute face-to-face educational visit with each surgeon in the trial by a transfusion medical specialist.

Educational messages were developed based on factors affecting transfusion decisions identified from a survey of surgeons from another state, a pilot study of transfusion practices, from a United States National Institutes of Health consensus conference, and from the transfusion literature. The educator was

trained to use the same techniques as those used in the drug therapy study when conducting the face-to-face visits (see above). The average proportion of inappropriate transfusions declined by 40% among study surgeons compared with an increase of 9% among control surgeons (P=0.006). The effects were consistent across procedure type and specialty, and for surgeons in teaching and community hospitals.

Although a formal cost–benefit analysis was not carried out, the authors reported that preliminary data suggested substantial net economic benefits — even excluding consideration of the likely flow-on effect to surgeons' practice outside of the study hospitals, lower rates of transfusion in nontargeted cases, and reduced costs of infections and transfusion complications.

Decision-support systems and other reminders

These comprise any interventions that prompt health care providers to perform a clinical action. They can be manual or automated. Examples include reminders about screening, enhanced laboratory reports, follow-up appointment systems and stickers on charts. Clearly this type of intervention draws from behavioural theory and organisational theory.

The use of computerised decision-support systems has led to improvement in the performance of doctors in making decisions on drug dosage, the provision of preventive care, and the general clinical management of patients, but not in diagnosis (Hunt et al 1998).

Example: checklists for preventive health measures

Cheney and Ramsdell (1987) studied the introduction of an inexpensive system of age- and sex-specific preventive health maintenance checklists introduced into patient records at a university health centre in the United States. The checklists were based on research and other data from recognised authorities, and contained an area for recording the date on which the measure (such as mammography, Pap smear, vaccination, or breast, pelvic, or rectal examination) was performed and the results.

Each morning for a nine-month period, the medical records for the day's clinic were reviewed, and checklists were placed in the front of the charts of patients to be seen by clinicians in the experimental group. No specific efforts were made to encourage their use. After one year, 200 randomly selected records were audited to determine the proportion of recommendations implemented for each patient. The checklists significantly improved practitioner performance of appropriate preventive health measures compared to control ($P<0.002$).

Example: computerised cue for mammography

Chambers et al (1989) looked at the use of an existing microcomputerised clinical encounter form system in an outpatient clinic in the United States. In

the intervention group, the date of the last mammogram ordered was shown in the 'comments' section of the encounter form generated for each visit. No information regarding previous mammograms was printed for patients in the control group.

At the end of the six-month study period this simple and inexpensive prompt had resulted in significantly more women in the intervention group being in compliance with mammography guidelines when compared to controls (P=0.011).

Interactive educational meetings

Interactive educational meetings involve participation of health care providers in workshops that include discussion of practice, small-group interactive learning and/or problem-based learning (Bero et al 1998). In addressing gaps in both knowledge and skills, and incorporating interactive elements as well as information, such implementation strategies draw from health education theory.

Example: ethics education lectures

Sulmasy et al (1992) reported on a study carried out on members of a United States university-based internal medicine residency program — the Osler Medical Service of the Johns Hopkins Hospital. A control group of interns received a series of six lectures over an eight-month period addressing ethical vocabulary, principles, landmark court decisions and local law.

The first of these lectures was devoted entirely to the hospital's recently revised policy concerning 'do not resuscitate' (DNR) orders and associated 'concurrent

A second group of interns (intervention group) received a more extensive ethics education intervention involving the same six lectures with an additional series of six case conferences. In the case conferences, interns chose cases for discussion that they viewed as raising issues of ethical concern, such as termination of treatment decisions, or questions regarding confidentiality. The interns in the latter intervention were also assigned an assistant chief of service (junior attending physician) with formal training in ethics. This person was responsible for patient care and for frequent discussions of ethical issues during patient bedside rounds with this group. The more extensive ethics education intervention was associated with improved care for DNR patients, especially with respect to CCCs.

In the second month following completion of the intervention, the number of CCCs per DNR order fell among patients cared for by controls (P<0.05) and rose among patients cared for by interns from the intervention group (P<0.05).

Multifaceted interventions

In the research literature that has been systematically reviewed, multifaceted interventions that comprised two or more of the following were found to be effective in some situations:

- audit and feedback

- reminders

- local consensus processes

- marketing

Combinations of these types of interventions seemed to be more effective than single interventions, and incorporated strategies based on health education, social influence, marketing, social ecology, behavioural and organisational theories. The ability to address multiple theoretical aspects of the change process may explain the success of such programs when compared to single interventions.

Example: performance of general practitioners

In Putnam and Curry's (1985) randomised controlled study carried out in Canada, the effect of patient care appraisal on GPs' management of five disease conditions was assessed. The disease conditions included were acute bronchitis, headache, otitis media, hypertension and urinary tract infection. Sixteen GPs were randomly assigned to either the control or the experimental condition. GPs in the experimental condition were involved in developing the criteria of care for two of the diseases, and criteria of care for the rest were developed by an expert advisory committee.

The researchers conducted a baseline audit of patient records for assessing the performance of GPs against these criteria. The doctors in the experimental group then received an educational outreach visit involving individual feedback about the results of the audit and identification of each instance in which he or she had not met the criteria. During the feedback session, each doctor was offered any educational and/or administrative help that seemed appropriate or was requested.

Educational packages containing the information requested by the doctors during the feedback session were sent to the GPs within two months of the feedback session. A second audit was conducted six months later, and at this time participants in both the experimental and control groups were given feedback about their performance.

When essential criteria of care were considered, the experimental group significantly improved their management of patients' problems. However,

participation in the generation of the criteria of care had no effect on their performance.

Mass media interventions

Mass media interventions are based on social marketing theory. The results of a recent systematic review of the impact of mass media on health services utilisation (Grilli et al 1998) suggested that the mass media can have a positive impact, both as the result of planned campaigns and unplanned coverage. Although the interventions included in the systematic review varied in length and intensity, the clinical areas and types of behaviours addressed, and the study setting, the direction of the effect was consistent across studies. However, due to a lack of detail reported in the studies, it was not possible for the reviewers to draw any firm conclusions about the characteristics of successful campaigns or possible differences in the effect of planned campaigns and unplanned coverage. Thus, we still know very little about whether the characteristics of the message, and how it was framed, modified the effectiveness of the intervention.

The systematic review was unable to provide information about whether the impact of mass media on clinical practice is specific or nonspecific; that is, whether it results in more appropriate use of services by patients who can actually benefit from them, or if it just results in changes in overall rates of use, without affecting the appropriateness of service use. It is known that coverage of medical research in the popular press amplifies the transmission of medical information from the scientific literature to medical researchers (Phillips et al 1991). However, it was unclear whether the effects observed in many of the studies included in the systematic review were due to changes in the behaviour of health care providers (ie supply) or consumers (ie demand). Very few studies included adequate follow-up periods, so that the duration of the observed effects was unable to be assessed, and none utilised electronic mass communication channels (ie the Internet). Cost effectiveness of the use of mass media interventions was not addressed.

Example: Hysterectomy rates in a Swiss community

Domenighetti et al (1988) reported on the results of unplanned media coverage of the high hysterectomy rates in Ticino, the only Swiss canton whose official language is Italian. Initial media coverage included a newspaper article written by the chief surgeon of a public hospital and a radio news report on the results of a study presented at a scientific conference. These were followed by articles in six newspapers, and reports on television and radio. Three months later further reports appeared in the press and on radio following the publication of another study on hysterectomy rates. One month later, a radio station held a live phone-in program on indications for hysterectomy in which questions were answered by two researchers, one of whom was a gynaecologist. Two months later the issue of hysterectomy was raised again on a radio program in which the major events of the year in Ticino were being reviewed.

The annual rate of hysterectomy was significantly reduced in Ticino following the media reports, in contrast to the unchanged rate in a control canton (in the German-speaking part of Switzerland). The number of hysterectomies performed each year per gynaecologist decreased by 33.3% in Ticino, but was unchanged in the control canton. Overall, the greatest reduction in the number of hysterectomies was seen in nonteaching hospitals (32%) compared with teaching hospitals (18%). The authors suggest that this difference may have been due to the fact that patients were already being fairly carefully evaluated in teaching hospitals, whereas the campaign may have encouraged gynaecologists in nonteaching hospitals (who generally work alone) to be more careful in their evaluation of patients (ie there was more scope for improvement in the nonteaching hospitals).

Audit and feedback

Audit and feedback refers to any summary of clinical performance over a specified period, with or without recommendations for clinical action. The information may be derived from medical records, computerised databases, patients or by observation. Since such implementation strategies are designed to address gaps in clinicians' knowledge, they could be said to be underpinned by an educational approach to behaviour change. Some have viewed audit and feedback as being derived from behavioural theory in that behaviour is influenced by external stimuli before or after a specific action (Grol 1997). Where clinicians are compared with their peers and feedback is delivered by a person in a position of clinical leadership, they could also be said to be underpinned by social influence theory.

Plausible reasons for the variability in effectiveness of audit and feedback include differing components of the message, different target groups and targeted behaviour, and different methods of delivery. Although those attempting to influence professional behaviour have been advised not to rely solely on this approach (Thomson et al 1998b), it has not been possible to recommend a complementary intervention to enhance the effectiveness of audit and feedback (Thomson et al 1998c). A recent systematic review of audit and feedback (Thomson et al 1998c) was not able to determine the optimal characteristics of feedback generally, or in specific situations. However, an earlier review suggested that in order for feedback to be successful the following conditions must exist:

- clinicians must recognise that their current practices need to be changed;
- the person receiving the feedback must be in a position to act on it; and
- clinicians should be able to respond to feedback immediately.

Therefore, prospective reminders may be more effective than retrospective feedback in some situations (Greco and Eisenberg 1993).

Example: use of commonly ordered blood tests and X-rays

Berwick and Coltin (1986) used a cross-over study design (of intervention, test groups, and centre) to assess the impact of three interventions on the rate of use of 12 commonly ordered blood tests and X-rays among clinicians in a health maintenance organisation in the United States. The three interventions were:

- test-specific education (TSE)

- peer comparison feedback on cost of test use (PCF$)

- peer comparison feedback on yield of tests (PCFY)

TSE was designed to be analogous to grand rounds presentations. The TSE involved two departmental meetings over a two-week period which were devoted to the discussion of appropriate use of the tests. These were led by a visiting expert from the local academic medical community, and the discussions focused on the test itself or the test in relation to broader issues. Each expert was coached in advance to focus on issues of prudent test use. Prior to the meeting, all participants were given a package of journal reprints dealing with the tests to be discussed in the meeting.

With peer comparison feedback on cost of test use (PCF$), participants received individualised reports on the rates at which they and their centre colleagues were ordering tests, including:

- number of tests ordered per 100 consultations

- computed costs per 100 consultations

Clinicians were listed in rank order by cost, and by cost of tests ordered per 100 encounters. The rank order of the individual receiving the report was highlighted.

The peer comparison feedback on yield of tests (PCFY) was almost identical to PCF$, except that the information dealt with the rate of abnormal results per test, rather than cost.

Feedback on costs (PCF$) stood out clearly from the other interventions in its effect on test use. Overall test use fell by 14.2% compared to control (*P*=0.01). Eleven of the 12 tests showed some decrease. Neither feedback on rates of abnormal test results nor the program of test-specific education showed consistent effects. Variation in the rates of test use among clinicians fell by 8.3% with the cost feedback intervention, by 1.3% with the yield feedback, and by 2.3% with education, but these results were inconsistent across tests.

The use of local opinion leaders

Local opinion leaders are people who are trusted by their colleagues to evaluate new medical information and technology in the local context. This context may be hospital-based, regional, state-based or even national. Local opinion leaders are not necessarily innovators or authority figures, but are approached frequently for clinical advice, have good listening skills, and are perceived as clinically competent and caring (Soumerai et al 1998).

Both the theory of diffusion of innovations and the social influence model of behaviour change suggest the potential for local opinion leaders to change professional practice through the transmission of norms and modeling of appropriate behaviour. However, there have only been a few randomised controlled trials of this approach, and results have been mixed (Thomson et al 1998b).

Example: acute myocardial infarction (AMI)

Soumerai et al (1998) reported the results of a recent randomised controlled trial conducted in the United States that identified and utilised local opinion leaders to influence quality of care for AMI. They found that opinion leaders were easily identifiable and successful in increasing the use of highly effective therapies that had been promoted in national and local guidelines. In this study, opinion leaders were identified at experimental hospitals using a previously validated one-page questionnaire filled out by their peers. Sixteen first-ranked opinion leaders and four opinion leaders with the second-highest ranking agreed to participate in the study.

A preintervention audit of medical record data was conducted by trained nurses with cardiology experience. During the intervention phase, an expert panel led a one-day meeting of the opinion leaders that:

- promoted consensus and commitment to voluntary changes in practice in regard to AMI;

- identified common barriers to such change and promising interventions to overcome these;

- reviewed evidence from randomised controlled trials (RCTs) that supported guideline practice recommendations; and

- provided feedback on individual hospitals' comparative performance in relation to the guidelines.

Although several tools and resources were provided for opinion leaders to use (such as slides covering the main results of RCTs, administrative support and illustrated education brochures), they were not given any training in

communication and behavioural change. Control hospitals received only mailed performance feedback.

In the second phase of the intervention, opinion leaders carried out interventions adapted to the needs of clinicians in their own hospitals. Apart from educational interactions (such as small and large group discussions and informal consultations) all opinion leaders also worked to institute system changes (such as revising protocols, clinical pathways and standing orders).

The intervention was effective in bringing about changes in the use of aspirin and beta-blockers in relation to AMI in accordance with guideline recommendations, but not in increasing the use of thrombolysis (a riskier treatment). Soumerai et al (1998) concluded that, taken together with previous research in this area, their study suggested that:

> ….when best practices are clearly defined by national consensus guidelines and rigorous evidence, guided quality improvement interventions using local opinion leaders can accelerate adoption of effective treatments in community practice. Such changes are especially likely when there is substantial room for improvements…

However, they noted that it is not known whether such interventions can affect different kinds of treatment, particularly those without national consensus and a good evidence base.

Local consensus processes

Theories of change (Klein 1976) as well as commonsense have suggested that where efforts to change clinical practice are imposed by outsiders who do not share the personal and professional concerns of the target group, they may be opposed (Greco and Eisenberg 1993). The use of local consensus processes involves the inclusion of participating providers in discussion to ensure agreement on the importance of the chosen clinical problem and the appropriateness of the approach to managing it (Bero et al 1998). This is an approach that is clearly underpinned by social influence theory. However, as in the example below, such interventions may also include strategies based on educational, behavioural and organisational theories.

Example: flu vaccination in general practice

Karuza et al (1995) reported on a consensus-based intervention conducted in the United States to facilitate the adoption of a preventive practice guideline (flu vaccination for older adults) in general practice. Thirteen group practices and their GPs (mean size, five) were randomly assigned to intervention or control arms. General practitioners in the intervention group were involved in a small-group process which lasted one hour and consisted of two phases. In the first phase a 10-minute technical guideline dissemination lecture was presented by a respected expert in the area. This lecture covered the following:

- national guidelines for vaccination (including vaccinating those older than 65 years as a special priority group);

- the effectiveness of the vaccine in reducing mortality and morbidity;

- background on how the vaccine is prepared;

- contraindications to influenza vaccination;

- misconceptions about side effects;

- low compliance rate with the guideline; and

- a review of the literature on why patients are not vaccinated.

The second phase started once the lecturer had left. It consisted of a facilitator leading the group through a seven-step group discussion lasting 40–50 minutes. The seven steps addressed the following discussion points in order:

1. Is this a guideline that merits our attention? Do we want to do something about it?

2. What is our present level of performance? For this step the facilitator had group data from a previous record review which was made available if desired.

3. Are you curious about your own level of compliance? If yes, the facilitator supplied each GP with a sealed envelope containing his or her individual performance data for the previous year.

4. Why do you think we have been falling below an acceptable level of performance? What are the barriers we are running into?

5. What specific steps can be taken to address these barriers?

6. Can we prioritise these steps and reach a final plan of action?

7. Does this plan make sense to you, both as individuals and as a group? Are you willing to include this as one of the goals for your practice during the coming year?

Following a four-month vaccination season, it was found that the intervention group had increased vaccination rates by 34% compared to the no-intervention control group ($P<0.001$). All clinicians in the intervention group increased their vaccination performance from the baseline, compared to only 54% of those in the control group ($P<0.001$). Thirty-nine per cent of the control group actually decreased their vaccination rate. There were no significant changes in overall

attitude towards preventive health care, attitude towards vaccination, or knowledge following the intervention. Unfortunately, it is not possible to isolate the effects of the education and performance feedback provided in this intervention from the effects of the small-group consensus process.

Patient-mediated interventions

These are any interventions aimed at changing the performance of health care providers based on information sought from or given directly to patients, such as direct mailing to patients, patient counselling delivered by others, or clinical information collected directly from patients and given to the provider. To the extent that such strategies address gaps in knowledge and skills and provide interactive educational experiences they are underpinned by health education theory. To the extent that they facilitate patient/clinician interaction and patient influence on clinicians' behaviour they are underpinned by social influence theory.

Recognition that patients can serve as agents for change for clinical practice is increasing, particularly in health promotion and prevention efforts. National campaigns for cholesterol reduction and awareness of hypertension in the United States (Wofford et al 1994) have been addressed to patients as well as health practitioners.

Example: treatment of depression in general practice

In a randomised controlled trail conducted in the United States and reported by Katon et al (1995), 91 patients with major depression and 126 with minor depression (who were willing to take antidepressant medication) were assigned to either a control group or an intervention. The intervention consisted of increased intensity and frequency of visits to the clinic over the first four to six weeks of treatment (visits one and three with a GP, and visits two and four with a psychiatrist). The psychiatrist also reviewed monthly automated pharmacy data on antidepressant refills to monitor the patients' adherence to the continuation phase of treatment (three to seven months) and alerted the GP if there was any apparent premature discontinuation.

During the visits to the psychiatrist, patients in the intervention group were educated about the biology of depression, the mechanism of action of antidepressant medications, and potential side effects. They were also provided with a brief booklet on the biology of depression and how antidepressant medications work, a second booklet on simple cognitive-behavioural techniques for managing depression, and a videotape showing four doctor–patient vignettes which covered material similar to that provided in the written materials. They were also given a doctor–patient questionnaire to fill out for their return visit to the GP. This questionnaire was designed to motivate patients to take an active role in their treatment by writing down any questions they had after reading the booklets and watching the video. The form also asked

patients to write down their current major depressive symptoms from a checklist, and to list any side effects of their antidepressant medication.

In patients with major depression, the intervention group had significantly greater adherence to adequate dosage of antidepressant medication for 90 days or more ($P<0.01$), was more likely to rate the quality of care they received as good to excellent ($P<0.03$) and was more likely to rate antidepressant medications as 'helping somewhat' to 'helping a great deal' ($P<0.01$) when compared to controls. Also, 74% of these patients showed a 50% or more improvement on a symptom checklist compared to 44% of controls ($P<0.0004$).

In patients with minor depression, the intervention group had significantly greater adherence than controls to adequate dosage of antidepressant medication for 90 days or more ($P<0.001$), and more often rated antidepressant medication as helping somewhat to helping a great deal ($P<0.02$).

Unfortunately, the multifaceted nature of this intervention makes it difficult to identify which components of the intervention were effective. However, the authors concluded that this model of care appears to be a promising approach to improving adherence to antidepressant therapy and improving patient outcomes in general practice, particularly in patients with major depression.

Educational materials

These include recommendations for clinical care, such as clinical practice guidelines, audiovisual materials and electronic publications. This approach is underpinned by education theory.

Passive dissemination of information appears to have only a small effect in altering practice, no matter how important the issue or how valid the assessment methods (Bero et al 1998; Freemantle et al 1998). However, it has been noted that the cost effectiveness of such interventions has not been assessed reliably, and if the small effects seen can be achieved at a low cost, this type of intervention may still be worthwhile (Freemantle et al 1998).

Example: antibiotic treatment for otitis media in paediatric patients
Maiman et al (1988) reported on a study in which a group of United States paediatricians were posted reading materials covering the magnitude and determinants of parental noncompliance with treatment regimens for acute and chronic paediatric conditions (including otitis media), and practical compliance-enhancing strategies relevant to these conditions. This educational material was patterned on a six-page journal article, with appropriate references.

The strategies for compliance enhancement were presented in a problem and solution format to increase their practical applicability. A comparison group of

paediatricians attended a two-part tutorial (five hours in total) which consisted of didactic presentation of the information covered in the printed materials with time set aside for group discussion. This group was also provided with the printed materials at the initial tutorial session. A no-intervention control group was also included in the study.

Following the interventions, data on compliance and on reported behaviours of paediatricians were collected from a large random sample of mothers whose children were being treated for otitis media. The tutorial intervention was found to be more effective than the mailed educational materials (when compared to control) in increasing paediatricians' knowledge about patient compliance and compliance enhancing strategies. Paediatricians in the tutorial intervention were also more likely to have a greater proportion of patients who did not miss any doses of antibiotic, and a lower proportion of patients who missed at least four. However, when mothers' estimates of compliance were used, the mailed educational materials intervention appeared to do quite well in general.

The authors concluded that although the tutorial intervention was superior,

> …[the] lower costs and greater practicality…[of the mailed educational materials]…suggests that, where it is too expensive or otherwise difficult to provide tutorials, the mailing of educational materials deserves consideration….(Maiman et al 1988 p778)

Didactic educational sessions

Didactic educational sessions such as conferences, personal visits and workshops in which no explicit effort is made to determine practice needs or to facilitate practice change have failed to produce changes in performance or health outcomes. More comprehensive strategies drawing from health education theory and employing workshops in which interactive participatory elements are included have effected changes through the use of practice rehearsal or other patient educational and practice-reinforcing methods (see section on interactive educational meetings above) (Bero et al 1998).

Example: teaching skills for giving up smoking to senior medical students

Roche et al (1996) reported the results of a block-randomised controlled trial to examine the relative effectiveness of three interactive educational programs to teach skills for giving up smoking to fifth-year medical students in an Australian medical school, compared to a traditional didactic lecture mode as control.

The three interactive programs all included a one-hour lecture and prereading materials, as well as a two-hour interactive session which utilised either audiotaped role plays with feedback in group tutorial sessions, role plays with peer feedback, or videotaped role plays with feedback in group tutorial sessions.

Participants in the control group received a standard three-hour didactic teaching presentation on the physiological and other effects of smoking, its prevalence, and its public health implications. This lecture also encouraged the participation of doctors in giving up smoking.

The medical students demonstrated significantly improved skills in smoking cessation interventions after specific training in intervention techniques through any of the three three-hour interactive educational programs ($P<0.0001$). In contrast, the intervention skills of those who received only the three-hour didactic lecture showed no significant improvement.

Financial incentives and penalties

There have been very few randomised controlled trails of the impact on clinical performance of different methods of payment and other incentives for clinicians. Although systematic reviews of the effect of target payments and different systems of payment on primary care professional behaviour are currently being conducted by Cochrane Collaboration groups (Gosden et al 1998; Giuffrida et al 1998), they are unlikely to include many studies, as most have tended to be cross-sectional and so do not meet inclusion criteria (T Gosden, personal communication).

Observational studies have suggested that different methods of payment for clinicians result in different practice performance and that clinicians also respond to financial incentives directed at hospitals (Greco and Eisenberg 1993). However there is a danger of supplier-induced demand in some situations (J Grimshaw, personal communication), and so fee-for-service systems and target systems may be best restricted to where appropriate prevention and treatment measures are fairly clear-cut, such as in the case of immunisation.

The use of financial incentives and penalties to change the practice of clinicians is underpinned by behavioural theory.

Example: Influenza immunisation rates in general practice

Kouides et al (1998) reported on a randomised controlled trial to investigate the effect of performance-based financial incentives provided to general practitioners on the influenza immunisation rates in the elderly in a New York county in 1991. A total of 54 solo or group medical practices participated in the study and were randomised to either control or intervention. The intervention group received an additional $0.80 per shot or $1.60 per injection (above the standard $8 fee) if an immunisation rate of 70% or 85% respectively was attained among their eligible patients. Final immunisation rates and change in percentage immunisation from a 1990 baseline were calculated for each practice.

It was found that performance-based financial incentives for immunisation resulted in a nonsignificant 7% higher immunisation rate compared to the control group. The median practice-specific improvement in immunisation rate was 10.3% in the incentive group compared with 3.5% in the control group (P=0.03). In the incentive group, 52% of practices reached the 70% target level, and 15% attained the 85% target. In the control group, 44% of practices attained the 70% goal, and 7% reached the 85% goal.

Administrative interventions

Administrative interventions that aim to encourage or force health practitioners to change their practices are in widespread use, although many have not been evaluated (Greco and Eisenberg 1993). Changes in behaviour can be encouraged by the creation of administrative barriers to undesired practices (such as requiring the approval of a specialist for certain tests or drug orders, and removing certain diagnostic tests or drugs from order forms). They can also be encouraged by reducing barriers to desired practices (such as simplifying order forms). Changes in behaviour can also be required by the implementation and enforcement of laws, regulations and institutional policies.

Administrative interventions are underpinned by behavioural theory.

Example: Blood product transfusion in an Australian tertiary teaching hospital

An audit of blood product utilisation in an Australian tertiary teaching hospital (Metz et al 1995) had revealed high rates of inappropriate transfusion. In an effort to reduce this, a system of prospective monitoring of blood product request forms, involving several administrative interventions, was implemented in the hospital, and reported by Tuckfield et al (1997).

The blood product request form was modified to incorporate patient information about indications for transfusion and clinical and laboratory data. In addition, the hospital guidelines for transfusion of each blood product were printed on the reverse of the form, and the request form stipulated that the indication for transfusion must conform to these. Requests for blood products were then monitored by the senior medical laboratory scientist in the hospital blood bank for compliance with the hospital transfusion guidelines. If there was any information missing from the request form, the scientist telephoned the requesting doctor to obtain the information. If the request conformed to the hospital guidelines then the order was filled. If not, then the request was referred to the haematology registrar for nonconfrontational consultation with the requesting doctor. If agreement could not be reached then the blood product was always issued, but the case was subsequently referred to the consultant haematologist for review.

Data collected over three months following the implementation of the intervention showed that the rates of inappropriate transfusion had fallen

significantly for red cells (P=0.004), platelets (P=0.02), and fresh frozen plasma (P=0.02). The authors noted that prospective monitoring is both time consuming and demanding of staff, yet for sustained improvement in practice it must be continued indefinitely. They suggested that the workload may be lessened over the long term by computerised audit of transfusion requests whereby clinical and laboratory data are entered into a program which would flag only noncompliant requests for review by blood bank staff.

APPENDIX E

MODELS FOR BEHAVIOUR CHANGE

It has been stressed that there are no implementation strategies that are 'magic   , Thomson et al 1998abc) — that is, that could be relied on to change practice in all circumstances and settings. Insight into why some interventions might be more appropriate in some circumstances than in others can be gained from relevant theoretical models of the process and/or stages of behaviour change. This, in turn, has led to the development of some suggested models for the implementation of interventions to change the clinical practices (see Section 11).

The two main models of the behavioural change process concern:

- the diffusion of innovation model; and

- the transtheoretical model of behaviour change, also known as the stages of readiness to change model.

The diffusion of innovations model

The uptake of innovations (new ideas and practices) is conceived as occurring in four stages:

- the knowledge stage, which involves learning about the innovation;

- the persuasion stage, in which the individual forms positive or negative attitudes toward the innovation;

- the decision stage, when the acceptability of the innovation is tested; and

- the stage of adoption or rejection of the innovation (Bero et al 1998).

Characteristics of an innovation influence the diffusion process, notably the potential for adapting the innovation to local circumstances, the complexity of the innovation, its compatibility with local and personal norms, and the extent to which it can be tried out and discarded if not appropriate (Lomas 1997). The theory places emphasis on the role of 'change agents' — individuals who attempt to influence the target group in its decision about the adoption of an innovation by identifying with their concerns. However, factors such as self-efficacy of the target group and skills development are not addressed.

The transtheoretical model of behaviour change

This model, developed by Prochaska and DiClemente (1983), views behaviour change as a continual process made up of five main stages.

The first stage, 'precontemplation', is when individuals are not considering change at all. Moving to the second stage of 'contemplation' requires knowledge and attitude change.

The following two stages — 'preparing for action' and 'action' — will require positive attitude toward change, belief in the ability to undertake change, the skills required to do so, and organisational support for change.

The fifth stage — 'maintenance of change' — will require organisational and social support, and incentive/reward systems (Moulding et al 1999).

Different strategies for implementing change may be required for different stages of the change process.

APPENDIX F

EVALUATION OF CASE STUDIES

Case study 1: SIDS

The success of the multifaceted approach to reducing SIDS can be seen by the declining number of deaths from the syndrome (as shown below). The decline in deaths from SIDS in Australia started in 1986 and accelerated in 1991. The decline has been enormous — from 579 deaths in 1986 to 163 in 1997. During 1991 parents in Australia were advised they should not sleep their babies prone and Dwyer et al (1995) calculated that the change in sleeping position has caused about 70% of the decline in SIDS.

Number of deaths from SIDS in Australia

Year	No. of deaths	Year	No. of deaths
1979	397	1989	513
1980	396	1990	506
1981	442	1991	345
1982	471	1992	308
1983	457	1993	253
1984	510	1994	249
1985	557	1995	217
1986	579	1996	208
1987	533	1997	163
1988	491		

Source: Australian SIDS organisations

Other factors have subsequently been shown to be important, such as overheating (Ponsonby et al 1993) and smoke in the house (Golding 1997).

Our assessment is that the main contributing factors to the decline in SIDS were:

- the research;
- natural public interest;
- deliberately raised public interest;

- media interest;

- active consumer groups;

- the enthusiasm of health professionals; and

- the enthusiasm of government and other agencies.

The research
The research showing that SIDS was associated with sleeping prone underpinned all subsequent activities. Without it, the SIDS death rate would almost certainly still be 500 or more infants per year.

Natural public interest
SIDS is an event that affects a small number of families each year, but has an enormous impact on that family and their friends and relatives. Of greater importance to the uptake of an innovation — a change in sleeping position — is that the death of a child is one of the most feared events in our society. People are, quite naturally, predisposed to listen and learn when they hear about ways to reduce the risk of a child dying.

Active consumer groups
Many SIDS consumer groups have formed around the nation, mainly involving people whose child has died of SIDS. The most prominent is the Victorian-based organisation, SIDRF, which was formed in 1977. Similar groups subsequently formed in other States and Territories. They have now joined to form SIDSAustralia. Some of their activities are listed in Section 11.

Media interest
Whether the media tries to reflect or create public interest, there is often a synchronicity of views about what is important. It is certainly the case for SIDS. Journalists fear for their own children, so are naturally interested in SIDS. Personal interest is one of the strong influences in a journalist's choice of what story to cover.

At a higher level, editors and producers have the same feelings, as well as access to sales figures, circulations and ratings. They know, without doubt, that SIDS is of public interest.

The coverage of SIDS in Australia has been relentlessly positive and consistently interested.

Deliberately raised public interest
Consumer organisations, researchers, governments and nongovernment organisations have all tried to raise public interest above its natural high level. Red Nose Day, which focuses public attention on SIDS and provides an opportunity for people wishing to help and raise money for research, support,

health promotion and education, exemplifies this. The media have cooperated fully by publicising Red Nose Day each year.

All groups involved also feed the media a steady diet of developments in SIDS, and have a planned public relations campaign.

The enthusiasm of health professionals

Although the desired outcome is a change in sleeping position that is mainly controlled by parents, health professionals are influential in determining a parent's choice of how to put his or her child to bed. So it was important that health professionals both accept the research evidence, and pass it on.

Health professionals received considerable education, especially with the change in policy in the early 1990s. Researchers published as widely as possible, professional newsletters carried articles, health departments published circulars, and the general media, which is a good source of information for health professionals, reported many of these developments.

As well, consumer organisations made conscious efforts to educate health professionals. For example, staff members from SIDRF attempted to visit every midwife and maternity nurse in Victoria in 1991–92 to convince her or him to adopt a supine sleeping position for the babies under their care (K Fitzgerald, personal communication).

Health professionals adopted the change quite quickly. Another factor in this change was that there were few identifiable barriers to change. It cost no more time, money, equipment or professional pride to advise parents to sleep babies on their backs or sides.

The enthusiasm of government and other agencies

Federal, State and Territory health departments have supported SIDS research and, in 1991, advised parents and health professionals about new policies on sleeping position.

Organisations such as Shell, Coles Supermarkets, Target, Bi-Lo, Apex and AV Jennings have been generous supporters of SIDS research, as have many other organisations and a wealth of private individuals.

Summary

SIDS has many features that make it ideal for a change in health outcomes. It has the interest of the populace, it has an identifiable outcome in reduced death rates and an identifiable intervention — a change in sleeping position.

An important factor in the spread of knowledge about sleeping position, and in the rapid uptake of that knowledge by health professionals and the community, has been the coalescence of interest. All groups involved have an interest in

reducing the death rate from SIDS, and no groups would benefit from not doing so. This results in a free and fair exchange of information and influence between the key players, as shown in the figure below.
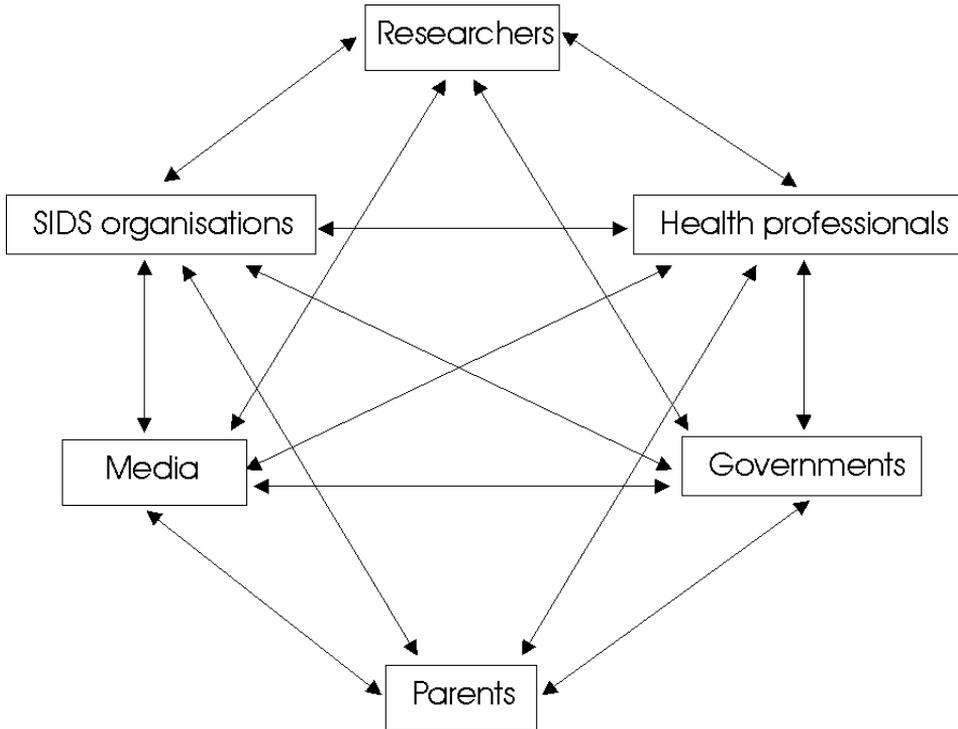
Notes:
- 'researchers' include scientists, epidemiologists, research clinicians, midwives and pathologists;
- 'SIDS organisations' include parents, professionals and others;
- 'media' includes national, regional, local and community media, in print, radio and TV;
- 'parents' include those who have lost a baby to SIDS, those who know them, those with living children and those without children;
- 'governments' include federal, State/Territory and local; and
- 'health professionals' include midwives, nurses, community nurses, local doctors, obstetricians and paediatricians.

The flow of information and influence

Case study 2: blood transfusions

Royal Melbourne Hospital evaluated outcomes of their program to reduce inappropriate blood transfusion by repeating the audit after the guidelines had been implemented. They found that inappropriate transfusions had reduced significantly, as shown below.

Proportion of transfusions judged inappropriate

Blood product	Before guidelines	After guidelines	*P*-value
Red cells	16%	3%	0.004
Platelets	13%	2.5%	0.02
Fresh frozen plasma	31%	15%	0.02

Sources: Metz et al (1995), Tuckfield et al (1997)

However, they were not satisfied with the reduction in inappropriate transfusions for fresh frozen plasma. The hospital team is now carrying out a study of the process of implementing the guidelines, with respect to fresh frozen plasma, to see why the reduction for that particular blood product was not as significant (J Metz, personal communication).

Guidelines on early breast cancer

In October 1995 the NHMRC published *Clinical Practice Guidelines for the Management of Early Breast Cancer.* These were the first guidelines produced under the NHMRC's approach of using a multidisciplinary team and an evidence-based approach. The National Breast Cancer Centre (NBCC) of the NHMRC was asked to disseminate and encourage implementation of the guidelines. It was also given the task of producing, distributing and implementing *A Consumer's Guide: Early Breast Cancer* (NHMRC 1996a). It saw these documents as complementary.

The NBCC developed a national dissemination and implementation plan. The plan was based on the principles that:

- dissemination and implementation should be targeted at three key groups — consumers, specialist clinicians and GPs;

- there should be a systematic framework for each target group;

- dissemination and implementation needed to be both active and cost-effective;

- the plan for dissemination and implementation should be evidence-based;

- scientific knowledge of dissemination and implementation strategies should be increased by the incorporation of several randomised trials of different strategies; and

- evaluation was essential.

The NBCC saw it faced a number of challenges. These were that:

- it lacked information about existing patterns of care, which would make comparison of clinical practice pre- and post-guidelines difficult;

- it had a relatively short time-frame of two years to show changes from the guidelines;

- these were the first NHMRC-produced guidelines, so there may be some initial clinician resistance or uncertainty;

- the guidelines provided no priority for implementation of different recommendations; and

- there was little evidence available about effective dissemination and implementation strategies.

The strategy that was developed is described below.

Reaching the target groups

The three key target groups were specialist clinicians, consumers and GPs. Secondary target groups included other health professionals or related groups such as:

- nurses
- nursing academics
- family planning organisations
- ethnic health workers
- migrant resource centres
- women's health centres
- Aboriginal health workers
- rural and remote health workers

and others involved with health at policy or administrative levels, such as:

- cancer organisations
- departments of health
- health promotion units
- women's health units
- offices of multicultural or ethnic affairs
- directors of regional, area or district health services
- public health units
- chief executive officers of public and private hospitals
- managers of health insurance funds

The NBCC laid out a framework for each target group, and planned a number of strategies to ensure that each step in the process was carried out. As an example, we will describe the steps and strategies for specialist clinicians. The NBCC made similar but tailored plans for all other target groups.

Strategies for specialist clinicians

Step 1: Ensure all relevant health professionals know about the guidelines

The strategies here included:

- mailing the guidelines to:
    - relevant medical and nursing specialists and trainees;
    - university, state and hospital libraries;
    - deans of medical faculties;

- holding or presenting the guidelines at a series of conferences, workshops and seminars;

- writing articles for professional journals;

- publishing the guidelines at its website;

- publishing articles about the guidelines within its own publications for distribution to the target group;

- holding training programs for surgical trainees; and

- helping with the incorporation of the guidelines into medical curricula.

Step 2: Ensure that all relevant health professionals believe the guidelines are credible, and that there is professional and consumer support for the guidelines

Strategies here included:

- asking colleges to endorse the guidelines and publicise that endorsement;

- nominating opinion leaders in each State and Territory and specialty to promote the guidelines; and

- asking consumer groups for endorsement.

Step 3: Ensure that all relevant health professionals understand whether changes are needed in their own practice

The NBCC planned several trials to evaluate different audit and feedback strategies targeting the key audiences. One trial was designed to encourage adoption of the guidelines among general practitioners — it explored the impact of involving them more closely in the care of women with breast cancer through links with clinic facilities. Another examined whether computerised feedback would improve compliance with the guidelines. The third trial planned was designed to encourage consumers to more actively seek care according to the guidelines. Finally, a trial was designed to look at working with hospitals to

encourage change in health service delivery policies and structures in order to better support clinical specialists.

The NBCC also encouraged audit and the collection of data at the national, State/Territory and local levels to identify aspects of care that were not in accord with the guidelines.

Step 4: Ensure there are prompts at the consultation for implementation of the guidelines

The NBCC developed a consumer guide kit, which included boxed guidelines, with a prompt for reordering, and a small poster and fliers about the guidelines. This was distributed to all hospitals and relevant specialist clinicians.

It also planned to develop computerised records, standardised records and patient held prompts.

The NBCC saw the consumer guide as vitally important. Apart from the information it imparts, it contains a list of questions consumers might wish to ask of their doctors.

Step 5: Ensure professional structures support the guidelines through CME, quality assurance and accreditation

This was to be discussed with the relevant colleges.

Discussions with the Royal Australasian College of Surgeons (RACS) yielded the following strategies. A rural surgical fellowship scheme was developed to assist rural surgeons in linking to multidisciplinary teams in major teaching hospitals. With assistance from the NBCC, RACS developed a data audit system to provide feedback to its members about the management of breast cancer.

The RACS also provides CME points for participation in communication skills training designed to increase compliance with recommendations in the guidelines.

Step 6: Ensure there is support from local clinical and organisational policies for implementation of the guidelines

It was recognised that this was the most difficult task for a national organisation. A range of strategies were planned, including liaison with clinical teams through coordinators based in cancer organisations in each State and Territory, and targeted letters to State and Territory health departments, area health services and CEOs of major hospitals. In acknowledgment that little was known about how best to generate this support, a hospital-based kit was planned to assist institutions to identify the areas in which structural or policy change is needed.

Step 7: Ensure there are no barriers to implementing the guidelines relating to medicolegal issues, financial disincentives or access to referral services

The NBCC planned to identify possible barriers to implementing the guidelines and to develop specially targeted strategies to address these issues. A survey of clinicians' opinions about the guidelines was developed to identify issues perceived as problematic; these included concerns about medicolegal issues and about recommendations relating to multidisciplinary care. It was planned to develop special strategies to address these and other identified barriers.

The pharmaceutical industry

A number of people within the pharmaceutical industry were interviewed to determine:

- the range of the industry's activities in promoting more widespread and better use of their products;

- the particular activities the industry thought were useful;

- the particular activities the industry thought were not useful; and

- the level of research backing for these beliefs and activities.

One to two years preregistration

If a new product is developed, the company involved carries out substantial work to understand the epidemiology of the disease and its management in Australia. How common is the disease? In what age groups? Who manages it? Is it an illness like migraine, for which many people do not see doctors?

The company talks to recognised experts in the field to:

- tell them about the product, and what they hope to achieve with it;

- discuss what profile the company hopes it could achieve, and what the experts hope it could achieve;

- seek critical analysis, rather than endorsement;

- work out costs and benefits;

- plan what trials to do, both preregistration and postregistration; and

- seek information on any guidelines for management of the disease, and contact the group working on the guidelines to see how the new product could be included in the recommendations.

The company carries out market research among patients to help determine the best positioning of the drug.

They may also conduct 'seeding' awareness campaigns amongst the general public to raise awareness of the condition. Similar campaigns can also encourage media awareness of an issue. For example, one company established an award recognising medical writing on women's health issues a few years before it launched a new women's health product in Australia.

Nearing registration

The company talks to confined small groups and to professional bodies.

It distributes the results of international trials widely, including to the media. It uses publicity both to recruit people into clinical trials and to increase patient awareness of the disease and/or the problem with treatment that this drug is said to solve.

It works on doctors' awareness of the disease and/or the problem with existing treatments that this drug is said to solve. Local opinion leaders are recruited to give talks, mentioning especially any relevant clinical trials for which patients can be recruited.

At registration

The company communicates broadly with the medical profession, using:

- journal articles;
- advertorials;
- news articles in medical magazines;
- face-to-face communication by a sales team;
- sponsored symposia;
- sponsored sessions at scientific conferences;
- advertising;
- funding key opinion leaders to attend conferences ;
- funding divisions of general practice or other professional organisations/events; and

- marketing strategies such as building brand image, using strategies and language similar to those used in advertising, and giveaways.

There is a feeling in the industry that it is wise to communicate with specialists first, then GPs, then patients. One interviewee said: 'Specialists resent finding things out from GPs, and both groups resent finding things out from patients. They find it threatening. Driving patients to doctors can be counterproductive.' To this end, public relations campaigns generally target medical publications first, and then conduct awareness campaigns in the general media.

Interviewees suggested the medical media should be used wisely. The more prestigious end of the market, such as the *Medical Journal of Australia*, may be a less effective method of communication than magazines such as *Australian Doctor, Medical Observer, Australian Family Physician, Modern Medicine* and *Current Therapeutics.*

Communication with the public takes many forms, including:

- direct advertising, as long as the product name is not mentioned directly;

- sponsorship of 'information lines';

- sponsorship of events;

- encouragement of media reports of registration, market research or new data;

- sponsorship of patient information, such as brochures or videos; and

- sponsorship of patient support groups.

One to two years postregistration

The company hopes to publish new data, either long-term data or data showing a benefit over a key competitor. It aims for publication in a peer-reviewed journal. If new data are available, the company develops a new advertising campaign to sustain sales. At the same time, it increases face-to-face contact and advertising.

If no new data are available, the industry believes it is hard work and expensive to increase sales.

Summary

Based on interviews, and an observation of practice, the pharmaceutical industry uses five key methods to influence doctors to change behaviour. These are:

- getting research-based information into peer-reviewed journals;

- getting endorsement by local opinion leaders;

- face-to-face discussions with other doctors, if possible, or with the sales force;

- using the media to influence medical prescribing and practice; and

- using the media to influence patient demands and expectations.

Guidelines on melanoma

In June 1997, the Australian Cancer Network (ACN) launched *Guidelines on the Management of Cutaneous Melanoma* at the World Melanoma Conference before an audience of 800 dermatologists and surgeons, half of whom were from nations other than Australia.

The primary target audience for these consensus guidelines were general practitioners, dermatologists and surgeons. Secondary target audiences included medical oncologists and palliative care physicians.

Distribution

The guidelines were distributed originally in bulk, as follows.

Number sent	Target group
6000	4th World Conference on Dermatology delegates
5000	All Queensland medical practitioners, via the Queensland Cancer Fund
2159	All pathologists, via the Royal College of Pathologists of Australasia
1765	General and plastic surgeons, via the Royal Australasian College of Surgeons
1200	World Conference on Melanoma delegates
1059	All radiologists and radiation oncologists, via the Royal Australasian College of Radiologists
300	All medical oncologists, via the Medical Oncology Group of Australia
130	All dermatologists, via the Australasian College of Dermatologists

There was no bulk mailing to general practitioners.

Many individual requests followed. The following is a selection of the larger individual requests for copies.

Number sent	To
308	NHMRC Health Advisory Unit
50	Newcastle Melanoma Unit
45	Sydney University Western Clinical School
35	Uppsala Regional Oncologic Centre, Sweden
30	Xenophon (legal firm)
24	Cancer Clinical Service Unit
20	Anti-Cancer Council of Victoria Information Service
20	Geelong General Practitioners Association
15	Phillip Island Medical Group
12	Rowville General Practice
10	NSW Health Department
10	Wollongong Division of General Practice
10	Ludwig Institute for Cancer Research
10	Buckland Centre for Radiation Oncology
10	Townsville Hospital

Requests for more copies have been received from Canada, England, Germany, New Zealand, Scotland, Singapore and the United States. The guidelines have been translated into Spanish by the Fundacion del Cancer de Piel in Argentina, and the South African Medical Association has been granted the right to adapt the guidelines for its own purposes.

In all, 20 000 copies of the guidelines were printed. At least 17 000 have been distributed.

There have been no charges for the books. Postage is charged only if more than one copy is ordered.

The summary of the recommendations has also been posted on the Internet at the website of the Sydney Melanoma Unit.

The guidelines were reviewed and revised by the NHMRC in 1999, following public consultation.

Implementation strategies

Various efforts have been made to encourage doctors to use the guidelines. These efforts have been led by Professor Bill McCarthy AO, an international opinion leader in the field of melanoma and a leading author of the guidelines, with the support of other leaders in the field. Efforts have included:

- encouraging articles in *Australian Doctor* and *Medical Observer*, the two main newspapers for GPs, on the publication of the guidelines;

- lectures, seminars and symposia for groups of GPs;

- incorporating the guidelines in all formal teaching on melanoma;

- presenting and distributing the guidelines at international meetings; and

- quoting from the guidelines when replying to referral letters.

Implementation was also assisted by the process of guideline development. The ACN consulted widely during development of the guidelines, and the following organisations received drafts and were given the opportunity to comment:

- ACT Cancer Society
- Anti-Cancer Council of Victoria
- Anti-Cancer Foundation of the Universities of South Australia
- Association of Australian Medical Research Institutes
- Australasian College of Dermatologists
- Australasian Faculty of Occupational Medicine
- Australasian Society of Blood Transfusion
- Australasian Society of Clinical and Experimental Pharmacologists and Toxicologists
- Australasian Society of Clinical Immunology and Allergy
- Australian Academy of Science
- Australian and New Zealand Intensive Care Society
- Australian and New Zealand Society of Nephrology
- Australian and New Zealand Society of Palliative Medicine
- Australian and New Zealand Association of Physicians in Nuclear Medicine
- Australian Association for Hospice and Palliative Care
- Australian Association of Neurologists
- Australian Association of Private Radiation Oncology Practices
- Australian Cancer Society
- Australian College of Health Service Executives
- Australian College of Paediatrics

- Australian Diabetes Society
- Australian Faculty of Rehabilitation Medicine
- Australian Health Insurance Association
- Australian Health Ministers' Advisory Council
- Australian Hospital Association
- Australian Institute of Health and Welfare
- Australian Institute of Radiography
- Australian Leukaemia Study Group Association
- Australian Medical Association
- Australian Nurses Federation
- Australian Private Hospitals
- Australian Rheumatology Association
- Australian Society of Consultant Physicians in General Medicine
- Australian Society for Infectious Diseases
- Australian Society for Geriatric Medicine
- Australian Society for Medical Research
- Cancer Council of Tasmania
- Cancer Council of the Northern Territory
- Cancer Foundation of Western Australia
- Cardiac Society of Australia and New Zealand
- Centre for Health Economics, Research and Evaluation
- Clinical Oncological Society of Australia
- Colorectal Surgical Society of Australia
- Consumers' Health Forum of Australia
- COSA Nurses Group
- Endocrine Society of Australia
- Faculty of Radiation Oncology, Royal Australasian College of Radiologists
- Gastroenterological Nurses Society of Australia
- Gastroenterological Society of Australia
- Haematology Society of Australia
- Human Genetics Society of Australasia
- Medical Oncology Group
- National Breast Cancer Centre
- National Health and Medical Research Council
- New South Wales Cancer Council
- New South Wales College of Nursing
- New South Wales Nurses Association

- Public Health Association of Australia
- Queensland Cancer Fund
- Royal Australian College of General Practitioners
- Royal Australasian College of Physicians
- Royal Australasian College of Radiologists
- Royal Australasian College of Surgeons
- Royal Australian College of Obstetricians and Gynaecologists
- Royal College of Nursing, Australia
- Royal College of Pathologists of Australasia
- Thoracic Society of Australia and New Zealand
- Urological Society of Australasia

These organisations also received copies of the guidelines upon publication.

By the time the guidelines were published, they were widely known and long awaited. The ACN took many requests for the guidelines even before publication. Importantly, many of those who commented on early drafts would have felt a sense of ownership of the final document, which encouraged uptake of its suggestions.

However, Professor McCarthy acknowledges that the guidelines have not reached GPs adequately. GPs are a primary target audience, considering that the guidelines deal with primary management of suspicious skin lesions and referral patterns. One drawback is that the guidelines are available only in the form of a 106-page document which has a fair amount of technical material. There is no summary available, apart from on the Internet. Such a book is not suitable for GPs, who have limited time available to read such a long and detailed volume, except those with a special interest. There has been no publication developed specifically for GPs.

Evaluation

A reply-paid card was inserted in each copy of the guidelines and, as of the end of 1997, 133 replies had been received, with 132 of these saying they had read the guidelines.

Asked about the comment that the guidelines were easy to use, 83 strongly agreed, 43 agreed, one wasn't sure and one strongly disagreed. Asked about the comment that the guidelines were helpful, 78 strongly agreed, 46 agreed, two weren't sure and one strongly disagreed.

Eighty readers provided comments. Most were complimentary, and many asked for changes to layout and design. A number commented that the guidelines agreed with the reader's practice policy. Others raised doubts about the

accuracy of the guidelines. Nobody commented that the guidelines had encouraged a change in practice.

As an evaluation tool, this reply-paid card helps the Australian Cancer Network improve the second edition by making the book more readable and easier to use. However, it provides no information, based on a small and self-selected sample, on vital questions such as:

- how many recipients read the guidelines;

- how many believe they have learnt anything from the guidelines;

- how many believe they would change their practice as a result of the guidelines; and

- how many have changed their practice because of the guidelines.

To deal with part of the last question, NSW Health has established a working group to develop indicators. At the end of 1998, 72 possible indicators had been identified, such as the rate of needle biopsy as a proportion of all biopsies, or an appropriate margin of excision. The plan was to refine these and develop a small series of indicators, most of which can be obtained from existing data, to compare preguideline and postguideline adherence with best practice, as defined by the guidelines.

ACRONYMS AND ABBREVIATIONS

ACN	Australian Cancer Network
AMI	acute myocardial infarction
CCC	concurrent care concerns
CME	continuing medical education
DNR	do not resuscitate
EPOC	effective practice and organisation of care
GP	general practitioner
NBCC	National Breast Cancer Centre
NHMRC	National Health and Medical Research Council
PCF$	peer comparison feedback on cost of test use
PCFY	peer comparison feedback on yield of tests
PDSA	plan–do–study–act
RACS	Royal Australasian College of Surgeons
RCT	randomised controlled trial
SIDRF	Sudden Infant Death Research Foundation
SIDS	sudden infant death syndrome
TSE	test-specific education
WHO	World Health Organization

REFERENCES

Antman EM, Lau J, Kupelnick B, Mosteller F and Chalmers TC (1992). A comparison of the results of meta-analyses of randomised control trials and recommendations of clinical experts. Treatments for myocardial infarction. Journal of the American Medical Association 268:240–248.

Avorn J and Soumerai SB (1983). Improving drug-therapy decisions through educational outreach. New England Journal of Medicine 308:1457–1463.

Beal SM (1986). Sudden infant death syndrome: epidemiological comparisons between South Australia and communities with a different incidence. Australian Paediatric Journal 22S:13–16.

Beal S (1991). Sudden infant death syndrome related to sleeping position and bedding. Medical Journal of Australia 155:507–508.

Beal SM and Finch CF (1991). An overview of retrospective case-control studies investigating the relationship between prone sleeping position and SIDS. Journal of Paediatric Child Health 27:334–339.

Bero LA, Grilli R, Grimshaw JM, Harvey E, Oxman AD and Thomson MA (1998). Closing the gap between research and practice: an overview of systematic reviews of interventions to promote the implementation of research findings. British Medical Journal 317:465–468.

Berwick DM (1996). A primer on leading the improvement of systems. British Medical Journal 312:619–622.

Berwick DM and Coltin KL (1986). Feedback reduces test use in a health maintenance organisation. Journal of the American Medical Association 255:1450–1454.

Campbell NC, Thain J, Deans HG, Ritchie LD and Rawles JM (1998). Secondary prevention in coronary heart disease: baseline survey of provision in general practice. British Medical Journal 316:1430–1434.

Chambers CV, Balaban DJ, Carlson BL, Ungemack JA and Grasberger DM (1989). Microcomputer-generated reminders: Improving the compliance of primary care physicians with mammography screening guidelines. Journal of Family Practice 29:273–280.

Cheney C and Ramsdell JW (1987). Effect of medical records' checklists on implementation of periodic health measures. American Journal of Medicine 83:129–136.

Chren M-M and Landefeld CS (1994). Physicians' behaviour and their interactions with drug companies: a controlled study of physicians who requested additions to a hospital drug formulary. Journal of the American Medical Association 271:684–689.

Cockburn J, Ruth D, Silagy C, Dobbin M, Reid Y, Scollo M and Naccarella L (1992). Randomised trial of three approaches for marketing smoking cessation programmes to Australian general practitioners. British Medical Journal 304: 691–694.

Coulter A (1998). Evidence based patient information: Is important, so there needs to be a national strategy to ensure it. British Medical Journal 317:225–226.

Davis DA, Thomson MA, Oxman AD and Haynes RB (1995). Changing physician performance. A systematic review of the effect of continuing medical education strategies. Journal of the American Medical Association 274:700–705.

Domenighetti G, Luraschi P, Casabianca A et al (1988). Effect of information campaign by the mass media on hysterectomy rates. Lancet 2:1470–1473.

Donoughue D (1996). Australian and New Zealand Neonatal Network 1994. Sydney: Australian Institute of Health and Welfare, Perinatal Statistics Unit.

Donald A and Haines A (1997). Implementing research findings in hospital settings: barriers and opportunities. 2nd International Conference on the Scientific Basis of Health Services, October 1997, Amsterdam.

Dunning M, Abi-Aad G, Gilbert D et al (1997). Turning evidence into everyday practice. London: King's Fund.

Dwyer T, Ponsonby AL, Blizzard L, Newman NM and Cochrane JA (1995). The contribution of changes in the prevalence of prone sleeping position to the decline in sudden infant death syndrome in Tasmania. Journal of the American Medical Association 273:783–789.

Dwyer T, Ponsonby A-L, Newman NM and Gibbons LE (1991). Prospective cohort study of prone sleeping position and sudden infant death syndrome. Lancet 337:1244–1247.

Engelberts AC and de Jonge GA (1990). Choice of sleeping position for infants: possible association with cot death. Archives of Disease in Childhood 65:462–467.

Freemantle N, Harvey EL, Wolf F, Grimshaw JM, Grilli R and Bero LA (1998). Printed educational materials to improve the behaviour of health care professionals and patient outcomes (Cochrane Review). In: The Cochrane Library, Issue 2. Oxford: Update Software.

Giuffrida A, Leese B, Forland F et al (1998). Protocol: The effect of target payments on primary care professional behaviour. The Cochrane Database of Systematic Reviews, Issue 4.

Golding J (1997). Sudden infant death syndrome and parental smoking: a literature review. Paediatric and Perinatal Epidemiology 11:67–77.

Gosden T, Forland F, Kristiansen I et al (1998). Protocol: Capitation, salaried, fee for service and mixed systems of payment and the behaviour of primary care physicians. Cochrane Database of Systematic Reviews, Issue 4.

Gray JAM (1998). Where's the chief knowledge officer? British Medical Journal

Greco PJ and Eisenberg JM (1993). Changing physicians practices. New England Journal of Medicine 329:1271–1274.

Grilli R, Freemantle N, Minozzi S, Domenighetti G and Finer D (1998). Impact of mass media on health services utilisation (Cochrane Review). In: The Cochrane Library, Issue 3. Oxford: Update Software.

Grol R (1997). Personal paper: beliefs and evidence in changing clinical practice. British Medical Journal 315:418–421.

Grol R, Dalhuijsen J, Thomas S, Veld C, Rutten G and Mokkink H (1998). Attributes of clinical guidelines that influence use of guidelines in general practice: observational study. British Medical Journal 317:858–861.

Guntheroth WG and Spiers PS (1992). Sleeping prone and the risk of sudden infant death syndrome. Journal of the American Medical Association 267:2359–2362.

Haines A and Donald A (1998). Making better use of research findings. British Medical Journal 317:72–75.

Haines A and Jones R (1994). Implementing findings of research. British Medical Journal 308:1488–1492.

Hunt DL, Haynes RB, Hanna SE and Smith K (1998). Effects of computer-based clinical decision support systems on physician performance and patient outcomes. A systematic review. Journal of the American Medical Association 280:1339–1346.

Institute of Medicine (1992). Guidelines for Clinical Practice: from development to use. Field MJ & Lohr KN (eds). National Academy Press: Washington DC.

Karuza J, Calkins E, Feather J, Hershey CO, Katz L and Majeroni B (1995). Enhancing physician adoption of practice guidelines: dissemination of influenza vaccination guideline using a small-group process. Archives of Internal Medicine 155:625–632.

Katon W, Von Korff M, Lin E, Walker E, Simon GE, Bush T et al (1995). Collaborative management to achieve treatment guidelines: Impact on depression in primary care. Journal of the American Medical Association 273:1026–1031.

Klein D (1976). Some notes on the dynamics of resistance to change: the defender role. In: Bennis WG, Benne KD, Chin R & Corey KE (eds). The Planning of Change. 3rd edition. New York: Holt, Rinehart & Winston 117–124.

Kouides RW, Bennett NM, Lewis B, Cappuccio JD, Barker WH and LaForce FM (1998). Performance-based physician reimbursement and influenza immunisation rates in the elderly: the primary-care physicians of Munroe County. American Journal of Preventive Medicine 14:89–95.

Leape LL, Kabcenell A, Berwick DM and Roessner J (1998). Reducing Adverse Drug Events. Boston: Institute for Healthcare Improvement.

Lee NN, Chan YF, Davies DP, Lau E and Yip DC (1989). Sudden infant death syndrome in Hong Kong: confirmation of low incidence. British Medical Journal 298:721.

Lomas J (1994). Teaching old (and not so old) docs new tricks: effective ways to implement research findings. In: Dunn EV, Norton PG, Stewart M et al (eds). Disseminating research and changing practice. Research methods for primary care Volume 6. London: Sage Publications.

Lomas J (1997). Beyond the sound of one hand clapping: a discussion document on improving health research dissemination and uptake. University of Sydney.

Maiman LA, Becker MH, Liptak GS, Nazarian LF and Rounds K (1988). Improving pediatricians' compliance-enhancing practices: a randomized trial. American Journal of Diseases of Children 142:773–779.

Metz J, McGrath KM, Copperchini ML, Haeusler M, Haysom HE, Gibson PR et al (1995). Appropriateness of transfusions of red cells, platelets and fresh frozen plasma. An audit in a tertiary care teaching hospital. Medical Journal of Australia 162:572–577.

Mosteller F (1981). Innovation and evaluation. Science 211:881–886.

Moulding N, Silagy C and Weller D (1999) A framework for effective management of change in clinical practice: dissemination and implementation of clinical practice guidelines. Quality in Health Care.

NHMRC (National Health and Medical Research Council) (1995). National Breast Cancer Centre. Clinical practical guidelines for the management of early breast cancer. Sydney: NHMRC National Breast Cancer Centre.

NHMRC (1996a). A consumer's guide: early breast cancer. Sydney: NHMRC National Breast Cancer Centre.

NHMRC (1996b). Clinical Practice Guidelines on Care around Preterm Birth. Canberra: Australian Government Publishing Service.

NHMRC (1997). Care around preterm birth. A guide for parents. Australian Government Publishing Service, Canberra.

NHMRC (1999). A Guide to the Development, Implementation and Evaluation of Clinical Practice Guidelines. Canberra: NHMRC.

NHMRC (2000a). How to Present the Evidence for Consumers: Preparation of Consumer Publications, Canberra: NHMRC.

NHMRC (2000b). How to Review the Evidence: Systematic Identification and Review of the Scientific Literature, Canberra: NHMRC.

NHMRC (2000c). How to Use the Evidence: Assessment and Application of Scientific Evidence. Canberra: NHMRC.

NHMRC (2000d). How to Compare the Costs and Benefits: Evaluation of the Economic Evidence. Canberra: NHMRC.

Orlowski JP and Wateska L (1992). The effects of pharmaceutical firm enticements on physician prescribing patterns. There's no such thing as a free lunch. Chest

Oxman AD, Thomson MA, Davis DA and Haynes RB (1995). No magic bullets: a systematic review of 102 trials of interventions to improve professional practice. Canadian Medical Association Journal 153:1423–1431.

Phillips DP, Kanter EJ, Bednarczyk B and Tastad PL (1991). Importance of the lay press in the transmission of medical knowledge to the scientific community. New England Journal of Medicine 325:1180–1183.

Ponsonby AL, Dwyer T, Gibbons LE, Cochrane JA and Wang YG (1993). Factors potentiating the risk of sudden infant death syndrome associated with the prone position. New England Journal of Medicine 329:377–382.

Poole SR, Schmitt BD, Carruth T, Peterson-Smith A and Slusarski M (1993). After-hours telephone coverage: the application of an area-wide telephone triage. Pediatrics 92:670–679.

Prochaska JO and DiClemente CC (1983). Stages and processes of self-change of smoking: toward an integrative model of change. Journal of Consulting and Clinical Psychology 51:390–395.

Putnam RW and Curry L (1985). Impact of patient care appraisal on physician behaviour in the office setting. Canadian Medical Association Journal 132:1025–1029.

Roche AM, Eccleston P and Sanson-Fisher R (1996). Teaching smoking cessation skills to senior medical students: A block-randomized controlled trial of four different approaches. Preventive Medicine 25:251–258.

Soumerai SB and Avorn J (1986). Economic and policy analysis of university-based drug detailing. Medical Care 24:313–331.

Soumerai SB and Avorn J (1990). Principles of educational outreach (academic detailing) to improve clinical decision making. Journal of the American Medical Association 263:549–556.

Soumerai SB, Salem-Schatz S, Avorn J, Casteris CS, Ross-Degnan D and Popovsky MA (1993). A controlled trial of educational outreach to improve blood transfusion practice. Journal of the American Medical Association 270:961–966.

Soumerai SB, McLaughlin TJ, Gurwitz JH, Guadagnoli E, Hauptman PJ, Borbas C et al (1998). Effect of local medical opinion leaders on quality of care for acute myocardial infarction: a randomized controlled trial. Journal of the American Medical Association 279:1358–1363.

SPAFI (Stroke Prevention in Atrial Fibrillation Investigators) (1991). Stroke prevention in atrial fibrillation study. Final results. Circulation 84:527–539.

Sudlow M, Rodgers H, Kenny RA and Thomson R (1997). Population based study of use of anticoagulants among patients with atrial fibrillation in the community. British Medical Journal 314:1529.

Sulmasy DP, Geller G, Faden R and Levine D (1992). The quality of mercy: caring for patients with 'Do Not Resuscitate' orders. Journal of the American Medical

Thomson MA, Oxman AD, Haynes RB, Davis DA, Freemantle N and Harvey EL (1998a). Outreach visits to improve health professional practice and health care outcomes (Cochrane Review). In: The Cochrane Library, Issue 2. Oxford: Update Software.

Thomson O'Brien MA, Oxman AD, Haynes RB, Davis DA, Freemantle N and
Harvey EL (1998b). Local opinion leaders to improve health professional
practice and health care outcomes (Cochrane Review). In: The Cochrane
Library, Issue 2. Oxford: Update Software.

Thomson O'Brien MA, Oxman AD, Haynes RB, Davis DA, Freemantle N and
Harvey EL (1998c). Audit and feedback to improve health professional practice
and health care outcomes (Cochrane Review). In: The Cochrane Library, Issue
2. Oxford: Update Software.

Todd C (1995). Is there a role for academic detailing in today's healthcare system?

Tuckfield A, Haeusler MN, Grigg AP and Metz J (1997). Reduction of
inappropriate use of blood products by prospective monitoring of transfusion
request forms. Medical Journal of Australia 167:473–476.

US Department of Health and Human Services Agency for Health Care Policy and
Research (1992a). Urinary incontinence in adults. A patient's guide.
Pub no AHCPR 92-0040.

US Department of Health and Human Services Agency for Health Care Policy and
Research (1992b). Preventing pressure ulcers. A patient's guide.
Pub no AHCPR 92-0048.

US Department of Health and Human Services Agency for Health Care Policy and
Research (1993). Cataract in adults. A patient's guide. Pub no AHCPR 93-0544.

Wofford JL and Moran WP (1994). Changing physicians behaviour.
New England Journal of Medicine 330:435–436.