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# In Pursuit of Clinical Effectiveness

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NHS Executive Sponsored Workshop

At the King's Fund Centre on Tuesday 13 June 1994

Report by

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June 1994

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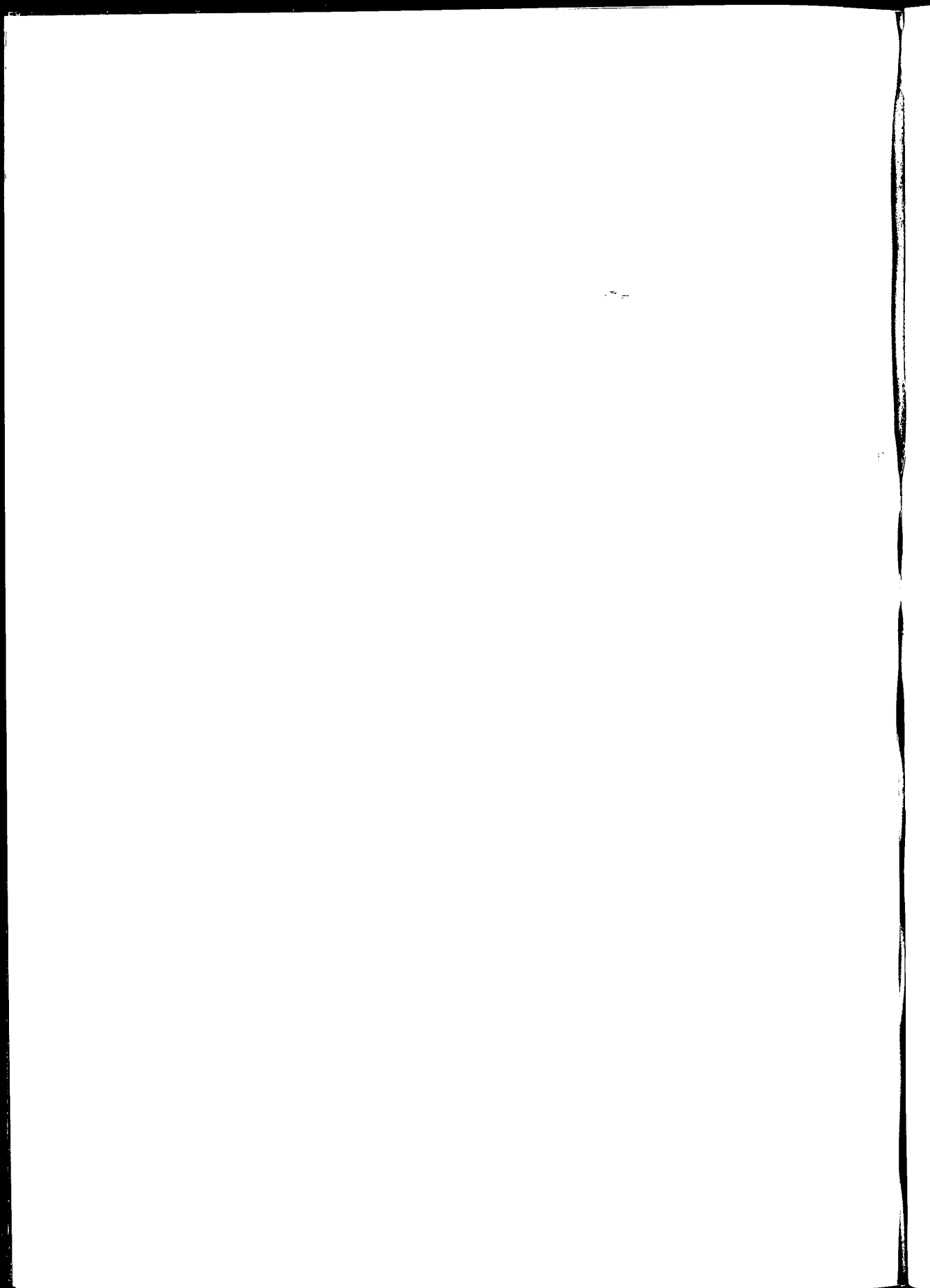
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# Introduction

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This workshop was one of five events sponsored by the NHS Executive to promote clinical effectiveness and the use of clinical guidelines. The day was organised to enable participants to share their experiences of working with guidelines; to feedback comments to the NHS Executive about the lessons learned so far; to identify some of the barriers to change and ways of overcoming them.

Just over 100 people were invited from the Thames Regions, including providers, purchasers, other health professionals and people with research and development expertise. Participants attending the workshop fell into the following categories:

	%
Public health consultants/directors	27
Research and development/academic	20
Purchasers	16
Providers (clinicians)	10
GPs	8
Other	5
TOTAL (= 100%)	51

The workshop began with three presentations by people with different experiences of working towards clinical effectiveness.

Angela Coulter, Director of the King's Fund Centre, spoke about sources of evidence as the basis for action; Professor Andy Haines, Director of Research and Development, North Thames (West) Region, and Professor of General Practice at University College London, identified methods of promoting clinical effectiveness; and Dr Declan O'Neill, Consultant in Public Health Medicine, South Thames (West) Region, talked about delivering clinically effective care. Summaries of these papers, together with references and copies of overheads used, are attached as appendices.

After the plenary session, participants worked in small groups on different topics. These were:

- \* achieving clinical effectiveness in primary care;
- \* clinical guidelines for coronary heart disease;
- \* commissioning for clinical effectiveness;
- \* using clinical audit and education to improve clinical effectiveness.

Each group was given the task of discussing and reporting back under three headings:

- \* actions and achievements
- \* barriers to change
- \* ways of overcoming barriers/problems

At the end of the day the groups shared their proceedings under these three headings.

## **Actions and Achievements**

In primary care, there is a programme of continuing education, mentoring arrangements and, in some areas, protocols have been developed. In Barking and Havering, for example, a protocol on back pain had been drawn up, with the involvement of people from different disciplines, including medical, nursing and physiotherapy staff.

In coronary heart disease individual clinicians vary in the extent to which they evaluate their practice and the methods they use. At King's College Hospital, a rigorous system of evaluation is used to audit outcomes and use the results to improve practice. The group agreed that clinical guidelines were part of the route to clinical effectiveness and the need for them was generally accepted.

Commissioners felt public health was emerging as a discipline with a key role in needs assessment. One area where people had actually achieved change through commissioning was North West Surrey, where the purchasers had involved clinicians in drawing up strategies for implementing guidelines in coronary heart disease, asthma and cancer services.

The management of multi-disciplinary issues like day surgery and thrombolytic therapy has been made easier by a shift in management culture which is itself becoming multi-disciplinary.

Clinical audit and its role in clinical effectiveness predates the NHS Executive's EL on the subject. Joint guidelines for primary and secondary care had been developed. It was hard for the guidelines to link in with non-medical education, because there was no body equivalent to the General Medical Council which covers both registration and education.

## Barriers to Change in:

### Primary Care

The culture of general practice makes it difficult to think about, or work according to, guidelines; or to regularise and formalise practice.

Many GPs complained of information and work overload. They were just too busy to get involved in thinking about guidelines.

Sometimes the subject matter of guidelines is not appropriate to general practice.

### Coronary Heart Disease

At present, information systems within provider units, are often inadequate for the purposes of audit. When a purchaser asked for details of clinical activity from a provider, the figures provided were often unreliable.

Purchasers were not being given the funds to pay for research, when it is an essential part of clinical effectiveness. This situation should improve when the research and development programmes are up and running.

Clinical guidelines should not be about rationing. Guidelines should specify what the optimum treatment is for a specific condition, and then the purchaser should decide how much of that they could afford to purchase. The guidelines should not start from the point that resources are scarce and recommend sub-optimal treatment.

Members expressed concern that, while providers were being audited, no-one was audited purchasing decisions. If a GP fundholder, for example, decided to purchase care from small, inadequately staffed hospitals, who would audit this decision?

### Commissioning

Purchasers tend to be contract driven rather than commissioning focused. They need to identify health gains and use contracts as a wedge. Effectiveness bulletins are not widely enough distributed. Distribution should be widened, possibly to include GPs.

## Audit

There is duplication of local/national work. Where local guidelines have been developed, the clinicians prefer to carry on with these, rather than adopt national guidelines.

The group felt it was difficult for purchasing districts to influence providers when a great deal of their budget had been removed, to provide budgets for GP fundholders.

There is uncertainty about the legal implications of guidelines which sometimes leads to difficulties.

There is uncertainty about policing guidelines. Could purchasers police guidelines without provoking fears and paranoia among clinicians?

## Ways of Overcoming Barriers/Problems in:

### Primary Care

There is a need for evidence-based education programmes for primary care and easy access to information.

Communication in primary care must take account of the multi-agency nature of the work. In producing guidelines for primary care, for example, the instigators should cover the primary/secondary care interface.

Within general practice, there should be educational opportunities for all members of the primary care team.

The best way to promote clinical effectiveness is to focus on specifics and do a few things well.

### Coronary Heart Disease

Continuing medical education is necessary to encourage an evidence-based culture.

Clinical guidelines should be kept simple and scientifically robust, and need to be interface-specific. They should be regularly up-dated in the light of new research.

Guidelines are more acceptable if they are professionally led. They should be drawn up at a national level, to avoid duplication, but adapted to local needs.



### Commissioning

- \* Empower consumers/public opinion
- \* Involve clinicians and GPs
- \* Encourage mutual respect between commissioners and providers
- \* Develop competence for commissioning
- \* Develop the specialty of public health - at present there are wide variations in resource levels
- \* Identify a common agenda
- \* Use clinical audit as a vehicle for change
- \* In setting an effectiveness agenda, plan for it to be resource neutral, rather than designed to save money.
- \* Focus on health gain
- \* Engage the four 'Ps' - public, purchasers, providers and practitioners.

### Audit

- \* Identify change agent/project leader
- \* Provide more effective dissemination
- \* Improve education - both undergraduate and continuing.
- \* Consider resource implications: for authorities who are resource-losers, the cost implications of trying to fund clinical effectiveness changes is enormous.
- \* Keep number of audit topics down for any given group.

### Advice to the NHS Executive

- \* Consult before issuing ELs
- \* Identify four to five indicators of clinical effectiveness, which can be monitored
- \* Allow appropriate length of time for reporting back (timetable for EL (93)115 was unrealistic)
- \* Inject incentives, either professional or personal, and remove disincentives eg the efficiency index
- \* Add value eg disseminate examples of good practice throughout the service; feed into continuing education; provide guidance on new technology.

A multi-faceted approach is necessary. The Executive cannot rely only on ELs. To move to clinical effectiveness, commissioners need to present evidence for change and provide the criteria, by which to judge it.

### Main Issues Arising from the Workshop

Improving clinical effectiveness is a complex process which starts with research and the creation of an evidence based culture. Once this base is established, providers and purchasers need to work together to ensure that care and treatments are effective. Audit and evaluation complete the effectiveness cycle by feeding back into research and development. Speakers and participants agreed that education and research are essential factors in changing practice and professional behaviour. The drawing up of guidelines should be professionally led but patients, purchasers and providers should also be involved in the process. They need to be sufficiently flexible to allow for different local conditions. They should be established on the basis of good practice and be 'resource neutral'. The most effective way to introduce clinical effectiveness is to focus on a few issues and do these well, extending the range over time (eg the Oxford GRIP project).

More effective dissemination of the knowledge base and the process of evaluation and audit is essential; as is continuing education and development for all health professionals.

## APPENDIX I

### CLINICAL EFFECTIVENESS

Angela Coulter, Director, King's Fund Centre

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The NHS Executive is currently trying to promote an evidence-based culture and clinical effectiveness because Britain has some fundamental problems in delivering health care. There are wide variations in clinical practice. In the area of elective surgery, for example, whether it is tonsillectomy, hysterectomy or cholecystectomy, there is considerable variation in the rates at which they are performed.

The key questions in considering clinical effectiveness are: Does the intervention work? Do the benefits outweigh the risks? Is it cost-effective?

Such questions can be applied not only to treatments, but also to diagnostic tests and health services organisation.

When looking at treatments, tests and services, it is necessary to look at them in context. Which people can benefit from this treatment? Just because some people may, it does not mean that all will. Is this treatment being applied correctly? Is it acceptable and do patients want it? Much of health care is not about saving life, but improving quality of life, which makes it even more important that patients become involved as active participants.

#### Sources of data on health care outcomes.

The gold standard for evaluation must be the randomised controlled trial (RCT). This is the only way in which the many problems of bias can be dealt with (1). It has been estimated that only about 20 per cent of clinical procedures have been evaluated scientifically, but often there is more evidence available than people realise. The newly-established UK Cochrane Centre, in Oxford, is trying to trawl systematically through the international literature to identify controlled trials that have been carried out, but which have not been widely reported. These data are then being put on to a standardised data base, so that they can be subjected to meta-analysis.

Meta-analyses, which are the systematic overview of RCTs, can prove useful. Where the numbers involved in individual trials are small, taking the results of several trials together can produce more reliable, and often surprising, results.

Where the results of randomised controlled trials are not available, we have to rely on observational data, but these may be biased for a variety of reasons, such as: data inaccuracies, random variations or chance events, demographic factors, such as age, sex or social class, other unmeasured factors, such as disease severity and co-morbidity.

Two further sources of data are: routine statistics and cross-design syntheses, in which researchers pool the best information they can find from different studies.

One example of putting research into practice is the Oxford Region's Getting Research Into Practice (GRIP) Project. This programme was developed by the Oxford Regional Health Authority, (now the Oxford and Anglia Region) and is being adopted by the region's purchasers, with a view to improving the clinical effectiveness of the services they are buying.

The project involves eight steps: choosing an issue; reviewing the evidence; consulting with interested parties; doing a baseline audit; developing a protocol; drawing up contracts, including targets; drawing up guidelines, which have to be widely discussed on the ground; and providing information to patients.

One procedure which has been considered as an issue, under the GRIP initiative is the use of Dilatation and Curettage (D&C) for the treatment of menorrhagia (heavy bleeding) (2).

In reviewing the research evidence and the local situation, several important points became clear.

- \* forty-two per cent of GPs were referring women with menorrhagia to a specialist without first trying drug therapy
- \* half of those women who were referred to specialists were given D&Cs
- \* over half ended up having surgical treatment, namely a hysterectomy
- \* D&C was the most common operation performed in the Oxford region in the late 1980s, slipping to second place in 1991/92
- \* rates for carrying out D&Cs were variable. They varied two fold between one district and another
- \* D&C rates in the US had plummeted during the 1980s, leaving British rates eight times as high as those in the US.

A further review of the literature identified other important and relevant points:

- \* a D&C had no therapeutic effect for menorrhagia. Sometimes, it made the bleeding worse;
- \* D&Cs could be useful for diagnostic purposes to discover whether a woman had endometrial cancer. This type of cancer is uncommon in women under 40;
- \* forty per cent of D&Cs were being done in women under 40, despite the fact that endometrial cancer is extremely uncommon in that age group;
- \* another, equally accurate, diagnostic test for endometrial cancer is now available, namely outpatient endometrial biopsy, which can be done under local anaesthetic.

As a result of this review, the Oxford GRIP project staff are trying to implement changes in practice to reduce the number of D&Cs done on women under 40 years old.

In order to achieve change the GRIP Project has:

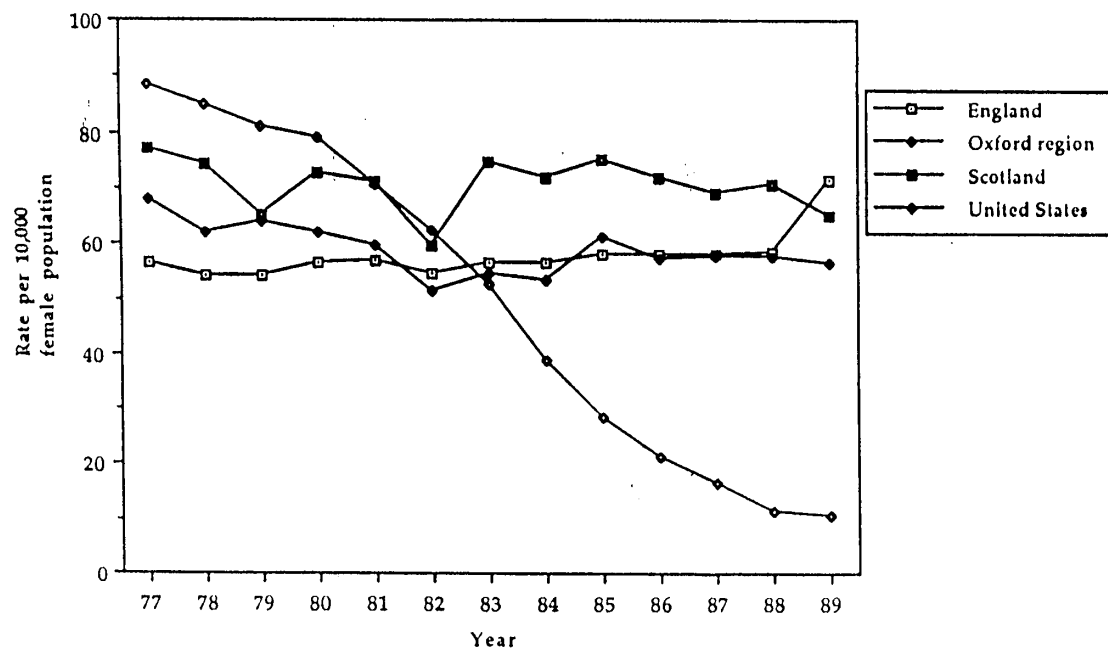
- \* identified local opinion leaders;
- \* involved gynaecologists, GPs and managers;
- \* developed local guidelines
- \* produced contract targets, to reduce the number of D&Cs being done on women under 40;
- \* encouraging outpatient endometrial biopsy in women over 40
- \* issued information for GPs, patients, press and other media.

These steps are based on the knowledge that telling clinicians not to do something is not enough. It is essential to involve a much wider range of people if practice is to change.

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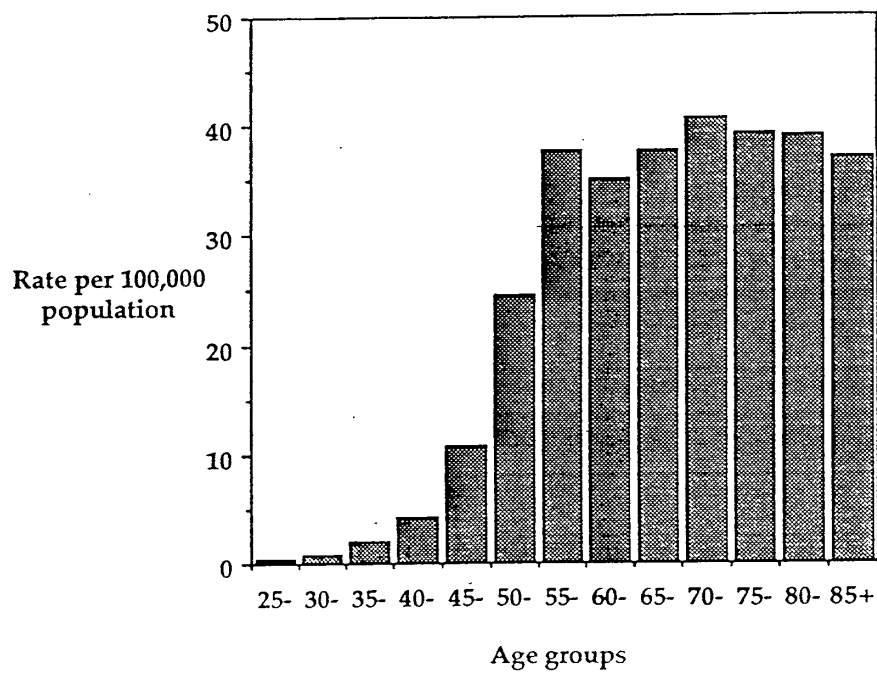
TRENDS OVER TIME IN RATES OF DILATATION AND CURETTAGE:  
ENGLAND, THE OXFORD REGION, SCOTLAND, AND THE UNITED STATES



DILATATION AND CURETTAGE (D&C):  
MAIN FINDINGS FROM THE LITERATURE

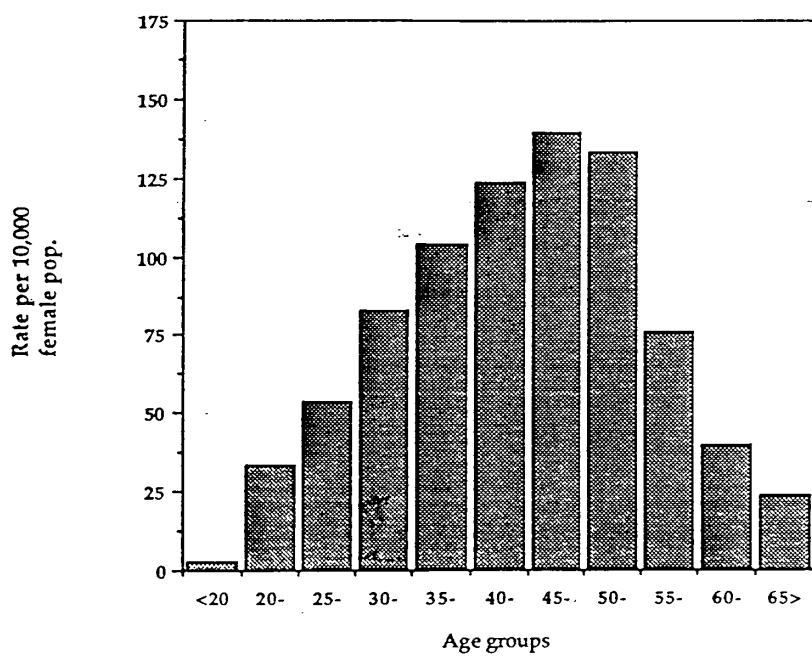
- \* No evidence for therapeutic effect of non-obstetric D&C
- \* Diagnostic D&C should not be performed on women < 40
- \* Diagnostic efficacy of D&C has been questioned
- \* D&C should be replaced by alternative methods of endometrial sampling, with or without hysteroscopy, performed in ambulatory settings

# UTERINE CANCER IN ENGLAND AND WALES, 1986





AGE-SPECIFIC RATES OF DILATATION AND CURETTAGE:  
OXFORD REGIONAL HEALTH AUTHORITY



## WHAT SHOULD BE DONE ABOUT D&C?

- \* systematic review of diagnostic and treatment options
- \* identify local opinion leaders
- \* involve gynaecologists, GPs, and managers
- \* development of local guidelines
- \* contract targets to reduce D&Cs in women under 40
- \* encourage outpatient endometrial biopsy in women over 40
- \* information for GPs and patients, inc. press and media

## APPENDIX II

### DELIVERING CLINICALLY EFFECTIVE CARE

Dr Declan O'Neill, Consultant in Public Health Medicine  
South Thames (West) Regional Health Authority

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It is said that we are now into the third revolution of health care, that is the era of assessment and accountability (1). However, interest in this area is not completely new. Evaluation of health care was exercising some minds before the time of Bismark. In the 1850's, Jarvis (2) in the USA and Guy (3) at King's College Hospital, were already reporting variation in hospitalisation rates according to place of residence. In the early 1900s, the School Medical Officer noted and warned doctors of the rising rates of tonsillectomies being carried out on children. The trend was reversed in the 1920s but peaked again in the 1930s whereupon J. Allison Glover presented his famous paper on tonsillectomy rates in England and Wales to the Royal Society of Medicine (4). As well as finding a rate of 17 tonsillectomised school children per 1,000 in England and Wales, he also noted marked variation of rates across districts and reported a tenfold difference between Bexhill-on-Sea and Ramsgate.

Data on similar district populations in the former South East Thames Region for 1992 were recently examined to see if there had been any change over the intervening 56 years (5). The rate has dropped to a third of what it was, at 5.76 per 1,000, but it is interesting to note that variation in rates can still be demonstrated.

In the 1960s, Roemer (6) and Lewis (7) described how utilisation could be seen to follow supply. This again stirred the variations pot into a simmer and the resulting bubbles have produced a vast array of work in the field. By the time Wennberg and Gittlesohn (8) displayed their seminal work on small area variations, many eyes were being focused on this subject. This time around, the momentum appears to be sustained and capable of stimulating a significant culture change in medical practice. There are other closely connected developments occurring in parallel with these happenings which collectively contribute to the momentum for change.

These include the culmination of the vision presented a quarter of a century ago by Archie Cochrane which has now seen the establishment and flourishing of efforts to enlarge the scientific basis to clinical practice.

There has been the adoption from management theory of methods for developing consensus from Delphi in the 1940s to its numerous and various progeny which are around today.

There are emerging cadres of medical, nursing and allied health practitioners who are familiar with or interested in becoming familiar with patterns of clinical practice and in developing a longer term view of clinical outcomes.

There is increasing research into the patient's perspective of outcomes and patient responses to information on outcomes.

There is an increasing consumer awareness of the 'lottery factor' in the provision of healthcare allied to an increasing desire for more individual control on the decisions affecting individual well being.

There is the application of resources to identify unmet need and to reorientate healthcare delivery on the lines of equity, health gain, patients' rights and appropriate care. There is of course the development of mass information systems and the ability to communicate knowledge rapidly and effectively.

It also bears mention that there is rather a large industry in US Health care thriving on the formulation and application of critical monitors, genetic screens, tolerances, outliers, outcome severity scores, decision analysis, fuzzy logic and hundreds of specialist groups busy developing practice parameters faster than you can say 'algorithm'.

As the end of the millenium approaches, contemporary medical care is characterised by its enormously expanding knowledge base and associated decision making. The increasing range and depth of decision problems facing individual clinicians could be simplified by the codification of diagnostic methods or treatment through policies or guidelines. Many of those who have thought about this issue believe that this could be the way in which the medical and allied professions handle this knowledge base in the future.

One such thinker is the physician and mathematician, David Eddy. He has written widely on the concepts, principles, rationale and stumbling blocks in this area. Like many others he believes that medicine is likely to address problem solving differently in the future than it has in the past.

*"The solutions developed by the profession to solve the diagnostic treatment problems in the past do not work as well for the problems the profession will face in the future." (9)*

Weinberg also expects significant changes in the future.

*"The study of variations leads naturally to the question "What rate is right?" "What are the implications of these variations in medical opinion and costs of care for outcomes of patients illness?" "In years to come the status of our profession will depend in an important way on how we respond to the question." (10).*

And observers such as Leape expect guidelines to be the key to this change.

*"Where the old guidelines were general, broad and permissive, the new guidelines are specific, narrow and restrictive - the new guidelines represent a new technology for technology assessment." (11)*

Eddy has recommended two adjustments that the medical profession will need to make to maximise the quality of care in the face of limited resources and costs.

First, instead of a simple qualitative judgement that a procedure may have a benefit, a quantitative estimate must be made about the magnitude of benefits.

Second, instead of focusing on the patient at hand when making a decision and deriving clinical policies by formalising these individual encounters between physicians and patients, the profession must broaden the scope of the decision to make comparisons across procedures and across diseases. (9)

#### Evidence as a stimulus to modification of practice

Evidence per se is not as powerful a stimulus to modification as might be thought. One of the most comprehensive evidence based datasets for effective care in a specialty ever produced is the Oxford Database of Perinatal Trials. A survey aimed at discovering the effect of this database on everyday practice found that although more than four out of five consultant obstetricians know of the existence of the database, less than a third could actually define it, and only about a quarter had it available. (12)

#### Dissemination of advice

Is the difficulty mentioned above just a question of publicity? It would not appear so from other research. In Canada, in the 1980s, Caesarian Section rates were seen to be relatively high and continuing to rise. A consensus statement was developed and national guidelines produced in 1986. The obstetrician community was targeted and saturated with information on the guidelines.

After two years, a survey was conducted which found the following: between 87% and 94% of obstetricians were aware of the guidelines. 82.5% to 85% of obstetricians agreed with the guidelines. One third of obstetricians reported changing their practice. Obstetricians also reported that caesarian rates had come down in line with recommendations. However, in the final analysis of activity data, caesarian section rates were found to have been much higher than the obstetrician reported reduction and to have changed hardly at all from the previous increasing trends. The authors concluded that 'guidelines for practice may predispose physicians to consider changing their behaviour but that unless there are other incentives or removal of disincentives, guidelines may be unlikely to effect rapid change in actual practice. (13)

These apparent barriers to change are not confined to the practice of obstetrics or any individual specialty. Early experience has been similar across the board. A survey of the effect of 60 National Institutes of Health consensus conferences reported in 1987 showed little effect on practice patterns even where there was wide familiarity with the conference recommendation. (14)

However, as times goes on there seems to be increasing evidence of change estimated by a variety of factors.

### Incentives and Disincentives

The use of incentives and penalties has been noted by some to be effective under certain conditions. The Massachusetts Medical Malpractice Joint Underwriting Association in 1987 adopted the American Society of Anaesthesiologists standards for monitoring during general anaesthesia. (15) This was followed in 1988 by a year free from hypoxic brain damage episodes in patients for whom anaesthetists had followed ASA guidelines. This in turn was followed by a 20% reduction in malpractice insurance for those anaesthetists.

### Collegiate Approach

Another useful ingredient appears to be the collegiate approach. The Maine Medical Assessment Foundation demonstrated through the adoption of a collegiate approach with continuous feedback in a variety of specialty groups that they were able to radically reduce variations in practice across specialties and to sustain the reductions over a period of ten years.(16)

### Longer Term Perspective

Patience and a long term approach appear to be important ingredients at this stage. Fowkes and Roberts have described a three stage process for creating change in clinical practice with the Royal College of Radiologists' guidelines on pre-operative chest X-ray (17). The first stage consists of a cautious policy statement followed by intellectual resource commitment towards seeding change. This is followed by the introduction of guidelines into practice. The third stage involves the sustained implementation through education and feedback on clinical performance management and change.

### Other Aspects

Other aspects of change management have been highlighted in particular studies. They include the use of: clinician educators, face-to-face interviews, the use of influential clinicians as flag-ships (18), the use of standardised education programmes coupled with feedback on performance (19), the importance of close communication between participants (20).

### National Guidelines

Lomas (21) conducted a major review of development and promulgation, and found very few national guidelines that had actually been studied right through to their impact on practice, and of those, few which demonstrated an impact. He thought that national consensus exercises were mainly useful for 'softening up' practitioners to be receptive but that most successful strategies operate at a more local level. He thought, however, that this symbiotic relationship between the two justified the maintenance of a national consensus development exercise. This seems to be supported by most clinicians who see bodies such as the Royal Colleges or associations which deal with specific conditions or condition groups, taking a national lead, and local groups modifying these guidelines to local circumstances.

### Information Feedback

Mugford and colleagues looked at the effect on practice of feeding back the statistics to practitioners and discovered two important facts (22). Firstly, when an active standard setting exercise is accompanied by information feedback, there is more likely to be a positive effect, and, secondly, there is a positive relationship between the speed of the feedback and the effect on behaviour.

### Is Progress Being Made?

More recently, Grimshaw and Russell have reviewed 59 guideline evaluations and concluded that guidelines can improve practice when introduced in the context of rigorous evaluations (23). The size of improvements are variable. Over 90% of the evaluations detected improvements in the process of care, and over 80% of those which assessed outcome (11 studies) detected improvements in outcome.

### Contracts

Charles De Gaulle (General, President, 1890-1970) had an important comment about one form of contract.

*"Treaties (contracts) are like girls and roses, they last while they last."*

There is difficulty in placing emphasis on contracts alone. The commissioning process needs to be larger than the lines in the contract. There are certain things the lines in the contract can do to encourage appropriate care. I believe that the commissioner's role is that of facilitator and guarantor. The commissioner's duty is to see that certain things happen, but in order for them to happen many more people than the commissioner need to conduct activities and to apply concepts and this will not be done through contracts alone. The contract may provide some of the incentives and penalties and administrative rules but will only be a part of the whole picture. It should, at the end of the day, reflect what is going on.

The question of 'longer than one year contracts' arises and these may well be suited to the longer term process of developing effective care strategies. Mechanisms for screening for appropriate care may become an issue as the contracting process becomes more refined.

### Major Ways of Altering Practice

Six major ways of altering practice patterns have been described by Eisenberg and Williams. (24) They are: education, feedback, participation, administrative rules, incentives and penalties.

In addition one may wish to consider the identification of barriers and the development of strategies aimed at removing barriers.

An important action for commissioners, clinicians and managers will be to agree priority areas at the local level and see that these principles are applied.

## CONCLUSION

We have an opportunity in our hands, medicine in this part of the world is well positioned to maximise the potential benefit from a strategic approach to effective care while minimising the abreaactions, threats and potential for paranoia. The knowledge and decision making burden facing clinicians continues to grow. However, changes will not happen in a vacuum. If this is to be done, it will be a costly exercise requiring resources targeted at various levels. The fact that, through foresight or chance, we have not rushed in helter-skelter means that we may possibly avoid problems that others have encountered before us.

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## APPENDIX III

### METHODS OF PROMOTING CLINICAL EFFECTIVENESS

Professor Andy Haines, Director of Research and Development  
North Thames (East) Regional Health Authority

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The article below is an extended version of Professor Haines talk and contains all graphs and references. It was published in the BMJ on 4 June 1994 (vol 308; p1488-1492).

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#### Implementing findings of research

Andrew Haines, Roger Jones

There are unacceptable delays in the implementation of many findings of research. This results in sub-optimal care for patients. A number of approaches may be effective in speeding up implementation, including evidence based guidelines, the influence of opinion leaders, and computer based decision support systems. An integrated approach to speeding up this process by means of a number of mechanisms is likely to be most effective. The results of systematic reviews of the research literature should be incorporated into programmes of continuing medical education and clinical audit. Professional associations have an important role to play in ensuring that research based information is included in educational activities and clinical guidelines. Purchasers of health care could promote the uptake of research findings during contract negotiations. Improved methods of informing health care users and the public about evidence of effectiveness could also have an impact. Policy makers should take more account of the results of research when formulating recommendations. Methods of improving the implementation of research findings require further investigation and greater resources devoted to them.

The NHS research and development programme has embarked on a series of major reviews of research and development priorities in the NHS, leading to commissioned research. These priorities are being derived from an assessment of research need, rather than being based on vested research interests and agendas, and stand a good chance of generating new information for implementation in practice.<sup>1</sup> However,

this sequence of events cannot be taken for granted: Machiavelli warned, "The innovator makes enemies of all those who prospered under the old order and only lukewarm support is forthcoming from those who would prosper under the new."<sup>2</sup> The medical literature is littered with examples of research findings that have not found timely acceptance in practice, and clinical practice is characterised by wide variations in behaviour.

An early example of delayed uptake of innovations was the use of lemon juice to prevent scurvy. In 1601 James Lancaster showed that lemon juice was effective, but it was not until 1747 that James Lind repeated the experiment, and the British navy did not fully adopt this innovation until 1795 (not until 1865 in the case of the merchant marine).<sup>3</sup> Among more recent examples are ascertainment and control of hypertension<sup>4</sup>; widespread failure to give steroids to women in premature labour despite evidence of their beneficial effect on fetal lung surfactant<sup>5</sup>; inadequate use of prophylactic anticoagulants in patients having orthopaedic surgery<sup>6</sup>; inadequate treatment of asthma<sup>7</sup>; and inadequate treatment of children with gastroenteritis.<sup>8</sup> In the case of thrombolytic treatment for myocardial infarction there was a 13 year delay between the demonstration of effectiveness from cumulative meta-analysis of randomised controlled trials and the advocacy of the treatment by most authors of review articles or book chapters.<sup>9</sup>

Researchers need to give some thought to the means of implementing their findings. This paper outlines methods of achieving more effective implementation and discusses the organisational framework.

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### Problems of implementation

One factor working against the smooth transition from publication of research to clinical practice is probably the longstanding cultural divide between researchers, practitioners, and administrators. Communication of ideas occurs most effectively between people who share important attributes such as educational level, beliefs, social status, and networks. This has been described as homophily (heterophily being the opposite). Researchers and innovators are frequently heterophilous with the practitioners who will determine whether a specific innovation is taken up.<sup>11</sup> Research can easily become uncoupled from clinical practice<sup>12,13</sup> and the needs of health services and be driven by individual and institutional agendas that may operate in virtual isolation.<sup>14</sup> Clinicians may be unable to articulate their research needs and become dependent on the traditional publication and dissemination processes controlled by the research community. Many of the literature reviews that clinicians and researchers use as a means of keeping up to date have been methodologically flawed and have resulted in inappropriate conclusions being drawn.<sup>15</sup> Educational activities are rarely driven by evidence about effectiveness. Health policy makers may come to regard academic research as wilfully irrelevant to their needs, and important shifts in health policy often take place with little apparent regard for the research evidence.

There are dangers of uncritical acceptance of medical innovations.<sup>16</sup> Even medical leaders have occasionally endorsed treatments that have subsequently been shown to be ineffective or even dangerous. For example, William Osler favoured blood letting for the treatment of lobar pneumonia. J Marion Sims, a prominent figure in American gynaecology, described the postcoital test, which was designed to evaluate the ability of sperm to survive and penetrate cervical mucus. This has been extensively adopted, but it lacks predictive power.<sup>17</sup>

The challenge is to promote the uptake of innovations that have been shown to be effective, to delay the spread of those that have not yet been shown to be effective, and to prevent the uptake of ineffective innovations. This will require a greater capacity on the part of clinicians, managers, and policy makers to critically analyse evidence that is presented to them. A controlled trial showed that teaching techniques of critical appraisal to final year medical students significantly improved their ability to critically analyse the clinical literature whereas the ability of the control group, who were exposed to standard educational approaches, deteriorated over the duration of the study.<sup>18</sup> Having the ability to critically appraise evidence, however, may not necessarily result in change of behaviour.

### Diffusion of innovations

There is an extensive literature on diffusion of innovations, only a minority of which concerns medicine.<sup>11</sup> Diffusion is the process by which an innovation is communicated through certain channels over time among members of a social system. Five adopter categories have been defined on the basis of the rapidity with which they take up innovations: these are innovators, early adopters, early majority, late majority, and laggards. If the proportion of individuals taking up a new idea is plotted over time an S-shaped curve of variable slope is observed, with the innovators and early adopters being at the foot of the curve and the laggards at the asymptote (fig 1). The five categories can be partitioned by standard deviations away from the mean time of adoption: for example, innovators (2.5% of the population) are two or more standard deviations below the mean time of adoption.

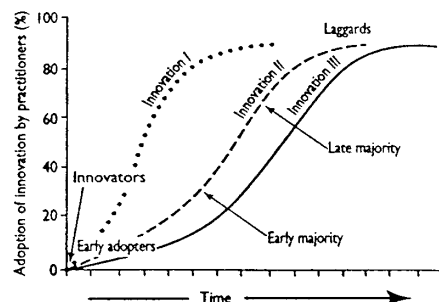


FIG 1—Diffusion of innovations. Speed of diffusion may vary, as shown by innovations I, II, and III. Modified from Rogers<sup>11</sup>

A classic study of the spread of the use of a new antibiotic among doctors in Illinois in the early 1950s showed that innovative doctors, who were among the first to use the new antibiotic (which researchers gave the pseudonym Gammanym), had attended more medical meetings out of town and had more extensive social networks than did those who adopted the drug later.<sup>19</sup> Studies of innovations in other fields have also reported that innovators tend to have extensive friendship networks. Those doctors defined as opinion leaders by their colleagues had almost all adopted Gammanym by the first half of the period studied. One reason for the S-shaped curve might be that once the opinion leaders in a given system adopt an innovation they influence their colleagues, who rapidly take it up.

Few resources have been devoted to testing strategies to implement research findings, and there is much to be learnt. There is growing interest in this topic, and the United States Agency for Health Care Policy and Research has prepared an annotated bibliography on dissemination of information to health care practitioners and policy makers.<sup>20</sup> Dissemination alone, however, is not sufficient to promote change. Strategies for implementation must be sustainable and dynamic, taking into account changing evidence about effectiveness.

### Priorities for implementation

Criteria for deciding priorities for implementation should include burden of disease, the potential benefit that might accrue from improvements in care, the strength and generalisability of the evidence, and the feasibility of implementation. Measures of cost effectiveness are also bound to play a part.

The strength and generalisability of evidence can be deduced from systemic reviews of the research evidence that have used the techniques of critical appraisal.<sup>21</sup> The Cochrane Collaboration is playing a key role in coordinating systematic reviews of randomised controlled trials in the United Kingdom and internationally,<sup>22</sup> and guidelines for reviews have been developed.<sup>23</sup> The NHS facilities at the University of York for commissioning and disseminating reviews will complement the activities of the Cochrane Collaboration by focusing on different types of studies and ensuring wide distribution of information.

### Different approaches

A top down, centralised approach to implementation is unlikely to achieve changes in behaviour. However, the implementation of research findings cannot be left solely to spontaneous local initiatives or specialty organisations, although both may have a useful part to play. The Royal College of Radiologists provides an example of how a specialty organisation can mount a sustained and effective programme through the use of

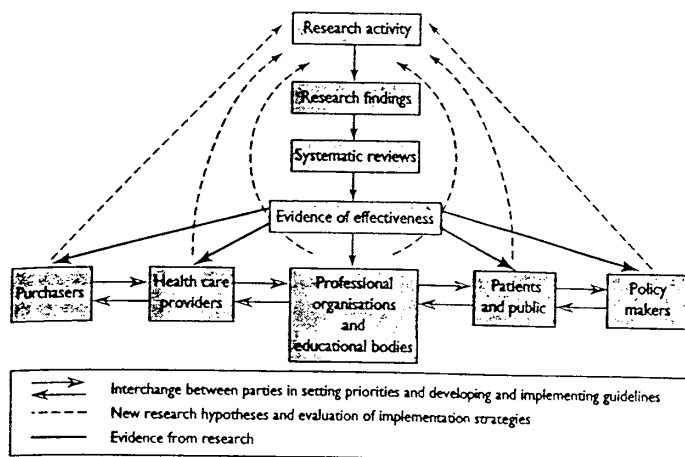


FIG 2—Proposed links to promote implementation of research findings

guidelines derived from the findings of research.<sup>24</sup> It has achieved success in several specific areas, including the use of x ray pictures in accident and emergency departments and preoperatively. The strategies for the incorporation of knowledge from well designed studies into clinical policies and practice have been classified, and those approaches that focus primarily on individuals have been separated from those that focus on geographical or specialty communities.<sup>25,26</sup> In each case there are four main strategies: patient centred, educational, administrative, and economic.

*Patient centred approaches* include educating patients about the effectiveness of interventions in an attempt to change the behaviour of professionals. Giving patients more information about the probabilities of different outcomes of surgery and their potential impact on quality of life may influence the treatment that the patients choose. This is exemplified by the use of an interactive videodisk for patients who are being offered a prostatectomy.<sup>27</sup>

*Educational approaches*—Traditional didactic approaches to continuing medical education do not seem to be an effective way of changing practitioners' behaviour, though they may increase awareness of issues.<sup>28</sup> A review of 50 randomised controlled trials of continuing education suggested that approaches that incorporate feedback of performance, involvement of learners in setting priorities, or face to face encounters between practitioners and an educator may be more effective. However, only a minority of studies have assessed the impact on patient outcomes. Strategies linked to activities that enable or reinforce practice

consistently improve the performance of doctors.<sup>29</sup> A randomised controlled trial compared the effect of audit and feedback on guidelines with education by local opinion leaders previously identified by a survey of local obstetricians.<sup>30</sup> Audit and feedback had no effect on the rates of trial of labour and vaginal birth that were advocated in guidelines for the management of women with a previous caesarean section. However, education by local opinion leaders substantially increased the rates.

*Economic strategies* are frequently motivated by the intention to contain costs, but there is little evidence that they have been used to promote effective health care based on research. An American study that compared a health maintenance organisation with "fee for service" care suggested that use of services fell at equal rates across appropriate and inappropriate areas of practice.<sup>31</sup> In the United Kingdom the use of target payments to encourage cervical cytology and immunisation has focused the attention of primary care teams, but it is unlikely that such a mechanism could be widely used because of the potentially large numbers of topics.

There is increasing interest in the use of guidelines, and a review of their efficacy has revealed factors associated with a high probability of successful use.<sup>32</sup> These include a sense of local ownership (that is, development of guidelines by those who are to use them), a dissemination strategy that includes specific educational interventions, and the use of patient specific reminders at the time of consultation.

#### An integrated system

It is clear that no single strategy is likely to be successful.<sup>33</sup> We therefore propose an integrated system that encompasses several components (fig 2). Systematic reviews of research should be used to inform providers, purchasers, patients and the public, professional organisations, and policy makers. Feedback from these groups might also lead to new research and reviews. Updated evidence about effective and ineffective interventions should be included in undergraduate, postgraduate, and continuing medical education. Large sums of money are spent on continuing medical education; the cost of the postgraduate education allowance is over £2000 a year for each general practitioner. The system does not seem to represent good value for money as there are no clear objectives either in terms of educational impact or outcome for patients. Similarly, much clinical audit activity is of questionable effectiveness. A much closer link between continuing education and clinical audit seems essential (fig 3).<sup>34</sup> An important element of continuing education could be the development, or more commonly adaptation, of guidelines and practice policies derived from the results of research. These guidelines could then form the basis of standards for audit. This could help to establish a sense of ownership, which appears to be important for success, while avoiding a proliferation of guidelines based on inadequate scientific evidence. Topics where evidence is insufficient for the development of guidelines could form the basis of new research projects. In the United Kingdom much of the coordination between the various components of the implementation strategy could take place at the level of regional health authorities or their successor organisations.

#### EVIDENCE BASED GUIDELINES

A growing number of guidelines have been developed after exhaustive reviews of the evidence; for example, those prepared under the auspices of the United States Agency for Health Care Policy and Research.<sup>35</sup> Three forms of guideline are available on each topic: a patient guide, a quick reference guide, and a more complete

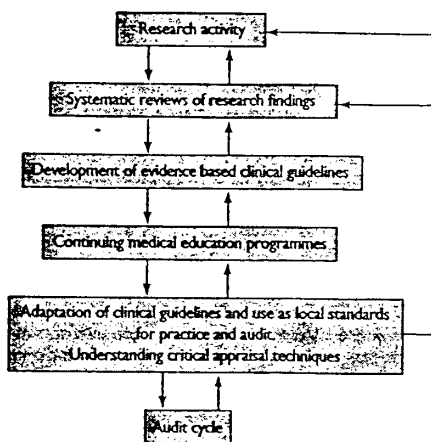


FIG 3—Interaction between continuing education, audit, and research findings

guideline that summarises the research rationale behind the guidelines. The database *Effective Care in Pregnancy and Childbirth* is now available on disk and is regularly updated.<sup>3</sup> It is the first of a series of specialised databases—*Cochrane Updates on Disk*—derived from the Cochrane Database of Systematic Reviews. *Effective Health Care*—a bulletin on the effectiveness of health service interventions for decision makers—systematically reviews the evidence on specific topics using three principal criteria: clinical effectiveness, cost effectiveness, and acceptability.<sup>4</sup> The use of resources such as these to develop locally applicable guidelines should encourage a participatory, multidisciplinary approach. If priorities are made solely on the basis of local interest they may address topics in which performance is already satisfactory, but if they are based only on national and regional priorities they may be seen as an imposition. Considerable discussion and negotiation may be required to ensure that an appropriate balance is achieved.

Systematic reviews of the evidence will not always lead to clear and unambiguous recommendations—the controversy over the drug treatment of hypercholesterolaemia is one example of this<sup>5</sup>—but they may suggest new priorities for research. Testing strategies for implementation should become a growing field. Thus, a more responsive relation between research and practice can be developed.

#### OTHER METHODS

Other methods of improving the implementation of research findings may include computer based decision support systems that incorporate information from research. A critical appraisal of relevant trials showed that such systems can improve the performance of doctors, but more work is needed on patient outcome.<sup>6</sup> The use of academic detailing—pharmacists trained in educational techniques talking on a one to one basis with doctors—has been shown to affect prescribing patterns in the United States.<sup>6</sup> Such pharmaceutical advisors could play a similar role for general practice in the United Kingdom, but further research is needed to determine their effectiveness.

#### Purchasers, providers, and public

Purchasers of health care could play an important role in implementing research findings, although it may be difficult to include more than a limited number of specific recommendations in contracts. Evidence of effectiveness needs to be presented to purchasers and providers in an appropriate form, including any available information on costs, acceptability, and overall impact of the intervention.<sup>4</sup> Discussions between purchasers and providers could help to identify priorities. Each specialty could be asked to identify a specific topic for implementation over the next year. Providers would thus be responsible for the detailed implementation of research findings, and this process should be subject to audit. As advocates for a particular topic, purchasers and providers could set up local implementation projects. The Getting Research into Practice project, based in Oxford, is focusing on improving practice in a number of specific areas, including the use of steroids in premature labour (H McQuay, personal communication), as are similar activities in North East Thames region. A recent circular from the NHS Executive (EL (93) 115) has outlined available sources of information about clinical effectiveness, and district health authorities are being encouraged to use the information in the 1994-5 contracting round and to make use of clinical guidelines in local discussions.

The role of patients (consumers) in the implementation of research findings requires more investigation.

The potential for "retailing" research was reviewed with the evidence in *Effective Care in Pregnancy and Childbirth*<sup>4</sup>; the results suggested that community organisations concerned with pregnancy and childbirth could increase the use of research based information.<sup>7</sup> In the United Kingdom the National Childbirth Trust uses *Effective Care in Pregnancy and Childbirth* in training its own staff.<sup>4</sup> Written material could be disseminated to patients through prenatal classes and by using local and national media. Clearly, working with health professionals where possible is more likely to be effective than working in isolation. In the United States news of the pain guideline of the Agency for Health Care Policy and Research made the front page of 11 newspapers and was covered by at least 44 television stations and 10 news programmes broadcast by more than 4400 radio stations.<sup>8</sup> The impact of such wide publicity has not been rigorously evaluated, but the volume of public inquiries suggests major public interest. In Switzerland the potential power of the media was shown by the successful outcome of a campaign to reduce the high rates of hysterectomy; this included newspaper, radio, and television debates.<sup>9</sup> Social marketing techniques, which entail the diffusion of socially beneficial ideas rather than commercial products, may have a role to play. They have been used successfully by governments to encourage the use of family planning techniques in several countries.<sup>11</sup>

#### Professional organisations and policy makers

Professional associations and colleges also have an important role to play through programmes of postgraduate and continuing education and in postgraduate examinations. The Royal College of General Practitioners has included a paper on critical reading of the medical literature in the membership examinations. The Royal College of Midwives promotes the sale of *Effective Care in Pregnancy and Childbirth* and encourages members to use the information in it to evaluate and change midwifery practice. Although some senior obstetricians initially seemed sceptical of its value, the audit committee of the Royal College of Obstetricians and Gynaecologists has recently recommended it as a source of information about effective forms of treatment.<sup>4</sup> Professional bodies may also influence the public. For example, the "Defeat Depression" campaign organised by the Royal Colleges of Psychiatrists and General Practitioners aims to improve the knowledge of professionals, patients, and relatives about this condition and to change attitudes.<sup>4</sup>

The role of professional bodies could include ensuring that systematic reviews of literature are undertaken in areas of special interest, recruiting members to participate in the reviewing process, and consulting those who are expected to implement guidelines during their development. Guidelines that span primary and secondary care should have input from both generalists and specialists. Increasing clinicians' participation in intervention trials may be another method of improving the uptake of their findings. For example, clinicians who participated in multicentre trials of lung cancer treatment were more likely to use effective treatments, and those who entered larger numbers of patients were more likely to be influenced by the results.<sup>12</sup>

Policy makers have a key role in determining whether evidence based approaches are used. Recent examples (such as the imposition of the general practitioner contract and particularly the inclusion of inadequately tested strategies for screening and health promotion<sup>13</sup>) suggest that policy makers need greater understanding of the need for evidence from research if they are to avoid such costly gambles in the future.

## Managing change

Clearly, approaches to implementation may vary according to the topic. Some (such as new surgical techniques) may require considerable training, while others may be dependent on organisational change (such as those that span primary and secondary care or affect the whole primary care team). A model for managing change in general practice has been developed based on experience in industry.<sup>1</sup> It emphasises the need to obtain comprehensive background information, identify barriers to change, negotiate with key individuals, achieve agreement on the approach to be used, and evaluate the programme for change.

## Resources

In the United Kingdom resources should be made available by the NHS research and development programme, both centrally and at the regional level, but other sources should also be tapped. As ownership of a topic is essential for success, this necessarily implies that financial commitment must be forthcoming from the participants. Thus purchasers, providers, and professional and educational bodies should all contribute because implementing research must be seen as intrinsic to improving the effectiveness of their work.

## Conclusions

It is unlikely that any single approach will be effective in ensuring the implementation of the findings from research. A more evaluative culture will require a shift in attitudes among health professionals and managers to ensure that they rigorously analyse their own activities and accept the need for critical appraisal of evidence. Patients should expect a clear explanation about the effectiveness of the treatments that they are offered where available. Policy makers, including political leaders, should acknowledge the requirement for policy to be supported by evidence from research where available. Changes in health service management and organisation should be designed as experiments and evaluated appropriately, and methods of promoting the use of research findings require further evaluation. A systematic review of trials of methods to improve professional performance is being prepared for publication (A Oxman and M A Thomson, personal communication), and a Cochrane Collaboration is being set up to keep trials of methods of promoting the uptake of research findings under surveillance (N Freemantle and I Watt, personal communication).

There is a danger that health professionals and patients may uncritically accept information and guidelines.<sup>20</sup> An integrated approach incorporating techniques of critical appraisal should minimise this possibility. It might be perceived as a threat to clinical freedom, but we argue that clinical practice should be responsive to the best available evidence. When evidence is inadequate clinicians should support the need for appropriate research rather than uncontrolled use of unproved interventions. The challenge now is to build on what is currently known about successful techniques of implementation and to ensure that adequate resources are provided and that cultural change is achieved.

Dr Andy Oxman independently presented a diagram similar to figure 2 at a Cochrane Collaboration meeting in 1992. We thank Dr John Spencer for providing useful information for this article.

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