SIGN

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Scottish Intercollegiate Guidelines Network

SIGN Guidelines

An introduction to SIGN methodology for the development of evidence-based clinical guidelines

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1 Introduction

1.1 CLINICAL GUIDELINES AND SIGN

The Scottish Intercollegiate Guidelines Network (SIGN) was established in 1993 by the Academy of Royal Colleges and Faculties in Scotland, to sponsor and support the development of evidence-based clinical guidelines for the National Health Service (NHS) in Scotland.[1]

Clinical practice guidelines have been defined as *"systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances"*.[2] They are designed to help practitioners assimilate, evaluate and implement the ever-increasing amount of evidence and opinion on best current practice. Clinical guidelines are intended as neither cookbook nor textbook but, where there is evidence of variation in practice which affects patient outcomes and a strong research base providing evidence of effective practice, guidelines can assist doctors and other health care professionals in making decisions about appropriate and effective care for their patients. It is intended that the national guidelines developed and disseminated by SIGN should be critically reviewed and tailored at a local level to produce local guidelines for implementation.[3]

Research has shown that clinical practice guidelines can be an effective means of changing the process of health care and improving health outcomes.[4, 5] However, guidelines vary in the extent to which they produce the anticipated health gains.[6] This report focuses on those aspects of the guideline development process which affect the validity and acceptability of guidelines, and discusses the development methodology which SIGN has evolved to address these key areas.

1.2 AIM AND STRUCTURE OF THIS REPORT

This description of the methodology presently used by SIGN is intended to support both the development of national guidelines for the NHS in Scotland and their local adaptation and implementation. It provides guideline users with information on the methodology by which SIGN guidelines are developed, and acts as a starting point for groups embarking on new guideline development projects.

The report is structured around the accepted criteria for validity of guidelines which have evolved over the past decade from the 'essential elements of good guidelines' as identified in 1990 by a committee established by the United States Institute of Medicine to advise the public health service on clinical guidelines. These recommended 'attributes of good guidelines' included validity, reliability/reproducibility, clinical applicability, clinical flexibility, clarity, multidisciplinary process, scheduled review, and documentation. The recommendations were underpinned by the twin themes of credibility and accountability: "*The link between a set of guidelines and the scientific evidence must be explicit, and scientific and clinical evidence should take precedence over expert judgement.*" [2]

SIGN's original *Criteria for Appraisal of Clinical Guidelines for National Use,*[7] the more recent *Appraisal Instrument for Clinical Guidelines* developed by the Health Care Evaluation Unit at St. George's Hospital Medical School in London,[8] and the *Appraisal of Guidelines for Research and Evaluation in Europe (AGREE)* instrument presently in development,[9] are all based on these founding principles of guideline development.

SIGN guidelines provide only brief details of their development methodology in order not to overload every guideline with repetition of the same methodological detail. This guide is therefore an essential companion document to SIGN's published guidelines and those in development, outlining the key elements of the development process common to all SIGN guidelines. Only details specific to the topic under consideration or any variations from the standard processes described here are reported in individual SIGN guidelines.

An overview of the SIGN guideline development process and the structure of this report is provided in figure 1. Key criteria from both the SIGN *Criteria for Appraisal*[7] and the *Appraisal Instrument for Clinical Guidelines*[8] relevant to various stages of guideline development are noted at the start of each section, followed by an explanation of their importance and details of how they are incorporated into the SIGN guideline development methodology. The criteria for appraisal have previously appeared in the form of checklists for reviewing published guidelines but they have been rephrased here to enable them to be applied *proactively* to guide the development of guidelines in order to maximise their validity.

1.3 REVIEW AND UPDATING

As with all SIGN reports and guidelines *(see section 9)*, this publication will be kept under review and updated as required to reflect SIGN's evolving guideline development methodology. Any updates to this or other SIGN publications will be noted on the SIGN website. Comments on this report are welcome and should be sent to:

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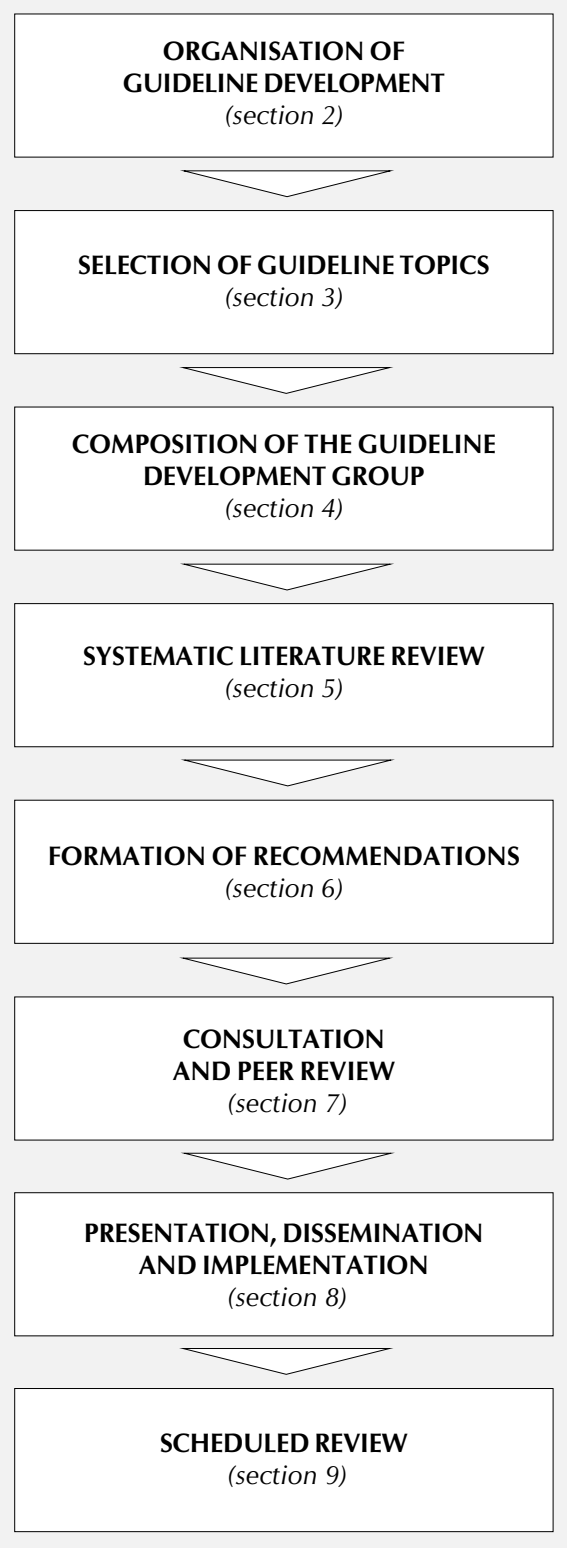
Figure 1

OVERVIEW OF THE SIGN GUIDELINE DEVELOPMENT PROCESS



2 Organisation of guideline development

- ✓ *The agency responsible for development of the guideline should be clearly identified*
- ✓ *Sources of funding and other support for development of the guideline should be stated*
- ✓ *If external funding or support is received, there should be evidence that any potential biases of the funding bodies have been taken into account*
- ✓ *Overall, the potential biases or conflicts of the guideline development process should be adequately dealt with*

2.1 THE SCOTTISH INTERCOLLEGIATE GUIDELINES NETWORK

SIGN is a network of clinicians and other health care professionals, including all the medical specialties, nursing, pharmacy, dentistry, professions allied to medicine, and the NHS in Scotland. Patients' views are represented on SIGN through the Scottish Association of Health Councils. The present membership of SIGN is noted at Annex 1. Members of SIGN are nominated by a particular Royal College or other professional organisation or committee, but also represent their specialty or discipline in a wider sense and consult widely with other specialist societies in their field. SIGN also works closely with other relevant national groupings and agencies within the NHS in Scotland.

Members of SIGN determine the overall direction of SIGN's development and play a key role in shaping the SIGN guideline programme. Some members of SIGN are also actively involved in aspects of the guideline development process – as members of the Editorial Board, or as chairmen or members of individual guideline development groups – and all provide input into the selection of topics for guideline development and the composition of guideline development groups *(see sections 3 and 4)*.

Many of the early SIGN guidelines were described as being developed by a particular college "on behalf of SIGN". This reflected to some extent the genesis of these projects, which were established before the formation of SIGN and only later adopted into the SIGN programme. SIGN has since moved away from the concept of having a "lead college" for individual guideline development projects, emphasising the essential multidisciplinarity of SIGN guideline development *(see section 3)*. In addition, it has been necessary for coordination of SIGN guideline development projects to become increasingly centralised through the SIGN secretariat *(see Annex 1)* in order to ensure that SIGN methodology is adhered to throughout the development of each guideline and that the process is fully documented and quality assured.

2.2 FUNDING FOR GUIDELINE DEVELOPMENT

The SIGN guideline development programme is funded by the Clinical Resource and Audit Group (CRAG) of the Scottish Office Department of Health. This funding supports the SIGN secretariat, expenses associated with individual guideline development projects (e.g. on-line search costs, library and copyright fees to obtain copies of articles for review, guideline development group meeting expenses), and the costs of printing and distributing published SIGN guidelines.

Members of SIGN guideline development groups do not receive any payment for their participation, although General Practitioners reclaim locum payments and travel expenses to enable them to attend guideline development group meetings. The expenses of other members of SIGN guideline development groups are met by their employing NHS Trusts and universities, which make an important contribution to the SIGN initiative in this way. The expenses of any members of guideline development groups who are unable to reclaim these from their employers for any reason (e.g. patient representatives not employed within the NHS) are met by SIGN.

Additional funding for the SIGN initiative takes the form of a small amount of sponsorship for SIGN national meetings *(see section 7.1)* from companies in the health care industry. These companies may show display stands in the foyer of the meeting venue, but have no input into the meeting programme or proceedings. The Royal College of Physicians of Edinburgh, as lead college in the SIGN initiative, also absorbs a proportion of SIGN's overhead in hosting the SIGN secretariat.

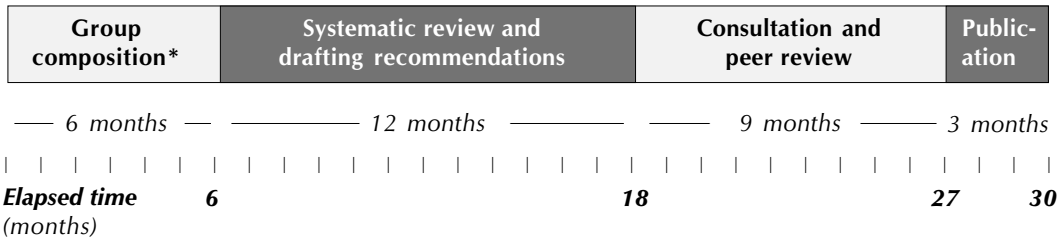
The income received from delegates to SIGN national meetings is offset against the meeting expenses. Income from the sale of SIGN publications is offset against SIGN's grant from CRAG.

2.3 TIMESCALE FOR GUIDELINE DEVELOPMENT

The time taken to develop a SIGN guideline varies widely according to the scope of the topic under consideration, the volume of relevant literature to be critically appraised, the amount of feedback received during the consultative phases of development and, most importantly, the competing pressures on the time of members of guideline development groups. The average time taken by recent guideline development groups is illustrated in figure 2.

Figure 2

AVERAGE TIMESCALE FOR SIGN GUIDELINE DEVELOPMENT



* *from acceptance of the topic proposal to the first meeting of the guideline development group*

The timescale for development is not, of course, the most important measure of SIGN's performance, and the quality of the finished product is certainly more critical than the timing of its production. However, SIGN is concerned to minimise delay, particularly in the period from completion of the systematic review until publication of the guideline, for three reasons in particular:

- The need for the guideline has been established, thus important variations in practice will remain until the guideline is disseminated and implemented.
- Various groups will be waiting for publication of the guideline in order to carry out implementation programmes and other supporting activities such as education initiatives and audit projects. The resources – and enthusiasm – for these initiatives may not be available indefinitely.
- The evidence base for the guideline will become dated and there is the possibility of new evidence making some of the guideline recommendations suboptimal or even redundant. There is, of course, the opportunity to check the currency of the literature search immediately prior to publication, but such changes will then not be subject to the consultation and peer review which have been identified as important elements of the guideline development process *(see section 7)*.

3 Selection of guideline topics

- ✓ *Reasons for developing the guideline should be clearly stated*
- ✓ *Objectives of the guideline should be clearly defined*
- ✓ *The patient group to which the guideline is meant to apply should be described*
- ✓ *The condition to be detected, treated, or prevented should be described in unambiguous terms*

3.1 CRITERIA FOR SELECTION OF TOPICS

The experience of SIGN and other guideline developers has shown that selection of appropriate topics for guideline development is crucial. The New Zealand "Guidelines for Guidelines" Advisory Committee[10] has emphasised that guidelines should address a specific health care need and that *"there must be an expectation that change is possible and desirable and that, if the guidelines are followed, there is potential to improve the quality of care and/or patient outcomes."* To this must be added the requirement for robust evidence of effective practice on which to base guideline recommendations.

The development of evidence-based guidelines is a relatively new and still rapidly developing field and there is a steep learning curve for each guideline development group to climb. SIGN therefore advises new groups to break down larger topics into more manageable 'salami-slices'. For example, the SIGN diabetes guidelines were initially developed as a programme of seven projects, addressing separately the prevention and management of eye disease, diabetes in pregnancy, children and young people with diabetes, management of diabetic renal, foot, and cardiovascular disease, and finally a recommended data set for collection in people with diabetes. These are now under review and will be combined into one guideline.

Guideline topics selected for inclusion in the SIGN core programme are chosen on the basis of the burden of disease, the existence of variation in practice, and the potential to improve outcome. The following criteria are considered by SIGN in selecting and prioritising topics for guideline development:

- Areas of medical uncertainty as evidenced by wide variation in clinical practice or outcomes.
- Medical conditions where effective treatment is proven and where mortality or morbidity can be reduced.
- Iatrogenic diseases or interventions carrying significant risks or cost.
- Priority areas for the NHS in Scotland: presently these are coronary heart disease and stroke, cancer, and mental health.

Details of the SIGN guideline development programme as at the date of publication of this report are given at Annex 2. For updated information, see the SIGN website.

3.2 APPLICATION PROCEDURE

Any group or individual may propose a guideline topic to SIGN. Interested parties are encouraged to discuss the topic with the appropriate specialty or professional representative(s) on SIGN *(see Annex 1, or contact the SIGN secretariat for up-to-date membership and contact details)*, who will advise on preparation of the outline or formal proposal to SIGN. Peer reviewers may also be asked to comment on guideline proposals to inform discussion at a full meeting of SIGN.

SIGN's standard guideline application form requests the following information:

(1) A summary of the clinical problems and outcomes to be addressed.

(2) Details of the group(s) or institution(s) supporting the proposal.

(3) A brief background to the clinical topic which will be addressed by the proposed guideline.

(4) Evidence of variation in practice in the management of the condition.

(5) An indication of the benefits likely to arise from the development and successful implementation of the guideline.

(6) A definition of the patient group to which the guideline will apply.

(7) A definition of the aspects of management of the clinical condition which the proposed guideline will address and an indication as to whether the guideline will apply to primary or secondary care, or both.

(8) An indication of the health care professionals potentially involved in developing the guideline.

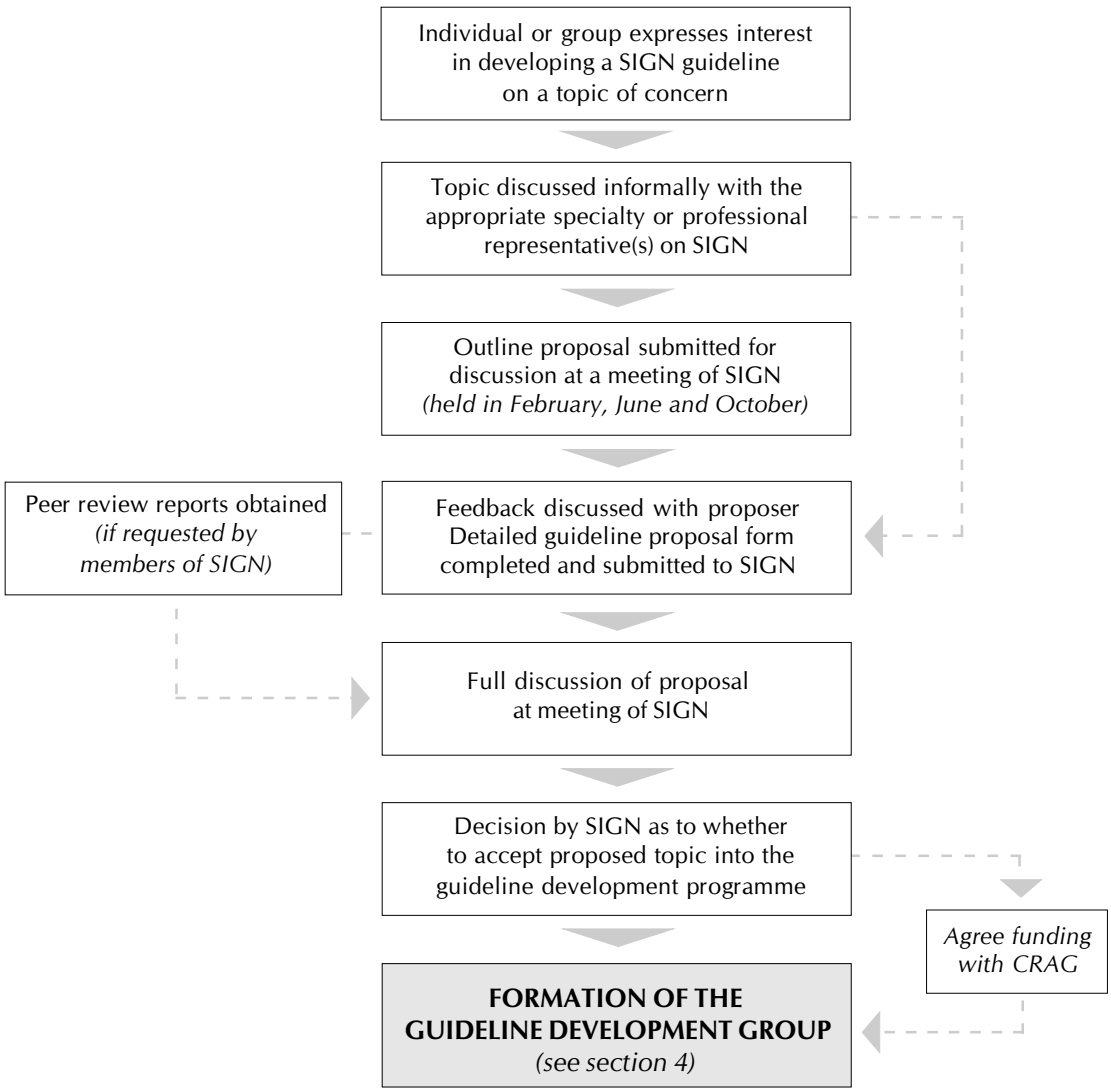
(9) An indication of the size and strength of the evidence base which is available to support recommendations on effective practice, citing key supporting papers.

(10) Details of any existing guidelines or systematic reviews in the field.

The procedure for selection of SIGN guideline topics is illustrated in figure 3. The application form to request consideration by SIGN of a specific guideline topic proposal is available from the SIGN secretariat or can be downloaded from the SIGN website.

Figure 3

SELECTION OF TOPICS FOR SIGN GUIDELINES



4 The guideline development group

- ✓ *The individuals who were involved in developing the guideline should be described*
- ✓ *The guideline development group should contain representatives of all key disciplines*
- ✓ *Formal declarations of interest should be made by all those involved*
- ✓ *The inclusion of patients or their representatives should be considered*

4.1 COMPOSITION OF THE GUIDELINE DEVELOPMENT GROUP

One of the US Institute of Medicine's strongest recommendations for 'good guidelines' *(see section 1)* was that the process of developing guidelines should include participation by representatives of key groups and disciplines affected.[2] Farmer (1993) has also stressed that guidelines should not be developed by academics and senior clinicians insulated from the day to day pressures involved in providing medical care, warning that "*Unless a guideline accurately reflects the routine working practices of most doctors it will act only as a gold standard to be admired*".[11]

A Canadian Medical Association workshop held in 1992 to establish the principles on which to base the formulation of individual clinical practice guidelines also recommended that clinical practice guidelines should be developed by physicians in collaboration with representatives of those who will be affected by the specific intervention(s) in question, including relevant physician groups, patients and other health care providers as appropriate.[12] Studies have shown that the balance of disciplines within a guideline development group has considerable influence on the guideline recommendations.[13, 14] Widespread multidisciplinary participation is therefore important to ensure that:

- all relevant scientific evidence will be located and critically evaluated
- practical problems with using the guideline will be identified and addressed
- stakeholder groups will see the guideline as credible and will co-operate in implementation.[15, 16]

Following the acceptance of a guideline proposal into the SIGN development programme *(see section 3)*, the secretariat discusses with the topic proposer(s) which specialties and professions should be represented on the guideline development group. SIGN guideline development groups vary in size depending on the scope of the topic under consideration, but generally comprise between 10 and 20 members. There is necessarily a trade-off between the number of organisations or specialties which would ideally be represented on the guideline development group and achieving the optimum group size for effective decision-making. Care is also taken to ensure that the group is balanced geographically, with representatives from across Scotland.

One of the great strengths of SIGN is that in forming guideline development groups the secretariat is able to call on and receive advice and nominations from all the member organisations of SIGN, thus ensuring that all relevant professions in Scotland have an input into and feel ownership over the guideline development process.

The process for establishing SIGN guideline development groups is illustrated in figure 4. The membership of a typical guideline development groups is shown in table 1.

Figure 4

ESTABLISHING THE GUIDELINE DEVELOPMENT GROUP

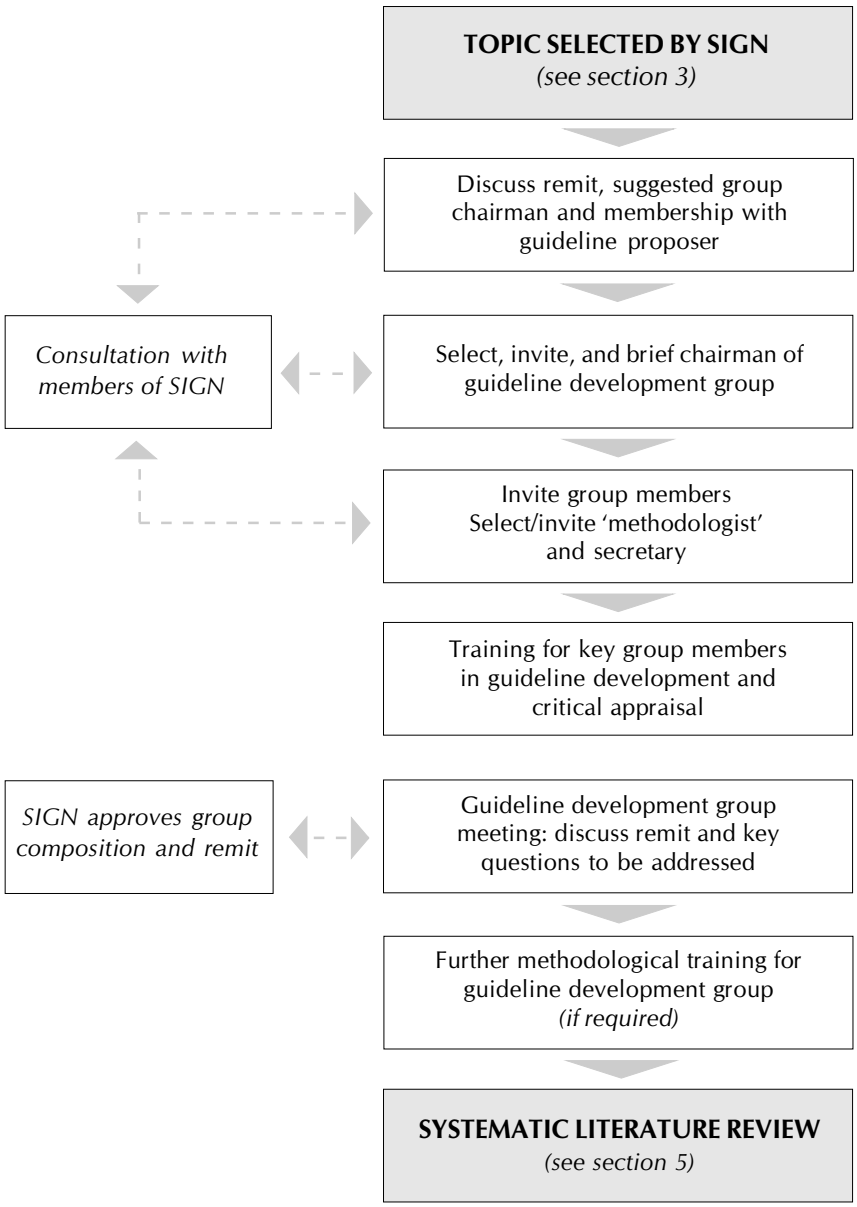


Table 1

MEMBERSHIP OF THE SIGN LEG ULCER GUIDELINE DEVELOPMENT GROUP

Chairman:

Consultant Vascular Surgeon, Falkirk Royal Infirmary

Methodologist:

Senior Registrar in Vascular Surgery, Royal Infirmary of Edinburgh

Group members:

District Nurse, Skene, Aberdeenshire
Consultant Dermatologist, Monklands Hospital, Airdrie
Consultant Plastic Surgeon, Canniesburn Hospital, Glasgow
Consultant Rheumatologist, Aberdeen Royal Infirmary
General Practitioner, Dundee
General Practitioner, Earlston
Lecturer in General Practice, University of Aberdeen
Liaison District Nurse and Leg Ulcer Specialist, Gartnavel Hospital
Patient representative, Stirling
Pharmacist, Ayr Hospital
Physiotherapist, Falkirk & District Royal Infirmary
Practice Nurse, Dumfries

4.2 DECLARATIONS OF INTERESTS

All members of SIGN guideline development groups are required to complete a declaration of interests, both personal and non-personal. (A personal interest involves payment to the individual concerned, e.g. consultancies or other fee-paid work commissioned by or shareholdings in the pharmaceutical industry; a non-personal interest involves payment which benefits any group, unit, or department for which the individual is responsible, e.g. endowed fellowships or other pharmaceutical industry support.) Details of the declarations of interest of any guideline development group member(s) are available on request from the SIGN secretariat.

4.3 ROLES AND RESPONSIBILITIES OF DEVELOPMENT GROUP MEMBERS

There is growing recognition of the potential psychosocial biases in guideline development[17] and the role of the group leader in particular is crucial to ensure that the group functions effectively and achieves its aims.[18] Chairmen of guideline development groups must be sensitive to pre-existing inter-professional tensions and hierarchies and ensure that all members of the group feel able to contribute fully to the guideline development process.[19] Guideline development group members in turn must make a full commitment to the group and the tasks involved in guideline development, and be responsible for indicating areas of concern to the chairman. Guideline development group members should also bear in mind that they represent both a geographical region and a specialty or professional group, and must be prepared to consult with colleagues to ensure that the widest possible range of views are considered.

An alternative perspective on the composition of a guideline development group is to view the group members not by the discipline which they represent, but by the role which they perform within the group.[18] SIGN has recently developed the roles of 'methodologist' and 'medical secretary' within guideline development groups to support the group chairman in balancing the resources and time available to the group with the demands of SIGN guideline development methodology. A one day training seminar in critical appraisal skills and guideline development is provided for these key members of the multidisciplinary group.

Guideline development groups are also supported throughout the development process by the SIGN secretariat *(see Annex 1)*. In particular, the SIGN Programme Manager assigned to each guideline will help the group chairman to plan and progress the guideline development project, whilst also ensuring that methodological checks are correctly applied and that the development process itself is fully documented.

4.4 PATIENT PARTICIPATION IN GUIDELINE DEVELOPMENT

Patients may have different perspectives on health care processes, priorities, and outcomes from those of health professionals. The involvement of patients or patient representatives in guideline development is therefore important to help ensure that guidelines reflect patients' needs and concerns. Patients also have an important role in promoting guideline implementation and it is important that they should have access to information on the recommendations of published guidelines.[20]

Where possible, patients or their representatives are included in the guideline development groups, but it is recognised that careful briefing, training and support may be needed to assist these representatives to play an active role in the group. SIGN has therefore established a Patient Information and Participation Subcommittee (PIPS) to take forward issues relating to both patient participation in guideline development and patient information on guideline recommendations. Patient participation in guideline development may also be achieved by the involvement of patients, carers, appropriate voluntary organisations or representatives from local health councils at the national open meeting which is held to discuss each draft guideline *(see section 7.1)*.

5 Systematic literature review

- ✓ *Method(s) used to collect (i.e. identify and select) the evidence on which recommendations are based should be described*
- ✓ *Sources of information used in developing the guideline should be adequately referenced*
- ✓ *Methods used to interpret and assess the strength of scientific evidence should be described*

Guidelines based on a consensus of expert opinion or on unsystematic literature surveys have been criticised as not reflecting current medical knowledge and being liable to bias.[21, 22] SIGN guidelines are therefore based on a systematic review of the evidence. Systematic review is defined as *"an efficient scientific technique to identify and summarise evidence on the effectiveness of interventions and to allow the generalisability and consistency of research findings to be assessed and data inconsistencies to be explored"*.[23]

The systematic reviews undertaken by SIGN guideline development groups are necessarily of a more limited scale than those carried out by the Cochrane Collaboration or the NHS Centre for Reviews and Dissemination. Nevertheless, the essential elements of systematic review are met: *viz.*, the literature should be *identified* according to an explicit search strategy; *selected* according to defined inclusion and exclusion criteria; and *evaluated* against consistent methodological standards.

5.1 IDENTIFYING AND SELECTING THE EVIDENCE

The training in critical appraisal and guideline development offered to members of SIGN guideline development groups encourages them to break down the guideline remit into structured key questions which clearly identify the *population* concerned, the *intervention* (or diagnostic test, etc.) under investigation, the *outcome* measured, and the type of *control* used. These questions then form the basis of the literature search, which is undertaken or overseen by the SIGN Information Officer.

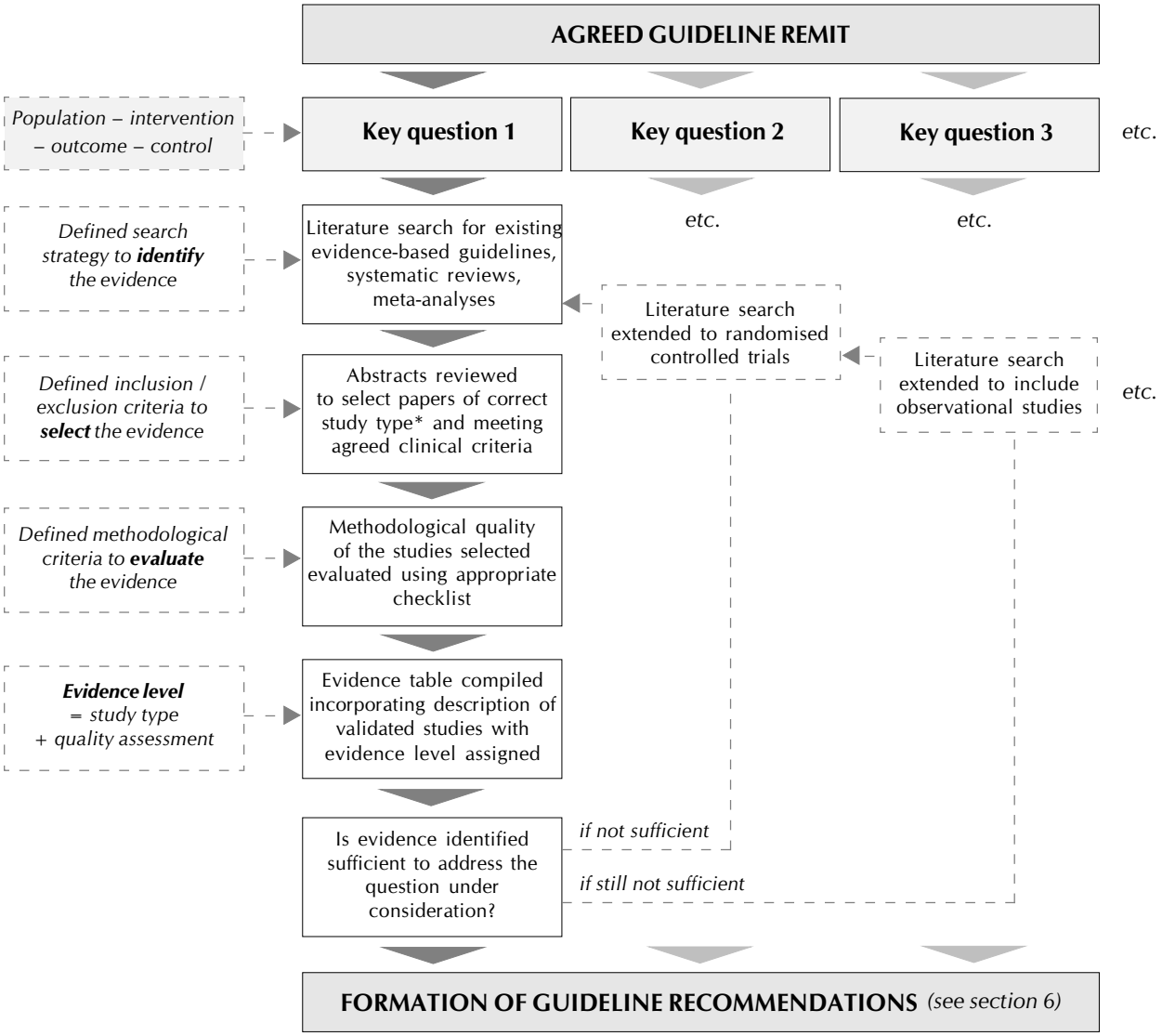
The search must focus on the best available evidence to address each key question, and should ensure maximum coverage of studies at the top of the hierarchy of study types *(see section 6)*. SIGN uses a set of standard search strategies that identify:

- Existing guidelines, meta analyses, and systematic reviews
- Randomised controlled trials
- Observational studies.

The procedure for systematic literature review which should be followed by SIGN guideline development groups is illustrated in figure 5. An example literature search specification including details of the selection criteria to be applied is illustrated in table 2. Further listings of the search strategies used in some of the SIGN guidelines in the early stages of development can be found on the SIGN website.

Figure 5

SYSTEMATIC LITERATURE REVIEW



** Note: although each search is designed to identify only studies of a specified type, there will often be 'false drops' of studies of the wrong type, e.g. consensus guidelines appearing in a listing of systematic reviews, which should be excluded at this stage*

Table 2

EXAMPLE LITERATURE SEARCH SPECIFICATION:
SIGN GUIDELINE ON ANTIBIOTIC PROPHYLAXIS IN SURGERY

Selection criteria		**Database**		
Include	*Exclude*		*From*	*To*
Literature types: - guidelines - meta-analyses - systematic reviews Clinical: - prophylaxis - surgical procedures - surgical wounds or deep wound infections - systemic antibiotics	Preventive or pre-emptive therapy Physical measures (e.g. environmental controls, operating theatre design) Intensive care Non-English language (for reviews only) Specific infective agents	Cochrane database of systematic reviews version 98/3 Embase Healthstar Medline Internet search engines: - Altavista - Excite - Hotbot - Infoseek - Lycos - Medical World Search - OMNI - UK Health Centre Internet sites: - AHCPR - Canadian Medical Association Clinical Practice Guidelines Database - Center for Disease Control and Prevention - New Zealand Guidelines Project	 1985 1985 1985	 1998/06 1998/06 1998/06

In order to minimise bias and to ensure adequate coverage of the relevant literature, the literature search must cover a range of sources. All search strategies are independently reviewed by a professional information librarian from the Health Services Research Unit at the University of Aberdeen. As a minimum, SIGN requires searches to cover the Cochrane Library, Medline, Healthstar, and the Internet. It is expected that in most cases the search will also cover additional sources specific to the topic under review.

The period that the search should cover will depend on the nature of the clinical topic under consideration, and will be discussed with the guideline development group. The example above relates to a rapidly developing field and a 15 year limit to the search was agreed to be appropriate, whereas in other areas a much longer time frame might be necessary. This may require hand searching for papers published prior to 1966, the first year covered by Medline (and many other medical databases have more recent cut-off dates).

Each search produces a single set of records that can then be linked with the relevant subject material to produce a final output listing of all studies of the required type on the topic of interest. At an early stage, development groups are asked to define the criteria by which they will select studies for inclusion or exclusion as evidence. Selection takes place in two stages: when the initial search strategy is constructed, and when reviewing the abstracts obtained through the literature search. The second stage normally involves the use of more specific clinical criteria than is possible during the search process.

In practice, it is rare for a single search to cover all the questions being addressed within a guideline. Different questions may be best answered by different databases, or may rely on different levels of evidence. Guideline development groups are encouraged to take an iterative approach to the search, carrying out a search for existing guidelines and systematic reviews in the first instance. After the results of this search have been evaluated, the questions may be redefined and subsequent searches focused on the most appropriate sources and study types, as illustrated in figure 5.

5.2 EVALUATING THE EVIDENCE

Once papers have been selected as potential sources of evidence, the methodology used in each study is assessed to ensure its validity. The result of this assessment will affect the **level of evidence** allocated to the paper, which will in turn influence the **grade of recommendation** that it supports *(see section 6)*.

The methodological assessment is based on a number of key questions which focus on those aspects of the study design that research has shown to have a significant influence on the validity of the results reported and conclusions drawn. These key questions differ between study types, and a range of checklists is used to bring a degree of consistency to the assessment process. SIGN has based its assessments on the MERGE (Method for Evaluating Research and Guideline Evidence) checklists developed by the New South Wales Department of Health,[24] which have been subjected to wide consultation and evaluation. As part of the ongoing review of the system of grading recommendations *(see section 6.1)* these checklists are presently undergoing further evaluation and adaptation to meet SIGN's requirements for a balance between methodological rigour and practicality of use.

The assessment process inevitably involves a degree of subjective judgement. The extent to which a study meets a particular criterion – e.g. an acceptable level of loss to follow up – and, more importantly, the likely impact of this on the reported results from the study will depend on the clinical context. To minimise any potential bias resulting from this, SIGN guideline development groups are encouraged to ensure that each study is evaluated independently by at least two group members. Any differences in assessment should then be discussed by the full group. As an additional quality check, a random sample of the papers cited for each guideline are also reviewed by someone who was not a member of the development group, and the results compared with the guideline development group's evaluation.

6 Forming guideline recommendations

- ✓ *Methods used to formulate the recommendations should be described*
- ✓ *Methods used to seek views of interested parties not on the guideline development group should be described (see section 7)*
- ✓ *The guideline should make explicit links between recommendations and the strength of the supporting evidence*
- ✓ *The health benefits that are likely to be gained from the recommended management should be described*
- ✓ *The potential harms or risks and likely costs associated with the recommended management should be described*
- ✓ *The recommendations should be supported by the estimated benefits, harms, and costs of the intervention*

6.1 SYNTHESISING THE EVIDENCE AND GRADING RECOMMENDATIONS

Guideline recommendations are graded to differentiate between those based on strong evidence and those based on weak evidence, this judgement being made on the basis of an (objective) assessment of the study design and quality (as discussed in section 5) and a (perhaps more subjective) judgement on the consistency, clinical relevance and external validity of the evidence.[25] It is important to emphasise the grading does not relate to the *importance* of the recommendation, but to the strength of the supporting evidence and, in particular, to the predictive power of the study designs from which that data was obtained. Thus, the grading assigned to a recommendation indicates to users the likelihood that, if that recommendation is implemented, the predicted outcome will be achieved.

The process for synthesising the evidence base to form graded guideline recommendations is illustrated in figure 6. Evidence tables should be compiled, summarising all the validated studies identified from the systematic literature review relating to each key question. These evidence tables form an important part of the guideline development record and ensure that the basis of the guideline development group's recommendations is transparent.

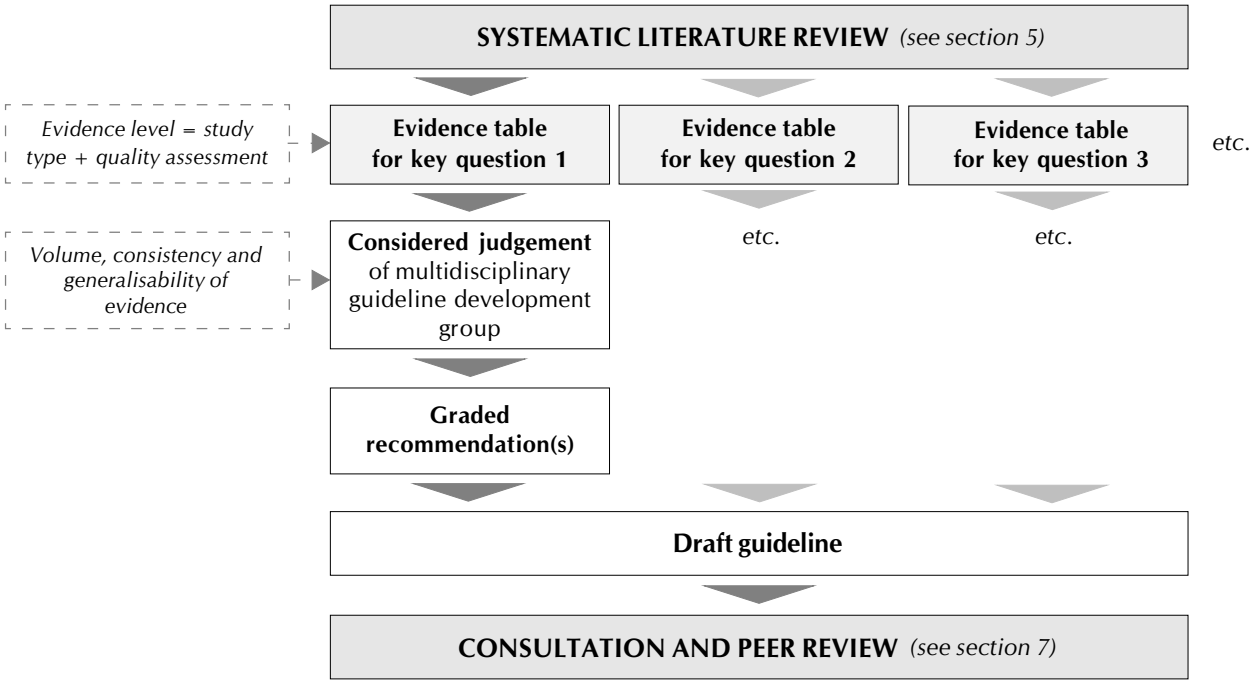
The study design classification presently used by SIGN originates from the US Agency for Health Care Policy and Research (AHCPR) and is set out in table 3.[26] Randomised controlled trials (RCTs) are accepted as the 'gold standard' for scientific research evidence with the least risk of bias in the results and therefore yield stronger evidence than other study designs such as non-randomised studies or observational studies. The guideline recommendations are then graded to reflect the strength and quality of the supporting evidence, as illustrated in table 4.[26]

6.2 REVIEW OF THE GRADING SYSTEM

SIGN's experience in guideline development has led to growing awareness of the limitations of the present system for grading recommendations. For example, although RCTs are the best type of evidence when looking at the effectiveness of health care interventions, for questions of diagnosis, or prognosis, other types of design may provide the best available evidence.

Figure 6

FORMATION OF GUIDELINE RECOMMENDATIONS



A number of guideline development groups have expressed concern about their inability to make high grade recommendations in areas of medical practice where RCTs may not be possible or not ethical. Furthermore, the present system has been criticised for not incorporating explicitly the subjective considerations which are required to bridge the gap between evidence table and guideline recommendation.

SIGN is therefore undertaking an initiative to review and, where appropriate, to refine the system for evaluating the quality of evidence and grading recommendations. The outcome of this project will be discussed with guideline developers and users both within and outwith Scotland. It is hoped that any resulting revisions to the system for deriving and grading guideline recommendations will be in place at the end of 1999. For further details and updated information on this project, see the SIGN website.

Table 3

CLASSIFICATION OF EVIDENCE LEVELS

Ia	Evidence obtained from meta-analysis of randomised controlled trials
Ib	Evidence obtained from at least one randomised controlled trial
IIa	Evidence obtained from at least one well-designed controlled study without randomisation
IIb	Evidence obtained from at least one other type of well-designed quasi-experimental study*
III	Evidence obtained from well-designed non-experimental descriptive studies, such as comparative studies, correlation studies and case studies
IV	Evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities

* *refers to a situation in which implementation of an intervention is outwith the control of the investigators, but an opportunity exists to evaluate its effect*

Table 4

CLASSIFICATION OF GRADES OF RECOMMENDATIONS

A	Requires at least one randomised controlled trial as part of a body of literature of overall good quality and consistency addressing specific recommendation *(Evidence levels Ia, Ib)*
B	Requires the availability of well conducted clinical studies but no randomised clinical trials on the topic of recommendation *(Evidence levels IIa, IIb, III)*
C	Requires evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities. Indicates an absence of directly applicable clinical studies of good quality. *(Evidence level IV)*

Note: *These definitions of types of evidence and the corresponding grades of recommendation originate from the US Agency for Health Care Policy and Research.*[26] *SIGN is presently reviewing this grading system (see section 6.2).*

6.3 ANALYSIS OF RESOURCE IMPLICATIONS

SIGN recognises that, in an NHS with limited resources and ever-increasing costs, the ability to cost individual items of care and weigh these against some quantification of patient benefit is important.[27] However, the science of economic analysis of health care is at a relatively early stage and many published studies do not meet the required methodological standard to be incorporated as part of the evidence base for a guideline.

The interim solution adopted by SIGN has been to ask guideline development groups to make recommendations based on the evidence of *clinical* effectiveness, but highlighting those recommendations which have significant cost or resource implications for further discussion as part of the local implementation process. However, there is concern that consideration of the economic and resource implications of guideline recommendations only at the end of the guideline development process means that, whilst the guideline may represent the optimum management of a particular condition in terms of *effectiveness*, it may not be the most *economic* or *efficient* strategy overall.[28]

These issues are presently under consideration. The Scottish Health Technology Assessment Centre (SHTAC) as proposed in the 1998 White Paper *Designed to Care* is presently being established and it is hoped will interact closely with SIGN to address the key economic issues highlighted by guideline development groups. SIGN has also initiated a pilot project involving a number of health economists working in the NHS in Scotland to examine the feasibility of incorporating cost-benefit analysis and evaluation of the resource implications of treatment options as part of the guideline development process.

7 Consultation and peer review

✓ *The guideline should be independently reviewed prior to publication*

✓ *Explicit information should be given about the methods used and how comments were addressed*

7.1 NATIONAL OPEN MEETING

The criteria for appraisal of guidelines suggest that guidelines should be pilot-tested prior to publication. SIGN considers that the pilot-testing phase is more appropriately carried out at a local level as part of the translation of the national guideline into local guidelines for implementation, as testing the feasibility of implementation in one environment may not be applicable to another. However, as an early stimulus to this process, SIGN holds a national open meeting to discuss the draft recommendations of each guideline. This takes place whilst the guideline is still in development and gives the guideline development group the opportunity to present their preliminary conclusions and draft recommendations to a wider audience.

The benefits of the national open meeting are two-fold:

(1) the guideline development group obtain valuable feedback and suggestions for additional evidence which they might consider, or alternative interpretation of that evidence

(2) the participants are able to contribute to and influence the form of the final guideline, generating a sense of ownership over the guideline across geographical and disciplinary boundaries.

SIGN national open meetings are widely publicised and are usually attended by between 150 and 300 health care professionals and others interested in the guideline topic, including patient representatives, from across Scotland. (The meetings are registered for Continuing Medical Education and Postgraduate Medical Education accreditation.) The draft guideline is also available on the SIGN web site for a limited period at this stage to allow those unable to attend the meeting to contribute to the development of the guideline.

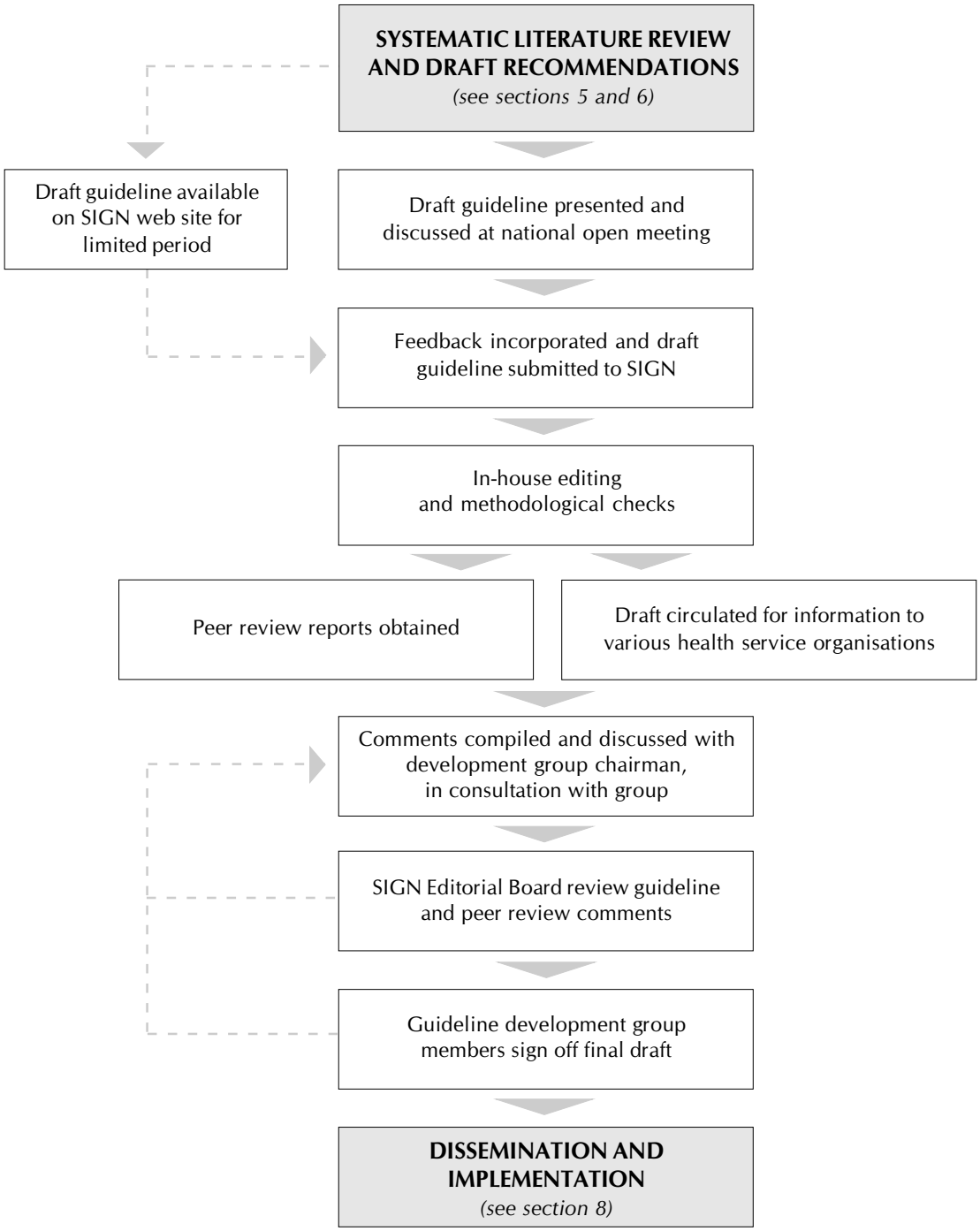
The national open meeting is the main consultative phase of SIGN guideline development. Although the draft guideline is circulated to directors of public health and to a number of health service organisations at a later stage, this is more as a courtesy to inform them of the likely content of the final guideline than for consultation.

7.2 PEER REVIEW

All SIGN guidelines are reviewed in draft form by independent expert referees, who are asked to comment primarily on the comprehensiveness and accuracy of interpretation of the evidence base supporting the recommendations in the guideline. Members of the Royal College of General Practitioners (RCGP) guidelines advisory group *(see Annex 1)* also provide comments on the guideline from the primary care perspective, concentrating particularly on the clarity of the recommendations and their assessment of the usefulness of the guideline as a working tool for the primary care team. The comments received from peer reviewers and others are carefully tabulated and discussed with the chairman and with the guideline development group. Each point must be addressed and any changes to the guideline as a result noted or, if no change is made, the reasons for this recorded.

Figure 7

CONSULTATION AND PEER REVIEW OF SIGN GUIDELINES



As a final quality control check prior to publication, the guideline and the summary of peer reviewers' comments are reviewed by the SIGN Editorial Board *(see Annex 1)* to ensure that each point has been addressed adequately and that any risk of bias in the guideline development process as a whole has been minimised. Each member of the guideline development group is then asked formally to approve the final guideline for publication.

The full editorial and consultation phase is illustrated in figure 7 and examples of this 'audit trail' may be found on the SIGN website. This process of extended consultation, although lengthy, cumbersome, and occasionally frustrating, greatly enhances the validity of the final SIGN guideline and increases the likelihood that the guideline will be implemented successfully into local practice for the benefit of patients.

8 Presentation, dissemination and implementation

- ✓ *The recommendations should be clearly presented*
- ✓ *Possible method(s) for dissemination and implementation should be suggested*
- ✓ *Key elements which need to be considered in local guidelines should be identified*
- ✓ *Key areas on which information for patients should be provided should be identified*
- ✓ *Measurable outcome indicators and clear targets or standards should be identified*
- ✓ *Core clinical data for reporting the relevant clinical care should be defined*

8.1 CONTENT AND PRESENTATION OF THE GUIDELINE

There is little information available on the effect that style and format have on the adoption of guidelines. Guidelines with a wide range of styles and formats have been shown to be effective in changing practice.[4] However, clarity—of definitions, language, and format—is obviously important. Guidelines should be written in unambiguous language and should define all terms precisely.[2] The best format for presenting guidelines will vary depending on the target group(s), the subject matter, and the intended use of the guideline[30] and, ideally, end users should be consulted regarding the most appropriate method of presentation for them.[31] This is an additional function of the extensive peer review process which all SIGN guideline go through *(see section 7)*.

Each SIGN guideline includes an introduction, outlining the need for the guideline (including evidence of variation in practice) and defining carefully the remit of the guideline, including the patient and practitioner groups to which it applies. Within the main body of the guideline, the structure should as far as possible reflect the development process that the guideline development group has followed, i.e. (for each section):

(1) A clear statement of the question/issue under consideration.

(2) A brief explanation of the treatment options available.

(3) A summary of the conclusions drawn from the critical appraisal of the evidence (the evidence statement, annotated with the level of evidence and key references). This should provide the justification for the recommendation to follow – i.e. the evidence for improved outcome resulting from the recommended action.

(4) The recommendations which the group has derived from this evidence (graded according to the strength of the supporting evidence).

(5) A brief discussion of any practical points (e.g. resource/geographical considerations to be taken up in the discussion of local guidelines for implementation), or outstanding treatment options for which there is no evidence (the last should be stated clearly).

(6) Finally, if the group feels it is important to give guidance in any of these latter areas where there is no suitable evidence, a "good practice point" based on the clinical experience of the guideline development group may be presented.

The guideline should also include annexes noting key points for audit (accompanied where possible with a recommended minimum data set), key outcome measures, recommendations for further research, and key messages for patients. These key messages, translated into 'plain English', form the basis of the *"SIGNpost"* bulletin issued by the Patient Information and Participation Subcommittee of SIGN to inform patient support organisations and voluntary groups of the key messages for patients from SIGN guidelines, for inclusion in their patient information materials as appropriate. The Royal College of General Practitioners is carrying out a similar initiative to identify and disseminate key messages from SIGN guidelines for primary care.

Other annexes may provide examples of patient-specific reminders or data collection proformas to facilitate local implementation of the guideline. Brief details of the systematic review on which the guideline recommendations are based should also be provided, although it is intended that the majority of this information should be made available for reference on the SIGN website, rather than included in the printed guideline.

The criteria for appraisal of guidelines suggest that there should be an explicit statement of how patients' preferences should be taken into account in applying the guideline. SIGN considers this to be too prescriptive to be included in the national guideline, but might be considered in the development of local guidelines for implementation. However, the suggestion that circumstances (clinical or nonclinical) in which exceptions might be made in using the guideline should be described may not be appropriate even in the context of a local guideline. All SIGN guidelines are prefaced by a section of Notes for Users, which explain the status of the national guideline and outline procedures for the development of local guidelines, emphasising that the guideline is not intended to be construed as a standard of medical care, nor as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgement regarding a particular clinical procedure or treatment plan must be made by the doctor in light of the clinical data presented by the patient and the diagnostic and treatment options available.

SIGN guidelines are accompanied by a quick reference guide, often following a loosely algorithmic format, to provide a graphic summary of the key recommendations from the guideline. Note that the 'key' recommendations will not necessarily be the grade A recommendations (i.e. those with the strongest supporting evidence) but will be those considered by the guideline development group as having the greatest potential impact on patient care.

8.2 DISTRIBUTION, DISSEMINATION AND DIFFUSION

Guidelines must obviously be made as widely available as possible in order to facilitate discussion at a local level, translation into local guidelines, and eventual implementation into practice. Distribution of printed guidelines alone has been shown to be ineffective in achieving change in practice: guidelines are more likely to be effective if they are disseminated by an active educational intervention, and implemented by patient-specific reminders relating directly to professional activity.[4] Although specific implementation activities lie outside SIGN's remit, it is important for SIGN to consider dissemination strategies which will facilitate the process as far as possible.

SIGN guidelines are currently distributed to all consultants, specialist registrars and general practitioners, to Health Boards, NHS Trusts, medical libraries, and to senior nursing, paramedic and other clinical staff with a specific interest in each guideline. The intention is that the guidelines should then be *disseminated* via clinical teams to the operational level, and ultimately *diffused* by incorporation into local guidelines and educational materials (quick reference guides are also distributed to medical students).

SIGN is presently reviewing the effectiveness and efficiency of this distribution policy and it is likely that in future, greater use will be made of electronic means of dissemination, via the internet or CD-ROM. All SIGN guidelines are available free of charge on the SIGN website and there is clearly enormous scope for development of this means of making SIGN guidelines available where and when they are required. A number of pilot projects are in progress in which SIGN guidelines are incorporated on the 'intranets' (internal communications networks) of NHS Trusts, linked directly to the Trusts' own local guidelines and operating procedures, as derived from the SIGN national guideline.

9 Review and updating

- ✓ *Explicit details of how the guideline will be routinely reviewed should be given*
- ✓ *The guideline should identify which bodies are responsible for the scheduled review of the guideline*
- ✓ *The guideline should give a specific date for the scheduled review or an expiry date for the guideline*

9.1 SCHEDULED REVIEW

All SIGN guidelines carry a 'sell-by' date which requires that they should be reviewed two years after the publication date and updated to reflect newly published evidence. (SIGN guidelines themselves may act as a stimulus to research: an important subsidiary outcome of the guideline development process is in highlighting gaps in the evidence base.)

Guidelines due for review must be formally proposed for re-inclusion in the SIGN guideline development programme, providing the opportunity to refocus the remit if appropriate. The scheduled review will also involve updating of the guideline development process to reflect advances in SIGN methodology since publication of the first – or previous – edition of the guideline.

9.2 MONITORING AND UPDATING

All comments received on published SIGN guidelines or information on important new evidence in the field is fed back to the guideline development group, either for immediate response or for more detailed consideration on review of the guideline. The two year review period is not intended to be applied rigidly: guidelines may be reviewed sooner if there are important developments in the evidence base; or the review may be postponed if, for example, the results of ongoing studies are awaited. Any updates to the guideline which might be required in the interim period prior to the scheduled review are noted on the SIGN website.

Annex 1

MEMBERSHIP OF THE SCOTTISH INTERCOLLEGIATE GUIDELINES NETWORK

(July 1999)

Professor James Petrie *Chairman and Co-editor*	*Royal College of Physicians of Edinburgh*
Dr Grahame Howard *Vice-chairman*	*Royal College of Radiologists*
Professor Jeremy Grimshaw *Methodological adviser*	*Health Services Research Unit, University of Aberdeen*
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The contribution made to the SIGN initiative by the chairmen and members of guideline development groups, and by past and present members of SIGN, the SIGN secretariat, and the CRAG secretariat is gratefully acknowledged.

Annex 2

SIGN GUIDELINE DEVELOPMENT PROGRAMME

(July 1999)

SIGN PUBLICATIONS

1 **Criteria for appraisal** *(superceded by this publication)*
2 **Prophylaxis of venous thromboembolism** *(under review)*
3 **Use of palliative radiotherapy in the treatment of non small cell lung cancer** *(superceded by guideline no.23)*
4 **Prevention of visual impairment in diabetes** *(under review)*
5 **Interface between hospital and the community: the immediate discharge document** *(under review)*
6 **Hospital inpatient management of acute asthma attacks**
7 **Helicobacter pylori: eradication therapy in dyspeptic disease**
8 **Obesity in Scotland: integrating prevention with weight management** *(under review)*
9 **Management of diabetes in pregnancy** *(under review)*
10 **Report on good practice in the management of children and young people with diabetes** *(under review)*
11 **Management of diabetic renal disease** *(under review)*
12 **Management of diabetic foot disease** *(under review)*
13 **Management of patients with stroke** - Part I: Assessment, investigation, immediate management, secondary prevention
14 **Management of patients with stroke** - Part II: Management of carotid stenosis and carotid endarterectomy
15 **Management of elderly patients with fractured hip** *(under review)*
16 **Colorectal cancer**
17 **Investigation of asymptomatic microscopic haematuria in adults**
18 **Investigation of asymptomatic proteinuria in adults**
19 **Management of diabetic cardiovascular disease**
20 **Management of patients with stroke** - Part III: Identification and management of dysphagia
21 **Diagnosis and management of epilepsy in adults**
22 **Interventions in the management of behavioural and psychological aspects of dementia**
23 **Management of lung cancer**
24 **Management of patients with stroke** - Part IV: Rehabilitation, prevention and management of complications and discharge planning
25 **Report on a minimum data set for collection in people with diabetes**
26 **The care of patients with chronic leg ulcer**
27 **Drug therapy for peripheral vascular disease**
28 **Management of adult testicular germ cell tumours**
29 **Breast cancer in women**
30 **Psychosocial interventions in schizophrenia**
31 **Report on a recommended referral document**
32 **Coronary revascularisation in the management of stable angina pectoris**
33 **Primary care management of asthma**

34 **Management of sore throat and indications for tonsillectomy**
35 **Diagnosis and treatment of heart failure due to left ventricular systolic dysfunction**
36 **Antithrombotic therapy**
37 **Hysteroscopic surgery**
38 **Emergency management of acute asthma**

GUIDELINES IN DEVELOPMENT

Lipids and the primary prevention of coronary heart disease
Secondary prevention of coronary heart disease after myocardial infarction
Hypertension in the elderly
Prevention of dental caries in high caries risk children
Control of pain in patients with cancer
Management of unerupted and impacted third molar teeth
Early management of head injuries
Management of stable angina
Hyperkinetic and attention deficit disorders in children
Management of genital *Chlamydia trachomatis* infection
Safe sedation of children
Non-elective surgery in high risk adults: assessment and preparation
Use of antibiotics in surgical prophylaxis
Early management of rheumatoid arthritis
Day patient cataract surgery
Management of post-menopausal bleeding
Use of blood products in the management of perioperative bleeding and anaemia
Management of lower respiratory tract infection in the community

References

1 Petrie JC, Grimshaw JM, Bryson A. The Scottish Intercollegiate Guidelines Network Initiative: getting validated guidelines into local practice. Health Bull (Edin) 1995; 53: 345-8.

2 Field MJ, Lohr KN (editors) Institute of Medicine Committee to Advise the Public Health Service on Clinical Practice Guidelines. Clinical practice guidelines: directions for a new program. Washington DC: National Academy Press; 1990.

3 Scottish Office. Clinical Resource and Audit Group. Clinical guidelines: a report by a Working Group. Edinburgh: Scottish Office; 1993.

4 Effective Health Care. Implementing clinical practice guidelines: Can guidelines be used to improve practice? Leeds: University of Leeds; 1994.

5 McEleny P, Bowie P, Robins JB, Brown RC. Getting a validated guideline into local practice: implementation and audit of the SIGN guideline on the prevention of deep vein thrombosis in a district general hospital. Scot Med J 1998; 43: 23-5.

6 National Health and Medical Research Council (Australia) Quality of Care and Health Outcomes Committee. Guidelines for the development and implementation of clinical practice guidelines. Canberra: Australian Government Publishing Service; 1995.

7 Scottish Intercollegiate Guidelines Network (SIGN) Clinical guidelines: criteria for appraisal for national use. Edinburgh: SIGN; 1995.

8 Cluzeau F, Littlejohns P, Grimshaw JM, Feder G. Appraisal instrument for clinical guidelines. London: St George's Hospital Medical School; 1997.

9 Appraisal of Guidelines for Research and Evaluation in Europe (AGREE) collaboration. Appraising clinical guidelines: EC BIOMED-2 project PL96-3669.

10 "Guidelines for Guidelines" Advisory Committee Guidelines for Guidelines: Principles to guide the evaluation of clinical practice guidelines. Auckland: Adis International; 1996.

11 Farmer A. Medical practice guidelines: lessons from the United States. BMJ 1993; 307: 313-7.

12 Canadian Medical Association. Guidelines for Canadian clinical practice guidelines. Ottawa: The Association; 1994.

13 Leape LL, Park RE, Kahan JP, Brook RH. Group judgement of appropriateness: the effect of panel composition. Qual Assur Health Care 1992; 4: 151-9.

14 Scott EA, Black N. When does consensus exist in expert panels? J Public Health Med 1991; 13: 35-9.

15 Lomas J. Making clinical policy explicit: legislative policy making and lessons for developing practice guidelines. Int J Technol Assess Health Care 1993; 9: 11-25.

16 Grimshaw JM, Russell IT. Achieving health gain through clinical guidelines. I: Developing scientifically valid guidelines. Qual Health Care 1993; 2: 243-8.

17 Grimshaw JM, Pagliari HC, Eccles MP. Clinical guidelines: scientific derivation and clinical validity (Unpublished report, Health Services Research Unit, University of Aberdeen).

18 Shekelle PG, Woolf SH, Eccles MP, Grimshaw JM. Clinical guidelines: developing guidelines. BMJ 1999; 318: 593-6.

19 Grimshaw JM, Eccles MP, Russell IT. Developing clinically valid practice guidelines. J Eval Clin Pract 1995; 1: 37-48.

20 Carver AD, Entwistle V. Patient involvement in SIGN guideline development groups. A report to SIGN. February 1998. (Unpublished report, available from SIGN)

21 Antman EM, Lau J, Kupelnick B, Mosteller F, Chalmers TC. A comparison of results of meta-analyses of randomized controlled trials and recommendations of clinical experts. Treatments for myocardial infarction. JAMA 1992; 268: 240-8.

22 Woolf SH. Practice guidelines, a new reality in medicine. II: Methods of developing guidelines. Arch Intern Med 1992; 152: 946-52.

23 Mulrow CD. Rationale for systematic reviews. BMJ 1994; 309: 597-9.

24 Liddle J, Williamson M, Irwig L. Method for evaluating research and guideline evidence. Sydney: New South Wales Department of Health; 1996.

25 Guyatt GH, Sackett DL, Sinclair JC, Hayward R, Cook DJ, Cook RJ. Users' guides to the medical literature. IX. A method for grading health care recommendations. Evidence-Based Medicine Working Group. JAMA 1995; 274: 1800-4.

26 US Department of Health and Human Services. Agency for Health Care Policy and Research. Acute pain management: operative or medical procedures and trauma. Rockville (MD): The Agency; 1993. Clinical Practice Guideline No.1. AHCPR Publication No. 92-0023. p.107.

27 Drummond MF, Stoddart GL, Torrance GW. Methods for the economic evaluation of health care programmes. 2nd ed. Oxford: Oxford University Press; 1997.

28 Williams A. Purchasing outcomes: How should cost-effectiveness information influence clinical practice? In: Delamothe T (editor) Outcomes into clinical practice. London: BMJ Publishing; 1994.

29 Scottish Office Department of Health. Designed to care. Edinburgh: Scottish Office; 1998.

30 Thomson R, Lavender M, Madhok R. How to ensure that guidelines are effective. BMJ 1995; 311: 237-42.

31 Conroy M, Shannon W. Clinical guidelines: their implementation in general practice. Br J Gen Pract 1995; 45: 371-5.

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