

Bedside clinical guidelines: the missing link

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on behalf of the Bedside Clinical Guidelines Partnership*

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ABSTRACT – Clinical guidelines for acute general (adult) medicine, general (adult) surgery, nursing and acute paediatrics, for use at the bedside, were developed over 10 years in North Staffordshire. The guidelines have been adopted by 15 other hospitals, all members of the Bedside Clinical Guidelines Partnership. The guidelines include advice on clinical management, prescribing aids, and practical procedures. Recommendations are validated against published evidence, and provide the ‘missing link’ between this evidence and practical clinical care, by taking current consensus into account. The guidelines are clear, brief and specific, informing and guiding the actions of clinicians. Annual updating involves checking evidence and compatibility with national recommendations, and soliciting feedback from users to eliminate ambiguity or misunderstanding. Continued human effort and financial investment are required to ensure that the guidelines remain a ‘living’ document.

KEY WORDS: acute medicine, clinical audit, clinical decision, clinical effectiveness, continuing medical education, evidence-based medicine, guidelines, patient care

Clinicians manage patients by developing action plans – logical frameworks¹ that apply medical knowledge to the patient’s condition. Workplace logistics and resources are factored in, but much depends on knowledge and experience. If medical knowledge has evolved since the clinician last encountered the situation, the plan may be suboptimal.²

Clinical guidelines are ‘systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances’.³ They present recommendations for optimal management, informed by published evidence and broad consensus, and encourage flexible application in individual patients. Guidelines that promote effective interventions and discourage ineffective ones have the potential to reduce morbidity and mortality, and improve quality of life. They facilitate consistency of care regardless of where, or by whom, patients are treated.⁴ Guidelines

also provide a focus for training, quality assessment and audit.⁵

Guidelines from national bodies, such as the National Institute for Health and Clinical Excellence (NICE) and specialist societies, are not easily consulted at the bedside. They are too comprehensive and generic, and need to be tailored to suit local circumstances.⁶ The most effective guidelines make precise recommendations, and help clinicians to address specific clinical problems, with minimal or no change to existing routine.^{7,8} They supply the connection (the ‘missing link’) between current medical knowledge and optimal care for individual patients.

As Tallis has observed:⁹

The mesh of evidence internalised by the most assiduous evidence-based practitioner is still sometimes quite coarse, leaving a penumbra of uncertainty around the singular patient ... Being a good doctor is, as much as anything, about learning how to handle uncertainty in the way that gives the best outcome for the patient.

In 1993, North Staffordshire Hospital (now University Hospital of North Staffordshire (UHNS)) reviewed acute medical care using the Appropriateness Evaluation Protocol.¹⁰ Results suggested that easier availability of investigations, faster reporting of results and prompt clinical decision-making could prevent inappropriate use of 4,000 bed-days per annum; better discharge planning could save 10,000 bed-days. Resulting revisions in care structure for medical inpatients included recommendations that guidelines be made available as a resource for clinicians.

We describe the development, dissemination and implementation of these guidelines, which comprise a rapidly expanding volume of guidance, formatted for easy consultation and implementation at the bedside.

Development

After two years of drafting and editing, UHNS first introduced guidelines to assist the care of medical patients in 1996. In 1997, the guidelines were offered to nearby trusts in the West Midlands on payment of an annual subscription, which supported development of a secretariat that initially comprised a pharmacist and clinical effectiveness librarian (both part

* For members, see end of paper.

time). The latter was appointed specifically to identify, assess and make explicit the evidence underlying the recommendations; when the guidelines were first drafted, the process of evidence-based medicine was in its infancy, but within a year of their introduction their credibility depended on systematic reviews of evidence.⁵

In 1998, the West Mercia Clinical Guidelines Partnership was formed, and issued its first volume of guidelines a year later. Membership has since grown from 10 hospitals to 16, covering over 10,000 acute beds and a population of over 4 million. In 2004, the Partnership changed its name to Bedside Clinical Guidelines Partnership (BCGP). As interest and resources have grown, the scope of the guidelines has extended beyond acute medicine to include general surgery (2002, updated 2004) nursing (2003), and paediatrics (2004).

The Partnership is now managed by an editorial board, comprising two consultant physicians (specialists in clinical pharmacology and respiratory medicine, who each allocate one session per week to reviewing and editing the guidelines) and the

secretariat, to which has been added a full time coordinator/developer. They hold regular meetings to discuss the development of new guidelines following feedback from users and the adaptation of existing guidelines informed by clinical advances and emerging evidence. Key stages for identifying and developing new guidelines are given in Table 1. The secretariat/editorial board works to an annual reviewing and updating cycle (Table 2).

Format and layout

The format and layout of the guidelines is set out in Table 3. The presentation and style are chosen to facilitate bedside reference. The editorial approach aims for conciseness, eliminating any information not of practical value, removing ambiguities and using bulleted, terse statements in the active tense, with bold/italic typeface to alert or warn.¹¹ Such simplicity of style is known to assist implementation.⁸

Other Partners present their guidelines in similar formats, each with its own local identity. Where opinions differ and no conclusive evidence exists to support a recommendation, Partners are encouraged to achieve consensus. Guidelines may be amended, however, to reflect the opinion of local specialists. Variation among trusts can also occur where local funding lags behind evidence of clinical effectiveness. BCGP recognises that patients are individuals, possibly with comorbidities or allergies that require alternative management; clinicians must be free to adapt the guidelines, which are explicitly advisory, not mandatory.

Table 1. Key stages for identifying and developing new guidelines.

- 1 Feedback from users points to the need for a particular guideline
- 2 The secretariat searches the literature referring to relevant National Service Frameworks (NSFs) and guidance from national bodies, such as NICE, SIGN, and specialist societies
- 3 Together with clinical specialists and potential users (junior doctors, pharmacists, nurses), the secretariat drafts the guideline posing clinical questions to challenge any knowledge/evidence gaps not filled by national or international guidance
- 4 Where appropriate, departments such as medico-legal, radiology and other service providers review the guidelines to ensure accuracy
- 5 This process can take more than one year

NICE = National Institute for Health and Clinical Excellence; SIGN = Scottish Intercollegiate Guidelines Network.

Table 2. Annual review of the guidelines.

- 1 A specialist is appointed annual editor for a guideline
- 2 As in the development of a guideline, the secretariat searches the literature on a continual basis to identify changes in practice and new developments (see Evidence – Table 4)
- 3 The annual editor reviews the previous year's guideline with regard to any new evidence and feedback from users across the partnership, which may include complaints and adverse incidents
- 4 Appropriate departments, eg medico-legal, radiology, review the guidelines
- 5 The secretariat edits the guideline with its accompanying evidence
- 6 The editorial board reviews the updated guideline

Table 3. Format and layout of the guidelines.

Format

- General services/administration
- Guidelines for management of common medical emergencies
 - a recognition/assessment
 - b immediate treatment
 - c subsequent management
 - d monitoring treatment
 - e discharge policy
- Prescribing regimens/nomograms (details on specific drugs)
 - a variable dosage requirements
 - b infusion rates
 - c selecting appropriate regimens
- Practical procedures (many illustrated)
 - a indications
 - b contraindications
 - c equipment (sterile packs designed to conform)
 - d procedure (rehearsed before publication)
 - e specimens to be obtained
 - f patient aftercare

Layout

- Three forms of presentation (each with three columns per page, minimising overall size)
 - a pocket booklet
 - b A4 loose-leaf (supplied to all wards)
 - c intranet (pdf)

Evidence

Any guideline statements not based on national or international guidance are challenged by clinical questions,² to which the clinical effectiveness librarian seeks evidence (Table 4). For example, ‘In patients with acute spinal cord compression, does dexamethasone phosphate 4 mg iv 6 hourly improve the clinical outcome compared to no intervention?’ The librarian searches the literature and obtains and appraises relevant papers, using checklists available from the Centre for Evidence-Based Medicine (www.cebm.net/downloads/worksheets.rtf). He then drafts answers and assigns evidence levels (I to V) to each question,¹² circulating answers to specialists in participating trusts for comment, and responding to feedback received. The eventual statements are included in the A4 version of the guide-

Table 4. Sequence of searching to identify national and international clinical guidance.

- Guidelines databases (eg NeLH Guidelines Finder, National Guidelines Clearinghouse, SIGN) to establish whether a relevant guideline already exists
- Cochrane Library and Clinical Evidence (available via NeLH (www.nelh.nhs.uk/default.asp)) to identify any systematic reviews or RCTs
- Medline 1951–current, to identify lesser degrees of evidence, using comprehensive search strategies employing combinations of thesaurus headings and text words
- If necessary, searches are repeated on additional databases (eg Embase, Cinahl, PsycINFO)
- Further items are identified by scanning reference lists from relevant papers
- General Internet searches (including discussion groups) may be used if the above databases fail to identify relevant material
- If other sources have failed recently published textbooks may be consulted to provide level V evidence
- General ‘catch-all’ updating searches are run monthly for each guideline, using stored search strategies

NeLH = National electronic Library for Health; RCT = randomised controlled trial; SIGN = Scottish Intercollegiate Guideline Network.

lines as Supporting Information. Examples of the distribution of levels of evidence among individual guidelines are shown in Fig 1.

Dissemination and implementation

Even when doctors know what to do, they often do not perform accordingly.⁶ Whereas dissemination of information may increase awareness and predisposition to change, it is insufficient without active implementation strategies, designed to modify:

- attitudes – stimulating agreement with/acceptance of recommendations
- behaviour – encouraging practice change to conform to guidelines
- outcomes – improving patient health/quality of care.¹³

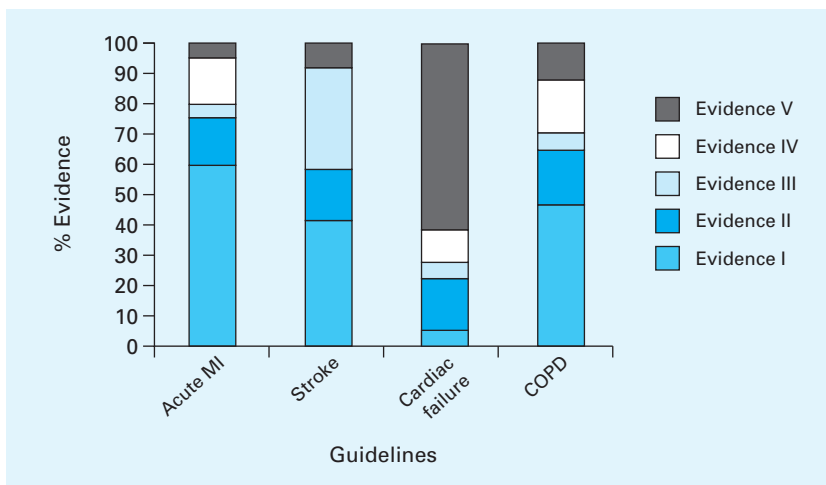
Creating systems that support desired clinical behaviour is as important as changing individual behaviour. Although clinicians must still be involved, implementing guidelines becomes difficult or impossible without underlying systems change.¹⁴

At UHNS, BCGP guidelines are distributed to current medical staff (including locums), new doctors at induction, all pharmacists, and all wards (where they are chained to the notes trolleys), including the A&E department and the medical assessment unit (MAU). Implementation measures used at UHNS include:

- referral to guidelines by consultants during ward rounds and teaching sessions
- incorporation into standards for nurse consultants on short-stay ward
- promotion of drugs of choice by ward pharmacists
- reiteration of guideline content at clinical meetings
- harmonisation of guidelines with hospital formulary
- regular audits of use among, and formal requests for feedback from, trainees (eg 6-monthly debriefing of house officers)
- audit of adherence to individual recommendations
- an annual inter-directorate quiz, following the format of *University challenge*.

Fig 1. Example of percentage evidence generated for selected guidelines.

COPD = chronic obstructive pulmonary disease; MI = myocardial infarction.



Revision and expansion

Questioning the facts

Members inform the secretariat of evidence supporting amendments. Where this is compelling, action is taken between editions. To date, the guidelines have been challenged by 323 questions, producing 49 answers at level I evidence, 61 at level II, 40 at level III, 61 at level IV and 112 at level V.¹² These questions covered 45 medical guidelines, including 37 supplementary questions from members. Each guideline generates, on average, seven questions (range 1–21).

Changes in practice

Each annual review has incorporated and implemented changes resulting from user feedback, clinical advances and emerging evidence, including:

- revised antimicrobial prescribing to reduce incidence of *Clostridium difficile*
- pre-mixed infusion fluid bags to avoid inappropriate addition of potassium chloride

- annual review of pathological and radiological investigations, ensuring best practice
- triage for chest pain using ECGs and troponin T
- earlier angioplasty for acute myocardial infarction
- non-invasive ventilation in type II respiratory failure
- omeprazole for upper gastrointestinal haemorrhage (severe non-variceal bleeding)
- low-molecular-weight heparin for deep venous thrombosis and unstable coronary artery syndrome
- reporting of ventilation/perfusion scans as probabilities (1998); recommendation of computed tomography pulmonary angiograms by clinical scoring and investigation results (2004)
- changes in pathology investigations (1999 onwards)
- revised contents of sterile packs (1999 and 2004).

Table 5 shows examples of changes in practice that have resulted from questions posed by individual users. The number of queries has fallen over time.

Table 5. Feedback from individual users has led, after evidence reviews, to changes in a number of guidelines.

Evidence queried	By whom	Result
Clomethiazole causes dependence and is associated with fatal respiratory depression in patients who continue to drink	Consultant physician, 1998	Substitution of clomethiazole with diazepam
Guidance on arterial compromise in DVT	Vascular surgeon, 1998	Change from use of streptokinase to refer to vascular surgical team
Treatment graph for paracetamol overdose differs from NPC's guidelines	Medical specialist registrar, 1999	NPC's treatment graph used for 2000 edition
Misleading diagram shown for central venous cannulation using infraclavicular subclavian vein	Consultant cardiologist, 1999	Revised diagram substituted in 2000 edition
Recommendation for TED stockings should be strengthened to class 3 compression hose	Consultant physician, 2000	Change implemented in 2001 edition
In DKA, no potassium should be given if plasma concentration is > 5.5 (rather than 4.5)	Biochemist, 2000	Change implemented in 2001 edition
Should chlordiazepoxide be preferred to diazepam in the treatment of alcohol withdrawal?	Consultant physician, 2000	No change. Chlordiazepoxide is less likely to be abused than diazepam and is recommended by the DH and the RCP guidelines. The DH state, however, that 'some experienced practitioners use diazepam'.
Are laboratory tests for B12 and folate necessary when MCV is normal?	Consultant physician, 2000	Review suggested MCV alone could not be relied upon to identify the cause of the anaemia in sick, hospitalised patients so B12 and folate remain as routine investigations in severe anaemia guideline
Should Allen's Test be performed before arterial puncture?	Consultant physician, 2001	Led to no change following evidence for lack of sensitivity/specificity
Can it be dangerous to administer acetylcysteine >24 hr following paracetamol ingestion?	Consultant physician, 2001	Led to no change as no fatalities have been recorded in these cases
Should lumbar puncture be performed before CT scan in subarachnoid haemorrhage?	Consultant physician, 2002	The review did not support this
Should chest drains be removed during expiration or inspiration?	Consultant physician, 2003	No conclusive evidence, but BTS consensus guidelines suggest on expiration*

BTS = British Thoracic Society; CT = computed tomography; DH = Department of Health; DKA = diabetic keto-acidosis; DVT = deep vein thrombosis; MCV = mean cell volume; NPC = National Poisons Centre; RCP = Royal College of Physicians; TED = thrombo-embolic deterrent.

*Laws D, Neville E, Duffy J. BTS guidelines for the insertion of a chest drain. *Thorax* 2003;58(Suppl II):ii53-ii59.

Expansion in coverage

The first edition in 1996 contained 28 guidelines, 16 prescribing regimens, and 11 practical procedures. The ninth edition (2004) comprised 58 guidelines, 22 prescribing regimens/nomograms, and 14 practical procedures (Fig 2). The annual workload increases with the scope and number of guidelines.

Process evaluation

Awareness and use

In 1999 and 2000, a clinical auditor interviewed a random member of nursing staff on each adult ward to determine guidelines awareness. The results from the proforma suggested high and increasing awareness of the guidelines (Table 6). In 1999–2000, four houses of 11 medical pre-registration house officers (PRHOs) answered, at induction, a set of 250 questions based on guidelines, rating how confident they were in their knowledge on a scale 1–9. Six months later, they repeated the exercise. Results showed no change in knowledge but increased confidence.

Since August 2000, each PRHO at UHNS has been introduced to the guidelines at induction and attends feedback sessions at the end of compulsory training in November. When surveyed in 2003, all 63 PRHOs, SHOs, registrars and senior registrars working in the medical directorate found the guidelines extremely useful, carried the book at all times, and referred to them daily. Audit showed prescribing regimens/nomograms were most often referred to, and practical procedures/discharge policies least often. This feedback has led to the introduction of:

- notes pages/logbook
- clarification of the gentamicin nomogram
- an index
- a guideline on handling violent/aggressive patients.

No PRHO was aware of the guidelines' Supporting Information, despite their availability on every ward. This was partly due to copies being kept in inaccessible 'places of safety'.

Since March 2003, guidelines have also been available on the Trust Intranet. Over a 15-month period from March 2003 to June 2004, the webmaster reported 4,954 hits, although it is impossible to tell which guidelines are used most frequently.

Audits

At UHNS, 35 guidelines-related audits have been conducted since 1996:

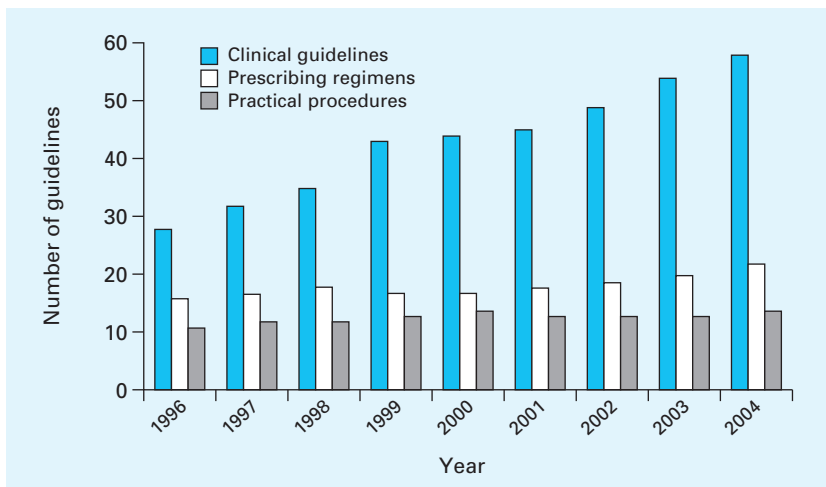
- Nineteen directly reviewed patient management. Overall patterns emerged of good initial management with poorer subsequent management and discharge. This informed the development of specialised teams for management of asthma, chronic obstructive pulmonary disease and heart failure.
- Three reviewed drug administration, two of which concerned anticoagulation. These informed the case for further involvement of pharmacists in anticoagulation, and development of a guideline on slow initiation of warfarin for outpatients with atrial fibrillation.
- Ten explored how efficiently care functioned, leading to streaming of patients for specialist inpatient care and shortened waiting times for investigations.

Documentation was a constant problem in the audits. This led to the piloting, auditing (three audits) and introduction of

Table 6. Medical guidelines awareness amongst nursing staff.

	1999	2000
Awareness on adult medical wards	15/15 (100%)	15/15 (100%)
Awareness on all adult wards	48/57 (84%)	53/55 (96%)
Availability of guidelines from previous year	38/57 (67%)	48/55 (84%)

Fig 2. Increase in the number of guidelines published annually by the Bedside Clinical Guidelines Partnership.



structured collaborative care documentation linked to the guidelines.

Prescription/drug charts

Clinical pharmacists encourage adherence to both formulary and guidelines by teaching at the bedside and a system of ‘Post-It’ reminders on patients’ notes. One consequence of this intervention was that total drug expenditure fell from £1,425,000 in 1997/8 to £1,275,000 in 1999/2000. As an example of how rational prescribing has been encouraged, attention was drawn in 1998 to the guidelines recommendation that clarithromycin was appropriate only for exacerbation of chronic obstructive pulmonary disease in patients allergic to penicillin; erythromycin was the macrolide preferred for all other indications. Oral clarithromycin costs fell from over £4,000 in 1998 to just over £2,000 in 1999.

In 2004, a senior pharmacist joined the clinical team in MAU (portal of entry for over 90% of acute medical admissions) to review all prescriptions against guideline recommendations. This initiative has halted the previous year-on-year increase (20–25%) in prescribing costs in this clinical area.

Discussion

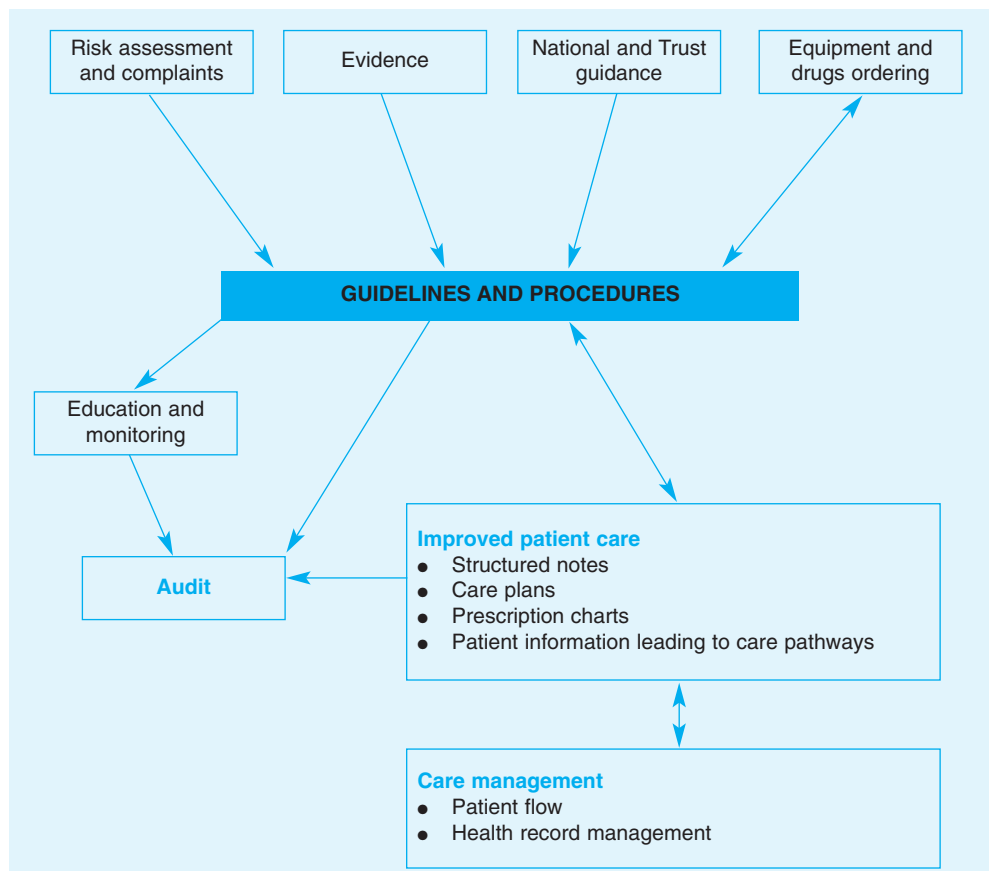
The clinical guidelines for use at the bedside developed in North Staffordshire have been adopted by 15 other NHS trusts.

We cannot demonstrate any direct benefit to individual patient outcomes, as guidelines are only one of many influences affecting patient management. Staffing levels, environment, and ways of working change constantly. Success can be judged only by the surrogate measures we have described. However, it is worth noting that in 2004, as part of its annual review, the West Midlands Deanery assessed standards for education at UHNS and praised its educational initiatives, including the guidelines.

Guidelines implementation requires systems that support desired clinical behaviour.¹² Thus, BCGP is exploring the design of structured notes, nursing care plans and prescription charts to facilitate compliance with recommendations. The vision is to move towards the clinical governance structure shown in Fig 3, with guidelines central to the implementation of quality at the point of care.

Greater consistency in patient care, while desirable, can lead the uninformed to equate divergence with negligence.^{6,15} Enshrining clinical guidelines within NHS clinical governance could result in their being viewed as the only correct approach; not merely advisory, but mandatory. This would be premature: the quality of current evidence in support of individual recommendations is variable and seldom as robust as we would like – only a quarter of NICE recommendations are supported by grades 1–2 evidence.¹⁶ It would also be undesirable: inexperienced clinicians might be reluctant to base their decisions on reasoning from first principles if their consequent actions would contravene a guideline to which they felt obliged to adhere.

Fig 3. Flowchart showing central role of guidelines within clinical governance.



Key Points

Clinical guidelines for immediate use at the bedside should explain exactly how to apply current medical knowledge to individual patient management

They must be underpinned by clinical evidence or by published consensus where such evidence is wanting

They will not lead to more consistent clinical practice unless accompanied by a comprehensive implementation strategy, designed to change attitudes and behaviour, and supported by audit to identify reasons for resistance

They should be reviewed annually to minimise the delay before new evidence influences patient care

They can provide a framework for high quality patient care, provided that clinicians use them as signposts rather than tramlines

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References

- 1 Schank RC, Abelson RP. *Scripts, plans, goals and understanding: an inquiry into human knowledge structures*. Hillsdale, NJ: Erlbaum, 1977.
- 2 Sackett DL, Richardson WS, Rosenberg WM, Haynes RB. *Evidence-based medicine: how to practice and teach EBM*, 2nd edn. Edinburgh: Churchill Livingstone, 2000.
- 3 Field MJ, Lohr KN (eds). *Clinical practice guidelines: directions for a new program*. Washington, D.C.: National Academy Press, 1990.
- 4 Woolf SH, Grol R, Hutchinson A, Eccles M, Grimshaw J. Clinical guidelines: potential benefits, limitations, and harms of clinical guidelines. *BMJ* 1999;318:527–30.
- 5 Shekelle PG, Woolf SH, Eccles M, Grimshaw J. Clinical guidelines: developing guidelines. *BMJ* 1999;318:593–6.
- 6 Wyatt JC. Practice guidelines and other support for clinical innovation. *J R Soc Med* 2000;93:299–304.
- 7 Grol R, Dalhuijsen J, Thomas S, Veld C *et al*. Attributes of clinical guidelines that influence use of guidelines in general practice: observational study. *BMJ* 1998;317:858–61.
- 8 Michie S, Johnston M. Changing clinical behaviour by making guidelines specific. *BMJ* 2004;328:343–5.
- 9 Tallis RC. *Hippocratic oaths: medicine and its discontents*. London: Atlantic Books, 2004:211.
- 10 Smith HE, Pryce A, Carlisle L, Jones JM *et al*. Appropriateness of acute medical admissions and length of stay. *J R Coll Physicians Lond* 1997;31:527–32.
- 11 Hartley J. *Designing instructional text*. London: Kogan Page, 1994.
- 12 Muir-Gray JA. *Evidence based healthcare: how to make health policy and management decisions*, 2nd edn. Edinburgh: Churchill Livingstone, 2001.
- 13 Polosa R, Cacciola RR, Avanzi GC, Di Maria GU. Making, disseminating and using clinical guidelines. *Monaldi Arch Chest Dis* 2002;57:44–7.
- 14 Solberg LI. Guideline implementation: what the literature doesn't tell us. *Jt Comm J Qual Improv* 2000;26:525–37.
- 15 Hurwitz B. Legal and political considerations of clinical practice guidelines. *BMJ* 1999;318:661–4.
- 16 Wyatt JC. Personal communication.