

AMEE GUIDE

Continuing medical education: AMEE Education Guide No 35

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Abstract

This guide is designed to provide a foundation for developing effective continuing medical education (CME) for practicing physicians. For the purposes of this work, continuing medical education is defined as any activity which serves to maintain, develop, or increase the knowledge, skills and professional performance and relationships that a physician uses to provide services for patients, the public, or the profession (American Medical Association 2007; Accreditation Council for CME 2007). The term continuing professional development (CPD) is broader and has become more popular in many areas of the world. As defined by Stanton and Grant, CPD includes educational methods beyond the didactic, embodies concepts of self-directed learning and personal development and considers organizational and systemic factors (Stanton & Grant 1997). In fact, this guide describes many modalities that may be defined as CME or CPD. In the interest of simplicity, we will use the term continuing medical education (CME) throughout, with the understanding that the same strategies may be applied to non-clinical continuing professional education.

For those who do not work exclusively in CME, many terms and processes may be unfamiliar. This guide is intended to provide a broad overview of the discipline of CME as well as a pragmatic approach to the practice of CME. The format provides an overview of CME including history and rationale for the discipline, followed by a practical approach to developing CME activities, the management of the overall CME programme and finally, future trends. At the end of the guide you will find resources including readings, websites and professional associations to assist in the development and management of CME programmes.

History of continuing medical education (CME)

It would be difficult if not impossible to state with any certainty when continuing medical education began as a clear entity, distinct from undergraduate and residency education. Regardless of its existence as a formal entity, physicians maintained their competence for centuries and probably practiced better medicine at the end of their careers than they did at the start – an innate process of reflective learning, and a tribute to these physicians' professionalism and self-directed learning. Certainly, a century ago, the preparation of the clinician in his (or rarely, her) medical school years was considered sufficient to carry him throughout a full career. With the advent of specialty training following World War I, and the establishment of specialty based colleges, academies and societies, several trends are apparent in the evolution of this last, longest, phase of medical education.

The standard format of CME for many years has been the formal course, conference, symposium or workshop, the staple of most CME providers. There are many additions to this methodology however, including perhaps the oldest form of alternative method, the outreach visit or visiting speaker, the product of the post- World War II farm extension service in the US. Other formats have of course grown in the last fifty years – chart audit and feedback, simulated experiences such as those involving mannequins like 'Resusci-Anne'TM video

Practice points

- CME means updating the knowledge and maintaining the professional competence of practicing physicians.
- The emphasis of CME is shifting from just improving knowledge to improving physicians' performance.
- Efforts are under way to give CME activities mutual recognition across borders.
- CME should be developed and based upon actual and perceived needs.
- Adult learning methods should be employed in developing CME.
- CME is becoming increasingly available at physicians' workplaces rather than at remote sites.
- The content of CME should not be influenced by commercial organizations providing financial support.

and audio conferencing, and others. Among the last category, those mediated by the computer in the form of informatics, Internet or web-based CME clearly stand out. The computer has permitted the advent of more practice-based learning.

The rise in interest and participation in CME has been triggered by a number of factors.

- The post-World War II knowledge explosion and need to reacclimatise physicians into practice after the War.

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- Specialty society interest in CME beginning with the American Academy of General Practice in 1947 followed by the American Medical Association's Physician Recognition Award and their use of CME 'credit' as documentation and recognition of maintaining knowledge and skills.
- The interest by pharmaceutical and other commercial interests that recognize CME as a means of influencing physician practice.
- The need for social accountability to ensure the competence of physicians and the health of the public.

Much as in the pre-Flexner entrepreneurial world of medical schools in the US, concern was raised over thirty years ago that many CME providers were more commercially-driven than focused on assisting physicians to provide better care. As a result of this increased attention, the Accreditation Council for CME was born, increasing its remit on appropriate standards for CME providers and assuring consumers (in this case, physicians) that they are met. This effort has now spread to several other organizations world-wide, including the European Union Council on CME and the Royal College of General Practitioners UK (RCGP-UK).

Concurrent with the rise of the movement towards accreditation of CME providers, and perhaps caused by it, international organizations have arisen which assist the provider in becoming more proficient at the tasks of the CME planning cycle outlined below. These include:

- European Union of Medical Specialists (UEMS);
- European Academy of Teachers in General Practice (EURACT);
- The Alliance for Continuing Medical Education (ACME);
- The Society for Academic Continuing Medical Education (SACME).

See resource list for more information about these organizations.

How adults learn: Adult learning theory

While there are many theories of adult learning (some of which are summarized below), the work of Fox et al. (1989) is possibly the most enlightening in this area. Fox and colleagues asked the questions – What did you change last in your practice? What caused that change? How did you acquire your learning in order to make that change? – to over 300 North American physicians. There were three clusters of responses, outlining a theory of how adults (at least adult physicians) learn.

First, physicians undertaking any change disclosed that they had an image of what that change was going to look like – the surgeon envisaged taking up a laparoscopic technique, the physician wanting to take on a nursing home practice imagined himself more comfortable and competent with geriatric patients. Second, the forces for change were widespread – while some drew from traditional educational and CPD experiences, many more were intrapersonal (e.g., a recent personal experience), or from changing demographics

(e.g., aging or changing populations and patient demands). Third, the changes varied from smaller 'adjustments' or accommodations (e.g., adding a new drug to a regimen within a class of drugs already known and prescribed) to much larger changes characterized as 'redirections', e.g., adopting an entirely new way or method of practice. Here, more minor changes might be accomplished with a brief CPD presentation, even a didactic lecture. Clearly however, larger changes require a much richer CPD experience – perhaps encompassing a lecture, a highly interactive session such as a hands-on workshop, and possibly refresher or practical experience in the work setting.

There are other theories and models of adult learning, however, of which perhaps Knowles' description of the adult learner is the most widely known (Knowles 1984). He describes the adult learner as needing educational experiences which are relevant to his practice, conducive to his learning style, non-threatening and supportive.

Other authors contribute to our understanding of the adult learner in general and the clinician-learner in particular. Some authors, such as Schon and Kolb, describe the internal process of learning (Kolb 1984; Schon 1988). Schon for example describes the pervasive force of 'reflection', suggesting that a potent learning mechanism is secondary to self-appraisal and self-awareness built from clinical experiences, leading to a building of a new and expanded competency or 'zone of mastery'. Similarly, Kolb uses the notion of experience, suggesting that learners move from the concrete (a case for example) to the more abstract (such as understanding more about the pathophysiology of a disease) and back again. Geertsma (1982) suggests that clinicians move through three phases being primed about a particular problem or gap in knowledge by some clinical experience; focusing on the exact extent and nature of their learning gap; and following up with an appropriate learning plan such as reading or speaking with a colleague. In our not-exhaustive list, Bandura places all learning in a social and environmental context, indicating that learning and its application takes place in the clinical setting, requiring us to focus in this area (Bandura 1963).

Finally, Candy's description of the traits of the self-directed learner, deserve some elaboration (Candy 1991). These include: discipline and motivation; analytic abilities; ability to reflect and be self-aware; curiosity, openness and flexibility; independence and self-sufficiency; well developed information seeking and retrieval skills; good general learning skills. Clearly these are desirable – if not always fully achievable – goals.

The role of CME in healthcare delivery

Although the description of the adult learner is itself enormously complex and well described, the world of health care is even more so, comprised of many individual learner-clinicians and learning patterns, operating in complex healthcare systems in Europe, North America, Australasia and elsewhere. In its midst, it may be difficult to see an answer to the question 'so where does CME fit in?'

To illustrate the complex world of the health care system and the role that CME plays within it, it is useful to describe a 'clinical care gap' – an instance in which the evidence to treat or manage a patient in a certain way is not fully adhered to. For example, despite clear evidence that ACE inhibitors are highly useful in congestive heart failure, nearly one-third of patients do not receive them, post hospitalization (Weil & Tu 2001; Antonelli et al. 2002). Many other examples exist – situations in which medication or treatments are underused (Pap Smears, mammography, adequate management of diabetes, other preventive measures), overused (antibiotics in viral infections for example) or misused.

Though there are many answers to this question of causes of the gap, they may be clustered into four broad areas; the first three fall within the boundary of the CME provider at least to some extent, the last one outside.

- The evidence or information itself: here the evidence may be inadequate, or weakly presented. Further it may be formatted in such a way as to make reading and absorption difficult.
- The means of communication.
- The health professional recipient of the information.
- The system itself: often outside the scope of the CME provider are issues of funding, system management, and resource constraints.

One area in which these four domains overlap is in the issue of commercial support. Of real interest to the CME provider, this issue raises strong ethical and business considerations.

Forces that Influence CME

Many forces align to shape the future of CME. We can picture them as concentric rings, moving from the broad or macro level of the social and regulatory environment in to that of the individual learner/clinician (Figure 1).

On the outer ring, the highest level of these forces include social changes (more immigrants or geriatric patients to care for, for example), and regulatory issues such as funding, licensing requirements, government mandates and other issues. Closer to the life of the physician are those large-scale forces which impact on the delivery of CME such as commercial support, regulations concerning CME credit hours, re-licensing or re-certification requirements and other issues.

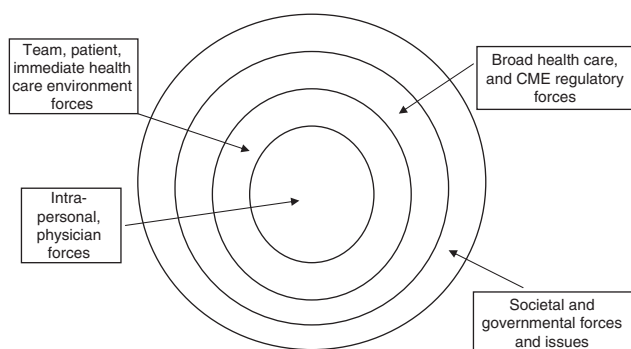


Figure 1. Forces that influence CME.

Still closer to the center of the physicians' worked are those issues which impinge directly on practice – team members, health care setting, availability of educational resources and colleagues, culture of education and improvement are only a few examples here. Finally, the intra-physician world has been explored to some extent in the paragraphs above on adult learning. In addition, the practical issues of time management, professionalism and many other factors are important when seen as forces directing the doctor and the health care field towards – or away from – engagement in CME and CPD.

CME programme planning

Each organization must determine its own priorities with regard to CME. Whether the organization has on-going continuing programming or only one annual meeting, it is important to determine goals and objectives for the overall programme. Strategic planning includes understanding learners' needs as well as those of the healthcare system and population healthcare needs. There must be a process for evaluating the programmes' ability to meet those needs, satisfy learners, have favourable outcomes and meet financial goals. This section will discuss activity planning along with a strategy for overall programme management and evaluation.

Needs assessment

The needs of learners should drive CME. Needs are any 'gap' between what is and what should be. Conducting effective needs assessment can be resource-intensive. Simple surveys of the learner population tend to be subjective (perceived) assessment rather than objective (actual) needs assessment. While this type of assessment is important and can be helpful, there may be other actual needs that should be appraised.

Subjective needs assessment. Though a useful and frequently employed tool, the self-assessment listing of learning needs has proven less accurate than anticipated (Norman et al. 2004), and rigorous tools are needed to obtain high-quality data (BMJ questionnaire series) (Boynton & Greenhalgh 2004; Boynton 2004; Boynton et al. 2004).

Examples of subjective needs assessment strategies may include:

- questionnaires;
- focus groups or individual interviews;
- reflection-on-action methods;
- diaries or log books.

Objective needs assessment. To offset the self-assessment deficiencies inherent in these methods, objective needs assessment strategies include:

- literature review;
- opinions of experts in the field;
- standardized assessments of knowledge and/or skills;
- chart/case-study audits;
- peer review (whereby doctors assess each others' practice);
- standardized patients to rate task performance;

- observation of physician practices;
- reports of practice patterns and physician performance data.

Objective driven. Once the need for an activity has been established and learner needs assessed, CME activity planning should begin with the end or objective in mind. What do you hope to accomplish with this activity? There may be several hoped-for outcomes:

- introduce new concepts;
- give specific practice recommendations;
- provide opportunity for discussion of controversial issues;
- teach new procedures with hand-on practice;
- document competence in a new skill.

Each of these end-points requires different planning, format and evaluation processes. Planners should consider what they expect of their learners as a result of the activity before determining specific educational objectives. Evaluation methods should be considered at the same time as educational objectives. A well-done evaluation will measure the success in meeting these objectives.

Educational objectives

CME has moved away from simple learning objectives, what the learner should know or be able to do at the end of the activity, to behavioural objectives, what the learner should be expected to do differently as a result of what has been learned. This movement toward physician performance improvement is an effort to demonstrate the effectiveness of CME at a higher level than simple knowledge acquisition.

Of course, not all activities can or should result in behaviour change. The goals determined early in planning should set the stage for educational objectives. For example, if the goal is to introduce a new concept, the educational objective should specify recognition and understanding of the new concept.

Educational objectives should be stated using active verbs appropriate for the expected outcome. Some examples of various types of objectives are found in Table 1.

Educational objectives should be clear and concise, conveying the expected outcome of the activity. Ideally, they should be measurable with follow-up after the activity to evaluate outcomes. Many CME developers believe they should delegate the development of educational objectives to the CME faculty since they are the content experts. This is not the case. Those who assess the need and develop the activity should establish the educational objectives. However, once basic objectives are identified, the faculty should be consulted for detail and work with planners to develop specific objectives.

Educational content

Teachers and planners are crucial stakeholders in developing CME activities. These content-experts must have the necessary expertise as well as be credible and trust-worthy. They must be effective teachers, capable of communicating learning points in order to meet the educational objectives. Content must be

free of commercial bias and based on best available scientific evidence.

One widely-used definition of evidence-based medicine is, 'the best available scientific evidence integrated with the physician's clinical expertise and the patient's values' (Sackett 2000). This is the foundation of evidence-based CME. Clinical content should come from the highest strength of evidence, but delivered by content experts who can present the research in the context of practice. Good patient communication and relationships should be emphasised as a part of the clinical application of best science. CME professionals should make expectations clear to invited faculty that the content will be evidence-based. Good sources of evidence-based practice recommendations include the Cochrane Database; Bandolier; the US Preventive Services Task Force; and the Guidelines Advisory Committee of Ontario Medical Association. Evidence-based clinical content in CME will help ensure evidence-based practice by physician learners.

Choosing the format

Formal, live formats. In this section, we focus on the preparing for and participating in the creation of formal CME activities. These may be clustered in a number of ways.

- By size: large group sessions of 50 or 500 which are often pre-planned and have their own sense of timing, rhythm and interchange – the question and answer section at the end of a formal lecture, for example. Smaller groups, say of five learners, are conversely much more learner-centred and often more self-directed.
- By degree of interactivity: here one can imagine a continuum from the standard didactic lecture allowing for little if any interactivity, to a self-forming smaller group which sets its own learning objectives and meets them. Most conferences and courses are at the front end of this continuum, workshops occupy a half-way point; informal discussion groups such as journal clubs are at the other end of the continuum.
- By format: while the face-to-face model of learning exists for the most part as the primary vehicle for CME, there are other ways in which this knowledge exchange or transfer may be accomplished. The visiting speaker programme may use a combination of small and large group sessions depending on the audience; web-casts may use didactic as well as interactive elements; video casting may be interactive or didactic, to small or large groups.

Knowing that the choice of formal or traditional CME may involve a wide variety of formats, it may be helpful to think of the format or method in CPD less as a lecture or presentation and more as an intervention. In this manner, one broadens the scope of the educational encounter and makes the provider/teacher think more creatively about ways in which he/she can effect performance change in the learner and improve practice outcomes. Green's PRECEED model (Green et al. 1980), which incorporates elements that are characterized as predisposing, enabling and reinforcing, helps with this conceptualization of the intervention and is explored below. Several decades ago Miller (1967) described the classical learning experience as

Table 1. Educational objectives and their appropriate verbs.

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| <p><i>Information – participants have new knowledge</i></p> <p>Following this activity, participants should be able to identify three major risk factors for cardiovascular disease.</p> <p><i>Comprehension – participants understand</i></p> <p>Following this activity, participants should be able to differentiate between inherited risk factors and environmental risk factors for cardiovascular disease.</p> <p><i>Application – participants can apply new knowledge</i></p> <p>Following this activity, participants should be able to develop an appropriate prevention plan for patients at risk for cardiovascular disease.</p> <p><i>Analysis – participants can use judgement</i></p> <p>Following this activity, participants should be able to predict which patients are at risk for cardiovascular disease.</p> <p><i>Synthesis – participants can link pieces of information or evidence</i></p> <p>Following this activity, participants should be able to generalize evidence regarding risk factors for cardiovascular disease to their practice.</p> <p><i>Evaluation – participants can assess a situation</i></p> <p>Following this activity, participants should be able to evaluate their practice next to evidence-based guidelines for the management of cardiovascular disease.</p> <p><i>Skills – participants can perform a new skill</i></p> <p>Following this activity, participants should be able to demonstrate an ability to perform a simple laceration repair.</p> <p><i>Attitude – participants change belief</i></p> <p>Following this activity, participants should be able to model appropriate counseling for tobacco cessation.</p> |
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‘rows of lecture desks, laden with pitchers of water’, a speaker at the front, communicating in a one-way manner. Though research regarding formal CPD methods has moved us ahead somewhat, there are still many gaps in the practice of effective CME (Davis et al. 1999). Effectiveness is improved by increasing interactivity and relevance using appropriate lecture delivery methods and case-based material.

Increasing interactivity and relevance

- *Introductory questions* – Ask participants to write down a case, or three questions they have, before the presentation.
- *Quizzes* – Provide a multiple choice or similar quiz to be completed before, after or during a lecture.
- *Small paper case* – with prompts for diagnosis or management; or leaving blank spaces for the participant to fill in.
- *Q & A* – a large block of lecture time can be effectively broken up into sequential ten-minute periods of lecture and questions and answers (de Buda & Woolf 1990).
- *Audience response systems* – a computerized vote-counting device that polls the audience for response to projected MCQs, and allows the speaker to have an instantaneous read on the uptake of his or her presentation (Miller et al. 2003). A lower-tech option is one in which participants are given colour-coded cards and asked to hold one up to correspond to a particular answer. This method, while not affording the anonymity of the computerized system, is often deemed just as effective by presenters and as enjoyable by participants.
- *Buzz groups* – described by the noise they make in a normally quiet audience, such methods allow participants to engage neighbouring audience members in

conversation – about a case presentation, possible diagnoses, personal experiences, etc.

- *Pyramiding* – here one builds from pairs of participants, to slightly larger groups of 4 or 6, finally involving the entire audience in a case discussion or similar exercise.
- *Think-pair-share* – here the idea builds on practice reflection (a quiet moment for participants to think of a particular case, for example), to share it with a neighbouring audience member, then to share it with the larger audience.
- *Clinical scenarios and vignettes*

Patient scenarios or vignettes reflect actual clinical cases, frequently modified to protect patient privacy and to exemplify details of history, diagnosis or management; they promote reflection and interaction, increasing the relevance of the presentation.

- *Standardized patients*

Much has been written from the perspectives of using standardized patients in teaching undergraduates and residents, assessing competence, among others. These are relatively less common in the CPD setting, but may be useful when used in the appropriate context (Craig 1991; Kantowitz 1991; Davis et al. 1997).

- *The written case*

The written case is described here because of the relative ease with which they may be used in the CPD setting. These are relatively simple to construct, may be given out during or before a lecture/presentation to stimulate discussion and problem-solving, or may be used as a part of a slide presentation.

- *Enabling change; reinforcing learning*

It is a truism in CPD that knowledge is a necessary but not sufficient condition for performance change to occur. This brief section described some methods which may enable change in the practice setting. They derive from a rich literature on reminders, protocols, flow sheets and algorithms for care, more often found in the health services research literature than that related to CPD (Davis et al. 2003; Cochrane Review 2004; Jamtvedt et al. 2004).

Self-directed learning

This section will address physician self-directed learning which includes internet-based (on-line), computer-based (such as CD ROM or DVD), and print materials. There are many advantages to self-directed learning including the fact that it can be self-paced, performed when the learner's schedule allows. Additionally, it can be cost-effective since the learner need not leave practice or travel to more formal CME activities.

Web-based and other electronic CME. Live lectures, conferences and printed materials have been the primary vehicle for CME for the past hundred years. Electronic media have joined the fray, hesitantly at first in the 1960s and with growing impact for the past ten years. Cassette tapes containing topical reviews and tele-lectures via radio were first introduced as early as in the 1960s (Meyer et al. 1968; Harless et al. 1969).

While the role of computers was first considered at about the same time, it didn't really become practical until the advent of widely affordable microcomputers (Brandt 1974; McEnery et al. 1996). The web, as a means to provide CME, was first introduced by radiologists as an efficient means to distribute images in the mid 1990s (Fordis et al. 2006). Nevertheless, the role of the new media in CME has remained somewhat controversial. Early implementers had exalted its merits while traditionalists had difficulty seeing possible benefits. For a variety of reasons, evaluative research took some time to evolve.

Even today, some believe these self-directed, informal methods of learning are not as effective and should not be valued as traditional CME. However, recent studies have shown increases in physician knowledge and knowledge retention demonstrated following participation in on-line CME courses (Casebeer et al. 2002). In fact, if appropriately designed, some may be superior to live activities in effecting physician behaviour changes.

More formal distance learning in CME often consists of 're-purposed' live, formal activities. Transmitting a live activity via satellite or the internet can expand the reach to a remote audience. Recording a lecture and adding the handout materials in a package via CD-ROM or newer MP3 technology is the simplest form of repurposing live activities to allow self-directed learning. But as more is known about these technologies, it has become apparent that to be effective, just like live education, these activities must be interactive in order to engage the learner and improve impact. Interactive cases stimulate the learning to use critical thinking and problem-solving. Virtual patients create a clinical problem, patient presentation, options for diagnosis and treatment that

allow the learner to experience practice in a simulated environment. The world-wide-web allows links from educational materials to virtually unlimited resources. Case vignettes allow for presentation of a case and multiple choice options for the learner. Answer choices should provide rationale for the correct answer as well as those that are incorrect. Rather than simply repurposing content that was intended for a live audience, it is preferred that on-line education be designed appropriately for the medium. The content should:

- fit easily on a web 'page';
- be in short blocks;
- allow text to be limited and printed in easy-to-read read fonts;
- allow design to be appealing;
- create interactivity with the learner.

Talking heads or dense pages of text will not keep learners engaged. Developing for smaller formats such as hand-held devices requires even more sensitivity to sizing and length of content. Regardless of content, these technology-based activities allow for new approaches to CME. For example, on-line communities of learners can be formed to allow for follow up reminders, reporting of practice changes, as well as networking and consulting among peers. These groups can assist in evaluating the effectiveness of the education as well as determine needs for new activities. The adoption of adult learning principles, reflective practice and problem-based approaches has been shown to enhance physician learning and facilitate change in clinical behaviour (Zimitat 2001). There is only weak evidence that electronic CME is superior to traditional CME (Ruderich et al. 2004). Trials that showed the equivalence of traditional and electronic CME employed an 'efficacy' model: the two modalities were compared under optimal conditions, ensuring maximal compliance. A realistic 'effectiveness' trial would be considerably harder to accomplish. The big difference lies in the geographic and temporal accessibility of the two modalities. While the geographic effect may be minor for physicians practicing in large metropolitan areas, it becomes a major issue for the majority of physicians who reside and work at a distance from such centers.

Neither can the importance of accessibility be ignored. It is generally accepted that learners are more motivated to learn and retain the lesson better when they actually need that specific content. Web-based CME, at least in the industrialized world, is essentially available anytime, anywhere. However, to prove this point through an appropriately designed study does not appear feasible.

The spectrum of available CME offerings on the Web extends from electronic versions of traditional textbooks, whole integrated medical libraries with sophisticated search engines, such as MD Consult[®], databases, such as MEDLINE or OMIM, CME portals, such as Medscape[®], through case simulations such as MDchoice[®] or CAMPUS to such ambitious projects as 'The French language virtual medical university' or 'The RAFT network: 5 years of distance continuing medical education and tele-consultations over the Internet in French-speaking Africa' (Issenberg et al. 2001; Morin et al. 2004; Geissbuhler et al. 2007).

Many medical and specialty societies now provide their members with free access to a large palette of educational Web resources. Although the internet is now the most popular electronic venue for CME, there remains a niche market for sophisticated computer based virtual reality simulators with highly specialised interfaces for training complex sensory-motor skills such as 'HarveyTM' for ACLS or endoscopy trainers (Cosman et al. 2002). Such equipment tends to be utilised in specialised training centers.

While the acquisition and integration of knowledge remain a central function of CME, traditional CME events also serve a need for informal communications among colleagues and social bonding. Current Web-based CME offerings provide relatively little opportunity for such professional, social networking. This is where the profession can learn from our children and grandchildren. They have broadly adopted Web-based social networking. Web sites such as FacebookTM, YouTubeTM and MySpaceTM are popular among teenagers to form virtual communities on the Web. Wikipedia provides a platform for shared knowledge elaboration. Blogs allow essentially free publication and broadcasting of opinions. Groups can discuss complex issues on moderated and unmoderated Web-based computer fora. To date, such networking tools have found only limited application in CME. However it is easy to see how these tools could provide added dimensions to Web-based CME particularly for relatively isolated practitioners.

Before such networking tools can be widely used in a professional context, issues such as privacy, confidentiality, entitlement and potential misuse of information have to be systematically resolved. But CME is not unique in this respect, and many other professional organizations have successfully addressed these problems. The technological means exist to routinely manage user authentication, encryption and identity cloaking.

Web-based CME applications tend to be driven by marketing forces and technological feasibility rather than need. CME consumers, on the other hand, tend to be slow in discovering innovative solutions to their learning needs. There may be a potentially important function for an intermediate tier of educational brokers or managers. This seems an ideal, extended role for medical librarians, who no longer have to catalogue and stack books, fill out filing cards, dust shelves and do literature searches.

More effort should be placed on making CME Web portals more user-friendly. Some sites do include tutorials on how to use the portal. Consulting librarians could help the novice to find appropriate resources; learning needs and style assessment tools could be incorporated in CME sites and usage profiles could be stored for a variety of (legitimate) purposes. Such Web sites could then also incorporate a discussion forum, a Wikipedia, Blogs and possibly a dedicated social networking server. The profiles could help to provide assistance to the novice and to move experts directly to their usual activity pages by default.

Just imagine a forum platform where practitioners could present their appropriately anonymised problem cases including history, signs, symptoms and investigations and invite

comments and assistance from colleagues, be they a small confidential group or a larger assembly.

Obvious question are: who should do this, who will pay it and who should control it? Today, server hosting has become amazingly inexpensive. General purpose software for discussion fora, Wikipedias, Blogs and content management systems etc. are available largely for free as open source software. The cost lies mainly in the manpower required to administrate, to generate and manage content and access rights. Ideally, the pharmaceutical industry will be kept largely out of administration and content, although a judicious use of advertising for revenue might be considered. It seems like a perfect task for medical and specialty societies as service to their members directly and to society indirectly. Many societies are actually providing some of these services. There still is a fair degree of competition. Some society portals are more user-friendly than others. There is room for a greater degree of cooperation and mutual recognition of membership to optimize economies of scale in a field where resources will always remain scarce.

Support for CME faculty is available in web-formats as well. Shareable medical education content and multimedia teaching resources are available at sites such as the American Association of Medical Education's MedEd Portal, the Society for Teachers in Family Medicine's Digital Resources Library, Health Education Assets Library (HEAL), and IVIMEDS. Because technical standards are essential to the sharing of such resources worldwide, an international consortium of technology and medical education experts called MedBiquitous, has been formed. MedBiquitous working groups have been established to develop the necessary technology to standardize web-based medical education (see Resource List for more information).

Print formats. While the use of Web-based CME is on the rise, certainly reading is still a staple of physicians' efforts to stay current. One of the major questions in CME is this – what effect do print materials have on physician learning and change? Do they change performance? Do they 'work'? The answer of course is, 'it depends'.

From the perspective of the evidence-based guideline implementer wondering whether his or her society's clinical practice guideline has had an impact on practice, the outcome of the question is rather disappointing. Few full guidelines have an impact on practice. The reasons for this are fairly obvious: guidelines are often densely-written monographs with few aids to speed their adoption. Further, they are often confused by a plethora of guidelines which occasionally produce differing advice and directions about clinical care.

On the other hand, we have different results and evidence from two sources. Firstly, we know anecdotally that physicians read medical journals, text and other printed resources, often around a clinical case or problem and frequently with positive results. This can be simple – looking up a drug dosage for example, or more complex – refreshing one's memory by reading a standard text on commencing insulin therapy by injection, for example. Secondly, we do know from several trials that short, to-the-point printed messages can be relatively effective in changing physician practice. Further, given the low

cost of such post-card reminders, these can also be cost-effective.

Portfolio-based learning. Portfolio-based learning has become more popular in some countries and specialty societies. What do we mean by this phrase? The concept flows from the concept of the artist's or photographers' collection of his or her work, called a portfolio. Much more complex than a simple accumulation of exemplary work, the portfolio is intended to document educational activities undertaken by the clinician, plus such items as quality documentation (chart reviews/case presentations demonstrated, or achievement of performance milestones), other achievements, identified learning gaps, examples of learning plans, objectives and resources used to meet them, and other data related to the practice, education and quality of care given by the clinician in question (Rees 2005).

There are many uses for these portfolios, deriving from their richness and their superiority over simple measures documenting CME participation. They can be used for self-reflection, self-assessment and learning. Here the clinician can mark his/her progress from year to year, look at and monitor the achievement of learning objectives, and track other data and educational activities. They may be used in an educational manner – providing material for conversation with a peer or other mentor, and allowing for discussion about learning or educational plans. They may be used in a regulatory sense, applied to questions of re-licensure, re-certification and other needs.

Evaluation

Outcomes-based evaluation

CME/CPD developers should strive to evaluate activities at the highest level possible not only for satisfaction, but effectiveness and resulting outcomes in practice. Recently, a six-level model has been adopted for outcomes-based CME evaluation (Moore 2003) (see Box 1 and 2).

- Levels 1 and 2 are easily measured with registration data and participant survey results. The so-called 'happiness index' survey can evaluate participant satisfaction with the activity format, content and faculty.
- Level 3 can be assessed by pre-and post-tests that measure change in knowledge attitudes or skills before and after the activity.

Box 1. Six-level model for outcomes-based CME evaluation.

| Level | Outcome | Definition |
|-------|-------------------|--|
| 1 | Participation | Attendance |
| 2 | Satisfaction | Participant satisfaction |
| 3 | Learning | Changes in knowledge, skills or attitude |
| 4 | Performance | Changes in practice performance |
| 5 | Patient health | Changes in patient health status |
| 6 | Population health | Changes in population health status |

- Change in performance, or Level 4 can be measured by self-reported perceptions of participants or more accurately by chart review or other performance measures that can be extracted from practice data.
- Level 5 requires access to patient data.
- Level 6 requires epidemiology data.

Most CME activities are evaluated at Levels 1–3. Evaluating at higher levels requires expertise and resources that are beyond most immediate CME providers. Additionally, changes in patient and population health status often require other interventions outside the physician's control and may not be resolved with physician education. Health systems, societal issues and individual patient adherence are key factors in higher level outcomes.

CME Accreditation

Earning credit for participating in CME has historically served as documentation that the physician is engaged in life-long learning, keeping up with changes in medicine and keeping his/her skills current. Accreditation refers to the process for assigning credit to a particular CME activity. Generally, organizations are accredited to provide CME activities.

The European Union of Medical Specialists (UEMS) established the European Accreditation Council for Continuing Medical Education (EACCME) in 1999, and it began operation in January 2000 (Union of European Medical Specialties 2007). It connects existing and emerging national programmes on CME accreditation and acts as a clearinghouse for certification of CME credits in Europe. It does not provide accreditation of the CME activities directly. As such, it does not supersede the national authority on accreditation of CME. The EACCME reviews, approves and catalogues CME activities meeting the agreed quality criteria and approval by the appropriate authorities, including those at a professional level and the national CME authority of the country where the activity takes place. This system of accreditation and its designation of number of CME credits are recognized by all the national authorities of the countries of the European Union. Individual physicians are awarded the designated number of European credits. The EACCME has set its priorities on discipline-specific, centrally developed learning objectives and curricula rather than individual learner-driven activities. Other European organizations working with the EACCME include the European Boards and many other European professional institutions, such as the Federation of European Cancer Societies and the European Federation of Neurological Sciences and the RCGP UK.

While quality assurance for individual CME activities is the responsibility of the National Authority in each country, there are criteria for international accreditation for CME. Since 2000, at least for specialists, the EACCME and the American Medical Association have recognized each other's CME credit.

Credits for CME

The US and Canada have had systems to deliver credit for CME activities for over 50 years with many jurisdictions requiring

Box 2. Examples of outcomes evaluation data matched to educational objectives.

| Level | Outcome | Definition | Example | Educational objective |
|-------|-------------------|--|---|--|
| 1 | Participation | Attendance | Attendance records. Demographics of attendees. | |
| 2 | Satisfaction | Participant satisfaction | Satisfaction surveys at the end of the activity | |
| 3 | Learning | Changes in knowledge, skills or attitude | Pre/post-tests | Information Comprehension |
| 4 | Performance | Changes in practice performance | Responses to cases, simulations or audit of actual practice | Application Synthesis Skills Attitude |
| 5 | Patient health | Changes in patient health status | Chart reviews of patient outcomes | Analysis Synthesis Evaluation |
| 6 | Population health | Changes in population health status | Epidemiology reports | Analysis Synthesis Evaluation |

documentation of CME credit to maintain a license to practice medicine. Outside the US and Canada, CME credit is variable with many European countries having a CME credit requirement, but often without enforcement. In some cases CME credit leads to career advancement and salary differentials. There is a movement in Europe to have credit equivalency and reciprocity across borders. Most CME credit outside the US is based on time, e.g. 60 minutes equals one credit, but some are experimenting with added value for skill-based training. In the US, traditional CME is still based on one credit per 60 minute activity, but non-traditional formats such as performance improvement and point of care activities have moved away from time as a metric for credit. Specific criteria apply for assigning credit for these CME formats.

Across the developed world, mandatory CME credit has been controversial: some physicians do the minimum necessary to maintain credentials; participating in CME that is not relevant to practice; or hurrying to complete any activity in order to meet requirements before a deadline. The rationale for credit is a means to measure life-long learning. The traditional credit hour has served as a proxy for participation, but falls short in demonstrating actual effectiveness of the activity. With the movement toward more self-directed, practice-based learning, critics have argued that measuring time is not appropriate for credit and that there should be a relative value system that provides higher value credit for those activities that demonstrate improved practice.

Practice-based CME

While CME was traditionally often absent from everyday practice, there are many newer methods for ensuring learning now occurs more frequently in practice. In fact, learning at the point of care that is relevant to the learner's personal practice may be the most effective. In the US, CME credit may be

designated for learning that occurs at the point of care and impacts patient care directly. This section will describe how systems for reminders, clinical performance feedback and clinical decision support can be used in practice to improve knowledge and performance.

Reminders and performance feedback systems

Problems exist in transferring new knowledge and skill from the CME setting to the hospital, clinic or office and in having the right information at the right time. Faced with gaps in practice and the realisation that knowledge management is difficult for each individual, what can we do? One approach is to ensure that physicians receive information related to specific clinical problems as they need it. Reminder and feedback systems offer this possibility.

Reminders may be defined as 'any intervention, manual or computerized, that prompts the health care provider to perform a clinical action'. Reminder systems provide practitioners with specific clinical information matched to specific criteria about a patient at the time of a patient visit. Such systems provide one-way communication from an expert source to an individual physician or a team at the point and time of care, in the form of a recommendation regarding the need for a specific test, exam, or procedure.

Oxman and colleagues define a feedback system as 'any summary of clinical performance of health care over a specified period, with or without recommendations for clinical action. This information may have been obtained from medical records, computerized databases, patients, or by observation' (Oxman et al. 1995). In contrast to reminders, feedback systems provide a clinician with information about his or her own past performance in specific clinical areas, generally compared to other individuals, groups, practices, or standards.

Reminder systems

Reminders appear in a variety of forms and may be directed to health care professionals or to patients. These reminders are categorized by their method of transmission: print; team-member; computerized public; and patient reminders.

Reminders in print. Printed prompts clipped to a chart or patient record are simple forms of reminders. These might include a note about a standard of care, suggestions about follow-up for an abnormal laboratory test, or a screening or health promotion reminder such as alerting the physician to give the patient a flu shot. Wilson and colleagues, in their study of smoking cessation, used three prompts placed by receptionists on charts to encourage physicians to ask about smoking and to provide counseling about quitting.

Reminders delivered by team members. Messages delivered by nurses, social workers, therapists, staff, or other team members offer a second medium. They may remind the physician (or others on the team) about a test or make recommendations for an intervention or a follow-up procedure. Rhew et al. (1999) showed that nurse-initiated vaccine protocols raised rates substantially more than physician or patient reminder systems in preventing certain types of pneumonia.

Reminders delivered by electronic or computerized means. A third form of reminder makes use of electronic data and computer-based systems about patients and processes.

Performance improvement feedback systems

A feedback system represents communication about physicians' actual practices in managing patients, other practitioners' performance, and/or a set of standards for optimal care. Such systems help a physician compare his or her practice to that of others and/or to an outside standard. Specific criteria are used to review the performance data of a particular physician or group of physicians and are then compared to national or local standards, institutional mandates, or practices of other physicians in a group.

In adult education terms, optimal learning uses feedback, frequently and with emphasis. Without specific, direct information about a work pattern, an individual can only surmise whether he or she is 'in compliance' with best practices. Although any physician may have good reasons for noncompliance with established patterns for some or all of their patients, feedback systems provide a way to help physicians view their work in very specific, concrete ways. It is essential that physicians agree – ahead of time – that the comparative standards are practical, useful, and demonstrate good medicine is essential. Feedback works best when there are agreed upon standards that fit the patient panel for the individual or group involved.

Feedback to a clinician may summarize his or her performance data over a period as short as a week or less or over much longer periods. Once summarized, these data may be provided to the physician, a week, month, or several

months later. Although study effects vary, most believe that the more immediate the feedback, the better. Three major sources, individually or in combination, provide the basis for establishing a feedback system.

First, uninterrupted data is generated from clinical records (manual or electronic), using such sources as chart audit, prescribing summaries, records of laboratory tests, utilization, and other information sources.

Secondly, using survey methods, individuals or groups of patients may provide feedback to a physician, team members, or clinic about communication, interpersonal skills, or perceptions of quality of care. Hospital satisfaction questionnaires are a common example. Thirdly, group discussion by peers, consultants, or team members may be directed to changing practices by agreement within a group. Such a process, reported by Fidler et al. (1999) in Alberta, Canada, generates change and learning on the part of most physicians.

Clinical decision support systems

There are many studies of computerized support systems useful in diagnosis, case management, and treatment – each providing reminders in the form of electronically mediated algorithms, protocols, or flow charts. Johnson and colleagues reviewed controlled trials of systems, finding positive effects on physician performance in the following areas: three of four studies in computer-assisted dosing, one of five studies of computer-aided diagnosis, four of six in preventive care, and seven of nine studies of computer-aided quality assurance for medical care. These data are suggestive of a powerful effect for this more complex reminder system in disease management, in most of these areas. Even more elaborate 'expert systems' have also been described, e.g., in pediatrics. Johnson & Feldman (1995) describe the usefulness, both real and potential, of Meditel, Iliad, Quick Medical Reference, and Dxplain™.

For the individual clinician, evidence-based medicine databases have been developed to systematically review literature and make practice recommendations based on best evidence. These resources eliminate the need for busy clinicians to do the critical appraisal of the literature to glean best practices. Such resources are valuable for quick reference at the point of care or for more in depth study (see resource list for examples).

Additionally, user-friendly resources for use at the point of care have been developed to assist physicians in just-in-time learning and clinical decision support. Products such as UpToDate™, ePocrates™, InfoRetriever™, and others provide web-based or hand-held- based databases that are easily searched. Some also include various clinical calculators and other tools for quick reference.

The organization, administration and professionalism of CME

Those who provide CME to practicing physicians have a large and important responsibility. They are charged with ensuring

that physicians maintain their skills and competence in order to deliver the best possible care to their patients. With that responsibility comes the duty to ensure their own competence, accountability and resources to deliver the highest quality CME. The CME organization should have available educational and clinical resources. Staff skills and competencies should include:

- needs assessment – effectively appraise educational needs of physician learners and the healthcare organization through individual, and environmental assessments;
- educational design – develop learning objectives and educational formats based on needs assessment;
- programme evaluation – evaluate each activity and overall CME programme based on goals and objectives;
- performance improvement – use physician performance data as needs assessment and educational outcomes measures;
- accounting/budget management – ensure CME enterprise is fiscally sound;
- marketing/promotion – develop marketing and promotional strategies to optimise participation;
- communication with peers and faculty – effectively communicate with all stakeholders to ensure a high quality programme;
- regulation compliance – ensure all activities are in compliance with CME regulation and requirements;
- staff development – provide on-going professional development to ensure competency and skills of staff;
- professionalism – maintain a high standard of professionalism and ethics.

A framework for effective CME

A fitting model for the development of effective CME was described by Harden & Laidlaw (1992) using the acronym CRISIS: Convenience, making participation easy.

Relevance to the user

Individualization allowing learner-centered programs; self-assessment, allowing learners to assess their own educational needs; independent learning, allowing for learners to be independent and self-directed; systematic approach, offering a planned program to ensure comprehensiveness. This CRISIS model provides a guide for development of CME that is efficient, relevant and effective.

Future needs and trends in CME and performance improvement

In response to the forces outlined at the beginning of this chapter, and the product of the methods and issues considered throughout, the construct of CME is changing. This change is manifested in several areas.

- First, our understanding of CME has shifted – from a traditional understanding of CME as an information transfer vehicle to a more complete picture of the learning process

and the complex health care world in which this occurs. This has generated a new focus on quality improvement and using performance improvement principles with emphasis on health care outcomes.

- Second, the advent of new information technology methods serves to offer new methods in CME and to facilitate the growth of virtual and real networks or communities of practice. These communities of learners can participate in small group learning activities, share best practices and support one another
- Third, there are new public health and medical issues at play, world-wide. CME professionals must prepare for a new role in rapid response to public health threats. The recent international SARS and bio-terrorism threats speak to the need for more rapid response technology and planning processes. On-line and other technologies that allow for a rapid ‘push’ of information and practice recommendations are needed.
- Fourth and finally, CME has emerged as a distinct interdisciplinary field of study. Recent trends in CME research include increased emphasis on broader needs assessment, using both subjective and objective needs; understanding of the adult learner in the context of practice; design methodologies using more combined qualitative and quantitative techniques; and a focus on learning beyond that in the context of the traditional educational model with a practice-based approach, e.g., the effectiveness of the implementation of practice-based strategies.

CME began as professional growth and development that allowed physicians to stay up to date and competent as the art and the science of medicine evolved. CME credit was implemented to reward physicians who participated and demonstrate to others that they were life-long learners. As CME credit has become mandatory and ‘hours’ have become the surrogate for competence, we have lost sight of the original purpose. In an effort to meet credit requirements, physicians have participated in irrelevant CME. The movement toward performance improvement will re-focus physicians to what is relevant to their practice needs, their weaknesses and what truly makes a difference in patient care.

Notes on contributors

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Dr. DAVID DAVIS, a family physician, is widely recognized for his leadership in developing and testing innovations in physician education. While serving as Chair of Continuing Education at McMaster University he effectively applied problem-based learning principles to CME and developed a systematic, outcomes-based focus on CME. His research in the area of CME effectiveness is amongst the most cited in medical education literature. He has served as president of both the Alliance for CME and the Society for Academic CME and served as a Petersdorf Scholar-in-Residence at the Association of American Medical Colleges prior to joining the staff there. (Dr. Nancy Davis and Dr. David Davis are not related.)

Dr. BLOCH has had a distinguished career in clinical practice and medical education and provided the European perspective for this Guide. He is a graduate of the McMaster Medical School. Recently retired from his position as director of the Institute for Medical Education at the University of Bern in Switzerland, he has returned to his alma mater to teach part time.

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CME glossary of terms

Accreditation

A process for delivering continuing medical education for CME credit. Providers of CME may be accredited or individual activities may be accredited depending on the credit system. There is an effort to provide reciprocity between CME credit systems internationally.

Continuing medical education (CME)

Continuing medical education consists of educational activities which serve to maintain, develop, or increase the knowledge, skills, and professional performance and relationships that a physician uses to provide services for patients, the public, or the profession. The content of CME is that body of knowledge and skills generally recognized and accepted by the profession as within the basic medical sciences, the discipline of clinical medicine, and the provision of health care to the public.

A broad definition of CME, such as the one found above, recognizes that all continuing educational activities which assist physicians in carrying out their professional responsibilities more effectively and efficiently are CME. A course in management would be appropriate CME for physicians responsible for managing a health care facility; a course in educational methodology would be appropriate CME for physicians teaching in a medical school; a course in practice management would be appropriate CME for practitioners interested in providing better service to patients.

Not all continuing educational activities which physicians may engage in however are CME. Physicians may participate in worthwhile continuing educational activities which are not related directly to their professional work; these activities are not CME. Continuing educational activities which respond to a physician's non-professional educational need or interest, such as personal financial planning, appreciation of literature or music, or parent effectiveness, are not CME.

Commercial support

External funding provided usually by pharmaceutical or medical device companies in the form of education grants.

Clinical decision support tools

Electronic tools used at the point of care to answer clinical questions and assist in clinical decision making.

CME provider

Organizer of CME activity and provides/requests credit for the activity. Pharmaceutical companies are debatable providers of

accredited CME activities and countries vary in their relationships with such providers.

CME credit

The 'currency' assigned to CME activities. Requirements for the designation of credit are determined by the organization responsible for the credit system. In the European CME Credit (ECMEC) system, and many other International systems, one hour equals one credit.

Disclosure

Formal declaration of financial interests by CME faculty or provider.

Enduring materials

Printed, recorded or computer assisted instructional materials which may be used over time at various locations and which in themselves constitute a planned CME activity. Examples of such materials for independent physician learning include: programmed texts, audio-tapes, videotapes and computer-assisted instructional materials which are used alone or in combination with written materials.

Learning objectives

Statements that clearly describe what the learner will be able know or do after participating in the CME activity. The statements should result from the needs assessment data.

Evaluation

Measurement of the value of the CME activity. Maybe based on participants' satisfaction, economic success, attendance numbers, or success in meeting other pre-determined goals.

Needs assessment

A process of identifying and analysing data that reflect the need for a particular CME activity. The data could result from a survey of the potential learners, evaluations from previous CME activities, needed health outcomes, identified new skills, etc. Needs assessment data provide the basis for developing learner objectives for the CME activity.

Outcomes data

Measurement of the results of a CME activity. May include new knowledge by the learner, changes in practice or changes in patient outcomes.

Performance measures

Clinical actions based on evidence-based clinical guidelines. Performance measures are used to as a baseline as well as an indicator of practice improvement following intervention(s).

Practice-based learning

Learning that takes place at the point of care as opposed to a remote location. Practice-based learning tends to be more relevant and timely leading to more immediate improved patient care.

Self directed learning

Individual learner's initiative and responsibility to (with or without assistance) identify, assess, and set priorities for learning needs; define goals; select and organize learning activities; and evaluate outcomes in terms of performance.

CME resources

Accreditation

European Accreditation Council for Continuing Medical Education

www.uems.net

Accreditation Council of Continuing Medical Education (USA)

www.accme.org

Royal College of General Practitioners (UK)

www.rcgp.org.uk

Associations

Alliance for Continuing Medical Education

www.acme-assn.org

Association for Medical Education in Europe

www.amee.org

Association of American Medical Colleges

www.aamc.org

European Academy of Teachers in General Practice

www.euract.org

European Union of Medical Specialists

www.uems.net

Global Alliance for Medical Education

www.game-cme.org

Society for Academic CME

www.sacme.org

Society for Teachers of Family Medicine

www.stfm.org

World Organization of National Colleges, Academies, and Academic Associations of General Practitioners/Family Physicians (WONCA)

www.woncaeurope.org

Books

Continuing Medical Education: A Primer, 2nd Edition, A.B. Rosof, and W.C., Felch (eds), 1992 Praeger Publishers, New York.

The Continuing Professional Development of Physicians: From Research to Practice. D Davis, BE Barnes, R Fox (Eds). 2003. AMA Press.

Publications

Academic Medicine (journal of Association of American Medical Colleges)

www.academicmedicine.org

British Medical Journal

www.bmj.com

Journal of Continuing Education in the Health Professions

www.jcehp.com

Medical Education (journal of ASME)

www.mededuc.com

Medical Teacher (journal of AMEE)

www.informahealthcare.com

Evidence-based medicine

The Cochrane Library

www.thecochranelibrary.com

Bandolier

www.jr2.ox.ac.uk/bandolier

Guidelines International Network

www.g-i-n.net

National Guidelines Clearinghouse (USA)

www.guideline.gov

United States Preventative Services Task Force

www.ahrq.gov/clinic/uspstfix.htm

Clinical decision support for point of care learning

DXplain

www.DXplain.org

Dynamed

www.ebscohost.com/dynamed

ePocarates

www.pdamd.com

Quick Medical Reference

www.openclinical.org

Infotriever

www.info poems.com

MDCConsult

www.mdconsult.com

PEPID

www.pepid.com

VisualDx

www.logicalimages.com/prodVDx

Educational resources

MedEdPortal

www.aamc.org/mededportal

Health Information Assets Library (HEAL)

www.healcentral.org/index.jsp

Family Medicine Digital Resources Library

<http://www.fmdrl.org>

www.cemedicus.com

Medscape

www.medscape.com

UpToDate

www.uptodate.com

On-line CME

CE Medicus

CME technical standards

MedBiquitous

www.medbiq.org