Brief Review ■

Virtual Congresses

Silvia Lecueder, MD, Dante E. Manyari, MD

Abstract A new form of scientific medical meeting has emerged in the last few years—the virtual congress. This article describes the general role of computer technologies and the Internet in the development of this new means of scientific communication, by reviewing the history of "cyber sessions" in medical education and the rationale, methods, and initial results of the First Virtual Congress of Cardiology. Instructions on how to participate in this virtual congress, either actively or as an observer, are included. Current advantages and disadvantages of virtual congresses, their impact on the scientific community at large, and future developments and possibilities in this area are discussed.

■ **JAMIA.** 2000;7:21–27.

"So we are not going to travel anymore?" said a colleague when we invited him to the First Virtual Congress of Cardiology (FVCC). "Will this congress take place at my home?" he asked. "I will not have the opportunity to get to know faraway cities, as I did at last year's World Congress in Rio de Janeiro? No more working breakfasts at fancy hotels, no more cocktail parties?"

There was, in his voice, a wistfulness for the things he believed he was losing—colleagues with whom to share a drink while talking about topics of common interest, the hope of eventually meeting the professor whose work he admires, the possibility of knowing how people live and how medicine is practiced in big cities of the world.

Yet there was also relief on his face. No more excessive expenses, no more travel inconveniences, no more rushing because the conference he wants to attend starts before he can finish presenting his work at a different location. A virtual congress will provide him with access to the best and most up-to-date information about everything relating to his specialty. And at the same time he can present his work to an audience larger than any conference hall could possibly hold—all this in the comfort of his home, without expense, and at the most convenient times. But does this alternative really exist? Will the new millennium bring us such dramatic changes in the way we get together? Should we give up the old ways and enjoy the new ones?

Objectives and Rationale

Rapid advances in basic sciences and clinical research make it essential for physicians to be constantly learning in order to provide optimal medical care for their patients. Researchers aiming to share new discoveries and clinicians seeking to learn the latest medical advances, to enhance their abilities in diagnosis and treatment, have traditionally used two means of communication—traditional scientific meetings and publications in peer-reviewed journals. Following rigorous evaluation by a qualified group of peers, the best submitted abstracts are selected for presentation at local, national, or international traditional scientific meetings, sponsored and organized by recognized scientific bodies. In the cardiovascular sciences, the largest and most prestigious scientific meetings, providing a balanced mix of basic and clinical sciences, are those organized by the American Heart Association (AHA), the American College of Cardiology (ACC), the European Society of Cardiology, and the World Congress of Cardiology.

Information presented as brief abstracts at scientific meetings is usually published in its entirety a short time later in scientific medical journals, after again having been critically reviewed by editors and expert peers. There are numerous excellent and prestigious

Affiliations of the authors: Universidad de la República, Montevideo, Uruguay (SL); University of Alberta, Edmonton, Alberta, Canada (DEM). Dr. Lecueder and Dr. Manyari are members of the Steering Committee of the First Virtual Congress of Cardiology.

Correspondence and reprints: Silvia Lecueder, MD, José Ellauri 768 ap. 301, 11300 Montevideo, Uruguay;
e-mail: ⟨lecueder@fmed.edu.uy⟩.

Received for publication: 8/2/99; accepted for publication: 9/16/99.

cardiology journals, but publication of research in cardiac sciences also takes place in prestigious general medical journals. In both forms of information dissemination, researchers present the latest results of their investigations to an interested, and critical, audience of peers. Clinicians—as well as the national, state, and provincial medical licensing bodies that oversee professional medical competence—have long recognized these as some of the best forms of continuing medical education (CME). The remainder of this article will focus on the new version of the traditional scientific meeting, the ''virtual'' scientific meeting.

In this age of the Internet, when it is possible to share information almost instantaneously, the concept of the virtual scientific meeting is expanding. Smaller meetings of selected and limited professional audiences, such as courses, conferences, and symposiums, have taken place with increasing frequency for more than ten years,[1] mainly for purposes of CME, without the presentation of original research. Medical conferences of this type are now so common worldwide that, at any given time, they may be counted by the thousands.

To illustrate how common this practice has become, we searched the Internet using the words ''virtual medical meetings.'' The last time we tried, we had 23,465 hits. These ''cyber sessions'' have evolved to include newer computer-based technologies with audio and visual aids. During 1999, some of these cyber sessions have started to offer CME credits, implying their recognition, by the medical community at large and by (some) medical licensing bodies, as effective educational tools. This fact is indeed relevant, because virtual congresses will not go far without the recognition of the academic medical community.

Previous Virtual Meetings

Another type of virtual meeting, the virtual scientific medical meeting, may become an instrument similar to the more traditional scientific medical meeting, which participants attended in person.

After searching the Internet for virtual scientific meetings and after gathering information from Web sites and from meeting organizers by e-mail, we concluded that the first virtual medical congress took place on the Internet in 1994.[2] Other virtual congresses[3–9] have taken place in the relatively short time since then. On the basis of worldwide participation and the number of individuals registered for each, we selected for discussion, five of these as the most important.

By the time this article is published, the FVCC will be in progress.[10] Audiences with numbers comparable with or greater than those of the largest international traditional cardiology meetings are expected. Three months before the FVCC starts, it already has more registrants than any previous virtual congress. We will briefly identify the main previous virtual congresses and then describe in more detail the FVCC.

- *INABIS*. The First Internet World Congress for Biomedical Sciences (INABIS) was held Dec 7–17, 1994. It was organized by Mie University School of Medicine, Tsu, Japan. The second (Dec 4–15, 1995), third (Dec 9–20, 1996), and fourth (Dec 8–19, 1997) INABIS congresses were also organized in Japan. For the fifth, INABIS '98, Japan passed the torch to Canada. This congress was held for ten days (Dec 7–16, 1998) on a Web server at McMaster University in Hamilton, Ontario, and brought together more than 1,800 participants from 51 countries. Spain is now organizing INABIS 2000, which will be held Feb 14–25, 2000.
- *The Virtual Congress of Pathology*. The First Hispano-American Virtual Congress of Pathology took place May 15–Jul 7, 1997. The same Spanish team also organized the second pathology congress, held Jun 1–Jul 31, 1998, which included 176 contributions from 11 countries. That team is now organizing the Third Hispano-American Virtual Congress of Pathology, which will be held Feb 1–Mar 21, 2000.
- *The Fourth Oncological Reunion*. Held Feb 13, 1998, at the Oncological Institute of San Sebastian, Spain, this meeting was fully accomplished by means of Internet relay chat (IRC) channels. The IRC technology allowed all presentations and discussions to be performed live, on line, simultaneously.

Table 1 ■

Number of Countries of Origin of Participants in Four Major Virtual Congresses

	No. of Countries
Pathology II	11
Neurology I	22
Biomedical Sciences V	51
Cardiology I	79

NOTES: Pathology II indicates the Second Hispano-American Virtual Congress of Pathology, Jun 1–Jul 31, 1998; Neurology I, the First Ibero-American Virtual Neurology Congress, Oct 15–Nov 30, 1998; Biomedical Sciences V, the Fifth Internet World Congress for Biomedical Sciences (INABIS '98), Dec 7–16, 1998; Cardiology I, the First Virtual Congress of Cardiology (FVCC), to be held Oct 1, 1999–Mar 31, 2000. Although the FVCC had not started at the time this article was written, more countries were already represented by its registrants, in June 1999, than by participants in the previous congresses.

- *The First Ibero-American Virtual Neurology Congress*. This virtual congress took place Oct 15–Nov 30, 1998, with the participation of 918 neurologists from 22 countries.

The Internet has torn down barriers in such a way that geographic references lose their meaning, and it is sometimes difficult to say where members of a virtual congress come from. Table 1 shows the number of countries represented by participants in the main virtual congresses and registrants for the FVCC.

First Virtual Congress of Cardiology

The seeds of the FVCC were planted by a couple of Argentine physicians who met each other ''virtually'' through their contributions to selected cardiology mailing lists.[11,12] By the end of 1998, they had accomplished the extraordinary task of recruiting more than 60 professionals worldwide to be directly involved in the organization and planning of the FVCC. This international group of professionals has managed to secure the active participation of an impressive list of scientists from around the world. The participation of these scientists as invited ''speakers'' (honors committee) has been confirmed, and many more have volunteered to be members of the steering, scientific, review, and prizes committees. A Web page, mailing lists, a newsletter, and IRC channels have been set up. The committees have been active since October 1998, and during the months preceding the meeting their members have met daily in a virtual way, that is, by using mailing lists.

The FVCC will start Oct 1, 1999, and will last until Mar 31, 2000. The program will include lectures, round tables, symposia, courses, and presentations of original ''papers.'' A registered audience will have the opportunity to discuss all presentations through questions and comments. Lectures will be displayed on Web pages, questions and answers will make use of mailing lists, and debates will be performed as IRC chat sessions.

Since the first invitations were sent via mailing lists and Web pages, registrations have continued to grow (Figure 1). At the end of June 1999, a total 3,433 professionals from 79 countries on the five continents had registered.

For every virtual congress, the largest number of registrations comes from the country where the host server is located and from countries that, by area or by language, are close to it. Therefore, in the first four INABIS congresses, Japanese professionals were in the majority, whereas in INABIS '98, Canadians were. In the Virtual Congress of Pathology, Spanish participants predominated, and Argentine registrants outnumber others for the FVCC. The distribution of FVCC registrants as of June 1999, by country, is shown in Table 2.

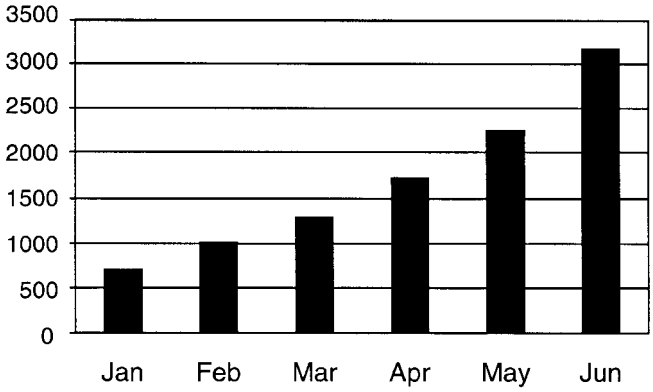

Figure 1 The number of registrations for the First Virtual Congress of Cardiology up to three months before its start.

Although the bulk of FVCC participants are from Latin American countries, North American and European interest is increasing, as we can tell by the number of visits to the FVCC Web site (Table 3).

As of June 1999, there are 45 active members from 16 countries on the steering committee; 66 members from 14 countries on the scientific committee; and 20 professionals from 9 countries on the honors committee. In addition, 54 national and international medical societies, 16 foundations and leagues, and 13 medical schools have added their names in support of this event.

The FVCC is an international event that is expected to be the prototype of more virtual congresses in the new century. As this manuscript is written, original abstracts—all dealing with the most recent advances in the cardiovascular sciences, under 16 subheadings —are being submitted for possible publication. The FVCC will be the first large virtual scientific meeting with a significant number of original presentations. Before the FVCC finishes in March 2000, it is expected that more than 6,000 professionals will have registered. If so, the FVCC will be one of the largest cardiology meetings, and its impact will be most significant.

How to Participate in the FVCC

We invite readers to participate in the FVCC. The opportunity to have first-hand experience of a virtual scientific meeting will last from Oct 1, 1999, to Mar 31, 2000.

Table 2 ■

FVCC Registrants by Countries of Origin, as of June 1999

	% of Total Registrants
Argentina	39
Spain	9
Brazil	7
Uruguay	7
Cuba	6
Peru	6
Mexico	4
United States	3
Colombia	3
Other countries	16
TOTAL	100

Table 3 ■

Countries and Organizations of Origin of Visitors to the FVCC Web Site, as of June 1999

	% of Total Visitors
Argentina	20
United States (commercial)	19
Network	9
United Kingdom	4
Spain	2
Uruguay	1
Nonprofit organization	1
Brazil	1
Cuba	1
Other	5
Unknown	37
TOTAL	100

To register, prospective participants may go to the congress Web page, at http://www.fac.com.ar/cvirtual, or directly to http://pcvc.sminter.com.ar./facforms/cvirtual/insceng.htm and fill in the registration form. It is also possible to register by e-mail at rlombard@satlink.com.

Registration is open to all medical and paramedical professionals and to advanced medical students with a special interest in cardiology. Engineers, analysts, and computer scientists may also be interested in the FVCC, particularly in the thematic unit entitled ''Informatics and Cardiology'' and in a mailing list to debate the problem of the year 2000 (Y2K) as it pertains to cardiology instruments. Medical professionals would certainly benefit from contributions made by computer professionals.

Participants may be as active as they wish. Some registrants may want simply to observe the process.

The deadline for sending abstracts to the FVCC was Jul 31, 1999. By that time, 515 abstracts were received, 404 (78 percent) of which were accepted. The scientific committee has finished this review process, but everyone is still encouraged to participate in debates using mailing lists and chat sessions and to ask questions on line during lectures that will be broadcast ''live'' on the Internet. All this information, including questions and answers, will stay on the Web pages as a permanent resource for cardiologists.

The process of gaining access to and participating in a virtual congress is common to all virtual scientific meetings that use the Internet. Participation in the FVCC, as in most virtual congresses, is free. Participants do not have to pay the fee that is usual for traditional congresses. In the future, this practice may change. Some CME cyber sessions on the Internet already charge a nominal fee, mainly to cover expenses related to the recognition of the event as a valid CME activity by administrative medical bodies (such as the American Medical Association).

The only technical requirement for FVCC participation is Internet access. Some cyber sessions, especially those performed on line, will require more sophisticated and up-to-date software than others, as well as powerful hardware. Recent versions of browsers and audio, video, and animation software will enable users to forget that they are in a virtual domain. They will feel like they are attending a lecture in the real domain.

People may also participate using just e-mail. They can contribute to debates via mailing lists and can even receive images and Web pages as attachment files. People in many countries do not have full access to the Internet, because of economic or political constraints, but they may communicate using e-mail services. This is the case in Cuba, where online Internet access is not allowed. Yet three months prior to the start of the FVCC, almost 300 medical and paramedical professionals from Cuba had already registered for the FVCC. They will participate by e-mail.

It is important to point out that, the more requirements a virtual congress has, the fewer the possibilities are for people from countries with limited Internet access to participate.

After a person has registered for the FVCC, he or she will receive instructions on how to access the various events. The scientific program is available on the FVCC Web page at http://www.fac.com.ar/cvirtual/index.htm. Each item of the program has a corresponding mailing list, which is ''moderated'' by a team of managers and coordinated by experts in that

area. Participants in the congress are advised to subscribe to all the mailing lists in which they are interested.

Lectures, symposia, round tables, and abstracts will be displayed on Web pages and discussed on the mailing lists. Since the congress lasts for several months, participants can always catch up on a particular lecture or debate, since messages will remain in their mailboxes, and material will remain on the Web pages, even after the FVCC is over.

Advantages of a Virtual Congress

Broader participation is possible in a virtual meeting than in a traditional meeting. Some traditional meetings have already achieved a saturation point, manifested by their inability to accommodate all those who want to hear particular presentations. Despite the excellent meeting facilities in large American cities, for instance, meeting rooms where important topics are being presented are routinely closed by fire marshals at the ACC and AHA scientific sessions once the number of persons in the room has reached the maximum allowed. This problem will not arise in a virtual congress, since access to the Internet is practically unlimited.

Another advantage of a virtual congress is its translation facilities. Translation into many languages is easier on the Internet than at traditional congresses. Although the FVCC is set up in English, Spanish, and Portuguese, immediate translation into every language is possible.

The cost of organizing and setting up traditional scientific meetings are estimated to be much greater than those for virtual meetings. Moreover, the costs of participating in a virtual meeting are significantly lower. Thus, it is not surprising that the efficiency and cost–benefit ratio for virtual biomedical conferences were found to be far better than those for traditional meetings.[13]

Participants' time can be better managed at a virtual congress. Virtual events can last from a few days to several months, facilitating the access of professionals and students who have limited time. Their participation is enhanced by better management of their time. Longer events allow delegates to decide when to participate; there will be more time to select various activities, without having to choose between concurrent presentations as at traditional meetings.

Presenters' time management is also improved with virtual meetings. Although traditional meetings allow some time for questions and discussions, it is usually limited. Moreover, the time allowed for the presentation of research is usually also limited and is sufficient only for presentation of the highlights, without details. These limitations do not exist in virtual scientific meetings. In a virtual congress, presentations may be more extensive and complete, permitting more thorough appreciation of the work being presented. In addition, more time for questions and discussions allows better communication, with benefits for both authors and audiences.

A virtual meeting also has advantages for professionals who live in isolated towns and distant villages. Having a computer and a modem enables them to participate in large scientific meetings for clinicians and researchers.

Virtual congresses have the potential to improve the North–South scientific exchange deficit. It has been pointed out that doctors working in the developing world need affordable access to medical information.[14] It has also been noted that scientists in these countries face unseen difficulties in placing their work—referred to as our "lost science"[15]—in the mainstream of scientific publications, mainly because of poor access. Virtual congresses are ideal for overcoming these problems for both clinicians and scientists in developing countries. Interestingly, efforts to achieve the same objectives are being made by *The Lancet* with its proposed use of the "electronic research archive" and "e-print server," which just became operational.[16]

Disadvantages of a Virtual Congress

Although it is incredibly easy to obtain information through the Internet, it is not easy, as pointed out by Wyatt,[17] "to discriminate between genuine insight and deliberate invention." Moreover, as an information resource the Internet completely lacks quality controls. The context deficit and privacy issues[18] are additional drawbacks. There is always the risk that the contents of a Web site or the advice in a mailing list may not be correct, even if the original sources were reliable.[19]

Although these problems hold true for information displayed for the public at large on the Internet, information obtained from a virtual scientific meeting should be as reliable as that obtained from traditional meetings, depending on the rules set up by the organizing body of the event. The FVCC, for instance, has steering and scientific committees overseeing the quality of the invited presenters, and abstracts are accepted only after rigorous peer review. It is clear that reliability will not be an issue with virtual scientific meetings, provided that the organizing institutions apply the usual scientific standards.

No university or college that we are aware of confers, at this time, academic merit for research presented at a virtual scientific meeting. As noted earlier, some medical organizations have started to recognize the educational value of certain cyber sessions and cyber lectures and symposia by conferring CME credits for participation in them. Academic institutions are expected eventually to confer similar recognition on authors and presenters at virtual scientific meetings, as the high standards of these meetings become established. It is imperative, therefore, that organizers of virtual meetings follow the same rigorous methods of publication as those used for traditional meetings and biomedical journals, in which strict peer review plays a key role. Presentations at virtual scientific meetings will not be an attractive alternative for authors until the issue of academic recognition is solved.

The impersonal nature of a virtual meeting may discourage some persons from participating. The lack of lively, dynamic debates and exchanges (except during chats and online sessions) is certainly a disadvantage. A traditional congress also provides opportunities for social gatherings and tourist activities. This is a benefit that can not be reproduced by virtual meetings.

Lack of computer facilities or access to the Internet is a particular problem in rural areas that do not have telephone lines or electricity and in developing countries where professionals often do not have personal computers. Paradoxically, as noted earlier, one advantage of virtual meetings is the participation of professionals in isolated towns and remote areas—the very people who are also likely to have problems with computer access to the Internet. Although this drawback could apply to medical meetings designed for general practitioners and specialists alike, we believe that it will not affect the FVCC, since cardiologists and cardiac surgeons do not usually practice in smaller towns and villages that lack electricity.

A final drawback of virtual meetings arises from the reluctance of some professionals to use computers. Some people still prefer to learn and teach only in the old, ''personal'' way. We believe that this is mostly a generation issue. But in addition, for cultural or personality reasons, some people feel a natural distrust of machines, and the very idea of words like ''hypertext'' and ''multimedia'' makes them feel uneasy and perhaps insecure. It is hard to explain to beginners, without resorting to jargon, the use of the Internet for a scientific meeting. This is why the FVCC has set aside in advance a brief online tutorial, to train those who have registered in the use of the main tools of the virtual congress, such as Web pages, chat sessions, and mailing lists.

Discussion

Coming back to our bemused colleague and the question posed in the introduction—Will the new millennium bring us such dramatic changes in the way we get together?—the answer is yes. Should we give up the old ''presence'' congresses? The answer is no. Far from replacing traditional scientific meetings, virtual congresses will, we think, complement, enrich, and recreate personal relationships between colleagues and scientists. This is already happening. With a few exceptions, the teams, or committees, organizing the FVCC largely comprise cardiologists, clinicians, and researchers from many countries who, like the authors of this paper, have never met each other.

Any branch of medicine, and of science in general, that has organized traditional presence meetings should be ready to accept the challenge of having its own virtual scientific meetings. They are equally useful for the clinician,[20] the investigator,[21] and the teacher.[22] However, virtual congresses may be superior to traditional meetings in some circumstances. For instance, a virtual congress may be optimal for the deaf, whose participation may be limited in traditional meetings,[23] and it may be especially suitable in some medical specialties, such as those in which the presentation of large numbers of images is important.[24]

It is possible that those in the antitechnology lobby are not well informed or have never experienced the benefits of the new means of communication. In a recent article Greenberg,[25] for instance, calls for the ''renaissance of the Luddite spirit.''[25] He finds that the Internet is an ''anarchist offspring of computers'' and perceives it as a threat, whereby scientific progress is mixed with child pornography and financial frauds, among many other catastrophes. Virtual scientific meetings occur at a different level, however: It is up to us to guard their scientific integrity and security. We are convinced that a virtual congress is an extraordinary undertaking that provides significant CME advantages and also benefits our students and, ultimately, our patients.

The other traditional way to disseminate the results of original research, publication in peer-reviewed journals, may change dramatically in the next few years. The NIH has proposed the creation of a Web site for the publication of all new biomedical research reports.[26,27] This proposed site will have a powerful search engine to allow free and convenient access to all biomedical research results, from basic sciences to clinical studies. This endeavor has many hurdles to overcome before it becomes a reality.[28] But its advan-

tages may outweigh the concerns, especially if it provides for rigorous peer review before electronic publication.

Unlike these initial efforts to create an electronic journal, the virtual scientific congress is now a reality. It needs to evolve and mature. Most of all, it urgently needs the recognition of academic institutions that translates into credit for authors of publications at virtual congresses, with merits for achievement similar to those awarded for more traditional publications. When this happens, virtual congresses may become the preferred way to share basic and clinical research results.

References ■

1. Zucconi G. Medical conference by computer. MD Comput. 1986;3:40–3.
2. First Internet World Congress for Biomedical Sciences. Available at congress Web site: http://www.medic.mieu.ac.jp/proc.html.
3. Fifth Internet World Congress for Biomedical Sciences (INABIS '98). Available at INABIS '98 Web site: http://www.mcmaster.ca/inabis98/stats/index.html.
4. Sánchez Ramos MA, et al. Congresos virtuales: 1998. Presented at I Congreso Virtual Hispanoamericano de Anatomía Patológica [the First Hispano-American Virtual Congress of Pathology] (I-CVHAP); May 15–Jul 7, 1997. Available at congress Web site: http://conganat.uniovi.es/.
5. MEDNET '97: proceedings of a conference on the Internet in medicine; Nov 1997. Med Inform (Lond). 1998;23:177–264.
6. Fourth Oncological Reunion at the Oncological Institute of San Sebastian, Spain; Apr 1998. Available at congress Web site: http://bio.hgy.es/biomed/logs/jornadas/joronc.
7. First Iberian-American Virtual Congress on Neurology; Oct 15–Nov 30, 1998. Available at congress Web site: http://cvneuro.org.
8. Virtual Congress of Pharmacy; Jan–Dec 1998. Available at congress Web site: http://www.ugr.ex/~genfarma/bien.htm.
9. First Ibero-American Virtual Nephrology Congress. Available at congress Web site: http://bio.hgy.es/nefrocon.
10. First Virtual Congress of Cardiology (FVCC); Oct 1, 1999–Mar 31, 2000. Available at FVCC Web sites: http://www.fac.ar/cvirtual and http://pcvc.sminter.com.ar.
11. Vélez MD, Tortoledo F. Internet for cardiologists. Clin Med HCC. 1997;2:26–30.
12. Jabbour S, Luna MA, Goldberg RJ, Lown B. ProCOR: a global electronic conference for promoting cardiovascular health in developing countries. J Am Coll Cardiol. 1999;33:6A.
13. Pacher A, García Rojo M, Mola S, Torres G, Rioja Alcubilla C. Efficiency and cost–benefit ratio of biomedical virtual conferences. Presented at the Fifth Internet World Congress for Biomedical Sciences (INABIS '98); Dec 7–16, 1998. Available at INABIS '98 Web site: http://www.mcmaster.ca/inabis98/forum/biomededu/coma/board.html.
14. Haddad H, Macleod S. Access to medical and health information in the developing world: an essential tool for change in medical education. CMAJ. 1999;160:63–4.
15. Gibbs WW. Lost science in the third world. Sci Am. Aug 1995:76–83.
16. McConnell J, Horton R. Lancet electronic research archive in international health and e-print server. Lancet. 1999;354:2–3.
17. Wyatt JC. Commentary: measuring quality and impact of the World Wide Web. BMJ. 1997;314:1879–81.
18. Eysenbach G, Diepgen TL. Towards quality management of medical information on the internet: evaluation, labelling, and filtering of information. BMJ. 1998;317:1496–502.
19. Coiera E. The Internet's challenge to health care provision. BMJ. 1996;312:3–4.
20. Purves I, Bainbridge M, Trimble I. Ongoing electronic conference is available for general practitioners. BMJ. 1995;311:512–3.
21. Della Mea V, Puglisi F, Beltrami CA. Internet per la ricerca in medicina [The Internet for medical research]. Patologica. 1995;87:485–91.
22. Edgecumbe J. Value-adding information: virtual conferencing, a telecommunication pathway to the future. Nurs Admin Q. 1997;21:61–7.
23. Clymer EW, McKee BG. The promise of the World Wide Web and other telecommunication technologies within deaf education. Am Ann Deaf. 1997;142:104–6.
24. Knopp MV, Bock M. Die internet-datenautobahn. Gibt es radiologische anwendungen? [The Internet data highway. Are there radiological applications?]. Radiologe. 1996;36:92–5.
25. Greenberg D. Delete the revolution. Lancet. 1999;353:764.
26. Varmus H. E-biomed: a proposal for electronic publication in the biomedical sciences. Bethesda, Md: National Institutes of Health, 1999. NIH reprint 04.99doc. Also available at NIH Web site: http://www.nih.gov/welcome/director/ebiomed/53ebio.htm.
27. Marshall E. Varmus circulates proposal for NIH sponsored online venture. Science. 1999;284:718.
28. Relman AS. The NIH ''E-biomed'' proposal: a potential threat to the evaluation and orderly dissemination of new clinical studies. N Engl J Med. 1999;340:1828–9.