

Use of the Internet to provide pharmaceutical support in an HIV program

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INTRODUCTION

An important part of meeting the needs of patients, health care workers and community groups dealing with human immunodeficiency virus (HIV) disease is the provision of current and accurate information that reflects the rapid progress in knowledge about HIV. Pharmacy services are a critical component in HIV care.^{1–2} One of pharmacy's functions is the provision of drug information.³

The Internet has become a popular and powerful vehicle for communication, entertainment and information dissemination. While one million people around the globe had Internet access in 1990, this figure jumped dramatically to an estimated 57 million in 1997, and may reach 700 million by the end of this century.⁴ The Internet may soon be the vehicle of choice for information dissemination for both health care professionals and the general public. It is imperative that this information be of high quality, current, accurate and created by professionals.⁵

The experience of the health care team, particularly primary care physicians, in managing acquired immunodeficiency syndrome (AIDS) is strongly linked to improved patient survival.⁶ In one 10½-year study of 403 patients, it was found that patients looked after by physicians with the most experience had an adjusted

relative mortality risk of 0.69 compared to patients cared for by physicians with the least experience.⁶ Although specialization is not required to provide excellent care for HIV-positive individuals, information and expertise from specialists should be available.⁷ In areas with low prevalence of infection, centralized HIV services may be necessary to achieve a critical threshold of experience. However, centralization presents a challenge for disseminating specialists' expertise to support the care of HIV-positive patients in their communities, especially if they are dispersed over a large geographic area.

Southern Alberta encompasses an area of approximately 300,000 square kilometres with a population of at least 1 million people.⁸ Among the various vehicles available for communication to patients and health care professionals, we have identified the Internet as the most appropriate, based on the size of the area serviced and a very high degree of Internet access by our consumers.

In 1989, the Southern Alberta Clinic (SAC) was given the mandate to provide centralized outpatient care to all HIV-positive individuals living in Southern Alberta, in both urban and rural areas. Outpatient care — including provincially funded drugs, sophisticated disease specific laboratory support tests (CD4, viral load) and dedicated services — is focused at the clinic and its 2 satellites. Although 85% of the HIV-positive population resides in Calgary, the remaining 15% lives in a large geographic area and may, between clinic visits, access routine health care in settings where HIV is seldom seen.

To assess the potential usefulness of a web site to our patient population, we questioned 100 patients consecutively attending the clinic about access to the Internet. 63% had access to the Internet and 40% used it on a regular basis. This situation is in stark contrast to that of cancer patients in our region, who expressed no interest in using the Internet as a vehicle for gathering information (JC Sheelar and CR Chambers, personal communication, 1997). The likely explanation lies in the

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Table I — Topics with pharmacy contribution on the Southern Alberta Clinic HIV/AIDS Web site

| Topics by sector | |
|--|--|
| Pharmaceutical (developed solely by pharmacy) | Multidisciplinary sector (developed jointly with pharmacy) |
| <ul style="list-style-type: none"> ■ drug information sheets for patients on antiretroviral agents ■ drug names, abbreviations and available formulations ■ drug reviews of drugs commonly used in HIV-positive individuals (licensed drugs and those in clinical trials) <ul style="list-style-type: none"> - generic and trade names and abbreviations - doses and common regimens - dietary considerations - storage specifications - side effects ■ drug interactions ■ compassionate access programs | <ul style="list-style-type: none"> ■ disease management philosophy and approach ■ protocols for parenteral and aerosolized drug administration ■ laboratory monitoring of therapy ■ therapeutic research protocols ■ dietary suggestions for certain drugs ■ financial coverage for pharmaceuticals ■ breaking news ■ education programs |

difference in the average age of these 2 patient-populations. Of our patient-population, 66% is under the age of 40, in contrast to 9% of cancer patients in the same region. Our patient-population is 90% male and 84% Caucasian; 87% have high school education, of which half have received further college and/or university teaching.

A multidisciplinary Web site containing general HIV information, epidemiological information, clinic information, disease management protocols and a glossary was initially created in 1996 and expanded in 1997 to include detailed drug information. Multidisciplinary input from pharmacy, medicine, nursing, nutrition, social work and community services helped determine the scope and content of the pharmaceutical section.

DESCRIPTION OF THE WEB SITE

The Web site, containing 1.3 MB of information, is available on the Calgary Regional Health Authority external Web server, a shared resource for the region, with migration to Netscape Enterprise. The address is <<http://www.crha-health.ab.ca/clin/sac/sac.htm>>. The site is best viewed using a recently released browser able to view Java applets (e.g. Microsoft Internet Explorer 3.0 and up or Netscape 3.0 and up). Adobe Acrobat, required for viewing tables, is available for downloading. The clinic Web-home page can be found through the common search engines. The home page has 6 major sections (general information on HIV, HIV epidemiology, clinic information, disease management approaches and protocols, community services, and drug information) with many subsections to each section and extensive

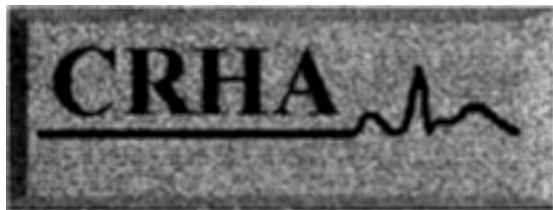
internal hypertext linkages.(Fig. 1) The home page displays a “hit counter”, which records the number of visitors to the site. The number of visitors to the pharmacy section, in particular, is being tracked.

Members of the multidisciplinary team update the site by submitting a written copy of new or revised material to the site programmer. The majority of changes reflect new data presented at the major HIV/AIDS conferences, which occur 2–3 times per year, although further updates may be required more frequently. Procedures are in place to allow peer review prior to programming and hence to facilitate a form of internal quality assurance.

The clinic pharmacist is responsible for 1 major section (drug information), currently consisting of 223 kilobytes of information and is jointly responsible for other subsections (Table I). The drug information section is designed to meet the specific information needs of 3 groups: patients, community groups and health care workers. Drug information sheets for patients, written in simple language, with particular emphasis on the practical issues of taking medications, are available for all currently licensed antiretroviral agents in Canada. In addition, to routine dosing and administration information, the pages address such topics as ways to minimize potential side effects, procedures after a missed dose, common drug interactions and storage specifications. Dietary suggestions with examples, developed in collaboration with the clinic dietitian, are provided for particular agents.

A list of common drugs used in HIV-positive individuals provides the different names and formulations available. Trade and generic names, including names given by generic companies) and

Fig. 1 — Home page of the Southern Alberta Clinic's Web site at <http://www.crha-health.ab.ca/clin/sac/sac.htm



Calgary Regional Health Authority
 Southern Alberta Clinic (SAC)
 Good morning. Welcome to SAC's Site.
 Calgary Address: #213 906-8 Ave. SW, T2P 1H9
 Phone: 403 234-2399 Fax: 403 262-4893



SAC's Mission

To offer comprehensive *Outpatient* care to people living with HIV/AIDS, in southern Alberta using a collaborative multi-disciplinary approach.

To strive for excellence in care, research and education while respecting an individual's privacy and autonomy.



Why a Web Site?



News 97/09/08

General HIV Information

- HIV Disease Description
- Glossary of Terms
- Selected Disease Bibliography
- Links to Other AIDS Sites

Epidemiology of HIV

- Local
- Provincial
- Federal
- US
- WHO

SAC Clinic Information

- History and Mandate
- Your Staff
- Booking Process
- Clinic Handbook
- Research Publications/Abstracts **UPDATED**

Drug Information

- Drug Information Sheets for Patients
- ALIGN=Absmiddle This browser is unable to view Java applets.
Names and Formulations (For browsers unable to view above applet)
- Drug Reviews
- Drug Interactions **UPDATED**
- Compassionate Access
- Drug Payment
- Intravenous Therapy Protocols
- Laboratory Monitoring

SAC Care Plan

- Disease Management Plan
- Clinic Protocols
- Clinic Services (including Social Work)
- Education Programs
- Research Activity
- CMV retinitis

Community Site

- Community Group Page **UPDATED**
- HIV/AIDS Community Resource List
- Donations/Endowments
- A Guide for Positive Women

Note This web site uses frames and is best viewed using a recently released browser such as Microsoft Internet Explorer or Netscape.

Pictures and tables containing data are *down loadable* in *pdf* format, you will need Adobe Acrobat Reader software to view them.

abbreviations used for these medications may help clarify any confusion arising from the names of drugs.

The site provides a review of antiretroviral drugs currently licensed in Canada, as well as those currently in phase III clinical trials or licensed elsewhere. The focus of this section is on dosage guidelines and side effect profiles. Comments on different formulations, dietary considerations and storage specifications are included, where applicable.

The drug interactions subsection, written primarily for health-care workers, summarizes the many and significant interactions between antiretroviral agents and other drugs. The lists are organized according to drug classes, which may facilitate the search for a medication in the same family that may not interact. These interactions are not marked according to severity levels. Where applicable, the pages offer recommendations for the management of interactions.

A Compassionate Access subsection outlines information on the unlicensed drugs that may be available to treat HIV or its opportunistic infections. Hypertext links to nursing administration protocols are provided for some drugs.

The clinic pharmacist collaborated with other members of the multidisciplinary team to develop material for various subsection of the Web site. Detailed protocols for administering intravenous drugs such as amphotericin, foscarnet, pentamidine, ganciclovir and zidovudine, and aerosol administration of pentamidine were developed with nursing. Collaboration with physicians resulted in laboratory monitoring guidelines for individual drugs. Details on local social programs for supporting drug costs were developed with social work. The Clinical Management section details pharmacy procedures with respect to role on a multidisciplinary team and educational activities. The pharmacist writes the Breaking News, including messages on issues such as

new drug licensing and newly described toxicities. The time spent by the pharmacist on site maintenance is comparable to that required to produce similar material for other media such as patient handouts, drug administration protocols and so on.

DISCUSSION

Using the Internet as a mean of distributing information has both advantages and disadvantages (Table II). Progress in the area of HIV/AIDS care is being made at a fast pace, and at this point treatments are pharmaceutical-based. As information grows and changes, it can be readily adapted on the Web site to reflect current findings. Also, the Internet is particularly useful in our situation, where services must be provided to a large geographical area. Health-care workers may benefit from this specialized information, possibly improving patient outcomes, even if they themselves do not have much experience with HIV patients.⁶ Both patients and health-care professionals can have immediate and unrestricted access to needed information 24 hours a day, 365 days a year. Thus, delays in providing information and answers, and possibly in administering drugs, decrease. Our multidisciplinary approach to the Web site is also an advantage in that it ensures that the information provided reflects the multiple sources of expertise currently needed for effective care of HIV-positive patients.⁹ All of the above advantages can enhance both the standardization and quality of patient care at care sites in our region. Using the Internet to disseminate information may be less costly than conventional methods such as telephone or facsimile, and less disruptive to professionals' work flow. Confidentiality in accessing HIV/AIDS information may be of concern to individuals in the community. This concern may be minimized when the Web site can be

Table II — Potential advantages and disadvantages of a Web site for pharmaceutical support

| Factors | |
|--|--|
| Advantages | Disadvantages |
| <ul style="list-style-type: none"> ■ currency of information ■ immediate, round-the-clock access irrespective of location ■ joint development by multidisciplinary team ■ low cost ■ private and confidential ■ may be as extensive and detailed as requested ■ integrates easily into care ■ optimal standard of care | <ul style="list-style-type: none"> ■ need to promote the site and educate regarding its use ■ access not universal ■ responsibility for maintenance ■ potential misinterpretation of information ■ need to provide information for diverse levels of literacy and knowledge ■ new technology, lack of access and resources |

accessed in the privacy of their homes. The site also builds a bridge with our patients by permitting them to peruse our protocols and participate knowledgeably in their disease management.

Certain challenges exist (Table II). First, for an information tool to be useful, potential users need to be aware of its existence and then be able to easily find, access and use it. To address this, we are rigorously promoting the Web site to health professionals within our region through our medical, pharmacy, nursing and social work education programs. As mentioned, our patient Internet survey found that the majority already have access to the Internet. A recent survey in Quebec revealed that at least 30% of physicians practising in both rural and urban settings had e-mail and consulted the Internet at least once a week.¹⁰ The counsellors of all 4 community groups within our region use our Web site for information. The largest organization, AIDS Calgary, actually introduces all new consumers to the clinic's Web site and provides access to it thereafter. Despite this positive evidence of Internet use, not everyone with Internet access can gain full benefit from using the Web site because there is the possibility that our server's technology may be too sophisticated for the user's computer. Rectifying this problem requires careful programming to a level widely available in the general community. Another consideration is that, once promoted, there is also a moral and likely a legal responsibility to keep the site current.⁵ This imperative has been addressed by making the Web site material our operations manual. Therefore, intended changes in our procedures mandate a change on our Web site manual. Another potential problem is misinterpretation of the data provided; much of the information is in a summary format and there is no opportunity for personal communication. This is particularly likely because of the broad range of educational backgrounds of the 2 audiences (health-care workers and the general public). The appropriate level of language cannot be defined easily, and information cannot always be presented to all consumers at a level they require. Potential solutions would be to divide the Web site into 2 levels of language and information. Making the site interactive would afford users the chance to send by electronic mail (e-mail) questions for response by return e-mail.

Future initiatives include the use of e-mail for responding to patient's questions and for following up with patient who could not be reached by telephone. This is viewed as an additional form of communication to patients and not as a replacement for personal

discussions.⁵ (Health on the Net Foundation Code of Conduct for medical Web sites <<http://www.hon.ch/HONcode/Conduct.html>>.) E-mail and electronic discussion groups among peers, both nationally and internationally, may also be of benefit in sharing and enhancing professional expertise and rapidly identifying new drug-related problems.¹² Further use of e-mail to disseminate new information using a subscription list of patients and health care workers may be useful. Lastly, confidential access to clinical and medication histories may be useful when patients obtain health care from other locales.

Other possibilities being considered for the site include an interactive section to facilitate drug interaction searches, an internal search engine, certain audio and visual presentations and the provision of a method to obtain feedback from our visitors, either through e-mail, questionnaires or, more indirectly, a voluntary "hit" profile. A feedback system may provide an estimate of user satisfaction and possibly external peer review, essential to the quality assurance program of any drug information service.¹²

SUMMARY

The Southern Alberta Clinic has created a Web site as a novel means of disseminating our experience, expertise and knowledge to support the continued care of our HIV-positive patients, a young population with a high level of computer access and sophistication. This site includes information for both health-care workers and patients on the services of the clinic, as well as general information on HIV and its management. The pharmacist, as part of the multidisciplinary team, is involved in providing all drug-related information to the site. The Internet is a useful tool that may be applied in a number of different health-care settings and disciplines. Certain aspects of providing pharmaceutical care lend themselves readily to this technology.

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