

eHealth

Where Healthcare Meets the Internet



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Winter 1998

“The Physician Practice Management Company -
Alternative to the Solo Practice”

Spring 1998

“Assisted Living -
Opportunity and Uncertainty in a Maturing Market”

Summer 1998

“For Profit Hospitals -
Capitalizing on the Non-Urban Frontier”

Spring 1999

“Home Health Care -
Weathering the Storm”

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INTRODUCTION

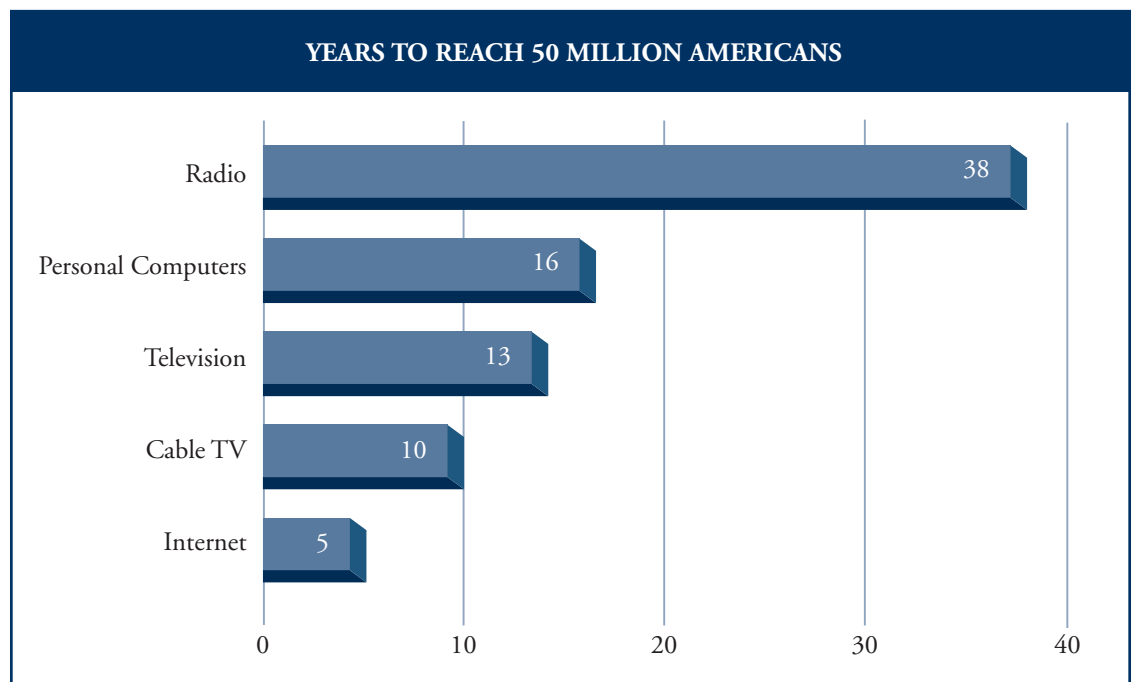
The dramatic expansion and acceptance of the Internet have revolutionized many aspects of society and business over the last few years. The low cost, flexible and enabling nature of Internet-based technology is improving the way individuals and companies transact business, communicate, and streamline workflow processes. The healthcare market is arguably the single largest segment of the U.S. economy that stands to gain the most from the implementation of Internet-based technologies. In an effort to eliminate waste and inefficiency, the healthcare industry is undergoing some fundamental changes. To cite one glaring example, managed care is increasing competition among industry participants and shifting the focus away from maximizing utilization to cost-effective delivery of medical services. In response to this changing environment, patients are attempting to empower themselves by taking more responsibility for their healthcare treatment and becoming more proactive in seeking out information related to their health and wellness.

The eHealth industry is where healthcare and the Internet converge, as a number of emerging companies attempt to rapidly leverage the power of the Internet and take advantage of the financial opportunities which are resulting from the ongoing transformation of the healthcare industry. This report focuses on the key issues, trends, and participants that will shape the future direction of the eHealth industry and examines both how participants within each industry segment plan to generate revenues and what hurdles these companies must overcome in order to reach their goals.

GROWTH OF THE INTERNET

The Internet is the fastest growing mass medium in history. According to data from the U.S. Department of Commerce, the Internet has grown to reach 50 million users in just five years, compared to 38 years for radio, 13 years for television, 10 years for cable television, and 16 years for personal computers (PC) (see Exhibit 1). The International Data Corporation (IDC) estimates that World Wide Web (the Web) users in the United States are expected to grow to 136 million in 2002, reaching approximately 50 percent of the U.S. population. The rest of the world is rapidly coming online as well. The IDC estimates that the number of Internet users worldwide will increase from approximately 97 million at the end of 1998 to 320 million by the end of 2002, representing a compound annual growth rate of 35 percent.

Exhibit 1



Source: U.S. Department of Commerce

A number of factors are contributing to the growth of the Internet, including: (i) the large and growing number of PCs in homes and businesses; (ii) easier and cheaper access to the Internet; (iii) increased awareness of the Internet among consumer and business users; (iv) the rapidly expanding availability of online content and commerce; and (v) improvements in network infrastructure and bandwidth. As Internet usage has grown, individual users are expanding their interests beyond entertainment and information retrieval to online commerce in increasing numbers.

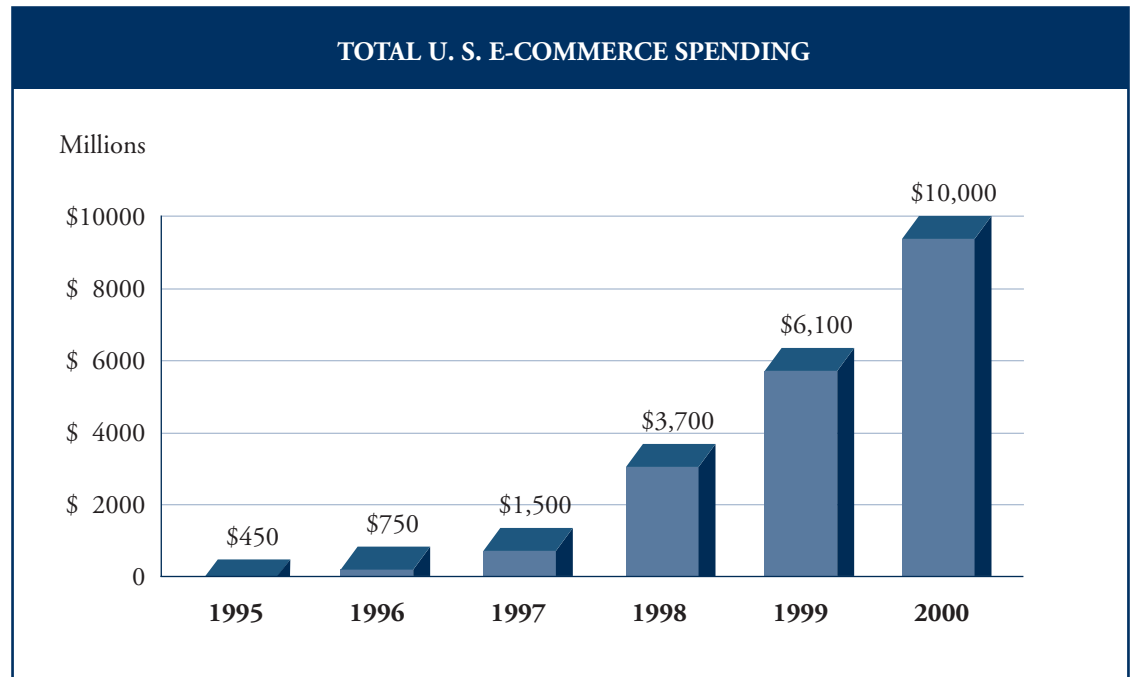
E-commerce transactions in the financial services, information, entertainment and health-related products and information sectors are increasing dramatically, in part because consumers have become more comfortable transmitting sensitive personal and financial data over the Internet. A recent USA Today poll indicates that 95 percent of Americans would give out their credit card number online. Based on the comparative amounts lost to fraud in other revenue transactions, such consumer confidence may be justified (see Exhibit 2). eStats estimates that consumer purchases of goods and services over the Internet in the United States will grow from \$450 million in 1995 to \$10 billion in 2000 (see Exhibit 3). Consumers can benefit from faster, more convenient and potentially less expensive transactions that e-commerce provides, while merchants can cost-effectively reach a global audience.

Exhibit 2

DOLLARS LOST TO FRAUD, PER \$1,000 IN REVENUE TRANSACTIONS	
Types of Fraud	Dollars Lost per \$1,000
Cellular-Phones	\$19.83
Toll Calls	\$16.00
Credit Card	\$1.41
Expected Internet Fraud	\$1.00

Source: Forrester Research

Exhibit 3



Source: eStats

RAPID MIGRATION TO THE INTERNET BY HEALTHCARE CONSUMERS

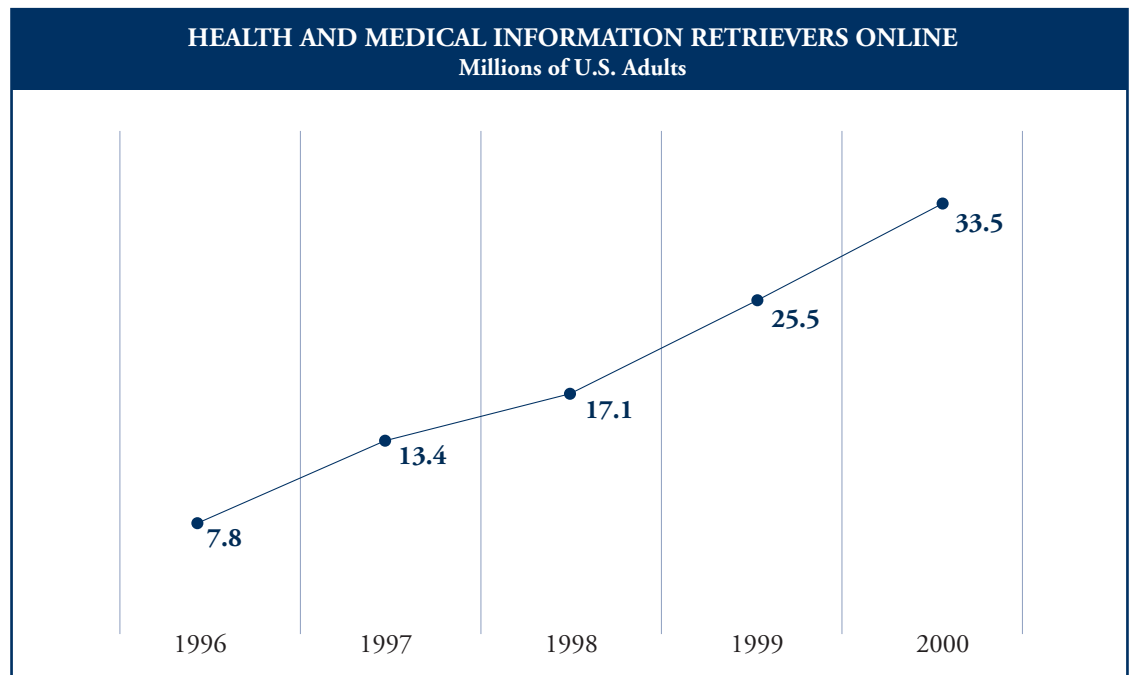
Healthcare is one of the largest segments of the U.S. economy. According to the Health Care Financing Administration (HCFA), the nation's total expenditures for healthcare in 1999 are estimated to exceed \$1.2 trillion and projected to increase to nearly \$2.2 trillion by 2008, growing about 6.5 percent annually. HCFA also expects healthcare spending to grow much more than the economy as a whole, with health spending increasing from 13.5 percent of the United States gross domestic product in 1997 to a projected 16.2 percent in 2008.

Health and medical information is one of the fastest growing areas of interest on the Internet. According to Media Metrix, healthcare-related content is the second most popular subject of Web-based searches. Cyber Dialogue estimates that the number of adults searching for online health and medical information will grow from approximately 17 million in 1998 to more than 33.5 million in 2000 (see Exhibit 4). With approximately 28 percent of the United States suffering from a chronic disease, it is not surprising that a significant portion of the population is very interested in medical developments for themselves, or on behalf of a close friend or relative. According to Cyber Dialogue, disease information is the most searched for health topic online, followed by nutrition, pharmaceutical information, online newsletters, and women's health (see Exhibit 5). In addition, 70 percent of individuals searching for healthcare information agreed that the Internet enables them to make better health-related decisions.

As a group, American adults searching for healthcare information online (often called “HealthMed Retrievers”) are older, more likely to be college educated, and more affluent than the general online population. Cyber Dialogue reports that the mean annual income for HealthMed Retrievers is \$61,700, and they are projected to spend nearly \$150 billion for all types of health-related products and services in the coming year (see Exhibit 6). Accordingly, these demographics make HealthMed Retrievers potentially very lucrative to marketers. Their age, income, education and occupational profile (see Exhibit 7) are all indicators of consumers with money to spend.

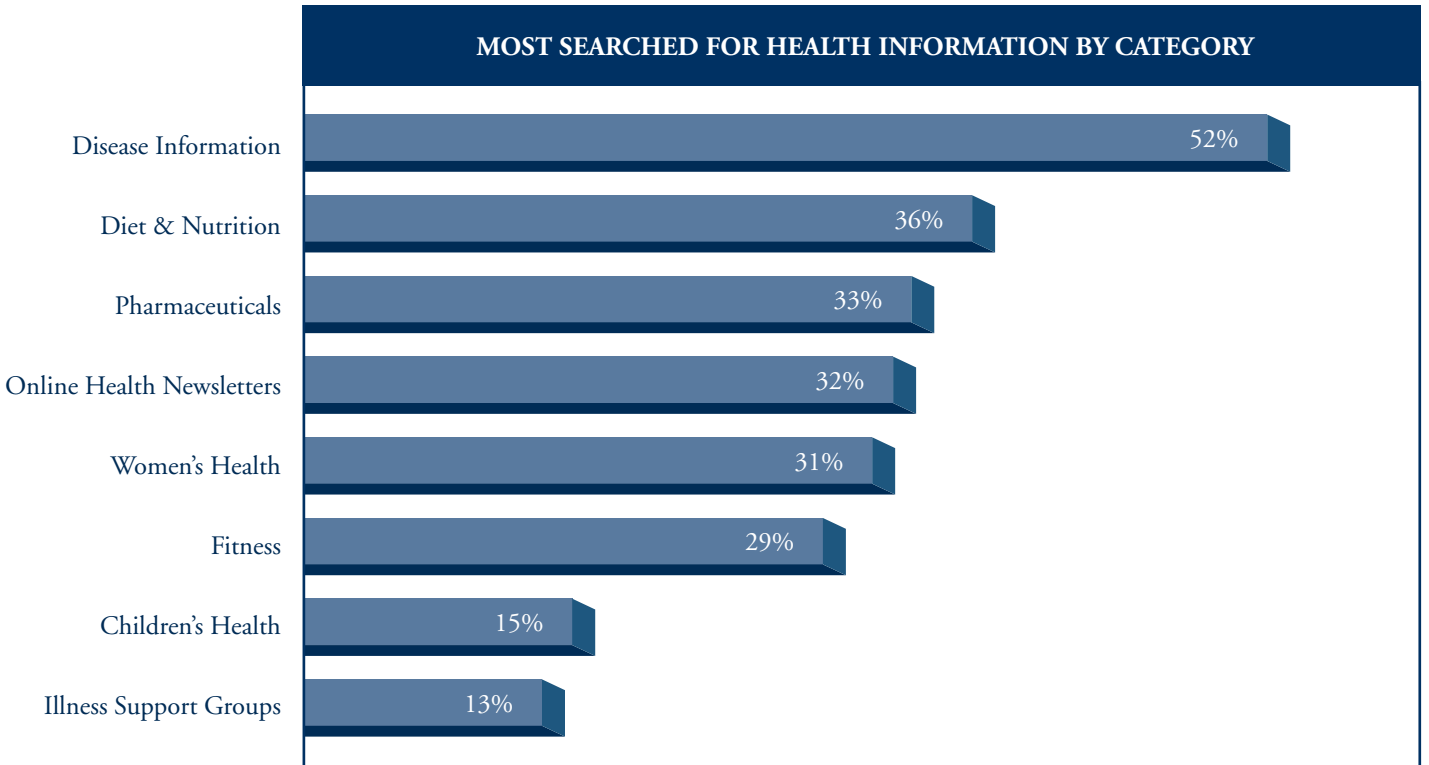
The single most pervasive influence driving increased use of the Internet for healthcare-related issues is the aging of America. According to a research report by Volpe Brown Whelan & Co., it is expected that as individuals age, health-related content will become increasingly important to them and their secondary caregivers and to other middle-aged users not currently counted as current HealthMed retrievers. Thus, many commentators believe that the current level of interest in online health-related content is only the beginning as the industry prepares for possible explosive growth.

Exhibit 4



Source: cyberdialogue/svp

Exhibit 5



Source: Cyber Dialogue

Exhibit 6

COMPARATIVE DEMOGRAPHICS OF HEALTHMED RETRIEVERS			
	U.S. Adults	U.S. Online Adults	HealthMed Retrievers
Population	195.0 Million	53.5 Million	17.3 Million
M/F Ratio (%)	47/53	54/46	47/53
Mean Age	44.0	38.7	41.0
Mean Income	\$43,200	\$56,800	\$61,700
College exp./Grad	49%	74%	81%
Ethnic Minority	22%	16%	15%
Married	59%	59%	68%
Children Present	39%	43%	43%
Avg. Online Experience	—	2.0 years	2.2 years

Source: cyberdialogue/findsvp

Exhibit 7

SELECTED OCCUPATIONS OF HEALTHMED RETRIEVERS			
	U.S. Adults	U.S. Online Adults	HealthMed Retrievers
Manager/Professional	26%	48%	54%
Blue Collar Occupation	21%	15%	11%
Primarily Self-Employed	7%	9%	10%
Retired	17%	5%	5%
Homemaker	8%	3%	3%
Full-Time Student	3%	6%	5%
Unemployed	4%	2%	2%

Source: cyberdialogue/findsvp

ACCEPTANCE OF INTERNET TECHNOLOGY IN THE HEALTHCARE MARKET

When taken in a global context, the U.S. healthcare market has traditionally operated under what arguably is one of the most complex and inefficient economic models. HCFA estimates that approximately 25 percent of healthcare spending is due to unnecessary care, overcapacity and administrative inefficiency. Some commentators argue that the single largest contributor to waste in healthcare spending is the lack of an efficient information collection and communication platform throughout the continuum of care. Until recently, providers had little incentive to contain costs or increase efficiency. The result has been an increasingly inefficient healthcare delivery system, with increased costs borne by the federal government and employers. Employers, frustrated with these rising costs, turned to managed care organizations (typically HMOs) in an effort to alter the healthcare spending model. Managed care organizations attempted to control costs through utilization controls, discounted prices, and risk-based contracts. However, these organizations require quality, utilization and outcomes data, which further increases the complexities of the providers' operating environment and general administrative burdens.

Exhibit 8

WHO DO CONSUMERS BELIEVE SHOULD INFLUENCE THEIR HEALTH CARE DECISIONS?			
Ranked by Individuals, 1-10 scale, 10 being most influential			
CURRENT		SHOULD BE	
Insurer	3.30	Self	5.44
Self	1.88	Doctor	2.44
Doctor	1.74	Insurer	0.72
Employer	1.20	Hospital	0.62
Government	1.08	Government	0.48
Hospital	0.60	Employer	0.30

Source: American Hospital Association

In response to managed care, both providers and patients are taking steps to empower themselves. Providers are responding by consolidating into integrated networks and investing in information technology in an effort to become more efficient and increase bargaining leverage. Similarly, patients are attempting to take more responsibility for their healthcare treatment and are seeking out additional information about medical treatment decisions and benefit plans (see Exhibit 8).

As the healthcare economic model continues to change, market forces will require participants to adapt in order to remain knowledgeable and competitive. The Internet is accelerating this process. Although the healthcare industry has historically been reluctant to adopt new technology, the Internet's low cost, flexible and customizable platform is likely to be more readily accepted.

One critical barrier that might impede the broad-based acceptance of Internet technology is concern about online security. There has been a great deal of public debate over the propriety of permitting the transmission of sensitive patient information across the Internet. Two strategies for addressing the security issue are: (i) overcoming the perception that current technology employed is insufficient to prevent access by unauthorized individuals; and (ii) developing practical technology to effectively protect sensitive data.

HCFR fueled the already heated debate by issuing initial guidelines early in 1998 which essentially banned the use of the Internet to transmit any individually identifiable patient data in an effort to avoid the unauthorized access or use of information that "could result

in substantial harm, embarrassment, inconvenience, or unfairness to any individual on whom information is maintained.” On November 24, 1998, HCFA released new guidelines that permitted the use of the Internet to transmit such data. Specifically, the guidelines state that

[i]t is permissible to use the Internet for transmission of HCFA Privacy Act-protected and/or other sensitive HCFA information, as long as an acceptable method of encryption is utilized to provide for confidentiality and integrity of this data, and that authentication or identification procedures are employed to assure that both the sender and recipient of the data are known to each other and are authorized to receive and decrypt such information.¹

Without getting into a technical discussion regarding the requirements of this policy, it is sufficient to say that using commercially available high-security encryption technology when sending patient and billing information over the Internet is acceptable under the current guidelines. However, HCFA’s release of the new guidelines does not fully address the perception problems that still exist between patients and providers with respect to the transmission of sensitive information through the Internet. As vendors improve their security features and the increased use of the Internet for transmission of sensitive data results in relatively few major security breaches, the transmission of sensitive information should be more widely accepted.

OVERVIEW OF eHEALTH MARKET SEGMENTS AND LEADING COMPANIES

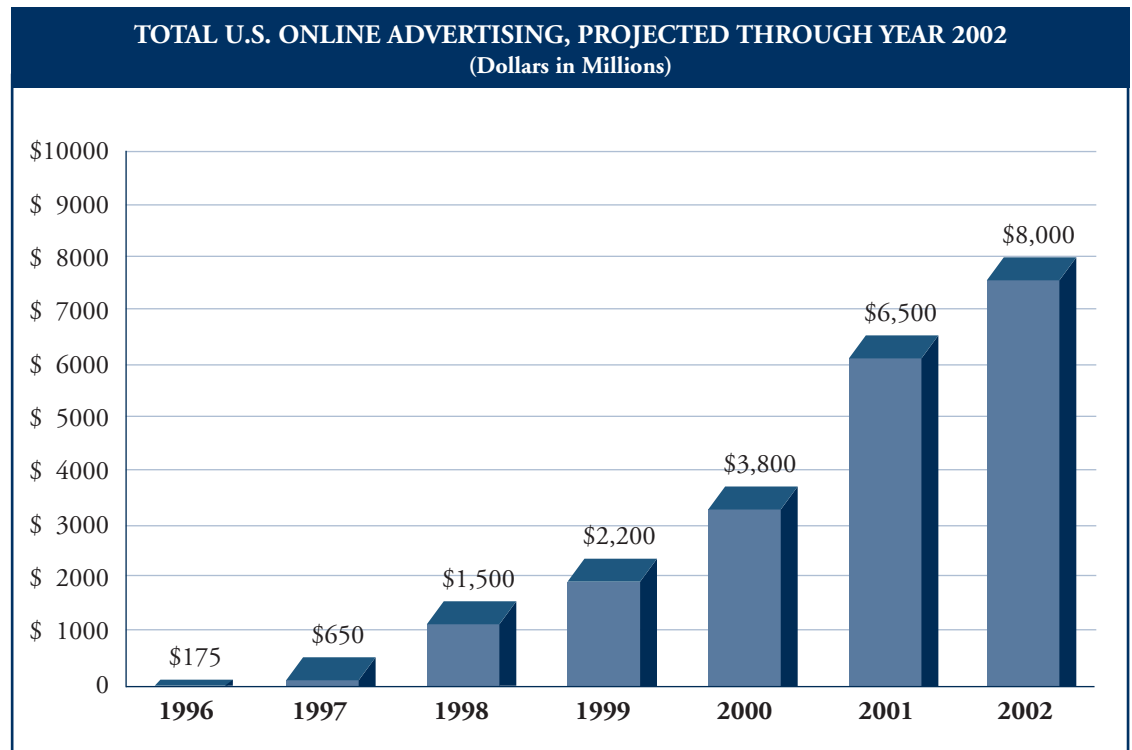
The growth of the Internet and its increasing importance in the healthcare sector is creating many opportunities for its participants as healthcare moves into the technology age. E*Offering estimates that the potential size of the eHealth market will be approximately \$205 billion in 2003, and is currently growing at rates in excess of 100 percent annually. Although many vendors and providers will overlap, there are three broad classifications and revenue models into which the eHealth industry will likely segment: (i) healthcare content; (ii) Web-based software and data connectivity products; and (iii) e-commerce. Individual company success will likely require focusing on one of these individual segments, and will also depend on developing multiple revenue streams that cross into the other categories. The large, yet relatively untapped, eHealth market represents a multi-billion dollar opportunity and the benefits attributable to utilization of the Internet should be the driving force in revolutionizing the delivery of healthcare information and services.

CONTENT

The delivery of healthcare content is becoming one of the fastest growing segments of the eHealth sector. As individuals and physicians attempt to empower themselves within the healthcare system, they are increasingly searching for reliable sources of healthcare information. There are more than 16,000 healthcare information sites on the Internet where users can go to research specific topics, discuss particular medical conditions in illness support groups, submit medical questions to online physicians, and/or review various medical treatment options. The most effective of these sites serve as “healthcare portals” which aggregate a mix of original, licensed and outside content on a variety of health and wellness topics. In fact, current technology permits users of many content sites to personalize the chosen site and participate in communities of similarly-interested users. Providing access to these features is a common example of how many sites attempt to create loyalty and drive return traffic. Analysts predict that as an increasing number of consumers seek to better manage their health, they will turn to content sites for health and wellness information. Through use of the Internet, physicians are now able to stay current on the latest medical news and research, read professional journals and gain continuing medical education credits. The sites most likely to be successful, whether they are individual- or physician-focused, are those which can create an effective “brand” that users trust and respect.

The primary source of revenue for content companies is advertising. One of the primary forces driving the development of content sites has been the dramatic increase in pharmaceutical direct-to-consumer (DTC) advertising in both print and online media. In 1998, an estimated \$1.5 billion was spent on DTC advertising, with this amount expected to double in 1999. DTC advertising efforts seek to stimulate demand by increasing the number of consumers who specifically ask their physician to prescribe brand-name drugs. Although the vast majority of DTC advertising is through traditional media, many pharmaceutical companies are shifting advertising dollars online in order to better target relevant markets at lower costs. U.S. Bancorp Piper Jaffray estimates that pharmaceutical companies could spend up to \$100 million a year for online advertising by 2000, although this amount represents a small fraction of the \$10 billion that is expected to be spent on health and medical advertising by 2002. Other secondary sources of revenue for content companies might include e-commerce revenues, subscription fees, referral revenues, and non-healthcare advertising.

Exhibit 9



Source: eStats

Even though the potential opportunity is significant, a possible impediment to the long-term success for content companies is the attitude of physicians toward online healthcare information. Physicians have been slow to embrace content and information sites due to concerns that patients will improperly diagnose their medical condition. However, recent studies have shown that 67 percent of patients prefer to print out information from the Internet and bring it to their physician for discussion and 90 percent prefer to involve their physician in any treatment decisions prior to making any decisions based on information obtained online.

This issue might also diminish over time as physicians begin to take greater advantage of the Internet themselves and become more comfortable with the information being disseminated from the more reliable content sites. In fact, a recent study by PSL Consulting Group shows that 80 percent of surveyed physicians own a computer, and 44 percent have used the Internet, while 36 percent planned to go online soon. Interestingly, 62 percent of the Internet-connected physicians reported recommending to their patients that they search online for health information, while 33 percent reported that their patients had brought information that they found on the Internet. A survey by Cyber Dialogue revealed that more than 50 percent of practicing physicians endorsed patient use of online support groups and recognized that such groups can play a powerful role in recovery from illness.

OVERVIEW OF LEADING CONTENT COMPANIES

AccentHealth, Inc. (www.accenthealth.com) AccentHealth uses advanced technology to deliver branded healthcare information directly to consumers and health professionals, and provides contract services to facilitate the flow of information and commerce throughout the healthcare industry. AccentHealth TV, produced in conjunction with CNN, provides health-related programming to 20 million medical waiting room visitors each month, and reaches more than 50,000 healthcare professionals at their offices. AccentHealth's real-time in-office satellite delivery system also offers interactive continuing education and training to doctors and their staffs. Through accenthealth.com, launched in May 1999, the company is also able to offer comprehensive and interactive wellness information, tools and resources, based on the latest developments in traditional and alternative medicine.

AmericasDoctor.com (www.americasdoctor.com). AmericasDoctor.com, Inc. offers consumers private, real-time medical dialogue with primary care physicians, therapists and other healthcare specialists. Although the online physicians do not diagnose, prescribe, or treat patients over the Internet, this site offers the consumer a variety of information on health-related issues and provides access to a range of products, services and programming free of charge. The costs for the site are underwritten by sponsoring hospitals, managed care organizations and advertisers.

Better Health (www.betterhealth.com). Better Health, a subsidiary of iVillage (Nasdaq: IVIL), is an online health community focused primarily on women. Better Health provides a variety of forums centered around specific healthcare conditions, chat rooms, message boards, health risk assessment, personalized tools, and other services.

drkoop.com, Inc. (www.drkoop.com). drkoop.com (Nasdaq: KOOP) is an Internet-based consumer healthcare network. Founded by former U.S. Surgeon General, Dr. C. Everett Koop, drkoop.com offers consumers health and medical information designed to empower them to better manage their own healthcare. The Web site includes more than 66,000 pages of information for men, women, and children, and also features over 50 disease centers and more than 1,700 health and wellness topics from a variety of healthcare sources. According to Media Metrix, drkoop.com was the number one dedicated healthcare Web site in the second quarter of 1999, with more than one million unique users and 11 million page views during this period. In June 1999, the company announced an alliance with DrugEmporium.com that will provide drugs at deep discounts as well as information to promote good health. In July 1999, the company entered into an \$89 million, four-year strategic alliance with America Online (AOL) to provide drkoop.com's specialty healthcare information to AOL and Compuserve members.

HealthCentral.com (www.healthcentral.com). HealthCentral.com is an on-air broadcast and online consumer health information service providing personalized interactive tools combined with television and radio programming. The company defines its brand around the expertise of Dr. Dean Edell, whose daily television and radio broadcasts reach more than 14 million people in more than 400 markets. In addition to personalized content, HealthCentral offers other applications, such as health risk assessment, research tools connected to the site's 6,000 topic encyclopedia, and a medical librarian who assists with personal health research. The company has also entered into partnerships with Snap.com, the Internet portal service from NBC and CNET, WebTV Networks, Inc., @Home Network and Ask Jeeves.

HealthGate Data Corp. (www.healthgate.com). HealthGate's (Nasdaq: HGAT) objective is to provide health and medical information over the Web to help healthcare professionals, patients and health-conscious consumers make informed healthcare decisions. Through its Web site, HealthGate aggregates and maintains content libraries, comprising more than 190 different content sources with 27 million different pages of health and medical information. The company is based in Burlington, Massachusetts.

The Health Network (www.thehealthnetwork.com). The Health Network, launched in July 1999, is a new media company that provides a variety of comprehensive and personalized health information to consumers, physicians and hospitals through a fully integrated cable/Internet media platform. The company is the result of the merger of America's Health Network, a leading health and medical cable network, AHN.com, a consumer-health Web site, and FOX's Fit TV, a fitness and healthy lifestyle cable network. The site also provides news and 24-hour live streaming video of the company's original cable television programming. In addition, the site also offers e-commerce opportunities including a health mall, online physician-education courses in partnership with HealthStream, Inc., and an Internet-based information service for hospitals in partnership with HCIA, Inc.

InteliHealth, Inc. (www.intelihealth.com). InteliHealth is an online media company providing personal health information, news, e-commerce, and discussion group services for consumers. The company is a joint venture between Johns Hopkins University and Aetna U.S. Healthcare. InteliHealth has content partnerships with the National Institutes of Health, adam.com, and WebMD. In addition, the company also has strategic partnerships with AOL, AltaVista, CBS.com, Snap.com, BarnesandNoble.com, and Reuters.

Mayo Health Oasis (www.mayohealth.org). Mayo Health Oasis is an extension of the Mayo Foundation for Medical Education and Research's successful line of books, newsletters, and CD-ROMS and provides users with the experience and knowledge of more than 1,200 physicians and scientists at the Mayo Clinic. The site provides information on a wide variety of medical topics and a database of explanations on how to treat both common and rare illnesses.

Medcast Networks (www.medcast.com). Medcast Networks, launched in March 1999, provides a wide range of news and information services to physicians. The company currently utilizes an electronic broadcast system that downloads large amounts of information onto a subscribing physician's computer hard drive overnight. Each morning, the physician can scan the days important medical news, as well as access regularly updated data on drugs, diseases, upcoming medical conferences, continuing medical education, and other areas that may interest them. The company is based in Atlanta, Georgia and employs over 150 people. On July 1, 1999, Healtheon and WebMD announced an agreement to acquire Greenberg News Networks, Inc., owners of Medcast, for approximately \$215 million.

Medical Networks, Inc. (www.healthatoz.com, www.medconnect.com). Medical Networks (MNI) is an Internet information, e-commerce and software services company with a focus in health and medicine. MNI operates two separate Web sites: (i) healthAtoZ.com and (ii) medconnect.com. HealthAtoZ provides consumers with the following services: free access to a health-only search engine of more than 50,000 professionally reviewed sources, a personal health calendar and reminder service, and interactions with healthcare professionals, and plans to offer e-commerce opportunities through a HealthAtoZ store and pharmacy to be launched in the future. Medconnect.com focuses on physicians and other health professionals and offers clinical content, continuing medical education, and other services.

Mediconsult.com, Inc. (www.mediconsult.com). Mediconsult (Nasdaq: MCNS) focuses its content on the disease-specific end of the healthcare information market, emphasizing the 60 most prevalent chronic diseases and conditions. The company's sites include mediconsult.com, pharminfo.com, cyberdiet.com, and inciid.org. In addition, Mediconsult recently launched a new e-commerce retail outlet for patients to find products by medical condition. The company currently has key partnerships with Compuserve (now AOL), IBM, Yahoo!, and several leading search engines. On September 7, 1999, Mediconsult.com announced an agreement to purchase Physicians' Online (profiled below), in hopes of creating the largest community of physician and patients online.

Medscape, Inc. (www.medscape.com). Medscape (Nasdaq: MSCP) currently operates Medscape.com, a Web site that provides medical information and interactive programs to physicians and allied health professionals. Medscape also offers one of the largest online collections of free, peer-reviewed, full-text medical journal articles and a library of continuing medical education accredited programs. In July 1999, CBS Corporation announced an agreement to acquire 35 percent of Medscape and together the companies have agreed to support the August 1999 launch of a new site for consumers, www.CBS.Medscape.com, which will become the exclusive consumer healthcare site integrated into CBS News. CBS News will provide additional editorial content to the site while Medscape will develop special online reports to complement CBS's healthcare programming.

OnHealth Network Company (www.onhealth.com). OnHealth (Nasdaq: ONHN) provides an online network of interactive health and wellness information and services to consumers. The company currently has distribution partnerships with AOL's Digital City New York, GO Network, WebTV, weather.com, GeoCities, Yahoo! and Snap.com, along with an alliance with drugstore.com for online pharmacy purchases. OnHealth has content partnerships with the New England Journal of Medicine, Cleveland Clinic, Scripps Clinic and Beth Israel Deaconess Hospital. OnHealth.com was a finalist for the 1998 International EMMA awards and a finalist for "Best Health Site" in the 1998 Webby Awards.

Physicians' Online (www.po.com). Physicians' Online (POL) is a medical information and communications network for physicians. Launched in February 1994, POL provides a secure physicians-only environment featuring access to MEDLINE and other medical databases, clinical symposia with peers and national experts, continuing medical education credits, daily medical news, private e-mail accounts, and Internet access, among many other services. The company has strategic partnerships with IMS Health, Quintiles Transnational, and Claimsnet.com. POL recently announced that it would be acquired by Mediconsult.com, Inc. in a transaction valued at \$180 million.

Thrive Online (www.thriveonline.com). Thrive provides users with information, message board topics, chats, interactive tools, and programming in six major areas: medical, fitness, nutrition, serenity, sexuality, and weight. The company was founded in 1996 as a joint venture between AOL and Time Incorporated, but is now a wholly owned subsidiary of Oxygen Media, which itself is funded by AOL, Disney and Paul Allen. The site is scheduled to be the cornerstone of AOL Women's Channel and ultimately tied into a cable television product.

WebMD (www.webmd.com). WebMD targets both the physician and consumer markets. The site offers consumers free access to WebMD's Health and Wellness Center, which includes premium and proprietary healthcare content, chat rooms, message boards, personalized healthcare information and e-mail updates. The company provides a comprehensive suite of Web-based services, which aim to simplify and enhance information access, communications, and e-commerce within the physician's office. Services include news and content retrieval, a "universal inbox" that manages fax, voice, and email messages, continuing medical education, transcription, and customized physicians' Web sites. The company has strategic relationships with several companies, including McKessonHBOC, Dell, Envoy, Medquist, DuPont and CNN. On May 20, 1999, WebMD announced that it would merge with Healtheon, in hopes of creating an end-to-end healthcare and e-commerce company.

WEB-BASED SOFTWARE AND DATA CONNECTIVITY PRODUCTS

The healthcare industry has lagged behind other similarly data-intensive industries in spending on and widespread acceptance of information technology (IT). Most business functions within the industry are still quite labor-intensive, rely heavily on paper, phone and facsimile, and often result in redundant services. The industry's initial attempts to embrace technology have focused on claims processing and other discrete transactions, rather than a more global IT strategy. Accordingly, the current healthcare IT infrastructure is highly fragmented, and suffers from a lack of a basic language and communication standard.

The Internet is well-positioned to play a vital role in connecting the healthcare industry, as many of the administrative and clinical inefficiencies in healthcare are attributable to the incomplete, incorrect or inefficient exchange of information among participants. Studies have shown that six out of every 100 hospital admissions result in an adverse drug event (ADE), of which 28 percent are preventable. More than 140,000 people die each year from such reactions, making ADEs one of the leading causes of death in the United States. Many of these deaths could be prevented if the attending physician had access to correct patient information at the time of prescription. The Internet may be the solution to providing this access to critical information, using it, a physician can access a patient's medical history, allergies and current medications, determine the suitability of new drugs, and be alerted to possible dangerous drug interactions.

In part due to the aforementioned problems in the healthcare industry, activity in the connectivity sector is increasing. In 1998, an estimated 40 percent of physician claims were processed electronically, up from 18 percent in 1994. Increasingly, companies operating in the healthcare connectivity space, including hospitals, laboratories, physicians and pharmacies, are trying to aggregate users on both the front- and back-ends of transactions. As the healthcare industry broadens its electronic focus beyond claims processing, expect to see many other clinical and administrative transactions become automated, including laboratory and prescription ordering, referrals to specialists, eligibility checks and formulary checks.

Companies seeking to introduce connectivity solutions have generally targeted either healthcare providers or payors. The provider-based business focuses on physicians, hospitals and laboratories. By connecting these various disparate organizations under this model, the connectivity company can derive revenue primarily through service and system fees for the implementation and maintenance of the network. Alternatively, companies choosing to utilize a payor-based model concentrate on providing caregivers with the necessary information at the appropriate time to ensure that the corresponding guidelines and protocols are adhered to and permitting greater savings to be achieved by payors. The payor-focused model will utilize the Internet to facilitate real-time communication at the point of care. The payor is likely to realize lower medical costs and in turn pay set-up and maintenance fees to the connectivity company to operate the network.

Although most direct healthcare spending occurs outside of medical offices, physicians control an estimated 80 percent of healthcare spending. The physician, therefore, is at the center of a variety of healthcare transactions. Any efforts to control these transactions require the support of the physician. While many healthcare entities, including payors, hospitals, pharmacy-benefit managers (PBM), laboratories and pharmacies have been more interested in electronic connectivity solutions because it streamlines their workflow, reduces administrative costs, and increases volume, physicians have traditionally been resistant to change. Generally speaking, physicians' primary priorities are (i) the quality of care provided to patients; (ii) cash flow; and (iii) quality of life. Therefore, changes in any area of their practice, including innovations in connectivity, must improve one or more of these aspects without materially detracting from the others. Past connectivity or automation efforts have failed because the associated economic savings were not substantial enough and/or physicians workflow processes were impeded and not enhanced.

OVERVIEW OF LEADING CONNECTIVITY COMPANIES

@Outcome (www.atoutcome.com). @Outcome developed and markets an Internet-based system used by healthcare organizations to facilitate care management. The company's primary product is the Patient Communicator, a multimedia software application that attempts to simplify the collection, storage and analysis of medical outcomes data, and reduce the cost of its collection. The company, based in Austin, Texas, markets its products to healthcare providers, medical device manufacturers, pharmaceutical companies and payors.

Abaton.com (www.abaton.com). Abaton.com, based in Minneapolis, Minnesota, provides browser-based software and services that automate transactions among physicians, pharmacies, clinical labs, and payors. Through the company's Clinical Suite software, the user can access a patient's medical history, test results, and insurance coverage. Physicians are able to prescribe medications electronically to pharmacies, and make referral and eligibility requests with payors.

Allscripts, Inc. (www.allscripts.com). Allscripts (Nasdaq: MDRX) provides physicians with medication management and distribution solutions. The company's prescription writing software, TouchScript, allows physicians to access certain benefit, formulary and patient history information at the point of prescription and utilizes the Internet to immediately route transactions to a pharmacy. Allscripts is based in Libertyville, Illinois, and provides services to over 15,000 physicians at 4,000 sites across the United States.

Axolotl (www.axolotl.com). Axolotl Corp. is a provider of clinical messaging solutions for independent physicians and their healthcare partners. The company's Elysium product suite utilizes Internet, e-mail, and automation technology to link healthcare providers and enable better communication and collaboration. Axolotl was formed in 1995 and is based in Mountain View, California. The company has strategic relationships with Eclipsy Corporation, Oceania, Inc., and Helus, Inc.

CareInsite. CareInsite (Nasdaq: CARI) develops and provides e-commerce, information, and messaging services to doctors, suppliers, laboratories, and administrators. The company currently provides services to and owns 20 percent of The Health Information Connection LLC (THINC), which offers healthcare information to managed care providers in the New York area. CareInsite has a strategic alliance with AOL and has also entered into a relationship with MedPartners to offer online prescription services. The company is a 72 percent owned subsidiary of Medical Manager Corporation (Nasdaq: MMGR).

Healtheon (www.healtheon.com). Healtheon (Nasdaq: HLTH), founded in 1996 and based in Santa Clara, California, provides Internet-based business-to-business and business-to-consumer electronic commerce services that link doctors and consumers with healthcare institutions, enabling them to efficiently and conveniently manage their business and personal healthcare needs. In an effort to build the first end-to-end Internet healthcare and e-commerce company, Healtheon entered into two major deals: (i) an acquisition of MedE America (Nasdaq: MEDE), a provider of healthcare transaction solutions for pharmacies, hospitals, physicians, dentists, payors and pharmacy benefit managers; and (ii) a merger with WebMD (described above). The combined company Healtheon/WebMD will be based in Atlanta, Georgia and has numerous strategic partners, including United Health Care, SmithKline Beecham, Brown & Toland, and Beech Street. Healtheon also recently announced an agreement with Merck-Medco Managed Care, LLC, for Healtheon to develop online prescription services for use on a pilot basis with physicians who have a high concentration of patients with prescription plans administered by Merck-Medco.

Kinetra (www.kinetra.com). Kinetra is a joint venture between EDS and Eli Lilly and Company. The company provides Internet-based connectivity solutions to providers and payors. Services include claims adjudication, prescription review messaging, referrals, electronic scripts, lab orders and results. The company currently claims to connect almost 75,000 physicians, 54,000 pharmacies, and more than 200 major hospitals. Kinetra was founded in 1998 and is based in Golden, Colorado.

Pointshare (www.pointshare.com). Pointshare, focused on healthcare communities in the Pacific Northwest, develops and manages community medical intranets and online services that enable healthcare professionals to securely communicate among themselves, access patient information and coordinate patient care. The company has also entered into an alliance with MD Consult to offer additional resources and e-commerce offerings for participating subscribers. The MD Consult service integrates more than 35 leading medical books, full-text articles from over 45 renowned medical journals, MEDLINE and other databases, complete prescribing information for more than 30,000 medications, peer-reviewed clinical practice guidelines, customizable patient education handouts, personalized daily clinical updates, and continuing medical education programs. The company was founded in 1995 and is based in Bellevue, Washington.

E-COMMERCE

The growth of the Internet and e-commerce is revolutionizing the way individuals and businesses make purchases and conduct fundamental business processes, such as sales, product distribution and customer service. A recent report by eMarketer states that 60 percent of all Internet users shop online, and that number is expected to increase to more than 92 percent in 2000.

The healthcare industry presents an enormous opportunity for e-commerce. There is an unlimited range of products that can be offered online and such products usually have a high level of repeat sales. In addition, many sectors of the healthcare industry have inefficient distribution channels that can benefit from Web-based solutions.

In the business-to-business subsector of health e-commerce, many of the companies focus on creating an efficient and cost-effective mechanism for hospitals, physicians and labs to compare product information, prices and purchase equipment and supplies at a single online location. Purchasers can benefit from time and cost savings, while sellers have access to an alternate distribution channel that expands their traditional customer reach to drive additional revenues. Interestingly, the market for business-to-business services is most evident in industries with fragmented distribution chains and inefficient supply chain processes. Although this subsector is still in the early stages of development, many analysts forecast significant profit potential. IDC estimates that business-to-business online sales will grow from \$210 million in 1996 to \$153 billion in 2000.

The business-to-consumer healthcare e-commerce market is developing rapidly in several different areas. Some companies are focusing on niche markets, such as nutraceuticals (vitamins, minerals, herbs, etc.) and baby products, while other companies are pursuing broader platforms, such as establishing online pharmacies. Whatever the focus of these companies, they are often able to provide specialized content and personalized services, such as personal health trackers, prescription refill reminders and chat rooms.

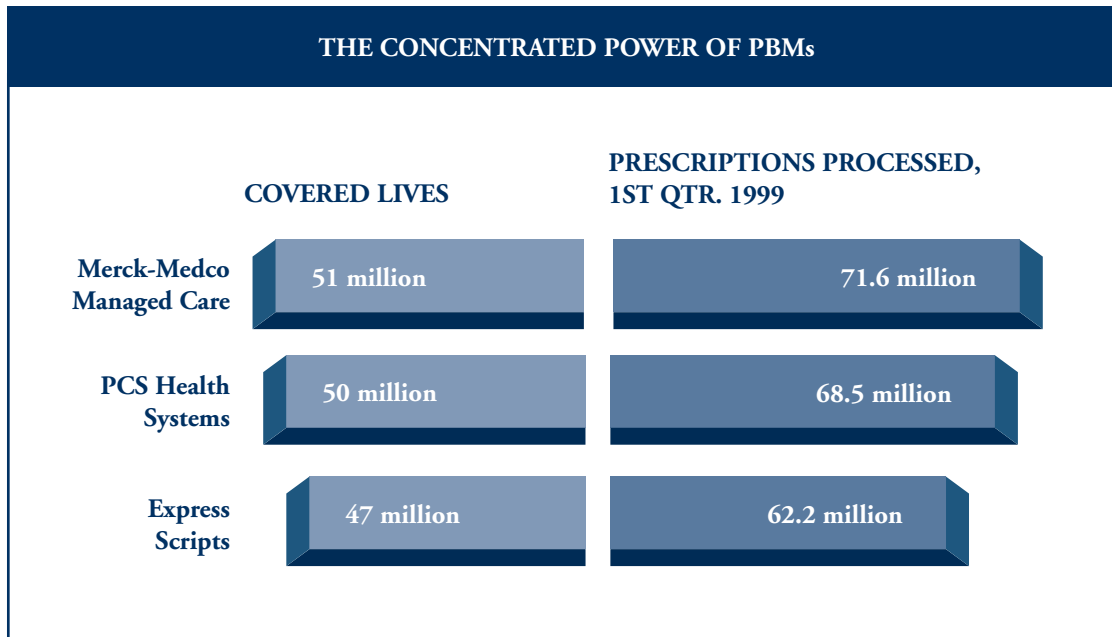
The size and importance of the pharmaceutical market have attracted an increasing number of companies that are attempting to develop online pharmacies. In 1998, more than \$90 billion was spent in the United States on prescription drugs, and nearly \$300 billion was spent worldwide. Pharmacies in the U.S. dispense nearly 2.5 billion prescriptions annually, nearly half of which are for individuals with recurring needs. In addition, estimates of consumer expenditures on health, beauty and wellness products sold in traditional drugstores and retail outlets are in excess of \$200 billion.

The online pharmacy marketplace is expected to become extremely competitive as more and more participants move into this sector to take advantage of the economic opportunity. Although Internet-only retailers like PlanetRx and drugstore.com (see profiles below) had a head start in establishing an online presence, traditional retail pharmacy chains such as

Walgreens and Drug Emporium are attempting to quickly establish their own presence. In addition, approximately 20 percent of independent pharmacies have Web sites and 10 percent are actively selling products online.

Several issues, however, could impede the growth of online pharmacies. First, these companies will find it extremely difficult to compete for episodic prescriptions - those patients that need a drug immediately and account for nearly \$55 billion in U.S. annual sales. Overnight delivery, while available at many sites, likely will not satisfy a customer's immediate need. Second, since insurance companies, rather than patients, pay for nearly 85 percent of all prescriptions filled in the United States, online pharmacies will need to establish relationships with PBMs in order to effectively compete for the vast majority of patients. PBMs are important because they essentially serve as brokers between payors and pharmacies by deciding where insured patients purchase drugs. If an online pharmacy does not have access to PBMs, its customers will have to pay full price for prescriptions instead of using their health insurance. The power of PBMs is highly concentrated, with the top three PBMs controlling prescription payments for more than half of all U.S. residents (see Exhibit 10).

Exhibit 10



Sources: Company reports, IMS Health, The Wall Street Journal

Second, back-end functions such as fulfillment, packaging and distribution need to be coordinated and systems must be properly developed so that PBMs and payors can interface in order to obtain formulary and benefit information. Third, due to the low barriers to entry, online pharmacies will likely face pricing pressure and the erosion of margins in the face of increased competition. In fact, some of the strongest competition

might ultimately come from PBMs that launch their own online pharmacies.²

Protecting patient confidentiality is another major concern that online pharmacies must satisfy in order to succeed. It likely will not be enough to merely inform customers that all information will be kept confidential; instead, proper technological safeguards must be implemented to prevent unauthorized access to patient health and insurance records, prescription orders and financial information.

Even those online pharmacies that can clearly demonstrate the steps they have taken to ensure a user's privacy will still need to overcome perceptions about Internet privacy. A study by Cyber Dialogue revealed that 77 percent of all American adults who plan to be online in the near future believe more regulation of the Internet is needed in order to protect privacy. At the same time, however, only 56 percent of American who regularly use the Internet to access healthcare information, including products available for purchase, believe more regulation is needed. The findings from this study seem to indicate that as more consumers go online and experience the privacy safeguards in place and the convenience of purchasing products online, the more likely they will be to trust that their personal information will be protected. Additionally, a continued crackdown by law enforcement groups on those sites that sell drugs and pharmaceuticals illegally or without a valid prescription will go a long way to increase consumer confidence.

OVERVIEW OF LEADING E-COMMERCE COMPANIES

drugstore.com (www.drugstore.com). drugstore.com (Nasdaq: DSCM) is a leading online source for health, beauty, wellness, personal care and pharmacy products. The company, based in Seattle, Washington and founded in April 1998, offers more than 17,000 brand-name personal healthcare products, a variety of decision-making resources, personal services and a licensed pharmacy. drugstore.com has formed strategic relationships with a wide range of companies, including AOL, Excite, Yahoo!, Netscape NetCenter, Amazon.com, OnHealth, IntelliHealth, Medscape, and Women.com. The company also recently announced a strategic partnership with Rite Aid and General Nutrition Center (GNC) through which drugstore.com will (i) offer users the opportunity to order prescriptions for same day pickup at 3800 Rite Aid stores nationwide; (ii) broaden the company's ability to provide prescription medication to customers with insurance reimbursement plans, including Rite Aid's PCS Health Systems, Inc.; and (iii) become the exclusive online distributor for GNC's products.

GreenTree Nutrition (www.greentree.com). GreenTree Nutrition is an online commerce and content company focused on the health and wellness market. The Web site provides comprehensive health and nutrition information (including information on alternative health issues) and sells a wide range of vitamins, minerals, herbs and other nutrition products. GreenTree does not accept advertising dollars from the manufacturers whose products are sold on the site. The company is based on San Francisco, California and has established partnerships with Yahoo!, iVillage/Better Health, Baby Center, Infoseek, Lycos,

Excite, OnHealth, and Moms Online, among others. Green Tree recently launched a new online store, more.com, in order to significantly expand its consumer product offerings beyond natural products. Through a strategic partnership with Bergen Brunswig, more.com will have access to more than 300,000 health and beauty products.

Medsite.com (www.medsite.com). Medsite is a provider of Internet-based services for the medical community. The company has launched a range of online resources including information, communication and commerce. Founded in 1995 and headquartered in New York City, Medsite.com claims a customer base of more than 150,000 registered users. In 1997, the company launched its first e-commerce destination - Medbookstore.com, offering a selection of more than 100,000 medical books and software titles. The company has also gone on to develop a number of other e-commerce destinations and services to meet the needs of the medical community, including MedMail.com, MedSupplies.com, MedMoney.com and MedCalendar.com. Medsite.com has over 600 strategic partnerships and alliances with hospitals, medical schools, associations, and healthcare companies, including WebMD, Physicians' Online, McGraw Hill, American Medical Association, and Stanford University, among others.

MotherNature.com (www.mothernature.com). MotherNature.com is an online retailer of vitamins, supplements, minerals, and other natural products, with a selection of over 30,000 items. The company also provides health information, with personalized information delivery and contributions from a panel of medical experts. A unique feature of the company's site is its Natural Health Encyclopedia, an online reference work designed to answer consumer questions on important topics, including health concerns, nutritional supplements, herbs, homeopathy, drug interactions, and diets and therapies. The company is based in Acton, Massachusetts and has been doing business on the Internet since 1995.

Neoforma (www.neoforma.com). Neoforma seeks to facilitate business-to-business transactions in the Internet healthcare market by creating a marketplace for healthcare professionals, offering commerce, content, and community services. The company operates the world's largest online database of medical products and services to enable commerce among healthcare professionals by linking organizations around the world that want to sell or donate used equipment with healthcare buyers and charitable medical organizations. Neoforma utilizes a revenue sharing business model, based on facilitating new and used equipment sales. The company has also entered into a strategic relationship with Healtheon. The company was founded in 1996 and is based in Santa Clara, California.

PlanetRx (www.planetrx.com). PlanetRx (Nasdaq: PLRX) is a full-service online retail pharmacy based in South San Francisco, California. The company offers a wide range of products, including prescription drugs, over-the-counter medications, vitamins, and other health and beauty products, as well as personalized services, including prescription refill reminders and warnings about drug interactions. In June 1999, PlanetRx received a \$50 million investment from News Corp., E*Trade, Louis Vuitton, and several significant healthcare investors. At the time of the announcement, News Corp. announced plans to

include PlanetRx into its plans to combine Fit TV, America's Health Network and AHN.com into a new service called The Health Network. PlanetRx recently announced an agreement with Express Scripts, Inc., the nation's largest independent PBM, to acquire the e-commerce operations of Express Scripts' yourPharmacy.com business and to become the exclusive online pharmacy for Express Script and its members. The agreement becomes effective upon completion of PlanetRx's IPO, at which point Express Scripts obtains a 19.9% interest in PlanetRx, post-IPO.

Soma.com (www.soma.com). Soma.com, based in Seattle, Washington, is another full-service online retail pharmacy. In May 1999, the company was acquired by CVS, the largest retail provider of prescriptions in the nation. CVS is also the nation's largest drugstore chain in terms of store count, with more than 4,100 stores. Soma.com plans to offer customers the option of picking up their orders at a CVS retail pharmacy as an alternative to having it shipped. The Soma.com site will ultimately be integrated into the cvs.com site.

MARKET ANALYSIS AND FUTURE OUTLOOK

The eHealth industry is poised for significant growth as demographic trends and the increasing pervasiveness of the Internet are transforming the manner in which healthcare services are delivered. Although the eHealth industry is still in the early stages of development, several companies are attempting to capitalize on the new revenue opportunities created by the restructuring of the U.S. healthcare system. While only a few eHealth companies are publicly traded today, there should be an increasing number entering the public market over the next several months. Up until this point, the stock market has greeted many Internet initial public offerings, including those of several eHealth companies, with a great deal of enthusiasm and bestowed high valuations on such companies. However, any prolonged downturn in the market could dampen investor enthusiasm and significantly decrease the valuations that such companies can command, in addition to possibly limiting opportunities for new companies to be brought public. Exhibit 11 provides a valuation summary of select eHealth public companies.

Exhibit 11

VALUATION SUMMARY OF SELECT eHEALTH COMPANIES

Company	Ticker	Recent Price (9/20/99)	52 Week Range	Market Value (millions) (9/20/99)	Shares Outstanding (millions)	EPS (ttm)
CONTENT						
adam.com	ADAM	\$11.88	\$ 2.13-40.00	\$ 54.77	4.61	\$(1.04)
drkoop.com	KOOP	16.94	10.00-45.75	500.72	29.56	(2.95)
Mediconsult	MCNS	9.50	0.42-23.88	270.49	28.47	(0.27)
OnHealth	ONHN	7.00	2.19-22.75	113.55	16.22	(1.40)
CONNECTIVITY						
Cybear	CYBA	9.63	9.00-23.13	127.71	13.27	(0.19)
CareInsite	CARI	46.00	26.75-62.25	3,201.32	69.59	(0.21)
Claimsnet.com	CLAI	5.69	5.13-19.13	35.54	6.25	(1.41)
Allscripts	MDRX	15.00	11.56-21.50	284.19	18.95	(1.50)
Healtheon	HLTH	46.38	21.75-126.19	3,297.67	71.11	(1.54)
E-COMMERCE						
Chemdex	CMDX	22.75	15.13-34.88	722.90	31.78	(4.79)
drugstore.com	DSCM	51.50	32.25-70.00	2,184.42	42.41	(2.40)

ttm = trailing 12 months

Sources: Thomson Investors Network, Yahoo! Finance

ENDNOTES

1. HCFA, *Internet Communications Security and Appropriate Use Policy and Guidelines for HCFA Privacy Act-protected and other Sensitive HCFA Information*, November 24, 1998.
2. Robert Berner, "Pharmacy-Benefit Mangers Launch Own Online Shops," *The Wall Street Journal*, July 27, 1999, B4.

Additional sources used in the preparation of this report include: U.S. Bancorp Piper Jaffray, Volpe Brown Whelan & Co., Hambrecht & Quist, Wit Capital, Forrester Research, Cyber Dialogue, Punk, Ziegel & Company, BancBoston Robertson Stephens, eStats, Thomson Investors Network, Quote.com, Company reports and filings with the U.S. Securities and Exchange Commission.

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