研究ノート

A Snapshot of e-Healthcare in the US and Implications for its Development in Japan

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E-healthcare involves the use of asynchronous communications and information technology to improve the effectiveness of healthcare delivery, healthcare administration, and access to healthcare information by consumers. This article used results of a literature search, news reports, and company information to compile a "picture" of the status of e-healthcare today in the US, and then analyze its potential for future adoption in Japan. Historically, administrative healthcare functions were the first to be revolutionized by information technology. Subsequently, Internet use caused an explosion of new e-health websites. Today, e-health tools are growing in use by all three major stakeholders in healthcare: payers, providers, and patients. Three areas of intense activity in e-health in the US are e-visits, e-prescribing or computer processed order entry (CPOE), and e-disease management. Each has been shown to reduce costs and errors, and improve the effectiveness of care delivered. Japan's healthcare system shares many similarities with the US, and should accrue similar benefits from the use of e-health tools. Current solutions to satisfy concerns regarding security and quality of information in the US, such as third party accreditation and government regulation, will likely alleviate similar concerns in Japan.

[key words] Internet, e-Health, Disease Management

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1. Introduction

This article describes the current state of e-healthcare in the US today. A variety of information sources such as the medical and industry literature, news reports, and company information were used. The history of e-healthcare is briefly traced and current business models examined. Benefits of e-health tool use, as well as obstacles to their use, are explored. Three specific e-health tools, e-prescribing/computer processed order entry (CPOE), e-visits, and e-disease management, are described in more detail including the extent of their current use. Finally, implications of these tools for Japan, including patient demand, their potential use and sponsorship in the healthcare system, and obstacles, are observed.

2. Background

(1) Description

e-health, i-health, and other recent healthcare vocabulary with the small letter "e" or "i" as a prefix refer to the use of electronic mail or other electronic communication, or information technology (IT), and/or the Internet for healthcare. e-health has been defined as "the leveraging of information and communication technology (ICT) to connect provider and patients and governments; to educate and inform healthcare professionals, managers and consumers; to stimulate innovation in care delivery and health system management; and, to improve our healthcare system.[1]" These "e-terms" are used both broadly, to define the use of these technologies in general such as in e-health or i-health, and specifically, to define specific transactions such as e-prescribing or an e-visit. Combinations of specific e-health transactions can be coordinated and used together in multidisciplinary activities such as e-disease management.

Two fundamental aspects of e- or i-health are the use of potentially asynchronous communication and access to information using technology. The Internet makes an ideal backbone for delivering both of these aspects. Any process or transaction in the delivery or financing of healthcare can be made into an e-process by using technology to provide communication between parties of the transaction and access to useful information.

There are two major categories of e-health tools: those used for healthcare delivery and those used for administration. A few examples of care delivery tools include those to facilitate physician encounters (e-visits), prescribing (e-prescribing), and e-disease management (e-DM) all three of which will be described in more detail later in the article. On the administrative side, filing insurance claims (e-claims), making referrals, (e-referrals), and appointment scheduling tools (e-appointments) are common examples. In addition to these two kinds of e-health tools, search engines, such as Yahoo, are widely used by healthcare consumers to find relevant information on the Internet.

Exactly who participates and who benefits from e-health? The stakeholders in healthcare can be broadly classified as patients, providers (e.g. physicians, hospitals, pharmacies,

laboratories, home care agencies, etc.) and payers, both private (e.g. HMOs and self-insured employers) and public (e.g. Medicare and Medicaid). Suppliers, such as pharmaceutical and medical device companies, also provide e-health activities related to the use of their products. All stakeholders can potentially benefit from the advances in e-health due to improvements in quality and efficiency. These benefits accrue to both care delivery and administrative activities.

(2) Business Models

Application of e-health to administration has advanced rapidly in the US due to both the tremendous burden of back office operations and the relatively easier challenge of automating administration versus care delivery. EDS, the electronic data processing firm started by Ross Perot, was arguably the first healthcare IT firm. The company succeeded in automating the processing of Medicare claims for the Blue Cross organization in the 1960s using computers. Later, doctors' offices and hospitals began to fill out claims on computers, using proprietary software, and send the claims electronically to the payers or their intermediaries using dialup modems. By 1999, 64.5% of the 4.6 billion medical claims processed by health insurance plans were transmitted electronically[2]. Today, 81% of physicians submit claims electronically, and of those 18% use the Internet[3]. Use of the Internet or other electronic communication is also growing rapidly for other back office operations such as specialist referrals, checking benefits eligibility, and formulary status.

During the Internet boom, four new e-health business models were born[4]. Portals, such as drkoop.com and Medscape, were set up with the goal of being the first place consumers head when they go the Internet whether for products, services, or information. Connectivity companies, such as Healtheon/WebMD, and TriZetto aimed to provide the connections between payers, providers, and consumers to expedite claims processing, sharing of web-based electronic medical records, provider ratings and other functions. B2B (business to business) sites, such as Neoforma.com and eBenX, tried to build businesses around healthcare supply and employer health benefits procurement, respectively. B2C (business to consumer) companies, such as drugstore.com and PlanetRx, set up on-line drugstores to compete with local pharmacies in selling products to consumers. Many of these new business models failed, or at least have not lived up to investors expectations. For example, drkoop.com which raised $200 million in capital and whose market capitalization once exceeded $1 billion, was recently sold for less than $200,000[5]. Today, the top 5 health web sites visited during a recent week were: MSN Health, WebMD, E-diets.com, Drugstore.com, and AOL Health, collectively receiving 7.3 million unique visitors[6]. Two of these, MSN and AOL, are major Internet service providers. The majority of these visitors are visiting these sites in search of health information, not to use e-health tools.

Today, the largest Internet healthcare companies are payers, providers, and suppliers, who buy or develop e-health tools to use with

their existing customers to do business more effectively. They have become the "bricks and clicks" companies in healthcare (i.e. using the Internet to augment their current "bricks and mortar" based businesses). Many payers have a number of website-based information and e-health tools intended for use by their contract providers, their members, and prospective members[7]. These tools may all be accessible from the same website, each user with their own login and password to restrict access to the intended user type. Providers, such as physician groups or hospitals, also have websites with e-health tools and health information intended for their patients and promotional information for prospective patients[8]. Other providers, such as pharmacies and clinical labs, and suppliers, such as pharmaceutical companies, offer website tools that help physicians and patients understand or request more information about their products and services. Pharmaceutical companies may have simple e-health tools for patients related to use of their products, such as e-disease management and health risk assessment tools. In summary, today's e-health tool sponsors and users are primarily existing stakeholders in healthcare, who are using the tools to support their current products and services.

But where do all these e-health tools come from? The trade journal *Healthcare Informatics* lists ~950 companies in 28 categories in the healthcare IT marketplace in 2002[9]. Most of these companies' products have some connection to the Internet, making them e-health tools. These companies make many of the e-health tools used by payers, providers, suppliers, and their customers. For example there are 197 companies listed as offering claims processing systems, 117 providing e-prescribing systems, and 287 selling electronic medical records systems. Many of the company names appear in all three categories, reflecting multiple IT and e-health tool offerings by single vendors. Most payers or providers would prefer to buy a full set of tools from a single, or only a few, vendors, instead of buying just one tool each from many vendors. The hundreds of e-health tool software and system vendors demonstrates the vibrant growth, fragmentation, and competition in the industry today. It is truly a buyer's market. Other payers and providers choose to create their own unique e-health tools using either internal IT departments or outside contractors.

(3) Benefits

There are three major benefits of using e-health tools: lower transaction costs, improved accuracy, and easy access to needed information. For example, the average cost of processing insurance claims could drop from the current $3 per claim to as little as 10 cents in a completely paper-less Internet system[10]. The costs of visiting the doctor, including time spent away from work, could be reduced by e-visits for certain conditions. Patients scheduling their own appointments on the Internet reduces the need for a receptionist. These reductions in overhead costs benefit all stakeholders. Back office automation is also the most common use of IT and Internet technology in other industries.

Healthcare is both communication- and information-intensive, providing much potential

for errors in relaying information. Use of e-health tools can reduce such errors in communication. For example, CPOE reduces errors due to illegible physician handwriting and can also check the order's logic. Higher accuracy in practice can be gained by the use of decision support tools for physicians based on the latest principles of EBM. This software can be updated continuously to incorporate the latest in scientific results.

All stakeholders can benefit from increased use of e-health tools in care delivery. Patients benefit from fewer errors and higher quality, more integrated care. Fewer procedures will be duplicated since all providers can see all pertinent information in a single place. Providers will benefit as these tools improve productivity and reduce risks associated with errors. Providers should be able to practice less defensive medicine, because they will have access to more information on which to base decisions. Payers will benefit due to improved efficiency in care provision and less duplication of care. Because of these many benefits, a bill was recently introduced in the Senate, The Efficiency in Health Care Act, or e-Health Act, by Senator Kennedy requiring healthcare organizations to meet strict mandatory IT guidelines in order to reduce costs and medical errors[11].

(4) Obstacles

Today, many obstacles slow the spread of new e-health tools. These include high capital cost, inconsistent processes and systems across providers, the continued use of legacy IT systems, and the lack of electronic medical records (EMRs). The capital cost of new e-health tools can be prohibitive, especially for smaller hospitals and medical groups. Some are even calling for government and private sector payers to bear the cost for new e-health tools, such as CPOE, since these payers will benefit from their use[12]. Some payers are advocating the tying of provider reimbursement rates to increased use of such e-health tools, to pay for and encourage adoption[13].

Another obstacle to widespread adoption is the variety of incompatible IT platforms that various providers currently use, requiring the new tools to be compatible with legacy systems. A similar obstacle is the variation in practice styles and patterns between providers. Since e-health tools used in daily practice must be based on the processes and workflow used by physicians, variations in practice style introduce complications in software development. Should the doctor adapt to the software, or the software adapt to the doctor? The former is difficult, and the latter further increases costs.

A major obstacle is the limited use of electronic medical records (EMRs). A recent survey indicates that only ~13% of hospitals across the country have fully operational systems in place[14]. Yet, a complete record of patient history, test results, diagnosis and treatment data is critical to many e-health tools. Patient charts are typically still in paper form in the offices of each physician the patient has visited. Until now, only integrated delivery systems, such as Kaiser Permanente (KP), have been able to use even a single paper

medical chart that moves, clumsily, with the patient from encounter to encounter to assure integration of care. Not surprisingly KP has been a pioneer in EMRs, eliminating this need to move paper charts between their offices. The organization plans to spend $1.5 billion over the next four years to convert paper records to electronic in all its offices for the convenient use of its 10,000 doctors[15]. However, outside of integrated health plans, patients with multiple insurance plans still visit multiple providers in different offices, making the maintenance of even a complete paper chart impossible.

3. Three e-Healthcare Tools in Use Today

(1) CPOE/e-prescribing

A 1999 report by the Institute of Medicine estimates that as many as 98,000 Americans die every year from preventable medical errors made in hospitals[16]. The application of information technology has helped other industries, such as manufacturing and financial services to improve efficiency and reduce errors. One source of preventable medical errors is in the prescription of medications. The Leapfrog Group estimates that 1 million serious medication errors occur every year in US hospitals[17]. These occur primarily due to illegible handwriting by physicians, drug overdosing due to decimal point errors, and overlooked drug interactions and medication allergies.

CPOE entails the doctor inputting orders for medication, lab tests, and procedures directly into a computer through either a conventional keyboard or personal digital assistant (PDA). e-prescribing, one type of CPOE, checks the drug prescription for correctness, interactions with other drugs the patient is taking, and known medication allergies. Other physician orders are similarly checked for both logic and correctness as well as duplication. Like many e-health tools, these programs are often web-based so they can be accessed from any location in or out of the hospital. They can be updated daily with information about new drugs, adverse reactions, and reimbursement. They are often tied into the patient's EMR, so that the patient's own medication history, including prior adverse reactions, can be accessed.

Hospitals and doctors' offices must buy these systems at large, upfront cost, and pay for system training, maintenance, and updates. The costs can run into the millions of dollars and there are more than 100 vendors of such systems. This has caused some hospitals to develop their own. For example, Brigham and Women's Hospital (BWH) in Boston, built their CPOE system internally at a cost of $1.9 million plus $500,000 per year in annual maintenance costs[18]. But despite the cost, concern and the avoidable nature of these errors has led to legislation requiring the systems. For example, a new law in California will require all urban hospitals in the state to have a CPOE system in place by 2005.

BWH found that implementation of their CPOE system, one of the earliest in the nation, reduced serious medication errors by 55%, from 10.7 to 4.9 per 1000 patient-days. Doctors enter

about 13,000 orders daily into the system, and on average 386 are changed due to system warnings and reminders. The system leads to estimated savings of $5-10 million per year, due to reduced errors[19),20)]. A study by LDS Hospital in Salt Lake City demonstrated a 70% reduction in adverse drug events after implementation of CPOE[21)]. Demonstrating other benefits, length of stay fell by 0.9 days and hospital charges fell by 13% after implementation of a CPOE system at Wishard Memorial Hospital[22)]. The Leapfrog Group estimates that CPOE can reduce error rates by 55% to 86%[23)].

According to a Gartner Group study, in 2001 only 16% of hospitals had a working CPOE system, but 67% planned to add one over the next few years[24)]. While 94% of physicians are not currently e-prescribing, 40% said they were interested in e-prescribing in the future[25)].

(2) e-visits

There are more than 1 billion outpatient physician encounters, the standard transaction in healthcare, per year in the US. While the doctor remains the focus of a patient's healthcare, patients actually spend very little time with the doctor. Because the visit is an example of synchronous communication, the doctor and patient must mesh their schedules together. The doctor may do this for 20-30 patients each day. The effort expended by those 20-30 patients in scheduling (often weeks in advance), traveling to, parking, and waiting for such doctor visits is immense. There is also a loss in worker productivity for the employer since most visits occur during the business day.

These additional costs and inconveniences have led to the rising popularity of telemedicine encounters. In these cases, a patient will call the doctor's office with a specific complaint and may receive diagnosis and treatment over the telephone for common ailments such as allergies, and ear or bladder infections. Telemedicine encounters are only successful for relatively routine and low risk complaints, and for patients that have already seen the physician. The telephone encounter may save hours of lost work time for the patient and his/her employer, a doctor bill for the avoided encounter, and precious physician visit time.

The next logical step beyond telemedicine is the e-mail, instant message, or other type of "e-visit". These are totally asynchronous, and can be incorporated into the course of a regular workday. An e-encounter has been defined as a "two-way, web-based exchange of clinical information between a patient and his or her caregiver that involves a closed loop conversation around a particular question or problem specific to the patient" [26)]. It may be initiated by either the patient or doctor. These e-encounters may consist of asynchronous e-mail exchanges regarding a new problem or medication, patient self-management, self-management status, an upload of information from a home-monitoring biometric device, or a real-time consultation. As with telemedicine encounters, the complaints are typically routine and relatively mild. e-encounters are valuable as inexpensive, self-documenting, relationship building interactions between patients and their physicians. One study estimated that 20% of all

physician encounters could be performed through e-visits[27].

There is a strong appetite for e-encounters among online consumers. For example, 90% of online consumers would like to use e-mail to ask their doctor questions, and 84% said they want to receive electronic alerts from their doctors specific to their medical histories to trigger a preventive interaction[28]. The potential in using this e-healthcare tool is growing as more physicians become Internet users. Currently, 95% of physicians have Internet access, 62% use it daily, and 21% consider it essential to their daily practice[29]. Approximately 60% of physicians believe that the Internet will increase and improve communication among physicians, patients, and payers[8].

There are two platforms for e-visits: standard e-mail software; and secure, web-based messaging systems. The first is easy to set up, with virtually no additional software needed in an office already equipped with e-mail. However, there are potential problems related to security, timely answers when physicians are out of the office, and long term storage and documentation of the e-visit.

This has led to the development of secure, web-based systems, such as those provided by Healinx, Medem, and other e-visit vendors. Healinx sells a system that provides for patient-initiated "web visits" with their provider as well as appointment scheduling, prescription refills, on-line access to medical records, and personalized prevention reminders. Each e-visit begins with an interactive questioning process for the patient which results in a succinct message about the complaint being sent to the doctor. Doctors can view the patient's medical record and prescribe one of a number of pre-determined treatment options. All of this occurs in a secure, asynchronous environment. The Healinx platform must be in use by the provider in order for the patient to access it[30]. Medem, founded by the American Medical Association and 44 other medical societies, also provides a secure Internet messaging platform for doctors and their patients, in addition to prescription refills and appointment scheduling[31].

The Healinx system will generate a bill for the patient or insurance company for the encounter. The Medem system currently charges the patient's credit card number for the price of the e-visit, typically $25. Physicians pay Medem $2.50 per e-visit for use of the web-based network.

Last year, First Health became the first national managed care organization to reimburse for e-visits. Patients with chronic illnesses, after an initial in-person visit, may have e-visits with their physicians reimbursed. Their providers receive $25 per e-visit[32]. Other plans are expected to follow. At Kaiser Permanente, where salaried physicians do not have to worry about reimbursement for individual encounters, approximately 25% of physicians already use e-mail with their patients.

While most patients want to e-visit with their doctor, most doctors do not. Only about 23% of all physicians currently use e-mail with their patients, though the number jumps to 37% among daily physician Internet users. According

to a recent survey, 54% of physicians said that ease of financial reimbursement would increase their willingness to conduct e-visits. However, payer and provider expectations may not be aligned, as 34% of physicians would expect payment between $50-74 for an e-visit[33].

(3) e-DM

More than 90 million Americans suffer from at least one chronic disease. Of these, approximately 58 million suffer from cardiovascular disease, 17 million from asthma, 16 million from chronic obstructive pulmonary disease (COPD), 15.7 million from diabetes, and 8.4 million from cancer[34)-36]. These diseases account for 1.5 million, or 70%, of deaths in the US annually. More than 60% of all medical costs are due to chronic diseases[37]. Cardiovascular disease consumes $287 billion per year, cancer $107 billion per year, diabetes $98 billion per year, and COPD $30.4 billion. The healthcare industry is seeking cost-cutting strategies that will provide these patients with more effective and comprehensive care[10),38)-40].

Today's leading model for effective disease management (DM) is the use of telemedicine nurses in a call center that contact patients to educate them about their chronic disease and help coordinate their care. This model requires sophisticated software to perform and track these telephone interventions and record individual patient progress. Data centers must merge all available claims and other data on each patient into a single database. These data are sometimes available on the Internet to patients and their physicians, thus DM today is already e-DM to an extent.

However, individual nurses calling individual patients is an expensive, labor intensive form of intervention. The ability to use interactive web-based tools and messaging to perform at least "semi-automatic" e-DM can reduce the cost of management substantially. This will allow DM to be performed cost-effectively on patients of much lower acuity in the future. For example, a McKinsey and Company report estimated that the use of e-DM tools could reduce DM program costs three- to seven-fold[41].

The First Consulting Group, has identified four operational models of e-DM in their recent report on the subject[42].

1. Patient self-directed is where the focus is on the patient with no electronic linkage to their provider. E-health tools for the patient may include a health risk assessment survey, personal action plan, medical search and FAQ, self-education modules, and others, all available on the Internet.

2. Patient support with linkage to case manager allows communication and information sharing to be established between the patient and case manager. Tools include case manager messaging, reminder messaging, and daily health questions. This technology resembles that used in e-visits, though the provider is a case manager who is educating and coordinating, but not directing, care.

3. Patient support with linkage to provider allows the patient to access information from, and establish communication with, their provider. Tools include pre-visit assessment, home monitoring data charting, and personal

health record with clinician access.

4. Clinician practice site allows the clinician's site to support patient and clinician based tools. Some of the tools for this model are a registry for tracking patients, disease history and management status displays, and online clinical care guidelines.

There are more than 225 DM companies in the US[43], including both fully integrated disease management companies and disease management tool companies, many producing e-DM tools, and/or offering e-DM services. For example, numerous companies produce physician assist software that tracks patient progress and suggests and communicates individualized treatment based on the latest EBM. This kind of toolset is applicable to the e-DM business model 4, above.

Each of these four models involves data gathering at the patient's home. This can be either subjective, as when the patient answers questions or inputs data manually, or objective, where a biometric medical device takes a measurement and transmits it directly to the provider or, more commonly, a case manager at a DM service company. For example, Alere sells a scale connected to the Internet that lets CHF patients measure their vital signs and respond to a series of symptom-related questions daily. Health Hero sells the Health Buddy, a simple question and answer device connected to the Internet, to gather answers to key questions about the status of their chronic disease. Lifemasters offers interactive web-based DM programs for individual patients to use. All three of these e-health tools could be useful adjuncts to all the above e-DM models.

Internet self-management companies, like Caresteps, allow patients to assess their health via a health risk assessment, and receive individualized advice and direction automatically through the Internet. This is designed for business model 1. Many e-DM tool companies still focus on a single product or specialty, necessitating payers or providers to assemble complete DM programs with components from multiple vendors. The alternative is to outsource the entire DM program to one of the fully integrated companies, such as American Healthways, CorSolutions, or Health Management Corporation. All of these companies use e-DM tools in their businesses.

There are few published studies of DM outcomes, and very little data to date on e-DM. In a meta-analysis of three CHF programs totaling 238 patients performed by Health Hero, use of the Health Hero Health Buddy was shown to reduce hospitalization and emergency room visits by 69%, and total healthcare costs by $8,000 per patient per year. In a second meta-analysis across two studies totaling 213 patients, hospitalizations for CHF-related events and emergency room visits were reduced 70% and CHF-related cost savings were $3,300 per patient per year. In a study of Health Buddy use for diabetes DM at Mercy Health Center in Texas, the tool resulted in a 32% reduction of inpatient admissions, 34% reduction of ER visits, 49% reduction of outpatient visits, and a reduction in overall charges of $747 per patient per year. Improvements in QOL were also documented using the SF-12[44].

The Palo Alto Medical Foundation used the Alere device and daily monitoring program as part of a comprehensive CHF disease management program. In a study reported at the 1999 American Heart Association meeting, 27 patients were enrolled for a total of 208 patient-months. The average patient age was 76, and 43% had been hospitalized within a year of starting the study. After beginning the program, which included use of the Alere device, there were no CHF-related hospitalizations compared with an expected re-hospitalization rate of 20-50% for this group. Other results showed clinical improvement in the patients' CHF and satisfaction with use of the Alere device[45].

In a study conducted by Life Masters comparing web-based versus interactive voice response communication, patients on the web-based system had fewer hospitalizations and shorter lengths of stay. The web-group also had higher compliance with vital sign measurement. Though 92% of the mostly senior-citizen web-based group had never used a computer before, it was reported that many went on to learn how to use the computer for e-mail, games, and exploring the Internet[46].

4. Issues With e-Healthcare

One of the most powerful features of e-health tools is the convenient access to information by all involved. For example, in e-DM, the patient, physician, nurse-coordinator, and home care nurse may all be able to access the EMR when necessary. This raises privacy concerns. Similarly, the abundance of healthcare information on the Internet seems to be of benefit to all. However, this too can be a double-edged sword since inaccurate information can mislead healthcare consumers. These two issues, patient privacy and accuracy of information, are the two major challenges facing e-health today.

A recent study of quality of healthcare websites showed that misinformation, such as vaccinations cause the diseases they are supposed to cure, drinking hydrogen peroxide will flush out your system, and deep coughing at the onset of a heart attack can save your life, is rampant[47]. Consumers want quality assurance of the healthcare sites they visit, but in many cases the only assurance available to them may be their physician's recommendation. According to a survey conducted by the American Accreditation Health Care Commission (URAC), a non-profit organization whose goal is to set the standards for the healthcare industry, 67% of consumers believe the sites recommended by their physicians are the most credible. When questioned, most consumers answered they would prefer if healthcare sites were evaluated by a third party non-profit organization. On the contrary, only 21% of the people surveyed wanted the federal government to regulate or evaluate the sites[48].

One way to assure the quality of the site is to obtain a "seal of approval" through accreditation. Accreditation and certification are voluntary processes whereby an agency or association grants public recognition to an organization that meets certain established standards of criteria as determined through initial and periodic reviews. Historically, healthcare accreditation

organizations have accredited managed care organizations (MCOs) and hospitals giving confidence to payers and patients. The growing use of the Internet as a source of healthcare information, has led many to call for similar accreditation for websites.

Payers, providers, and others with healthcare-related websites have an incentive to obtain the this seal of approval as accreditation leads to consumer confidence, and ultimately to better marketability of the product or service. According to a recent poll, 80% of consumers indicated they would have greater trust in a health insurance web site that carried an accreditation, while 77% said accreditation would increase their trust in hospital web sites[49].

There are a number of organizations that accredit e-healthcare sites. One such organization is URAC. It evaluates and accredits healthcare providers using a set of standards created by its board of experts. The accredited provider's name is made public through URAC's web site and other publications. URAC started its accreditation program for e-healthcare related sites in 2001. To this date a total of 13 healthcare sites are accredited and URAC has plans to have a total of 50 accredited by the end of 2002[50]. Other organizations that offer evaluation measures for sites are Hi-Ethics, TRUSTe, Internet Healthcare Coalition, Health on the Net (HON) Foundation, and eHealth Initiative. Some professional organizations such as the AMA also have guidelines for web sites, though they do not offer accreditation.

In addition to ongoing accreditation programs, there are number of independent studies and surveys looking at web site quality. In May 2001, The California Healthcare Foundation sponsored a study designed and conducted by RAND Health. The report, titled "Proceed with Caution: A Report on the Quality of Health Information on the Internet" is a comprehensive study of e-healthcare sites assessing accessibility, quality and readability. The report examined 24 healthcare sites and their contents relating to four conditions: breast cancer, childhood asthma, depression, and obesity. These four conditions were chosen because they affect a diverse population, are associated with an increased likelihood of early death and disability, and are likely to be the subject of inquiry for many consumers. Findings from the report concluded that: search engines are inefficient tools for locating relevant health information; while the information provided is generally accurate, answers to important questions are often incomplete; and content of the web sites is difficult for the average consumer to understand.

The second major issue involves privacy and ethical concerns. According to a recent survey[51], the following are the major concerns people have regarding the privacy and security of patient record information:

- Access to patient record information by unauthorized users
- Inappropriate access to patient record information by authorized users within and outside the organization
- Violations of data security policies and practices

- Inadequate standards for data security
- Limited data security functionality in vendor systems

Implications of breach of privacy include possibility of discrimination against an individual, embarrassment, identity theft, and being a target for marketing[52]. On being marketed, one of the finding from the aforementioned report states that about half of health information on the sites contains material that is promotional, but is not clearly labeled as advertisement[53].

To address these concerns, the US Department of Health and Human Services (HHS) recommends a single comprehensive guideline for privacy. HHS is currently analyzing the following leading frameworks: Health on the Net (HON) Code of Conduct; American Medical Association - "Guidelines for Medical and Health Information Sites on the Internet"; Health Internet Ethics (Hi-Ethics) – "Ethical Principals for Offering Internet Health Services to Consumers"; and "the Internet Healthcare Coalition" – e - Health Code of Ethics[54]. In addition, HIPAA of 1996, a privacy regulation proposed by HHS, applies to web-sites run by three types of entities: providers, health plans and claims clearing houses[55]. All businesses in the US are also bound by the FTC's Code of Fair Information Practice principles, which are to be adapted by organizations to develop their self-regulatory efforts[56]. The principles include notice, access, choice/consent, security, and enforcement.

Despite the efforts for a single comprehensive guideline, in reality there are an overwhelming number of guidelines created by various organizations, making it difficult for the consumers to distinguish between one site's privacy features and another. But the guidelines that may appear to be competing with each other are in reality complementary, with different goals and targets. In an annual meeting of the Internet Healthcare Coalition, representatives from various organizations met to discuss ways for reaching a consensus on ethical conduct codes.

There is also debate about whether a single entity should become the sole arbiter of quality in online health information. The website sponsors are diverse, representing hospitals to health insurance companies to pharmaceutical companies, each with their own different goals and incentives. For the time being, consumers must invest the time in determining which seal of approval they should look for on each type of web-site.

5. Implications for e-Healthcare Development in Japan

There are at least three questions to consider regarding implications for Japan: is the demand for e-health similar in Japan; can the current "supply" of e-health technology in the US be adapted to meet those needs or will uniquely Japanese tools be required; and who has the incentive to sponsor their use? While disease prevalence varies and healthcare practices differ in Japan, the range of healthcare needs is similar to the US. For example, a recent Harris Interactive report found that the percentage of Internet users who seek health information

online is 90% in Japan, slightly higher than the 80% who do so in the US[57]. Among the entire population, 53% of all Americans seek health information on the Internet, versus 38% in Japan. An interesting difference is the target of these searches. In the US, web sites of medical journals are the most commonly sought sources of information, whereas patient advocacy or support groups are the most common sources in Japan. Overall, demand for e-healthcare appears to be similarly high for both the US and Japanese consumers.

Will the same kind of e-health tools work in Japan? One can look at the roles tools play in the US healthcare system, and then compare the two countries' systems to see if the same tool set may be applied. Comparing the systems, healthcare in Japan is delivered and financed by the private and public sectors, respectively, similar to the Medicare system in the US. Patients have no choice for their primary insurance in Japan; it is determined by their age and place of employment. Patients have free choice among providers, since their insurance is accepted virtually everywhere. Whereas in the US, most healthcare for those under 65 is both delivered and financed by the private sector. There is choice among both insurance companies and providers.

The lack of choice for primary insurance and free choice of providers in Japan obviates the need for some of the e-health tools made available by payers for their members, such as those geared toward choosing among various types of insurance policies (except for the secondary insurance market) and locating contract providers. However, other insurance company e-health tools, such as those to assess health risks, self-monitor chronic diseases, and answer questions about insurance coverage, have similar application and utility in Japan. It should only be a matter of time before Japanese payers begin offering a full suite of e-health tools to help consumers get the most out of their "healthcare yen". Many of these first tools will probably be modeled after those in use in the US.

There are also many similarities between the fundamental nature of healthcare delivery in Japan and the US. Patients see doctors for similar complaints, receive similar tests and prescription drugs, and are hospitalized when necessary, though at different rates. Providers of all types must compete for their patients, in both the US and Japan. However, most US physicians have contracts with a limited number of health plans that refer patients. There are no such contracts today in Japan. Since there is no difference in price to the patient, and each patient's insurance is accepted everywhere, Japanese doctors compete on the basis of convenience, reputation/word of mouth, and the level of prestige of their institution, among other factors. Thus, the use of e-health tools to help improve, measure, and then communicate the outcomes of care is at least as important in Japan, as the US, in order for providers to differentiate themselves.

Financial incentive has much to do with who sponsors the use of e-health tools. The contract between payer and provider in the US call for payment by one of five ways: fee for service

(like Japan), discounted fee for service, per diem, capitation, or prospective payment (e.g. DRG). To the extent that e-health tools improve effectiveness, the type of payer contract should influence sponsorship of the tools. For example, a physician receiving a capitated payment in the US, is financially incentivized to provide free access to e-health tools, such as self-care e-DM tools, for his/her patients to reduce the patient's need for healthcare services, thereby reducing the provider's costs. On the contrary, if the providers are paid primarily by fee for service, there is no incentive for providers to sponsor such services. In this case, it is the payer that has the incentive to provide such tools directly to patients, usually though the payer's website. This mix of incentives in the US is a major reason for the wide variation among payers and providers in their offerings of e-health tools.

In Japan's fee for service system, providers have no financial incentive to offer such tools. Practicing more cost effective healthcare does not benefit providers in a fee for service system. However, Japanese payers have a direct financial incentive to offer effective e-health tools that improve health and help avoid unnecessary visits by their members. They should embrace e-disease management to the extent that it can be shown to reduce healthcare expenditures and improve quality of care in Japan. Since the kenpo plans are employer based, these companies should also be willing to sponsor e-visit tools and programs since they can both reduce healthcare costs, and improve employee productivity. e-visits for some minor complaints could take place at work, saving the time it takes to travel to the doctor. This could also cut down on the unhealthy practice of workers skipping necessary visits when they are very busy. The use of i-mode cell phones for e-visits makes privacy and security easier, since a cellular telephone screen is easy to conceal from co-workers as well as secure. Once shown to be cost effective in Japan, e-health tools should spread quickly, due to the use of a single language and high literacy, versus the language and cultural barriers in the US. One potential scenario for Japan, currently under discussion in the US, is that payers would sponsor increased use of e-health tools by providers, in a win: win manner.

However, certain obstacles to the adoption of e-health may be even larger in Japan than in the US. The fragmented, cottage industry nature of medicine is even more so in Japan. There are few provider groups, and more small hospitals and solo practices. Thus either e-health software must be adapted to even a wider range of practice styles, or more clinics and hospitals will have to re-engineer their core processes. Also, many e-health tools, including e-visit platforms, e-DM, and decision support software are based on EBM, which is not yet in wide use in Japan. Without such standards, each e-health tool would require even more customization for each clinic and hospital than in the US. Lack of EBM and acceptance of standards and guidelines also raises concerns about patient misinformation on e-health websites. Finally, concern for protecting patient privacy and aversion to risk of the consequences of betraying it may be even greater in Japan. This means that security will

likely play an even larger role among the features of e-health tools. These concerns will certainly lead to similar third party accreditation and/or government regulation to protect e-health consumers in Japan.

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A Snapshot of e-Healthcare in the US and Implications for its Development in Japan

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e-ヘルスケアは、非同期通信と情報技術の利用による、ヘルスケアの提供、管理、ならびに消費者による医療情報への効果的なアクセスの向上を目的としている。本稿では、文献検索、ニュースリポート、企業情報を利用して米国におけるe-ヘルスケアの現状の「全体像」を描き出し、日本におけるe-ヘルスケアの導入の将来的な可能性を探った。情報技術によるヘルスケア管理機能の革新は、歴史的にみても重要な対象であった。その後、インターネットの利用は、新たなe-ヘルスのウェブサイトの急増につながった。現在、支払者、医療供給者、患者という3つの主要な関係者のすべてにおいてe-ヘルスのツールとしての利用が拡大しつつある。米国においてe-ヘルスが活発に展開されている領域には、e-visit（受診）、e-prescribing（処方）すなわち医師のコンピューターオーダー入力、e-disease management（疾病管理）の3分野がある。各領域で費用ならびに過誤の削減、および提供されるケアの効果の改善がみられている。日米の医療制度には類似点があるため、e-ヘルスのツールの利用から同様な便益が得られるものと思われる。第三者認証や政府規制など、アメリカで現在利用されている情報のセキュリティと質に関する懸念を解消するための方策は、日本における同様の懸念を軽減するものと思われる。

キーワード：インターネット、e-ヘルス、疾病管理

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研究の背景と解説

医療経済研究機構
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インターネットの普及により、WEBサイトを利用した保健医療サービスの提供という新しい形態が生まれてきており、それらを総称して、最近ではe-Healthと呼んでいる。

e-Healthはとりわけ米国での普及が著しく、その背景には、情報技術（information technology）の発展をベースに、消費者の医療情報をもとにした医療サービスの選択、医療提供者、製薬企業など医療関連業界の情報による差異化などがあったと考えられ、1990年代後半には「e-health業界」とよばれるベンチャー企業が数多く誕生した[1]。

そこで、医療経済研究機構では、ファイザーヘルスリサーチ振興財団の国際共同研究助成をうけ、2000年9月より「インターネットによる患者・消費者への保健医療サービス提供（インターネットメディシン）に関する国際比較研究」（主任研究者 坂巻弘之）として主に米国のe-healthの現状について調査を実施してきた。

調査を通じ、e-healthに関する主な論点は、以下の４点に要約されると考えられた。

①e-healthの定義と範囲・類型化、関係者
②ビジネスモデルと成否の要因
③課題－情報の信頼性確保、個人情報保護、それらに関する規制
④情報技術の進展と新たなe-healthモデル

E-Healthは、わが国でも関心がもたれ、これまでもいくつかの研究が行われているが[2),3)]、これらの報告書をみても、事例の紹介をもとにこれらの論点を中心に議論を展開するという点で研究アプローチは共通している。われわれの研究では、消費者と医療サービス提供者との関係に焦点を当

表　e-Healthビジネスの類型化

	contents	commerce	care	connectivity	computer application
BtoB BtoBtoC	・医師、企業向け情報提供 ・情報検索サービス	・医療材料、医療機器の販売 ・医師向け生涯研修の企画販売	・医療機関向け疾病管理システムの販売	・保険請求代行 ・医療機関ネットワークシステムの構築	・電子カルテシステム ・遠隔医療システム ・オーダリングシステム
BtoC	・消費者向け情報提供 ・コンサルテーション（セカンドオピニオン含む）	・オンライン薬局 ・介護用品などの販売	・コンサルテーション（セカンドオピニオン含む） ・健康チェックサービス	・医師、医療機関の紹介 ・患者組織づくり（チャットなど）	
CtoC	・消費者向け情報提供 ・コンサルテーション（セカンドオピニオン含む）		・コンサルテーション（セカンドオピニオン含む）	・医師、医療機関の紹介 ・患者組織づくり（チャットなど）	

われわれは消費者に焦点をあて、インターネットを通してなんらかの形で消費者に情報提供、行動変容を促すモデルを「インターネットメディシン」とよぶこととした。インターネットメディシンは網掛け部分に該当する。
また、「toB」とは事業活動に役立てようとする顧客へのサービス提供をいい、「toC」とは１個人としての利用に限定される顧客へのサービス提供をいう。

てることを研究の特徴とした。すなわち、e-healthのうち、消費者とのコミュニケーションを目的にweb上で情報提供を行うものを「インターネットメディシン」とよぶこととし（表）、さらに本稿では、米国における最近の動向として、e-visit（受診）、e-prescribing（処方）すなわち医師のコンピューターオーダー入力、e-disease management（疾病管理）の3分野を取り上げた。この中で、患者/消費者とのコミュニケーションに影響を強く及ぼし、わが国への適用の可能性の高いものがe-disease management であると考えられる。

Disease management（疾病管理）とは、特定の疾患に対するハイリスク群に対して、生涯にわたり（予防からターミナルケアまで）、予防、診断、治療、リハビリテーションなどの組み合わせで、質の高い保健医療サービスと費用コントロールを維持するシステムの提供を目指す一連のプロセスである。こうしたプロセスのなかで、専門医、一般医、コメディカルはそれぞれ最も得意とする分野を受け持ち、患者（あるいは治療開始前のハイリスク群）に対して、予防的な生活習慣の改善や罹患後の治療順守を、費用の割に最も効果のある方法で達成させることを目的としている[4]。

Disease Managementにおけるツールとしては、診療ガイドライン、医療提供者の教育プログラム、患者・消費者の行動変容のための啓蒙プログラムなどがある。e-DMとは、インターネットを通して患者行動変容を促すことを目的としたものであり、わが国でもすでにWeb上の禁煙プログラムなどの事例[5]にみられるように実施可能性の高い領域であろうと考えられる。

情報技術の進展は著しく、消費者と医療提供者とのコミュニケーション手段は、インターネットにとどまらず、携帯電話・メール、携帯端末などへも広がりをみせている。90年代後半に米国で誕生したe-health企業もすでに消滅したものも多く、e-healthのビジネスとしての可能性については今後の検討課題であると考えられる。しかしながら、消費者の医療サービスへの関心は、より高まるものと予想され、e-healthは今後とも継続した調査研究が必要な領域である。

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