



**Patient-centric: the 21st Century  
prescription for healthcare.**

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***Patient-centric systems are evolving in which the patient's well-being and the responsibility for his or her own good health are defining treatment and operational policies. This change is made possible by advances in technology, but it is being driven by market forces and societal desire to improve the health of a nation's citizens, while reducing healthcare costs.***

**Introduction**

Throughout the industrialized world, healthcare systems are in crisis. Whether healthcare is shaped by government policy, driven by the market or a combination of both, aging populations and skyrocketing costs are putting unprecedented financial and organizational pressure on state and private healthcare providers as well as payers. The result is often a decreasing level of care.

In response, fundamental changes are taking place in the manner in which healthcare is administered. *Patient-centric* systems are evolving in which the patient's well-being and the responsibility for his or her own good health are defining treatment and operational policies. This change is made possible by advances in technology, but it is being driven by market forces and societal desire to improve the health of a nation's citizens, while reducing healthcare costs.

IBM is deeply involved in the move toward a patient-centric healthcare delivery system. In projects throughout the world, IBM is working with government bodies, healthcare providers and healthcare payers to help implement necessary patient-centric systems and strategies.

In this white paper, we will explore the meaning of a patient-centric healthcare system, its benefits as well as challenges, the changes necessary to create a patient-centric system, and the role that IBM is playing to help create new opportunities for all parties.

### **Healthcare today**

You have probably heard some of the anecdotes that illustrate the difficult state of today's healthcare systems. From patients to providers, everyone is affected:

- *The 250 000 people who die in the United States every year due to surgical errors, mistaken diagnoses, incorrect prescribing, hospital-acquired infections and inadequate care.<sup>1</sup>*
- *The heavy burden that U.S. industry pays to provide healthcare to its employees. For example, healthcare costs account for an estimated US\$1500 of every new car that General Motors sells, putting it at a serious disadvantage as compared to some of its foreign competitors.<sup>2</sup>*
- *The seriously ill woman who must go through the emergency room, rather than her physician, to get a hospital bed because the hospital needs the extra funds it receives from insurers for emergency room visits.*
- *The 45 million uninsured Americans who delay treatment or use the emergency room as their primary-care facility, shifting costs to private- and public-sector payers. As access decreases and premiums increase, the reputation of the health insurance industry plummets.*

The healthcare industries in many countries around the world are at a critical juncture. While offering the finest benefits to some of its citizens, nations are burdened with out-of-control health costs, rocketing insurance premiums, declining coverage and uneven access to quality care. Continuing a patchwork approach will only reduce a nation's competitiveness as the ability to keep citizens healthy falters.

In the U.S. for example, people expend more, but are getting less. In 2003, among nine industrialized OECD nations, the U.S. spent more per capita for all healthcare services (US\$5635) than any other, and more than twice as much as the median amount (US\$2280). In addition, the U.S. spends more than any of the 30 OECD member countries for public and private health insurance, with its citizens paying the most out of pocket.<sup>3</sup>

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**Highlights**

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***Patient-centric does not imply a fixed set of guidelines; rather it is a fluid and still-evolving definition characterized by practices that benefit patients: ensuring that they receive the best treatment, at a reasonable cost.***

***By following a patient-centric approach, every segment of the healthcare system benefits: patient health improves; payers reduce costs and premiums by becoming more efficient; providers improve the quality and safety of their clinical practice; and the industry reduces its financial burden to provide health insurance to employees.***

At the same time, the U.S. has the lowest longevity rate at birth among those 30 countries. Although virtually every other industrialized country offers universal health insurance, in the U.S., over 45 million people remain without any type of coverage, and millions more are underinsured.

Today's health benchmarks are not encouraging. According to various studies, more than 57 000 people in the U.S. die from inadequate care. Healthcare is unevenly available and unevenly priced. The World Health Organization ranks the U.S. 37th in overall health system performance; throughout the nation, similar procedures with similar outcomes can cost 400 percent more in one region than another. And among the 30 OECD countries, the U.S. ranks at the bottom in terms of life expectancy.<sup>4</sup>

**The patient-centric approach**

To help counter these trends, medical providers, governments and financing entities in the U.S. and a number of other countries are applying patient-centric approaches to healthcare. Patient-centric does not imply a fixed set of guidelines; rather it is a fluid and still-evolving definition characterized by practices that benefit patients: ensuring that they receive the best treatment, at a reasonable cost, while putting into place strategies that will help individuals avoid becoming sick in the first place.

Patient-centric models put the needs of the patient first, but require greater patient responsibility and accountability. Under a patient-centric system, individuals have the right to expect improved care as long as they educate themselves about health maintenance and wellness practices, change their behaviors to better manage their health, access medical records and information, and contribute an appropriate share to the total cost of care.

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***The definition of a patient-centric healthcare system is still evolving, but generally, patient-centric approaches have these characteristics:***

- ***Patient records, health information, procedure costs and practitioner data are made more easily available over the Internet.***
- ***Data is able to flow among system participants, including providers, physician practices, clinics and labs, and payers.***
- ***Patient and related medical information is incorporated into clinical work flows and processes, making pertinent medical information available at the point of care.***
- ***The individual's accountability for and participation in managing his or her own health and well-being increases.***

For this to occur, proper educational tools must be available to every part of the healthcare chain:

- *Accurate and accessible information allows patients to become better educated about their diseases, improve their overall health, find the best practitioners and factor costs into their decision making.*
- *Electronic health records help hospitals and doctors improve the accuracy of diagnoses, administration of medicines and the implementation of clinical trials. As patients become more responsible for maintaining good health, unnecessary doctor visits, testing and treatment diminish, reducing the burden on physicians' time, office staff and expenses.*
- *With electronic payments, providers are reimbursed on a real-time basis, reducing bad debt and a large accounts-receivable inventory.*

IBM is working with government and private industry and putting in practice various approaches to a patient-centric healthcare model; current successful projects have a number of key elements:

- *They involve every interested party in the healthcare chain: industry, patient, payer and provider.*
- *Medical records and information are stored electronically for instantaneous retrieval—in a highly secure environment that protects privacy and allows access only to authorized users.*
- *The Internet plays a key role in disseminating information.*
- *Technology standards are open, not proprietary.*
- *Cost and performance data is available to facilitate informed choice.*

Patient-centric implementations depend on advanced digital technologies. The development of the Internet and its pervasive use makes a patient-centric future possible. The Internet offers the patient, provider and payer access to the tools that can help rationalize a healthcare system.

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***Patient-centric networks, regardless of their ultimate structure, require these key elements:***

- ***The active participation of all parties: patient, payer, provider and employer***
- ***The electronic storage of highly secure and private patient data, accessible by appropriate individuals across institutions and geographical areas***
- ***Extensive use of the Internet for data access***
- ***Open, rather than proprietary, technical and interoperability standards***

***A patient-centric healthcare system is not a futuristic utopian dream; tools are now available that are already creating more rational, cost-effective and efficient healthcare systems***

The Internet allows patients unparalleled access to caregivers and others with similar diseases, learning the latest protocols and research. For example, sufferers of carcinoid cancer, a disease so rare that few physicians see more than one case in their careers, have created an Internet discussion group with a worldwide membership. Hosted by a carcinoid medical researcher, patients are now able to separate fact from fiction, offer moral support and receive information on the latest medical research and key research facilities.

On the consumer level, a network of MinuteClinics,<sup>5</sup> operating in Target stores throughout the U.S. is helping reduce the inability to access doctors and the burden on emergency rooms. The clinics provide walk-in medical care for busy shoppers with minor illnesses. Staffed with physician assistants, MinuteClinics see patients and prescribe medications usually within 15 minutes of arrival.

Patients will become more motivated to use this type of local low-cost walk-in medical facility when the cost of care becomes more transparent and patients must pay for services with healthcare-allocated savings. Health savings accounts (HSAs) are helping patients with high-deductible health insurance to set aside funds to pay for their medical costs. By increasing their fiscal responsibility, patients are able to use the healthcare system in a more prudent and responsible manner.

**Today's patient-centric systems**

A patient-centric healthcare system is not a futuristic utopian dream; tools are now available that are already creating more rational, cost-effective and efficient healthcare systems that are being implemented on governmental as well as institutional and individual levels.

For example, for the past two years, IBM has been working with the Mayo Clinic in Rochester, Minnesota to find new ways to analyze and organize patient data, with the goal of providing personalized diagnoses and treatment protocols based on personal histories, imaging, tissue, biochemical, genetic and other laboratory markers.

The two partners have integrated 4.4 million patient records into a unified system based on a standard technology platform, incorporating rigorous security and privacy features.

With this database, Mayo Clinic researchers are using breakthroughs in genomics, proteomics and molecular modeling to provide more-accurate care. Patient data can be compared to data from other patients with similar diseases as well as biochemical and genetic makeup.

The system has also enabled clinic staff to more-rapidly cull appropriate patient populations for clinical trials, reducing a 6-to-10-week effort to just minutes, and ultimately speeding time to discovery.

Still, health system advances in the U.S. are unevenly applied. For example, only 16 percent of primary-care facilities now use e-mail to communicate with their patients. Just 25 percent have implemented electronic health records and only 33 percent offer patients the ability to submit feedback evaluations.<sup>6</sup>

The U.S. government recognizes the importance of a patient-centric system and is actively encouraging the increased digitization of medical records. After medical data has been digitized, it becomes ubiquitous, available to all who require access, and available for research purposes. Efficiencies improve as health providers and patients have rapid access to medical information that can help avoid unnecessary procedures, incorrect diagnoses and inappropriate prescribing.

With electronic health records, facilities like MinuteClinics will be able to receive accurate medical histories without needing to contact a primary-care physician or to rely on the patient's memory.

In November, 2005, the U.S. Federal Government selected IBM and three other consortia to develop prototypes of a Nationwide Health Information Network (NHIN), with the goal of creating a nation-wide standards-based system of healthcare information exchange.

IBM, working in conjunction with Argosy, Business Innovation, Cisco and other companies, is developing an information network in three U.S. communities in New York and North Carolina, helping design databases based on open standards that will eventually be integrated into a national system of highly secure, user-authenticated information.

With electronic patient records, all medical specialists with a need to know can have immediate access through the Internet to information that can help shape a proper diagnosis and treatment. Lab results are entered into a patient's central database as soon as a test is analyzed, helping patients avoid premature office visits.

In a similar initiative, IBM has been contracted by Toronto's Trillium Health Centre<sup>7</sup> in Canada to integrate all of its patient information online, allowing healthcare professionals to obtain a complete, up-to-date picture of each patient from a single record, enabling improved patient care. To implement the project, IBM will employ IBM WebSphere<sup>®</sup> software, servers and integration services.

Now, family doctors will be able to access patient records regardless of the type of record or the system being used. With this data interconnection, tests will not need to be repeated and hard copies of charts and x-rays will no longer be physically sent between offices.

Digitizing diagnostic information increases the efficiency of both physician and staff. Online billing systems and pre-authorization streamline the payment process; physicians no longer have to bill for services, then await insurance notification of the actual rate they'll receive, and finally either rebill or credit the patient for the difference. Instead, a central billing database automatically deducts the approved amount from the patient's HSA or the insurer, upon completion of services. Funds flow more quickly and paperwork is dramatically reduced.

One of the most-frustrating aspects of visiting a doctor is that even with an appointment, one must often wait for long periods after the scheduled time to see a physician. Doctors are engaged in an often-futile struggle to stay on schedule as they attempt to manage unexpected medical issues.



With an Internet-based system, appointments are not only made online, but patients can confirm that the doctor is on schedule before they depart for the office.

In Denmark, Acure, an IBM subsidiary, has worked at solving many of these problems by creating the Danish national e-health Internet portal.<sup>8</sup> Utilizing IBM WebSphere Portal and database software as well as IBM hardware, citizens now have a central, highly secure point from which they can manage all their healthcare needs.

Using the highly secure Web site, patients schedule doctors' appointments, receive appointment reminders and check on appointment waiting times. The portal is also used to order and renew prescriptions, monitor drug compliance and gather information about prescribed drugs.

Every hospital makes its electronic patient records available through the system, allowing physicians to instantly determine a patient's health history and records regardless of which provider they've previously visited.

Patients also have their own personal health Web page from which they can monitor their health and learn who has accessed their records. Reliable medical information is available for those who wish to learn more about various illnesses and health concerns. For those looking for new providers, the site offers information on physicians and comparative costs of procedures.

Danish physicians and patients work hand-in-hand to maximize the healthcare experience. Each physician has an enrolled list of 1500 patients. Physicians are paid a set fee per patient, and additional sums are paid based on services rendered. Prescriptions are filled electronically. During emergencies, off-hours doctors either see the patient in person or prescribe medications remotely. The results of the off-hours consultation are communicated to the assigned physician using the Internet, ready for viewing on the next scheduled office day.

**The Internet is the key**

A patient-centric approach will only work if patients have the tools available to make informed decisions about their own care, and if they are encouraged to use them. Although the Internet offers a wide range of sites with medical resources, information is often difficult to find, poorly organized or simply inaccurate. To make well-informed medical decisions, patients need readily accessible medical information.

As patients gain more knowledge, they will begin to make decisions that help them obtain the best care, at the best prices. Market forces, which work so well in most other aspect of society, will come into play to help lower costs.

The Internet is playing a key role in creating a one-world market; in virtually every industry, goods and services are easily discovered, purchased and transferred from one country to another. Thanks to the Web, what would have taken weeks a decade ago can now be accomplished in a few seconds.

In medicine, sophisticated diagnostic tests performed in the U.S. are being read by highly qualified diagnosticians in other countries where costs are lower. The results are available as quickly as if the analysis were performed locally.

Patients are becoming “medical tourists,” using the Internet to discover world-class facilities abroad that offer advanced surgical procedures and top-quality care at a fraction of the cost at home.

As more patients use the Internet to pick care providers based on quality rather than simply location, that trend will accelerate. The market will encourage competitors at home to cut costs by rationalizing their business practices in order to stay competitive.

**A real-world approach**

The transformation from our current mélange of healthcare systems to a well-defined, patient-centric model requires a long-term transformation in economic models and individual behaviors. All parties that are involved in healthcare must be willing to alter their practices: patient, employer, provider and insurer, because each spoke of the healthcare wheel depends on the success of the others.

IBM has already enjoyed tangible health and financial benefits from a patient-centric approach. At IBM, employees are given financial incentives to fill out an employee health-risk appraisal. With the information, we develop a personalized preventative-care action plan.

Through over 40 different programs, IBM advises its employees on how best to reduce the risk of illness, through preventative care, exercise programs and diet.

The company's results have been impressive. Company injury and illness rates are lower than the rest of the industry's. Employees have enjoyed between a 9 to 25 percent reduction in emergency room visits, and a 16 percent cut in medical and pharmaceutical costs.

Thanks to the company's lower expenses, IBM has been able to reduce the price of insurance as well. IBM health premiums are 6 percent lower for families and 15 percent lower for single insured, compared to the rest of the industry. IBM estimates that it saves more than US\$100 million annually as a result of these initiatives.<sup>9</sup>

With fewer illnesses, employee productivity rises, employee medical costs decrease and insurance claims are lowered.

But to be most effective, change needs to be implemented on a nationwide rather than corporate level. Singapore's 3M system, for instance, combines mandatory medical savings accounts, US\$30 000 annual medical deductible medical insurance, a program that protects the indigent and wide access to comprehensive health information.<sup>10</sup>

The results: life expectancy has increased 15 years since 1960. Infant mortality is far lower than that found in either the U.K. or the U.S. And per-capita healthcare expenditures are much less than in the U.S. Singapore spends US\$1,105 per capita (in 2002) annually on healthcare, 4.2 percent of its GDP. By comparison, in 2003 the U.S. spent US\$5635 per capita, per annum, or 13.7 percent of its GDP. By 2005, that percentage had risen to 16 percent.<sup>11</sup>

**IBM's role**

IBM is in a unique position to help move forward the concept of a patient-centric healthcare system. The switch to a patient-centric health system requires robust standards of security and interoperability. The requisite system implementations define IBM's core strengths in data collection, aggregation, storage, integration and management.

Medical data must be as efficiently interchangeable as financial data is today. IBM is well-versed in creating interoperable networks, having played a major role in designing today's modern automatic teller machine (ATM) banking system. Through the company's efforts, financial data flows smoothly throughout a worldwide network, regardless of which institution or ATM is involved.

In North Carolina, IBM has been contracted by the Western North Carolina Health Network to enable patient data to be electronically shared across several hospitals in multiple regions of the state. IBM is providing a virtual electronic medical records system that links 15 network hospitals, allowing authorized doctors at member hospitals to access patients' medical records in a highly secure manner from other member hospitals' information systems.

Network officials believe that exchanging and using electronic health information between patients and consumers, clinicians and health sectors is critical for the industry to achieve essential improvements in quality and efficiency.

In Western Pennsylvania, IBM is working with the University of Pittsburgh Medical Center (UPMC) in a ground-breaking relationship to transform UPMC's IT infrastructure into an on demand environment, and we are collaborating in areas of mutual interest to bring innovation to healthcare.

IBM is providing hardware, software and consulting services to dramatically improve patient records management, biosecurity, information-based medicine and computational biology.

Under the arrangement, IBM is tasked with reducing UPMC's operating systems from nine to three, cut the number of its servers to less than half, while increasing capacity by 25 percent per year to keep up with the growing amount of digital data. Thanks to this innovative initiative, UPMC is estimated to save between 15 to 20 percent per year in operating expenses, resulting in approximately US\$100 million in cost savings over the term of the agreement.

In Singapore, the National Healthcare Group,<sup>12</sup> which oversees half of the nation's polyclinics, has rebuilt its hospital network, moving away from multiple platforms and implementing the integrated IBM WebSphere environment. Storage has also been consolidated, with the group migrating its clinical applications to the IBM Enterprise Storage Server® platform.

In Spain, IBM is working to overhaul the health service information systems in the nation's Extremadura region. Utilizing 31 IBM servers and server software, the region's 14 hospitals, 107 clinics and 300 local doctors' offices have been able to ease management and patient administration by integrating geographically separated systems, applications and data sets.

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**Highlights**

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***Whether one is a healthcare provider, insurer or employer, IBM has the necessary intellectual and technological resources to help begin the transformation to a more efficient, profitable, cost-effective and healthier society.***

And in British Columbia, Canada IBM has worked with the Ministry of Health to create the Fair PharmaCare Registration Project.<sup>13</sup> Families are now able to register at their convenience using the Internet for drug benefits, thanks to an interface designed by IBM and hosted on IBM servers.

As a result of this initiative, prescription eligibility results are now available to pharmacies within five minutes after registration is complete, thanks to open-standards-based messaging technology. In addition, the use of costly paper forms has been dramatically reduced.

**Conclusion**

Whether one is a healthcare provider, insurer or employer, IBM has the necessary intellectual and technological resources to help begin the transformation to a more efficient, profitable, cost-effective and healthier society.

With over 170 000 industry consultants, including the world's largest team of healthcare industry professionals, IBM is ready to provide the thought leadership essential for the implementation of a patient-centric healthcare approach.

IBM has a proven track record in designing, implementing and managing enterprise information systems. Member portals must fit the needs and capabilities of those accessing them. Our comprehensive research allows us to tailor and rapidly alter online access in response to a changing population's requirements.

For many Fortune 500 companies, IBM has become the outsourcing company of choice. We provide an entire range of back-end services, including billing and call-center staffing.

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**Highlights**

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***A patient-centric approach to healthcare will be one in which every part of the healthcare delivery-system benefits. IBM is already helping make this essential shift a reality.***

Most importantly, our approach always relies on open standards, not closed systems. The closed-loop, proprietary analogue world is over. Only open standards will allow all parts of the healthcare industry to quickly and economically respond to changing market forces and guarantee that data can be rapidly and seamlessly accessed throughout the world.

Major changes are coming to the way societies deliver, pay for, and use healthcare. New systems must be designed that take advantage of the advanced technologies that have already begun to improve life. A patient-centric approach to healthcare will be one in which every part of the healthcare delivery-system benefits. IBM is already helping make this essential shift a reality.

**For more information**

To find out more about how IBM can help change the shape of healthcare systems, contact an IBM Healthcare and Life Sciences specialist at [LS@us.ibm.com](mailto:LS@us.ibm.com) or go to

[ibm.com/industries/healthcare](http://ibm.com/industries/healthcare)



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- <sup>1</sup> HealthGrades estimates that 195 000 people die each year from medical mistakes. An additional 57 000 people die from inadequate care. Sources: *New England Journal of Medicine* and the California HealthCare Foundation ([www.chcf.org/](http://www.chcf.org/)).
- <sup>2</sup> PBS online, "Financial Troubles at GM." January 12, 2006. [www.pbs.org/newshour/bb/business/jan-june06/gm\\_1-12.html](http://www.pbs.org/newshour/bb/business/jan-june06/gm_1-12.html)
- <sup>3</sup> Organisation for Economic Co-operation and Development. *Health at a Glance: OECD INDICATORS 2005*
- <sup>4</sup> California HealthCare Foundation study, reported in *Health Affairs*, November, 2005.
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- <sup>6</sup> A 2020 Vision of Patient-Centered Primary Care. [www.medscape.com/viewarticle/514194\\_4](http://www.medscape.com/viewarticle/514194_4)
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