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Transforming Canadian Health Care through Consumer Engagement: The Key to Quality and System Innovation

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Introduction

Canadians are living longer today than ever before. Life expectancy for Canadian women is expected to rise from 82.9 years in 2006 to 87.3 years in 2036. Men are expected to increase their life spans from 78.2 years in 2006 to 84 years in 2036; precisely when the longevity of the Baby Boomer generation will result in persons over 65 years of age accounting for 24.6% of Canada's total population[i]. With Canadians living longer, the burden of ever-increasing demands falls on the health care system. Demands will grow exponentially as older Canadians demand and strive to maintain their independence and quality of life.

The aging Canadian population is increasingly challenged by chronic illnesses that place greater demands on Canada's publicly funded health care system[ii]. Increasing instances of the most prevalent chronic illnesses in Canada, including diabetes, heart disease and stroke, ensure pharmaceutical costs are perpetually increasing. Health system resources are spread thin to maintain the availability of hospital beds and meet the demand for health services that comes with an increasing volume of elderly patients. Given the limitations of current health service infrastructure, at some time in the coming decades, every hospital bed in Canada could be occupied by an elderly patient admitted for joint replacement surgery[iii]. As Canada's elderly population grows, Canada's health system, which is already struggling to provide quality patient care in a timely manner, will face a sustainability crisis. Canada's ability to withstand the repercussions of this crisis is questionable.

Healthcare is Canada's largest business sector[iv]. Between 1985 and 2005, the total per capital health spending in Canada rose by at least 50% across all jurisdictions with the largest growth experienced by privately funded health services and products[v]. In 1997, annual health care spending in Canada totaled

$79 billion; that figure had more than doubled to $160 billion[vi] in 2007. In 2010, the public sector accounted for seventy percent of Canada's annual health spending which was worth publicly $92 billon; 30% ($40 billion) came from private funding sources[vii].

Health care expenditures increase annually at a greater rate than both inflation and growth in the Canadian GDP[viii]. In 2009, growth in the Canadian economy measured 64% of the growth in national healthcare costs. Growth in Canadian healthcare spending is starting to exceed the growth of wealth in Canada. 2009 health costs accounted for 11.9% of Canada's GDP, up from only 10.8% in 2008. Canada is spending an increasing percentage of its wealth on health service delivery.

Canada is not alone in the struggle to preserve publicly funded healthcare. For the past sixty years, a number of OECD countries have experienced annual growth in health expenditures two percentage points higher than growth in their Gross Domestic Product (GDP)[ix]. Healthcare provision costs are a global problem. Countries that develop new world-class healthcare solutions will rapidly achieve success in competitive and robust global markets.[x] Benchmarking to global health leaders operating in these markets can help Canadian health stakeholders improve domestic performance and foster innovation. Canada is the third highest per capita health spender among OECD countries, but ranks only eleventh in health care performance behind (in order of rank): Japan, Italy, France, Spain, Korea, Switzerland, Sweden, Finland, Austria and Norway[xi]. Canada shares eleventh place with Iceland, Luxembourg and the Netherlands.

Although Canada ranks among the top four OECD nations in knowledge creation, it ranks dead last among OECD countries in the transfer of new knowledge into innovative health care technologies and solutions. Innovation is only achieved

when new ideas are brought into real world situations and used to improve patient and health system realities. Now more than ever, new cultures, attitudes and solutions are required to help close the gaps between knowledge, need and innovation.

Canada's economic competitiveness is contingent on the sustainability of its healthcare system. Health trends in the Canadian population play an important role in examining opportunities to achieve innovations that can dictate terms for the effective re-design of Canada's health system. Soaring health care costs, increasing rates of chronic illness and an aging population leave Canada struggling to meet the growing demand for quality health care. This is a time for new and innovative solutions to old problems. Canada's antiquated health system requires re-design at a system level in order to achieve sustainability in the years to come. That re-design needs to be focused through the lens of the Canadian health consumer and health information technologies will assume an important first step in health system innovation.

Fundamentally, Canadian health care needs to examine new ways of providing health care services that are meaningful to Canadians while leveraging technology to achieve system efficiencies and improved patient care quality. To learn what is meaningful to consumers, Canadian health leaders need to better understand Canadian health care consumers and their patterns of utilization. Once health leaders understand consumer demands and perspectives, they can effectively focus on developing vital technologies and innovative process changes that lead to system sustainability and consumer satisfaction. Satisfied health consumers are more likely to engage the health system as partners in improving care quality, safety, efficiency and ultimately sustainability.

The purpose of this white paper is to examine promising opportunities for innovation in Canada's health care system. This report examines opportunities to improve the system's sustainability in the midst of an immense and burgeoning market for healthcare products, systems and solutions. This report aims to de-compartmentalize many of the policy and programmatic tools and elements of the Canadian health landscape while demonstrating how unification of efforts across health stakeholder communities can transform Canada's health care system into an entity that achieves productivity, innovation and sustainability.

The Canadian Health Environment

The Modern Canadian Health Consumer

A recent Canadian health care consumer survey reveals the following insight into the Canadian Health Care System:

> "*It's not that Canada's health care system lacks many exceptional features, it's that Canadians' needs continue to evolve and the system is not keeping pace with (their needs and) their expectations"*[1]

Only 3% of Canadians interviewed in this survey considered the health care system to be grade "A"[xii]. 76% of Canadians rate the quality of health care they receive as excellent or very good, yet 52% of Canadians believe healthcare requires fundamental changes. 10% believe the system needs to be rebuilt completely. Canadians are expressing the need for health system service and process improvement[xiii]. Only one third of Canadians (37%) feel they have a good understanding of how the health system works. One in three Canadians report feeling "very satisfied" with the health care they receive. In the UK, 63% of people believe their system is working well with only minor changes required. Clearly, Canadian consumers value their health care system, but acknowledge system improvement is needed. These and other findings reveal important insights into the perspective of the Canadian health consumer; yet little attention has been paid to this existing body of knowledge outlining the evolution of consumer needs and values and how those expectations fit with current health service delivery systems in terms of access to care and services.

The use of and access to information technology is an important Canadian consumer trend. Canadians are avid global technological citizens. In 2009:

80.3% of Canadians used the Internet regularly,[1] 96% of Canadians thirty-four years and younger used the Internet regularly, and surprisingly, 40.7% of Canadians aged sixty-five or older used the Internet regularly. Trends in Internet usage tend to increase with education across Canadian demographic populations.[1] As of late 2009, more than 82% of Canadians had Internet access in their homes. More than eighty percent of Internet home users enjoy high-speed access. 69% of Canadians older than fifty-five have home access and they represent the fastest growing sector in Canadian Internet usage. Ipsos Reid predicts future consumer trends that will see massive increases in Internet usage.[1]

The Internet is a proven medium citizens use to interact with their communities and with publicly funded services such as health care. In 2009, 57.6% of people with Internet home access used the web to search for government information. 42.8% of home users accessed information online about a government program or service. 21.5% of home users submitted a completed government form online.[1] Canadians are not dissuaded from using the Internet for the transfer of personal information[1]. The growing importance of Internet technology for a Canadian population demanding paradigm-shifting transformation of the health care system is unmistakable. The growing trend toward health technologies that incorporate and transcend information technology may offer an important strategy for health system innovation in achieving greater consumer engagement in health care. There is a great need for health systems to engage consumers in new and innovative ways in an effort to achieve sustainability in a system struggling to cope and meet patient needs and demands. Information technologies that build direct connections to consumers may become one important opportunity for health system transformation.

A thorough review of the current health system literature reveals two fundamental features of the Canadian health system: service cost and service

access. These features are centrally important to Canadian consumers whose examination provides insight into how innovative technologies can be used to close the gap between evolving patient needs and the structure and function of health service delivery. Access to services and cost are both pivotal to achieving synergy between health system service functions and the needs and values of Canadian health consumers.

Access to Health Care Services

The 2010 Commonwealth Fund International Health Policy Survey revealed that Canadian attitudes toward national health care have not differed from attitudes outlined in the Romanow Commission report of 2002[xiv]. Canadians are generally pleased with the quality of care available to them, but are displeased with their ability to access care in a timely and coordinated way. Canadians are worried about their ability to access coordinated treatment, delivered in a timely manner.

The following commonplace scenario in Canada's health care system illustrates the challenges Canadians face accessing health services:

> *On Thursday, a person with severe eczema, living in downtown Toronto (a major urban centre known for leading health research and teaching) experiences a flare up and requires a refill on his steroid medication to ease the symptoms. He contacts his dermatologist and is informed he cannot be seen until referred by his family physician. The dermatologist had been caring for this patient, but had not seen him for over a year since his condition had been stabilized. The specialist requires a new referral, which will have to be faxed to the office directly. The office does not*

accept scanned referrals sent by email. The patient does not have access to a fax machine until after working hours, when the dermatology clinic is closed and will not accept faxes. The patient scans his referral and gets a family member to fax it to the dermatologist, but the office's fax machine is not working. The patient must wait until Monday and take a morning off work to deliver the referral in person; the very same referral that cost him a half-day of work to get in the first place. In the meantime, the patient's pharmacist requires an updated order since the number of refills has expired. Despite attempts by the pharmacy to contact the family physician for a new order, the pharmacy is unsuccessful. The patient has no choice but to go to the nearby emergency department or a walk-in clinic to refill the Betamethasone cream that eases his pain.

This scenario is all too common for Canadians who experience a health event and are challenged by the cumbersome processes required to begin treatment. The situation described above illustrates two challenges consumers face when attempting to access health care services. One challenge is the coordination of information flowing among health professionals (i.e., from primary care physicians to specialists to pharmacists) required for treatment. The second challenge is timely access to care and treatments necessary to ease discomfort and manage a patient's health needs. Access to care is clearly compromised by antiquated information systems that rely on fax machines and paper-based referrals that frustrate patients and often needlessly prolong their suffering. Clearly, current communication processes in health care have not kept pace with consumer trends in reliance on Internet based technologies. Consumers are understandably frustrated; forced to navigate a paper-based information system for health care service delivery when every other major consumer sector

in the Canadian economy (banking, travel, and retail sales) is able to harness web-based technologies to improve consumer access and expedite service.

Coordination of information among health care providers and timely patient access to both primary and specialist care are the basic health service provision issues that drive Canadian consumers to identify access to care as their greatest health-related concern. Canada's antiquated health information systems consume precious health care resources inefficiently and often unnecessarily. The following key indicators demonstrate losses in health care efficiency and productivity that contribute to Canada's failure in providing access to timely care:

- Twenty percent of Canadians state their time has been wasted due to poorly organized or badly coordinated care.[xv]
- 12% of Canadians report their specialist was missing basic personal information at the time of their scheduled visit.
- One in four reports that their regular doctor did not seem up to date on the outcomes of a specialist visit based on their own referral[xvi].
- In the past two years, 44% of Canadians visited an emergency room[xvii] and 47% of those visitors say they could have been treated by a primary care physician if one were available[xviii].
- Canadians have the highest rate of emergency department use among 11 OECD countries[xix].
- 65% of Canadians believe access to weekend and holiday care is somewhat difficult to attain. Canadians who find it "very easy" to contact doctors on holidays and after hours are far more inclined to rate the quality of care they receive as excellent.[xx]
- Fewer than 45% of Canadians report being able to get an appointment with a primary care physician the same day their request is filed[xxi]. Canada ranks lowest of 11 OECD countries in

- Patient ability to get an appointment the same or next day after contacting a primary care practitioner.
- 16% of Canadians have no primary care provider[xxii].
- 46% of Canadians say they would use a walk-in clinic rather than having to wait for a doctor's appointment[xxiii].

Access to care is an important element of the Canadian health care system that can be drastically improved by employing simple information technologies that allow information to flow easily and quickly between a consumer, their primary care physician, their specialists and additional health service providers. Practitioners and their administrative assistants require seamless information processes that efficiently e-schedule their time and patient follow-up services; conserving time on sending and receiving faxes, fielding phone calls, and managing referrals. Improved productivity in the system can be achieved by using information technologies to streamline communication and remove administrative burdens affiliated with a paper-based system.

Canadians want improved access to health care; access that requires timely and efficient information sharing and coordination between physicians, specialists, hospitals and primary care service providers to yield timely, quality service delivery[xxiv]. Currently, patients end up inadvertently punishing the system economically when they are driven to overuse emergency care facilities as their best viable option for routine health service provision, typically offered in primary care settings.

Information and communication technologies have transformed banking, travel and security sectors, leaving Canadian health systems lagging behind in the race to reap the benefits of system re-design. It is not enough for Canadian health systems to catch up to other sectors in the use of information technology. Canadian health systems need to develop and incorporate information

technologies that empower direct communication with patients and enable greater patient empowerment in achieving health and wellness. Consumers already embrace information technologies in their daily lives.

Health leaders can guide the effective re-design of Canadian health systems using information technologies, as a first step to streamline communication and coordination of health information among key health sector stakeholders while informing and engaging consumers at the same time.

Cost of Health Services

The second fundamental health concern shared by Canadians is the cost of health services. Consumer cost is a significant source of concern for most Canadians. A common misconception is that all health care costs in Canada are paid for, with little or no cost to the consumer. Yet, 29% of Canadians are not confident they could afford care if they became ill.[xxv] One third of Canadians report increased household spending on health care products and services, with annual increases in these costs as high as 20%. Only 39% of Canadians feel confident in their ability to handle future health care costs[xxvi]. While 75% of Canadians have private health insurance (primarily from their employer), only one quarter feel well insured[xxvii]. Currently, 10% of Canadians don't take medication due to cost[xxviii] and a further 10% don't seek health care due to costs affiliated with receiving treatments and therapies, including travel costs.

Canada has one of the largest land masses in the world and Canadians are often required to travel substantial distances to receive health care. Costs due to travel are a challenging reality for rural patients in particular[xxix]. The average Canadian household spends around $1,830.00 per year on healthcare[xxx]. Rising pharmaceutical expenses account for a significant portion of consumer concerns about rising health costs. Nearly half (47%) of the Canadian population takes prescription drugs regularly[xxxi]. Pharmaceutical drug expenditures are the

leading cause of personal health expenditure in Canada, while medical devices contribute significantly to the cumulative health expenses faced by Canadian families.[xxxii]

Cost is a significant factor for Canadian health consumers in seeking care within Canada and abroad. Despite frequent media reports of Canadians seeking care outside of the country, only 2% of the Canadian population actually purchases health services outside of Canada[xxxiii]. Two thirds of Canadians indicate they would see a health practitioner on a regular basis if visits demonstrated reduced costs (either public or private) in health care provision in Canada or if there was a financial reward or reduction in health system costs at the system level.[xxxiv] Most Canadians (69%) will choose a standard treatment (with 70% chance of success) that is covered by public health systems rather than seek treatments that are not covered by the public system promising 80% success[xxxv]. Even when expected treatment success rates of a private treatment are higher, Canadians overwhelmingly choose the covered option.[xxxvi] When out of country treatments are deemed necessary, only 23% of Canadians indicate a willingness to pay for these treatments out of pocket and only 17% of Canadians are willing to pay for elective care or treatment. Although only 6% of Canadian consumers used private health care services in 2009, 23% indicated they would access privatized services if it meant accessing better care quality. Only 17% of Canadians said they would access privatized services to gain improved access to care[xxxvii].

The costs of healthcare can escalate rapidly for Canadians suffering from one or more chronic illnesses, causing strain on the health system. It is widely known that the leading chronic illnesses in Canada include heart disease, stroke, diabetes, cancer and chronic respiratory diseases such as COPD and Asthma.[xxxviii] Many chronic illnesses are related to lifestyle factors in the Canadian population. In 2008, 55% of the Canadian population was found to be overweight or obese, while 45% of the population was found to be inactive and

27% of Canadians are smokers[xxxix]. The total direct costs related to these conditions are estimated at $492 million annually, while indirect costs are estimated at $1.12 billion with attributing costs for health care estimated at $1.62 billion[xl]. By 2026, older Canadians (the aging "Baby Boomer" generation) will propel this figure to $2.13 billion in annual "lifestyle" related healthcare costs[xli]. Still, Canada's health care system focuses a majority of its resources on managing illness and disease rather than preventing or minimizing the severity of chronic illness manifestations linked to lifestyle. Recent research suggests that an investment of $529 million in effective health and wellness programs that result in a reduction of obesity, inactivity and smoking by 1% in each category could yield a short-term direct annual health savings of $540 million[xlii]. A recent Deloitte health survey revealed that 56% of Canadians say they would likely participate in free wellness programs made available to them[xliii]. While the cost of chronic illness is substantial for both the health care system and Canadian consumers, these costs can be circumvented or reduced in many cases by programs designed to promote healthy lifestyles and improved patient-focused management of chronic illness.

Cost concerns shared among Canadian consumers are not limited to the individual costs related to health interventions; they also include the costs of caring for ill family members. An illness in one's family can be overwhelming[xliv]. For older Canadians with long-term chronic conditions, family members provide nearly 90% of assistance and support[xlv]. For children of Baby Boomers, supporting the needs of aging parents may be particularly challenging. Today, 28% of Canadians provide care assistance to a family member or friend. 20% of current family caregivers report a reduced ability to earn income[xlvi]. 38% of current caregivers (family or friend) have been providing care for more than two years[xlvii]. These figures are set to increase. With 51% of caregivers falling between the ages of 25 and 44, Baby Boomers may soon face intense pressures to relieve the burdens they place on family and friends, both in terms of quality

of life and hindrance of earning potential.[xlviii] In addition, the cost of family care giving has a substantial impact on Canada's economic growth potential. Chronic illness in Canada can create debilitating economic burden for patients, their families and society at large.

The Aging Canadian Population

Canada's citizens are aging. According to Health Canada, in 1998, only 12.3% of Canadians were over 65 years of age (3.7 million). Given current population trends, by 2016, 15.9% of Canadians, or 5.9 million people, will be senior citizens. By 2040, more than 20% of Canadians will be seniors[xlix].

The current generations of older Canadians, affectionately known as "Baby Boomers", were born during the post World War II baby boom between the years 1940 and 1965 when the number of annual births in Canada rose from 253,000 in 1940 to 479,000 in 1960. Annual births in Canada dropped to 419,000 by 1965. In a period of 25 years, the baby boom produced 1.5 million more births than would have been expected within normal growth patterns for that time (about 8.6 million); an increase of more than 18% in Canada's population.

Canadian Baby-Boomers are reaching their seniority[l]. In the second decade of the twenty-first century, the Baby Boomer generation will become the "Geri-Boom"[li] and Canada, along with many other developed countries, will experience a significant upward shift in its population pyramid toward the age of senior citizens[lii]. By 2050, nearly 2 billion persons will be over fifty years of age[liii].

The aging of Canada's population has special significance for the health care system. Rates of chronic illness increase with aging and the decline of a person's physical health associated with aging places additional demands on health care systems. Baby Boomers will be the greatest consumers of health

care services in the coming decades. For health systems to effectively manage increased demands for services, a much clearer understanding of the unique characteristics of these consumers is necessary in order to re-design the health system to more directly fit with their needs, their patterns of health behaviors, and their capacity to use technology.

Use of Technology:

Baby Boomers from industrialized countries formed the first television and advertising generation. They have positive attitudes toward technological consumption and innovation.[liv] Lifestyle expectations and standards of vanity among Baby Boomers lead them to embrace greater personal health management entering their geriatric years than those generations that preceded them[lv]. Baby Boomers are among the wealthiest segments of the Canadian population and are willing to spend disposable income on health care solutions[lvi]. Despite being less inclined than younger generations to be first adopters of new technology, Baby Boomers are willing to learn and adopt new technologies[lvii], particularly if these technologies offer meaningful connectivity with health and social support networks.

Baby Boomers are thought to have difficulty adapting to new technology because of technology-related anxiety. There is substantial evidence that older citizens experience diminishing anxiety toward embracing new technologies.[lviii] A 2007 Finnish study demonstrated Finnish Baby Boomers exhibited low levels of technological anxiety related to computer usage[lix]. Finland's booming mobile phone and technological industries make Finland's Baby Boomer population a good mirror to Canada's aging population.

Modern Baby-Boomers are overwhelmingly proficient with cellular phones, Internet browsers and even mobile Internet technologies[lx]. It was the Baby Boomer population that pioneered the use of mobile phones. Today, 85% of

Baby Boomers have mobile phones and 55% consider them a necessity[lxi]. Baby Boomers are on the verge of adopting smart phones and mobile Internet; led by tech-savvy younger Canadians. Younger Canadians (aged 45-54) are more likely than Baby Boomers to use touch-screens, smart phones and mobile devices in general.[lxii] Much like their adoption of social media, Baby Boomers are engaging these new technologies slowly, demanding to see results before they opt in. It is widely expected that the use of these devices will continue to grow among Canadians.

Patterns of Health Behaviors:

Baby Boomers are individuals with specific personality traits and needs. A majority of Baby Boomers are highly concerned with their own mental health, diet and body weight. Stress is a significant concern for 42% of Boomers[lxiii]. Because of their heightened awareness of health care options and product availability, Baby Boomers will be more likely than previous generations to seek preventative and elective health treatments.[lxiv] This generation has already demonstrated an enormous commitment to preserving and maintaining their own physical health, beyond that of the generation that preceded it, reinforcing a number of Baby Boomers' plans to work well beyond the traditional retirement age.[lxv] As medical treatment needs related to aging increase, Baby Boomers will increasingly demand service-oriented health solutions that preserve their quality of life, their time and their independence. As needs drive medical aides to become more socially acceptable, Baby Boomer patients may choose to rely on greater levels of assistance from technologies, simple and complex, that provides greater quality of life and free up hospital beds. This tendency toward maintaining independence and quality of life using assistive technologies may offer immense opportunity for health systems to engage this generation more directly in defining approaches to service delivery. Key indicators of this aging generation's openness to new approaches and technologies in health care are illustrated by the following:

- 29% of Canadian Baby Boomers say they would like personal health coaches to help them stick to personal health plans.
- 24% of Baby Boomers voice a need for care coordinators to aid patients in navigating the health system effectively. Like all people, Baby Boomers want to feel they are cared for and that health professionals are aware of their needs.
- 66% of Baby Boomers showed interest in remote health monitoring devices that empower them to monitor their conditions more independently on an ongoing basis[lxvi].
- Nearly 60% of Canadian Baby Boomers accessed medical information online last year[lxvii].

A 2009 national health survey indicated Canadian consumers are striving for integrated health care and health resources that allow them to pursue wellness and healthy living efficiently. However, existing supportive care models, like support groups and wellness programs, are not valued or heavily subscribed by this generation. There is clear evidence that older Canadians want to enhance their independence and self-care with improved convenience and more personalized approaches to care that maintain control of their personal health information. These Internet-empowered consumers are stronger advocates for their own care quality than generations before who had considerably less access to health information resources.

Engaging Baby Boomers in Health System Transformation

Knowing the general preferences, capabilities and health demands Baby Boomers will impose on the Canadian health system, the question is not if Canadian health care must evolve to offer greater consumer engagement but how this evolution can be effectively leveraged by consumer demand for greater access to care, at reduced cost, using the best available technologies. Canadian health leaders need to take advantage of this important opportunity

to engage high demand Baby Boomer health consumers, in shaping new technology-enabled health practices that reduce medical events and promote efficient patient care at home. Baby Boomers are sticklers for efficient use of their time and independence.

Baby Boomers are driven by a profound need to connect with their communities to build and sustain relationships with others and use socially validated and accepted brand names in their consumer choices[lxviii]. They appreciate online technologies. Baby Boomer adoption of new online technologies may be slow, but this doesn't mean that online socially integrated health solutions powered by health IT solutions can't gain popularity with younger, more adventurous technological generations and spread to Baby Boomers through word of mouth. This was the evolutionary path of the Baby Boomer adoption of Facebook[lxix].

Social networking websites like Facebook and MySpace now span generations and include a multitude of Baby Boomer participants[lxx]. According to Deloitte data, 2009 saw nearly 47% of North American Baby Boomers maintaining some sort of online social profile, up 15% from 2008. 36% of Canadians over 63 years of age are engaged in social media[lxxi]. 73% of North American Baby Boomers claim to have an account with Facebook; only 13% with Twitter. Nearly 90% of social media users over the age of 63 use Facebook. Clearly, Baby Boomers will retrieve information and communicate online. These image conscious consumers are willing to adopt technologies once the value of those technologies is demonstrated to them. The perception of missing a trend is a powerful motivator for this generation to adopt new lifestyle technologies. IBM is already developing PCs with display options that make interaction easier for aging Baby Boomers using technologies originally developed for disabled persons at St. Mary's University in Halifax[lxxii].

In his book, *The virtual community: Homesteading on the electronic frontier*, Howard Rheingold credits modern online communication technologies with the ability to turn the average person "*into a publisher, an eyewitness reporter, an advocate, an organizer, a student or teacher, and potential participant in a worldwide citizen-to-citizen conversation*"[lxxiii]. The Baby Boomers have embraced the web as a tool for business, personal discovery, communication and connection with others. This socially connected generation, obsessed with the preservation of personal wellbeing and empowerment, presents health systems with the opportunity to harness the Internet as an important resource in taking a greater role in managing their own health and self-care. Now is the time to introduce online health services that provide medically accurate information, patient support mechanisms and more informed and effective interaction with practitioners. The ability to personalize health services and offerings is extremely appealing to Baby Boomers who trust physicians above all others for medical council. Physician promotion of new health initiatives could be very helpful in soliciting Baby Boomer buy-in[lxxiv].

Building a Bridge to the Baby Boomers

Five Strategies for Reconfiguring the Health System to Improve Consumer Engagement

Canada faces a unique and defining moment in its history. The Canadian health system is approaching a prolonged period of unprecedented service demands from an aging Baby Boomer population. The Baby Boomers are a generation of tech-savvy game-changers who want to be more engaged in personal health management. They can become key partners in achieving health system efficiency and improving individual access to scarce health resources.

Below are five key strategies offered to health decision makers and stakeholders for creating goal-focused, pragmatic action in re-designing Canadian health systems to focus on engaging consumers. The five strategic guidelines outlined here identify "game changing" opportunities to engage consumers directly in the transformation of Canadian health systems; building sustainable, productive systems that deliver health care services directly interfaced with consumers, their needs, values and health behavior competencies.

The following strategies provide a roadmap to health care transformation in Canada.

<u>Strategic Focus 1: Engage Consumers Directly in the Health Care System</u>

There are three strategies that can engage consumers more actively in the Canadian health care system, impacting the quality of health care provided while reducing health care costs. These are:

- Create direct access points for consumers and health system stakeholders to seamlessly interact with health system services and information.

- Integrate consumer based "personal health records" with health information systems to create a streamlined flow of information between consumers and health professionals.
- Develop customized decision support tools and applications for consumers to more effectively manage their own health and wellness.

Canadian patients are expressing an interest in managing their own health records and engaging the health system as partners in administering their own care safely and accurately. Canadians increasingly want to be treated as consumers rather than as the recipient patients. Baby Boomers in particular want improved service, personalized programs and greater access to their personal health records.[1] New efficiencies in the management and distribution of health services can be strengthened by giving consumers direct access to health service providers, coordinating personal health information with health system services and supporting personal health decisions. This should be done in collaboration with health service providers and the health information systems that track and monitor patient outcomes.

Creating greater opportunities for consumers to interact directly with health systems may offer improved patient safety by minimizing duplication of patient information, streamlining processes for direct care access and supporting consumers to make health decisions in collaboration with health providers. Each year, between 9,000 and 24,000 Canadians die from adverse medical events. By avoiding duplication of system information via common health records containing all patient documentation, practitioners can have more time with patients and families while minimizing errors due to misinformation or gaps in information transferred between health team members. Canadian health systems need to provide patients quick access to information so they can

act as informed safeguards against medical error and alter courses of treatment. Today, a patient can have as many as ten different medical records in the Canadian health care system[lxxv].

Canadian consumers are concerned about their health care options. They want to be healthy, maintain independence and preserve their quality of life. A key challenge for health systems is finding ways to ways to engage consumers; particularly those with chronic illnesses, in managing their own care effectively to preserve their health and quality of life. Consumer engagement requires a shift in the culture of Canadian health care from a paternalistic manner where "doctor knows best" to a culture where patients are inspired to take a lead role in their own health, with health professionals as supportive partners. Direct access to health care services in a timely manner can empower consumers to manage their own care confidently knowing they can get help and support when they need it. Engaged and informed consumers can make better decisions about their own health needs and goals, and can be very effective at monitoring their own medications and treatments, preventing hospitalization for exacerbation of chronic conditions.

Consumer driven Patient Health Records (PHR) are an important step toward engaging Canadian consumers who want to manage a personal health record for themselves. Private sector companies now offer personalized health record services, yet there remains little or no ability on the part of the health consumer to integrate these personal health records with current health care data information systems. Consumers clearly desire greater autonomy in managing their own health care needs. 61% of consumers want their physicians, hospitals and/or the government to provide them with a personal health record (PHR) or online medical record, while 6% of consumers already maintain one[lxxvi]. 66% of Canadians in one study said they would like to access a family member's

PHR. 58% want online tools to help them assess, monitor and manage their health (e.g., risk assessment questionnaires, health diaries, etc.)[lxxvii].

The more complex the health conditions and challenges people experience, the greater the motivation of consumers to monitor and track their own personal health record[lxxviii]. This will also create greater potential cost savings for the health system by allowing greater consumer engagement using these tools. In 2006, the Commonwealth Fund outlined 14 advanced IT functions for EMRs. They are:

1. Electronic medical record functioning
2. EMR access for other doctors
3. EMR access from outside practitioner's office
4. Patient access to EMR
5. EMR routine use of electronic ordering for testing
6. EMR prescription issuance
7. EMR access to test results
8. EMR hospital record access
9. EMR hospital record reminders
10. EMR Rx alerts
11. EMR Prompt test results
12. EMR has easy to list diagnosis
13. EMR used to manage medications
14. EMR notifies patients due for care[lxxix]

Each capability represents a series of advantages to health stakeholders in their ability to interact with health information and empower consumers[lxxx]. Movements in Canadian health systems toward achieving these ends must be archetyped with specific plans for increasing the interoperability and

effectiveness of health information systems. Any EHR proposition should be measurable using four key characteristics[lxxxi]:

1. Interoperability: how well does it work with existing information systems?
2. Functionality: how well does it manage data and accessibility?
3. Complementarity: do EHR standards work with other system standards?
4. Market Relevance: are EHR formats accepted by consumers in the marketplace?

In Canada, only 8% of clinicians employ 7 or more functions from this list in their electronic medical record tracking. In the UK, this number is 83%. In New Zealand, it's 87%[lxxxii]. Only 23% of Canadian primary physicians employ EMRs and only 6% can share those records with other clinicians, while11% can access records from outside their own office[lxxxiii]. Canadian practitioners report minimal use of external health information systems in their routine practice. Only 8% of primary care physicians routinely order tests electronically and 11% routinely prescribe medication electronically. Canada has the worst primary care access to EMR technology among developed OECD countries[lxxxiv]. Canadian health systems require new innovation and a shift in organizational culture to move from its current state to a place where it can effectively engage health consumers online by sharing health information that supports active involvement in personal health care decisions and health management. Consumer use of information technologies to make informed health decisions has already begun to shift the doctor-patient relationship, which will continue to influence health system culture over time.[lxxxv]

Sunnybrook Hospital in Toronto made the bold step to provide all patients full access to their medical records online. This innovative approach to providing

consumers complete access to their own health information is an important step toward establishing partnerships with consumers who are highly motivated to participate in the administration of their own care, ensuring safety and accuracy. Sunnybrook Hospital is leading the way for Canadian health systems in recognizing the importance of utilizing technology to provide consumers complete access to their own health information.

Personal health records offer not only important opportunities for consumer engagement, but also offer substantial opportunity for cost savings in the health care system. PHRs enable the development of online personal health information systems, appointment management systems and referral management systems that can potentially reduce administrative costs and costs associated with appointment error while improving wait times. Better-informed consumers enable more efficient physician visits requiring fewer follow-up appointments.

The emergence of PHRs offering customizable decision support tools and applications to monitor and manage health and wellness by Microsoft (Healthvault launched in Canada in partnership with Telus) and Google (GoogleHealth) reinforces the value consumers place on personal health record keeping[lxxxvii][lxxxvii].

The system value of PHRs is impressive. Annual savings resulting from adopting PHRs could reach $1.5 billion[lxxxviii]. EHR system implementation in Canada could generate $39.8 billion in savings over 20 years: $10.4 billion in reduction of duplicate lab tests, $3.6 billion in the reduction of unnecessary and duplicate radiological tests and $48.3 million in the reduction of adverse drug events[lxxxix].

Canadians are not dissuaded from using the Internet for the transfer of personal information[1]. In 2009, 81% of Canadian males, 79.7% of Canadian females and 65.9% of Canadians sixty-five or older used the Internet regularly in a variety of capacities requiring the disclosure of personal data[11]. Canadians have privacy concerns, but a vast majority put them aside to embrace convenient banking, online commerce and government service access. Today, more than one hundred EHR projects are underway at a regional or national level worldwide[xc]. Canadians are ready to use the Internet to actively engage in health care[1].

Canadian Internet activity and subsequent access to volumes of health information on the Internet is changing the doctor-patient relationship. Patients are increasingly turning to online medical information sources (valid and invalid) to address their own health concerns and determine the best course of treatment for their ailments. Canadian health systems need to improve their presence online to ensure that patients can turn to reliable sources for information. Health systems can learn from the successes of the patient support website, Patients-Like-Me. Sites like this continue to connect hundreds of thousands of global disease sufferers through common treatment experiences and the exchange of best practices as experienced by fellow patients. With improved knowledge resources fueled by Internet connectivity, patients can be better guardians of their own health. 64% of Canadians declared interest in using available home monitoring devices to promote better preventative care[1].

Canadian health consumers, Baby Boomers in particular, are eager to actively engage in personal health management and participate in informed health decision-making. Canadian health systems need to promote the innovation and adoption of technologies that offer this opportunity. Patient empowerment can improve patient safety outcomes and quality of care by allowing for better understanding and more effective allocation of appropriate treatments. The engagement of Canadian consumers is a major step in achieving better

preventative health care throughout Canadian health systems. To achieve real engagement, Canadian health systems must part with paternalistic cultures and patiently embrace health consumers as partners in health care services.

Technology development and innovation need go beyond traditional health information systems to engage and empower consumers like never before.

Strategic Focus 2: Use New Technologies to Improve Communication Flow among the Health Care Team

There are three strategies that will improve the efficiency and effectiveness of the communication among health care professionals and the teams they work closely with to deliver quality patient care. These strategies are:

- Utilize hand held devices supporting communication among health care teams in "real time"
- Integrate best practice treatment protocols into health care team communication systems that provide real time information on patient progress toward treatment goals
- Create dynamic, interactive data sharing practices using technologies (such as bar coding, RFID, etc.) for more effective transfer and
- Sharing of patient information; leading to improved care quality, patient safety and efficiency.

If health systems can improve communication and the flow of patient information among health team members, they will place those team members in a better position to make informed, evidence-based decisions consistent with quality patient care. Health practitioners can improve efficiency by employing streamlined information systems that support communication in "real time" using hand held devices. Real time communication is a better alternative to staff constantly waiting for responses from physicians on call, nurses managing

demands from patients, or surgical teams completing procedures. Well-informed staff members who can readily access patient information and communicate that information among health team members can be much more productive and effective in providing efficient, quality patient care.

The results of strategic investment in health team communication can be remarkable. In the Maimonides Medical Center in Brooklyn, New York, automated record systems allow doctors to use computers around the hospital to communicate patient needs, order medications, and access best practice protocols for treatments of medical ailments[xci]. Telemetry beds output real-time EKG results, blood pressure, pulse and oxygen saturation displays for multiple patients, easily within reach of clinicians who make evidence based decisions on information literally at their fingertips. This reality emerged from a 1996 Maimonides Medical Centre that used a keypunch-card system to track billing. After undertaking IT improvements, Maimonides lowered its medical order processing time from 5 hours to 85 minutes. Laboratory tests have been reduced by 50%: attributed to a lessening of process redundancies. Length of patient stay has fallen (on average) 30%, freeing up beds to an additional 32,000 patients annually. By 2003, the hospital had appreciated a 9.4% return on its IT investments[xcii]. Similar improvements can be achieved in the Canadian health care system with a focused system level strategy for streamlining communication throughout the health care agency, with access to this very same information by consumers.

At the Indiana Heart Hospital in Indianapolis, 650 computer terminals have replaced nursing stations. There are no chart racks and no medical-records departments. Nurses do not have to ask patients for personal information multiple times, since all hospital departments share one administration system. This paper-less system freed up space that would have cost $230 per square

foot to build. Half a million dollars was saved on copiers, printers and filing cabinets. Indiana Heart runs its institution with 285 staff. A comparable institution using traditional medical filing systems requires 400 staff with an additional $3 million in annual salaries. The hospital's efficiency is credited with lowering post-heart attack recovery stays to three days from five. Of the

$60 million required to construct this hospital, $15 million (20%) was spent on IT and staff training in new procedures and system capabilities. The hospital gave health team members both technology and training in how to utilize it effectively and shift system cultures to accommodate new capabilities. Within five years, staffing savings alone will repay the hospital's investment in full. A single provider was selected to ensure interactive system performance[xciii].

Care of patients with multiple complex conditions requires an array of subspecialists at different sites with no single entity overseeing and learning from collective treatment patterns[xciv]. Today, health IT solutions exist that promote the dissemination of and adherence to best treatment practices in hospitals. Medical knowledge has become too large to navigate for individual physicians. Curing and treating complex health challenges have become an organizational responsibility whose fulfillment is reliant on best evidence protocols and standardized practice routines to ensure the highest possible quality patient care[xcv].

Harnessing technology to foster knowledge transfer among health professionals encourages a collaborative organizational culture that can better integrate knowledge at the team level, offering an important surveillance system that provides real time information on patient progress. Digitalization and unification of interoperable systems can promote this efficiency. Specialization of service providers creates further efficiency. In some health systems,

determining how to treat a woman with an abnormality in her breast can take weeks, requiring a multitude of separate appointments with a surgeon, a radiologist and an oncologist. Some clinics collapse this process into four hours by reorganizing these separate practitioners into a focused health team[xcvi]. Drastic technological upgrades are possible in short periods of time[xcvii].

Communication technologies working in the modern world could foster significant improvements in the systematic transfer of patient information between health team members. Barcodes can be used on health cards to provide easy access to patient records upon arrival to any medical clinic or emergency. Such a system can provide valuable safeguards for patient safety. Easier information access and less need for intrusive patient data collection can lead to better relationships shared by health care providers and patients.

In a premier organization, staff members are experts in their specific tasks and have a great understanding of protocols and goals that govern the greater actions of the system they work in. Canadian health systems need to formalize and improve the way practitioners communicate with one another on a personal and system level. Digitalization can cut administrative output, redundancy and cost. Referral systems can be arranged more expediently and appropriate information access more readily to appropriate specialists. Strategic uses of technology can build bridges between health practitioners and get rid of time consuming “paper work” that allows for more time to collaborate with patients to achieve their health goals. This becomes particularly important as the aging population requires increasing health care services and demand these services be personalized to meet their health care needs.

Improving communication among health team members will lead to more dynamic interactive data sharing practices, more effective knowledge transfer

and better sharing of patient information; leading to improved care quality, patient safety and efficiency. Changes in the ways health team members communicate and share patient information may help to shift Canada's health culture towards consumer engagement that drives care providers to worry more about working with patients than spending valuable time collecting or searching for valuable patient information.

Canadian health consumers want more guidance and personal care in their interactions with health systems. They want better tracking of their information and more efficient management of health practices, creating shorter wait times for care, urgent or otherwise. To achieve these ends, Canadian health care systems will have to foster better communication and knowledge transfer between health team members to achieve an effective interface with health consumers. The Baby Boomers will require nothing less.

Strategic Focus 3: Develop New Technologies and Software to Support Consumer Engagement in Accessing the Health Care System

There are three strategies proposed that can build Canada's health care system capacity to engage consumers more actively and in a meaningful way.
These include:

- Utilize social networking connectivity to engage consumers more actively in their own health care.
- Enable health systems to engage their patients in open dialogue and support collaborative partnerships with them to facilitate better home monitoring and care for aging Baby Boomers in their home.
- Develop social networking capacity that interfaces with personal health records and information systems for seamless communication between consumers and health care teams.

Health systems need information systems that go beyond operational efficiency and prescription management. It is time for broader thinking in health care service design. Canadian health systems need to utilize social networking connectivity and new methods of engaging socially active consumers in health care services. One example is the recent press release from PharmaTrust the creator and developer of the *MedCentre*, which makes use of advanced robotics, scanning and Telehealth technology to connect individuals in real-time to a pharmacist in another location. This technology dispenses medications, prepackaged in the correct dosage, to seniors in their own home and uses Telehealth technology to connect the senior with a pharmacist in the event they need assistance. This innovative technology provides seniors living independently with the ability to seek support from health professionals whenever it is needed to ensure safe and accurate medication administration. Greater research and development efforts are required in this sector with a focus on creating technologies that engage consumers directly in their own care while at the same time providing easy access to health professionals for ongoing support and monitoring in the home.

Health technology providers need to move quickly to develop new software that enable health systems to engage their patients in open dialogue and begin developing important coaching and monitoring competencies to facilitate better home monitoring and care for aging Baby Boomers. Health systems need to develop social networking capacities and features that interface with personal health records and administrative systems in Canadian health care institutions. Airlines have interactive consumer based software that input, manage and analyze data in a variety of capacities. Why can't health? Herein lays a significant opportunity for Canadian global health leadership as well as economic competitiveness.

Canadian health systems will require software to support innovative electronic health record (EHR) formats to manage patient information effectively, ensuring accessibility for appropriate practitioners. Secure Portable Token (SPT) EHR technology uses a certified operating system and secure microcontroller to keep data secure while enabling patients to keep a copy of their health record because of the decentralized architecture of the support system[xcviii]. This way, an independent copy of the patient's record stays with the patient. The effectiveness of such a system is contingent on the reliability of the software that supports it. The reality of such technologies should expedite some resolution in the difficult debate over who owns patient medical data. The results of this debate will shape the future of health care provision and monitoring in Canada for years to come.

Canadian software developers face stiff global competition. Secure token technology and smart cards in particular are emerging trends in health management upon which Canada can benchmark globally. France's *Sesam Vitale*, New York's *Patient Health Smart Card* and Taiwan's smart card system carry patient national security numbers and practitioner certificates to implement a strong identification process that ensures limited user access[xcix]. Germany's smart card initiative plans to use smart cards to carry recent prescription information[c]. The German system emphasizes holding patient files locally, as opposed to having health records housed in a central database. The German smart card is limited to 100kb of stable memory[ci]. SPT technologies in current development could boast as much as 256MB[cii]. These SPT technologies could give patients the opportunity to manage their own security needs relative to their health history and control user access to their files as needed[ciii].

Beyond PHR software, health software developers need to focus on engaging consumers and their need for social connectivity. Patients-Like-Me and other

patient support websites provide successful models of how health-focused online activity can support, inform and improve consumer awareness of personal health care challenges and best practice options for care.

Ultimately, the future of Canadian health care's online service delivery capacity is contingent on the software and ICT solutions available to the health system. Health system leaders, academic researchers, and policy makers need to collaborate with software developers to pursue functional programs that are designed with the consumer needs in mind, but also fulfill system needs and offer new and innovative avenues to engage consumers.

Strategic Focus 4: Redesign Health Care Services to Reach Out to Consumers and Support Health and Wellness Care at Home!

Three strategies are proposed to re-design health systems so they reach out to deliver care to consumers in their own communities to support independence and quality of life; particularly for seniors. The strategies are:

- Create innovative home monitoring and surveillance measures that build supportive networks connecting health service providers to consumers in their home environment.
- Design and implement creative ways to promote interconnectivity between homes, clinics and family health teams in communities to offer consumers personalized services that can maximize independence, improve patient quality of life and reduce system costs.
- Create distance health monitoring and surveillance for family and friends who care for ill loved ones and need to stay connected to elderly family members at home.

To control spiraling health costs and bed shortages in the years to come, Canadian health systems need to develop technologies and innovative

approaches that keep people at home with the support, monitoring and surveillance they need to effectively manage their own conditions in their own community. This is particularly important for Baby Boomers, who have had a long history of "game changing" interactions when displeased with the state of social systems. Canadian consumers are up to this challenge and many are looking to prolong their independence and quality of life by remaining at home. 64% of Canadians express interest in using and purchasing home health monitoring devices[civ]. Trends in better self-monitoring may reduce the reliance on health professionals to manage chronic conditions and shift the focus away from managing acute exacerbations of illness toward managing prevention of such health issues.

Canada's fundamental challenge in home care provision is the engagement of consumers with chronic or complex illness, particularly those aging consumers with two or more chronic illnesses. Health systems need to engage these consumers directly and support improved quality of life achieved through greater independence and autonomy in managing chronic illness. Substantial cost savings associated with reduced hospitalization come with the additional benefits of a cultural shift away from paternalistic, prescriptive care of patients.

Technologies that provide access to personal health records and provide health services in the home can support consumers to monitor and titrate their own treatments and medications to achieve stable health outcomes associated with chronic illness. There is tremendous potential to achieve greater levels of health and associated cost savings for health systems. To achieve these goals, health systems in Canada need to design and implement creative ways to connect consumers at home with institutional health professionals to build interconnectivity between hospital, clinic, home, family health teams and

communities, providing health practitioners with the ability to offer consumers personalized services that can maximize independence, improve patient quality of life and reduce system costs.

Case in point: the US care management organization at Montefiore Medical Centre is achieving impressive results using remote monitoring systems to reduce the need for elderly citizens to be hospitalized by managing their care and treatment in their homes. During the first year of their new program to facilitate active and accurate distance health monitoring, the Centre saw a 38% reduction in admissions and a 55% reduction in emergency room visits among elderly patients. All this was achieved while providing better quality of life for patients who spent fewer days in hospital with fewer serious medical events[cv].

New technologies and health outreach media can empower consumers to actively care for themselves in a home setting. In Mexico, Medicall provides telephone-based medical advice and triage to more than 5 million people for the nominal charge of $5/month, collected through the patient's phone bill. In Mexico, a regular physician visit costs roughly $30.00 USD[cvi]. Medicall is able to provide care for those who would otherwise be deterred from seeking it until their conditions became desperate and resulted in unnecessary suffering and high cost emergency treatment. Medicall resolves two thirds of all issues over the phone, resulting in a 30% reduction in doctor visits[cvii]. Each year, Medicall serves one million household subscribers and fields 90,000 calls per month[cviii]. Now that's Telehealth!

There are significant differences in Canadian and Mexican Telehealth. In Canada, Telehealth operators are fearful of repercussions for missed diagnoses and all too often direct callers to go to the emergency room[cix]. This safeguarding practice inhibits patients from avoiding hospital and successfully administering health management solutions in a home setting.

Beyond patients seeking greater independence, the possibility of improved distance health monitoring and surveillance offers hope to family and friends who care for ill loved ones. Future social health technologies and online resources may enable private caregivers, armed with improved medical knowledge and PHRs, to find social support among those who care for loved ones with similar conditions, facilitating informal exchange of best practices prescribed by physicians or appropriate practitioners. Perhaps new technologies will enable caregivers to spend more time away from home without worrying about loved ones by facilitating improved abilities to stay connected with older patients at home and track conditions moment to moment. This improved early detection and monitoring capability could lessen serious medical incidents that result in massive emergency volumes and costs associated with long-term care.

Getting older patients to employ new technologies effectively may be a key to freeing up younger family members for work and social obligations. Like any product or service to any consumer, an elder person's successful adoption of a new technology will likely be defined by the ease and comfort involved in using a given technology, the sense of physical safety and emotional security technologies provide, and the value they present in achieving desired goals or activities that promote personal feelings of independence.

Imagine the perceived value of new health technologies that give Baby Boomers the ability to work longer, preserve independence and enjoy managing their own health care with the support of home monitoring instead of costly and uncomfortable hospital stays. The consumer value proposition inherent in this efficient course of care provision may be enough to drive change in this direction if health leaders are conscientious in designing the right tools

available to make distance monitoring a safe alternative to prolonged hospital care.

Strategic Focus 5: Use New Technologies to Achieve Real System Integration

Three strategies are proposed to achieve integration of health services at the system level. These strategies are:

- Develop software that provides easy, accessible knowledge sharing and convenient transfer of patient records, diagnostic imaging, consultant reports, etc. to both patients and practitioners.
- Find practical and functional ways to meet consumers online to offer valid health information where patients are seeking it and ensure triage efforts are not merely funnels to emergency rooms.
- Develop metrics to evaluate new service approaches and technologies for their consistency with greater strategic goals of system integration and consumer engagement.

Canadian health systems need to streamline information flow and communication channels between agencies and specialized sectors in order to offer seamless, efficient health care service delivery across every province and territory. It isn't enough for health team members to work together at the ground level, there needs to be alignment of health efforts at a system level to ensure information can pass as easily between health team members in hospital settings, long term care and community settings, as it does among Canadian health institutions and provincial systems.

Canadian health services function in silos that need to encourage integration through software that provides easy, accessible knowledge sharing and transferability of patient records, diagnostic imaging and consultant reports. Improved interoperability of systems can improve efficiency in data exchange,

referral and appointment management, facilitating health team member consultation on shared patient matters and improving emergency care effectiveness for long-term care patients. Health system architects need to begin implementing systems that empower practitioners to change effectively and utilize new interoperable technologies and best practices to improve health service delivery[cx].

In modern Canadian health practice, clinicians face immense challenges in generating evidence-based recommendations at the population level in a short critical time window[cxi]. Traditional data collection and analysis methodology is slow. Beyond electronic health record capabilities, Canadian health systems need to provide clinicians with the ability to examine factors that place a particular patient at risk[cxii]. Canadian practitioners need information systems, like those in use by Intermountain Health, that offer detailed and accurate analyses of the populations that use their services. Greater system level unity of health providers and interoperability in health ICT technology is required to achieve this end. An "invention" is not an innovation until it has been implemented to a meaningful extent. Innovation success necessitates connectivity among health stakeholders and key health agencies.[cxiii]Today, health-sphere software developers and health systems in Canada are building system architectures and information storage systems that often do not interact with any systems outside of a particular hospital, or care group. Family health teams in Ontario operate separately and distinctly from community health centers and primary care physician practices. How can health systems connect its silos at the system level? A great number of computer programmers advocate the merits of using open source software (OSS) to form bridges between siloed health information systems. No one owns open source software. By definition, it remains in the public domain for users to utilize as a platform. OSS is based on a licensing form that allows users to change and export altered

versions of the original code. It is highly collaborative and has the potential to turn any user into an improver of a current system[cxivcxv].

European nations have embraced OSS much quicker than Canada and the US[cxvi]. In 2004, open source software saved several companies with annual revenues above one billion dollars on average of $3.3 million[cxvii]. To date, OSS applications for healthcare have been geared to offer business intelligence (Pentaho, Jaspersoft, RapidMiner, Eclipse BIRT), lab information systems (Bika, LIMS, Open ELIS, ClearHealth), inventory management systems (iDART), work shift management systems (Eureka Workshift), electronic health record facilitation and storage (MEDILIG, FreeMedForms, OpenEMR, OpenMRS, Indivo, OpenVista, OSCAR McMaster), overall healthcare practice management (Elexis, MirrorMed, FreeMed, ClearHealth) and imaging, data visualization and processing (Opensource PACS, Medical Imaging Interaction Toolkit, Eviewbox)[cxviii].

Open source software enables independent and government software engineers to work separately and still ensure that their output works within a greater interoperable whole. It permits transmission of information across the country to promote integration among the key stakeholders in the health system. The adoption of open source system solutions may eliminate interoperability challenges in existing proprietary health systems[cxix]. Open source electronic medical record systems are a modern reality and an important tool for health decision-makers in achieving improved organizational structures that foster interconnectivity, knowledge transfer and the effective exchange of best practices[cxx].

Currently, organizational leaders in health remain too focused on modular achievement with little regard for the greater system integration that could unleash the potential for vastly improved information sharing and the

empowerment of innovation. A vision for health technology systems cannot exist in isolation; it must breathe with each new innovation, demographic change, consumer preference, consumer behavior and environmental shift. The future engagement of Canadian health consumers in new programs and sustainability initiatives will depend on the accessibility and engagement level of health systems that provides a willingness to account for patient need and convenience.

Whatever management and innovation directions Canadian health systems follow to promote improved communication, there will be a need to periodically measure the progress of systems at the ground level. Organizations can only manage what they can measure. More than ever, Canadian health leaders need to find the right metrics to evaluate new technological programs to ensure consistency with greater strategic goals. It is not enough for Canadian health care to move beyond its tedious and time-consuming paper-based systems to save administrative costs. Canadian health systems need to utilize technology to streamline the flow of and access to information within integrated channels of communication that connect health care agencies and consumers. Canadian health systems need to become organizations that draw strength from efficiently organized knowledge resources.

Conclusion

Health systems need to reach out to consumers with familiar technologies in new and collaborative ways; to engage the Canadian health consumers' need to become partners in realizing health system efficiencies. Keeping seniors independent and enjoying quality of life at home is the first step to stemming the tide of the impending health sustainability crisis in this country.

To achieve this end, Canadian health leaders need to understand what Canadian health consumers need and want and to shift health delivery systems to account for those demands. Baby Boomers pose the greatest opportunity and challenge for the sustainability of Canada's health system. Engaging Baby Boomers in the re-design of health services that support efficient management of their own chronic conditions must become a system-level priority. Older patients must become more engaged in preserving their health and self-monitoring to an extent where the focus of health services in Canada shifts to the management and prevention of serious health events. The success of consumer driven personal wellness programs are contingent on the system's ability to engage, monitor and support consumers.

Canadian health leaders are finally asking the right questions and seeking to identify comprehensive, national health-innovation policies and dissemination strategies[cxxi]. How can Canadian health systems engage Baby Boomers and other health consumers to create more efficient and safe use of health systems to safely avoid emergency rooms? By changing the way Canadian health systems provide care.

In this white paper, ICHIL offers five system-level strategies that health leaders can follow to ensure health system decisions and investments coincide with the realization of a beneficial overarching national health strategy.

1. Engage Consumers Directly in the Health Care System

- Create direct access points for consumers and health system stakeholders to seamlessly interact with services and information.
- Integrate consumer based "personal health records" with health information systems to create a streamlined flow of information between consumers and health professionals.
- Develop customized decision support tools and applications for consumers to more effectively manage their own health and wellness.

2. Use New Technologies to Improve Communication Flow among the Health Care Team

- Re-design communication for health teams using hand held devices to supporting communication in "real time"
- Integrate best practice treatment protocols into health care team communication systems that provide real time information on patient progress toward treatment goals
- Create dynamic, interactive data sharing practices using technologies (such as bar coding, RFID, etc.) for more effective transfer and sharing of patient information; leading to improved care quality, patient safety and efficiency.

3. Develop New Technologies and Software to Support Consumer Engagement in Accessing the Health Care System.

- Utilize social networking connectivity to engage consumers more actively in their own health care treatments to promote greater patient satisfaction
- Enable health systems to engage their patients in open dialogue and develop important coaching to facilitate better home monitoring and care for aging Baby Boomers.
- Develop social networking capacities and features that interface with personal health records for seamless communication between consumers and health care teams.

4. Redesign Health Care Services to Reach Out to Consumers and Support Health and Wellness Care at Home!

- Create innovative home monitoring and surveillance measures that build supportive networks connecting health service providers to consumers in their home environment.
- Design and implement creative ways to promote interconnectivity between homes, clinics and family health teams in communities. Interconnected health networks provide health practitioners with the ability to offer consumers personalized services thereby maximizing independence, improving patient quality of life and reducing system costs.
- Create distance health monitoring and surveillance for family and friends who care for ill loved ones and need community support to ensure quality patient outcomes.

5. Use New Technologies to Achieve Real System Integration

- Develop software that provides easy, accessible knowledge sharing and convenient transfer of patient records, diagnostic imaging, consultant reports, etc. to both patients and practitioners.
- Canadian health systems need to find practical and functional ways to meet consumers online to share patient information more effectively, offer valid health information where patients are seeking it and ensure triage efforts are not merely funnels to emergency rooms.
- Develop metrics to evaluate new programs and technologies for their consistency with greater strategic goals and consumer engagement

The engagement and empowerment of consumers as knowledge partners within an improved national health communication network that provides optimal information sharing and unifies health silos is Canada's best hope for the sustainability of its public health system.

At the 2010 ICHIL conference, Dean Carol Stephenson of the Ivey School of Business told Canadian health leaders that the maxims of successful organizations hold true for healthcare: good leaders don't take risks they don't understand; they diversify risk and they encourage constructive dissent from experts that challenge existing norms and ideas[cxxii]. This work illuminates a modern Canadian health system where leaders know a great deal about who the key consumers are, how those consumers want to engage health care services and how to begin taking greater steps toward realizing significant system-wide improvements. The time for action is now. The Canadian health consumer needs to be engaged in ways they never have before and perhaps never thought

possible. Canadian health systems need to learn to support patients and behave as organizations intent on improving meaningful consumer engagement. To stem the tide of the impending health crisis, Canadian health leaders will have to accept change faster and in greater capacities than ever before. There is no illusory "tipping point" where healthcare becomes unmanageable. There is only the constant battle to provide better care and quality of life for Canadians into the future.

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