

**HORIZON SCAN: IDENTIFYING INNOVATIVE TECHNOLOGIES TO  
ADDRESS ALBERTA'S SHORTAGE OF HEALTH HUMAN RESOURCES**

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## EXECUTIVE SUMMARY

Providing sustainable health care is one of the most pressing policy issues facing Canada's federal and provincial governments. The shortage of health human resources (HHR) has been described by leaders and decision makers in health as the most important issue in their countries. Aging populations and an increase in chronic disease are placing new demands on a health workforce that is already inadequate and itself aging. It may seem as though, the simple solution is to add more health care providers but continuously adding more providers is unsustainable economically and demographically.

The way we approach it today, health care is a labour intensive service industry. In terms of managing health human resources, Alberta Health Services (AHS) is the largest employer in Alberta with almost 90,000 employees. AHS is the largest integrated health system in Canada. Leaders in Alberta's health care system have acknowledged that the health workforce is vitally important but currently strained. Estimates indicate Alberta is currently short more than 1,000 family physicians. In Alberta's largest city, Calgary, an estimated 1 in 4 people do not have a family physician. By 2016, there is a projected shortage of 1,800 physicians and 6,200 nurses.

Many different approaches can be used to address shortages of HHR. The manner in which, governments and agencies plan for, prepare, and manage their workforce all impact HHR. The performance of a workforce in terms of its availability, competence, responsiveness and productivity also impact the supply of HHR. Many analysts, agencies, and government reports support the idea that advances in health related technologies hold tremendous potential for changing and improving health care. In a recent report on health care the Conference Board of Canada goes so far as to contend that innovation which reduces the growth rate of health care costs, while raising production and health outcomes is the best option for keeping Canada's health system sustainable.

This project utilizes a horizon scan to identify technologies with the likely potential to significantly impact the physician and/or nursing shortage in Alberta. A horizon scan is a systematic process used to search out and identify new trends, opportunities and risks. During the search process one question, with three possible answers, was used to determine whether a particular technology was included in the results:

*Does this technology appear to have the likely potential to significantly impact the physician and/or nursing shortage in Alberta? YES, NO, MAYBE*

Four technologies were identified as having the likely potential to significantly impact the physician and/or nursing shortage in Alberta:

- Vscan®- pocket-size visualization tool for point-of-care ultrasound imaging

- Portable Magnetometer- cardiac scanner sensitive to magnetic fluctuations
- Moca- open-source, cell phone based, mobile information system
- Plasma Gas Hand Sanitizer

Twelve technologies were identified as maybe having the potential to significantly impact the physician and/or nursing shortage in Alberta.

The client for this project is Stratavera Partners; an Alberta based consulting practice with a focus on healthcare. The research and information generated for this report produced four client recommendations:

- Bring this report to the attention of leaders within Alberta's health system;
- Continue following the specific technologies included in this report;
- Continue scanning for new technologies with the potential to address HHR shortages;
- Explore and facilitate partnerships between industry, academia, and/or government to stimulate the process of identifying and/or developing innovative technologies to address HHR.

The problems associated with a shortage of health care workers are pervasive across the developed world. Technology has the potential to provide solutions to HHR shortages and can therefore be important in continuing health care reform.

## INTRODUCTION

Providing sustainable health care is one of the most pressing policy issues facing Canada's federal and provincial governments. The cost of health care has increased to the point where it now requires more than 1 out of every 3 dollars budgeted by the Alberta Government (Government of Alberta, 2009). In other Provinces health care costs are accounting for almost 45 cents of every dollar spent (Canadian Institute for Health Information, 2008). Funding for other government programs is being crowded out by relentless increases in healthcare spending.

Healthcare systems are also facing sustainability pressure in terms of human resources. The crisis in health human resources (HHR) has been described by leaders and decision makers in health as the most important health issue in their countries (World Health Organization [WHO], 2006). Aging populations and an increase in chronic diseases are placing new demands on a health workforce that is already inadequate and itself aging (WHO, 2006). New ideas must be found to address the shortage of HHR (Conference Board of Canada, 2005). To simply add more health care providers is unsustainable economically and demographically (Federal/Provincial/Territorial Advisory Committee on Health Delivery and Human Resources [ACHDHR], 2009). There are clear signs that intervention and repair will be necessary to maintain an adequate, healthy and satisfied health care work force (Conference Board of Canada, 2005).

The client, Stratavera Partners, believes technology provides numerous opportunities to impact the health worker shortage. This report builds on the premise that the "best option" for the future sustainability of Canada's health care system is innovation that reduces the growth rate of costs while raising productivity and improving outcomes (Conference Board of Canada, 2009).

The problems associated with a shortage of healthcare workers are pervasive across the developed world (WHO, 2006). Ultimately, there are a number of organizations that could utilize the process and information that will be presented in this project. However, the approach of using innovative technology to address the worker shortage is not feasible for many jurisdictions. The successful implementation of technology requires infrastructure and support many regions do not possess (OECD, 2005). The people and organizations that could action this report are limited by funding, infrastructure and training. This project will focus on one region with the potential to action results: Alberta, Canada.

Narrowing the focus of the policy problem to the shortage of skilled healthcare workers in Alberta is useful for four reasons. First, the mix of federal, provincial and territorial health care systems can make it challenging to assess the suitability of a new health technology (Simpson et al., 2008). A defined environment facilitates recommending specific solutions. Second, the opportunity

to seek solutions within a single but large environment is present in Alberta. Provincial health services in Alberta are managed by a single organization, Alberta Health Services (AHS). AHS is the largest integrated health system in Canada (AHS, 2009). Third, Alberta has already demonstrated a commitment to technology and healthcare. For example, Alberta is leading Canada in the successful implementation of a single, province-wide system of Electronic Health Records (Alberta Net Care, 2009). Finally, focusing on Alberta will provide valuable new information for the client.

An intended outcome for this report is to identify technologies that could significantly aid in addressing the shortage of HHR. Labour costs are by far the largest component of Canada's health care system. The specific percentage of spending on labour varies by jurisdiction but HHR expenditures are never below 60 percent and can be as high as 80 percent of a systems budget (Murphy & O'Brien-Pallas, 2005). One way to try and maximize the potential impact of this report is to focus on the largest, most expensive professions.

In Alberta, physician services alone make up 23 percent of Alberta Health and Wellness' \$12.9 billion budget (Alberta Health and Wellness, 2009). Nurses make up Alberta's largest group of health professionals. There are over 40,000 Registered Nurses (RNs), Licensed Practical Nurses (LPNs) and Registered Psychiatric Nurses (RPNs) working in Alberta (College and Association of Registered Nurses of Alberta, 2009). In addition to being large and expensive health professions, there is currently a shortage of both physicians and nurses in Alberta (Alberta Health and Wellness, 2007). Recruitment, training, retention and succession planning will be important to addressing the shortage but will likely not be sufficient (Siemens, Villeneuve, & Hurst, 2005; Alberta Health and Wellness, 2007).

A deliverable for this project is a horizon scan which identifies several innovative technologies with the perceived potential to positively impact Alberta's shortage of physicians and nurses. Two limitations of the horizon scan approach used in this report were illuminated by The Conference Board of Canada's report *Horizon Scanning: Gathering Research Evidence to Inform Decision Making* (2008). First, horizon scanning is best done by a small team with a variety of expertise. Second, continuous scanning is needed to ensure the relevance and timeliness of the information (Conference Board of Canada, 2008). Intense horizon scanning requires resources beyond the scope of this project.

The goal of this paper is to identify technology that facilitates the delivery of health care by fewer physicians and nurses within the province of Alberta. In order to maximize the potential benefit of the technologies identified in this report, a broad focus will be adopted. Key areas will be devices, procedures and drugs. The major focus will be on technologies which have not yet come to market or into use in Alberta. However, new applications for technologies that are already in place may be identified.

The paper will proceed in six sections. The next section of this paper will provide some brief background information before the methodology of the paper is outlined. Next, a literature review examining three aspects of the project will be conducted. Following the literature review section, the results of the horizon scan will be presented. Recommendations for the client will be discussed, followed by brief concluding remarks.

## **BACKGROUND**

This section will first briefly introduce Stratavera Partners, the client for this project. Next, several terms important to this project will be defined. Then, Alberta Health Services (AHS) will be briefly profiled. Finally, the supply and demand influences on HHR in Alberta will be presented. A profile of Alberta's health system, worker population and a general understanding supply and demand influences on HHR will provide information central to the evaluation of solutions.

### **The Client**

Stratavera Partners is an Alberta based consulting business with a focus on healthcare. The Stratavera team is passionate about the healthcare industry and committed to presenting ideas that shift thinking about healthcare. Current and future Stratavera projects include working with the healthcare related faculties at three Alberta Universities, STARS Air Ambulance, a First Nations Reserve, The Alberta College of Paramedics, and the former Calgary Health Region.

While working on projects for several clients, the value of a project exploring the role of innovative technology to address HHR problems in Alberta became apparent. Obviously, technology use is only one part of the puzzle but for the client the potential of technological solutions is a largely unexplored area. This horizon scan will be useful because it will bring together information and knowledge regarding new approaches and advancements in HHR offered by technology.

### **Definitions**

*Available Technology:* Technology that is currently in use although it may not be in use in Canada (CADTH, 2009).

*Emerging Health Technology:* A technology that is not yet adopted by the health care system; pharmaceuticals will usually be in phase II or phase III clinical trials or perhaps pre-launch; medical devices will be prior to marketing or within six months of marketing, or marketed but less than ten percent diffused, or localised to a few centres or a change in indication or use of an existing technology

(International Network of Agencies for Health Technology Assessment [INAHTA], 2010).

*Health Care Technology:* Any intervention that may be used to promote health, to prevent, diagnose or treat disease or for rehabilitation or long-term care. This includes the pharmaceuticals, devices, procedures and organizational systems used in health care (INAHTA, 2010).

*Health Technology Assessment (HTA):* A multi-disciplinary field of policy analysis that examines the medical, economic, social and ethical implications of the development, diffusion and use of a medical technology in health care (INAHTA, 2010).

*Health workers:* People, whose job is to plan for, protect and improve the health of their communities (WHO, 2006).

*Horizon Scan:* A systematic process used to search out and identify new trends, opportunities and risks. Horizon scans can be used as a tool to complement policy development. The terms “horizon scanning” and “environmental scanning” are sometimes used interchangeably (INAHTA, 2010; Conference Board of Canada, 2008).

*Health Human Resources (HHR):* Generally refers to those individuals who provide health care or health services to the public, from physicians, nurses and allied health professionals to family and volunteer caregivers (Health Canada, 2004).

*Investigational Technology:* A technology at the conceptual stage, anticipated or in the early stages of development through to technology that is undergoing bench or laboratory testing (CADTH, 2009).

## **Health Human Resources**

Health care is a labour intensive service industry (WHO, 2006). The World Health Organization estimates a global shortage of over 4 million doctors, nurses and midwives (2006). The current global workforce supply cannot meet current demand; hence any action that requires an increased supply of workers is cause for concern. The following will briefly profile health care delivery in Alberta and discuss supply and demand pressures on Alberta's health workforce.

### *Profile*

Alberta's health system is undergoing a massive restructuring. In May of 2008, the Government of Alberta announced that one provincial governance board, Alberta Health Services (AHS), would replace Alberta's nine regional health authority boards, the Alberta Mental Health Board, Alberta Cancer Board and

Alberta Alcohol and Drug Abuse Commission. AHS is the largest integrated health system in Canada (AHS, 2009).

In terms of managing human resources, AHS is one of the largest employers in Canada and the largest employer in Alberta with almost 90,000 employees (AHS, 2009). Table 1 provides a profile of AHS, giving a sense of the size and complexity of the organization. Table 1 was created using information provided on AHS *Quick Facts* webpage. The *Quick Facts* webpage contains information sourced from the AHS 2008/2009 Annual Report. Bed and physician numbers have been updated since the AHS 2008/2009 Annual Report. *Quick Facts* was updated on March 5, 2010 (AHS, 2009).

*Table 1*  
Profile of Alberta Health Services

<ul style="list-style-type: none"> <li>• Staff: 85,000</li> <li>• Physicians: 7,200</li> <li>• Volunteers: 13,000</li> <li>• Population served: 3.5 million over 661,848 square kilometres</li> <li>• Acute care hospitals: 97 and 5 stand alone psychiatric facilities</li> <li>• Acute care beds: 9,000</li> <li>• Addiction and mental health beds: 1,599</li> <li>• Long-term care &amp; supportive living beds/spaces: 19,300</li> <li>• Urgent care centres: 7</li> </ul>	<ul style="list-style-type: none"> <li>• Emergency visits: 1.9 million</li> <li>• Urgent care visits: 163,000</li> <li>• Hospital discharges: 354,000</li> <li>• Surgeries: 247,000</li> <li>• Births: 50,000</li> <li>• Lab procedures: 60 million</li> <li>• MRI exams: 147, 000</li> <li>• CT exams: 419,000</li> <li>• Home care hours: 10 million</li> <li>• HEALTHLink calls: 900,000</li> <li>• Cancer patient visits: 495,000</li> <li>• Immunizations: 1.3 million</li> </ul>
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AHS has repeatedly acknowledged that Alberta's health workforce is vitally important. It has also been acknowledged that Alberta's health system does not have the capacity to make changes because of a lack of health providers (Alberta Health and Wellness, 2007). Alberta is currently experiencing a shortage of both physicians and nurses. Estimates indicate Alberta is short more than 1,500 nurses and 1,100 general practice and specialist physicians (Alberta Health and Wellness, 2008; Physician Resource Planning Committee, 2006) In Alberta's largest city, Calgary, an estimated 1 in 4 people do not have a family physician (Canadian Broadcast Corporation, 2010). By 2016, the projected shortage is 1,800 physicians and 6,200 nurses (Alberta Health and Wellness, 2007).

Thus far, the profile of AHS has included information on the size and scope of the system, as well as estimates of the shortage of physicians and nurses. Given the premise that technology will assist in addressing HHR shortages, it might be

useful to have a sense of the degree to which AHS is already utilizing technologies aimed at addressing HHR shortages.

Alberta Health and Wellness' *Health Workforce Action Plan* specifically identifies technology as a means of expanding the capacity of the workforce by increasing efficiency and productivity (2007). AHS website includes a webpage entitled, "Innovation Improving Care". This page includes articles on several innovative projects, procedures and technologies currently being utilized by AHS. In an effort to address rural health care, AHS currently operates several mobile services: breast cancer screening, visiting psychiatry services, dialysis bus, and mobile MRI. There are also several telehealth programs currently operating within the Province including Clinical Telehealth Services, Telehome Care, Pediatric Telesurgery, Virtual Pain and Symptom Control/Palliative Radiotherapy Clinic, and TeleMental/ Psychiatry Services (AHS, 2010). A review of Alberta's Telehealth program is currently ongoing and a report is expected in early 2010 (AHS, 2010).

AHS is also heavily invested in robotic surgery. The Centre for the Advancement of Minimally Invasive Surgery is an AHS program based in Edmonton. Both the Royal Alexandra and University of Alberta hospitals have robots. Since 2007, these robots have primarily been used for urology procedures; however, recently, the robots have been used to perform gastric by-pass and they are working to expand the program into gynecology, general, and thoracic surgery (AHS, 2009). The neuroArm, an MRI compatible image-guided computer-assisted device is used, in Calgary, for both surgical and biopsy applications (neuroArm, 2010). In January of this year, Calgary's Rockyview General Hospital became the first hospital in Canada to acquire the da Vinci Robot Si HD (Edmonton Sun, 2010). This robot is currently the world's only robotic surgical system with high definition 3D vision.

### *Supply and Demand Influences on Human Health Resources*

Part of managing HHR depends on the ability to understand the impact of supply and demand factors on HHR including factors such as age, gender, practice patterns, career goals, and technology (ACHDHR, 2009). Many of the supply and demand influences that impact HHR are presented in Table 2. Table 2 was developed based on five sources *Health Care in Canada* (Canadian Institute for Health Information, 2008 & 2009), *Working Together for Health: The World Health Report* (WHO, 2006), *The Looming Crisis in the Health Workforce: How Can OECD Countries Respond* (OECD, 2008), and *How Many Are Enough? Redefining Self Sufficiency for the Health Workforce* (ACHDR, 2009).

*Table 2*

Supply and Demand Influences on Human Health Resources

Supply Influences	Demand Influences
<ul style="list-style-type: none"> <li>• Funding</li> <li>• Size of current workforce</li> <li>• Infrastructure</li> <li>• Regulation</li> <li>• Recruitment</li> <li>• Training</li> <li>• Length of training</li> <li>• Immigration</li> <li>• Retention</li> <li>• Retirements</li> <li>• Deaths</li> <li>• Attrition</li> <li>• Work patterns</li> <li>• Health and safety of workers</li> <li>• Compensation</li> <li>• Management/Supervision</li> <li>• Productivity of workforce</li> <li>• Competence of workforce</li> </ul>	<ul style="list-style-type: none"> <li>• Health of population</li> <li>• Burden of disease</li> <li>• Demographics</li> <li>• Geography</li> <li>• Patient expectations</li> </ul>

Alberta Employment (2007) noted several particularly pressing supply and demand factors are:

- The shortage of health professionals in rural and remote areas of the province;
- Recruitment of health professionals from other provinces and countries has negative consequences for those jurisdictions;
- Workforce planning is politically sensitive and often open to greater public scrutiny;
- General sense of frustration exists within the health care workforce regarding their working conditions and work-life balance;
- Sick time among health professionals is consistently greater than other professions;
- Public expectations of the health care system are increasing;
- General aging of the population will strain the health care system by reducing the number of health professionals as retirements increase, the physical demands of the work can increase incidents of injury and absenteeism; and

- Increasing demand for health care by elderly and chronically ill.

The exact level, mix and impact of these supply and demand forces are unknown; however many projections are based on current patterns (ACHDR, 2009). Numerous analysts predict the already inadequate supply of HHR will be increasingly pressured as supply and demand forces act upon Alberta's HHR (Alberta Health and Wellness, 2007).

## **METHODOLOGY**

Thus far the paper has profiled and discussed the shortage of HHR in Alberta. The remainder of this paper will focus on exploring solutions to this problem. The methodology section will describe how the project will proceed and provide details of the approach to horizon scanning adopted for this project.

First, a literature review will examine three aspects of this project. The review will explore various approaches to addressing the HHR shortage, the benefits and challenges to taking a technological approach will be presented, and the process of using a horizon scan to identify new technologies will be discussed. Then, a horizon scan will be conducted in order to identify innovative technologies to address the physician and nursing shortage in Alberta. Finally, results of the horizon scan and recommendations will be presented.

## **LITERATURE REVIEW**

### **Addressing the Health Human Resource Shortage**

Figure 1 presents a model for addressing the HHR shortage. The model was created after reviewing *Working Together for Health: The World Health Report* (WHO, 2006), *The Looming Crisis in the Health Workforce: How Can OECD Countries Respond* (OECD, 2008), *How Many Are Enough? Redefining Self Sufficiency for the Health Workforce* (ACHDR, 2009), and *Unleashing Innovation in Health Systems: Alberta's Symposium on Health* (Conference Board of Canada, 2005).

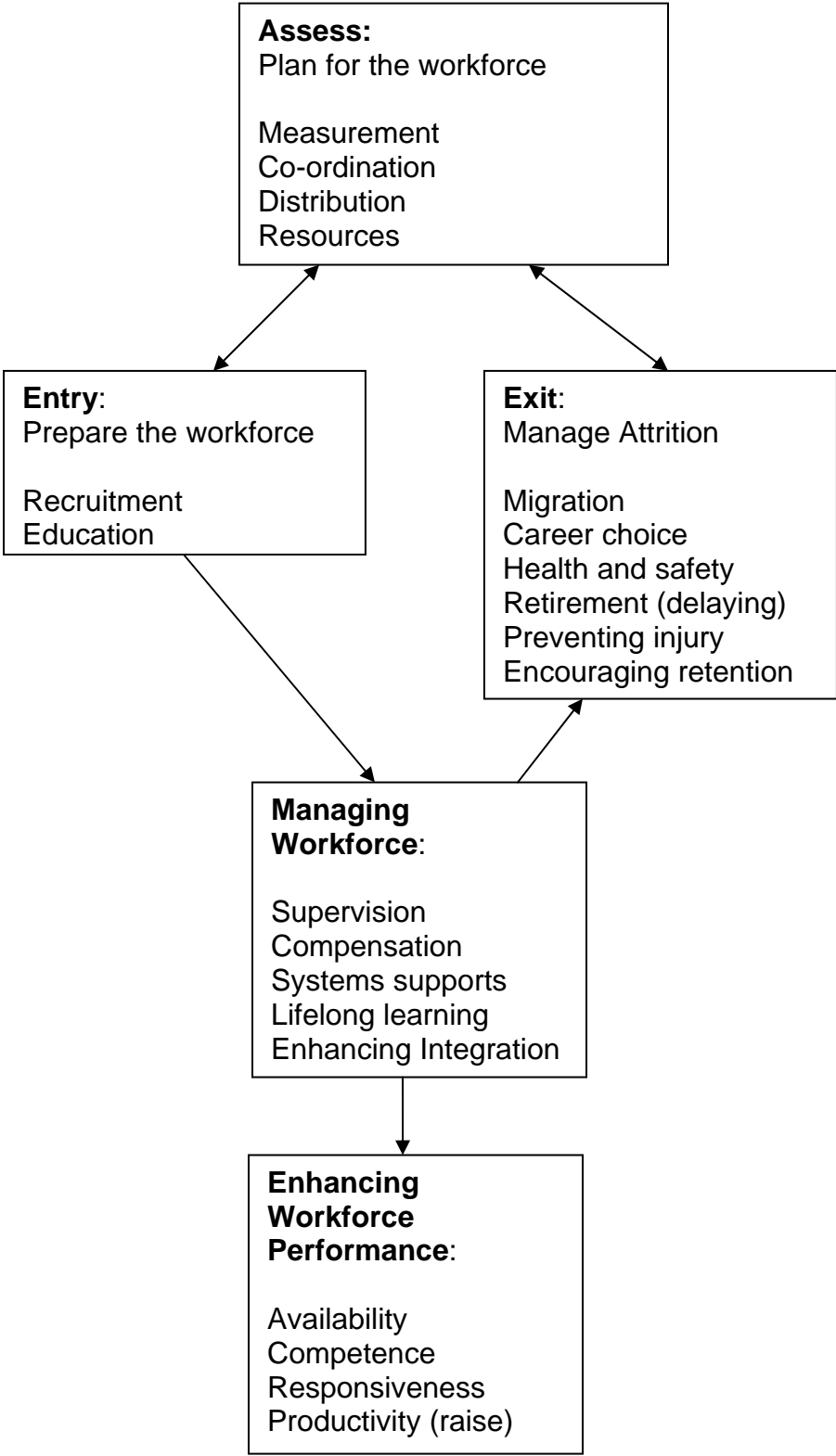
The model presents points at which workforce supply and demand can be managed and impacted. A technology which improves productivity while simultaneously decreasing physical demands and injury, thereby keeping the workforce on the job would impact multiple points on the model. The number and degree to which a particular technology can impact points on this model is one indication of the potential for how significantly a technology can address the shortage of physicians and nurses in Alberta.

Alberta Health and Wellness' Business Plan 2009-2012, states "technological advances will need to be leveraged to improve access and quality of care" (2009, p.159). Technology by itself is not a stand alone fix but rather creates a bridge

between the problem and the solution. Technology may impact supply factors by increasing productivity, avoiding time lost due to stress or injury, improving workplace conditions thereby reducing attrition, or maximizing practice patterns.

More efficiently treating disease or addressing geographic challenges could ease the demand pressures on HHR. Technology is a tool that can benefit the people engaged in the delivery of health care by reducing workload, increasing efficiency, or improving working conditions. Users of the system could ultimately benefit from improved access, quality, efficiency, and value for money. The next section will briefly review the use of technology in health care.

Figure 1  
Model for Addressing Shortages of Health Human Resources



## Technology in Health Care

Both the Kirby and Romanow reports support the notion that advances in health technology hold tremendous potential for changing and improving the health care system (Canada Health Innovation Council [CHIC], 2003). However, the introduction of new technology, particularly transformative technology, is accompanied by challenges, opportunities, risks and rewards. This section will examine the relevant literature.

Certainly one of the biggest challenges facing the introduction of health technology into a health system is cost. Health technologies can deliver enormous health benefit, however, many new technologies are more expensive than those they replace or complement. The use of technology is often blamed for rising health care costs (Borowski, Brehaut, & Hailey, 2007; Goodman, 2004). Some estimates indicate health technology may account for up to half of the increased costs of health care (OECD, 2005).

Cutler and McClellan argue there is a lack of evidence to support such a dramatic claim. Their study found that the total benefit of technological change exceeded corresponding costs (2001; OECD, 2005). Additionally, research shows that the rate of technological change in OECD countries is positively related to health outcomes (OECD, 2005). In their most recent report on health care technology *The Health Enterprise: Charting a Path for Health Innovation* (2009) the Conference Board goes so far as to contend that innovation which reduces the growth rate of health care costs, while raising production and health outcomes is the best option for keeping Canada's health system sustainable.

In addition to the costs associated with technology, there are many other factors impacting the use of technology in health care. The rate of uptake does not always match potential. Research indicates the most effective and efficient technologies may not always be employed (CHIC, 2003).

The pace of technological change is outpacing health systems' ability to operationalize it and new technologies are often adopted prior to rigorous evaluation (Federal/Provincial/Territorial Advisory Committee on Information and Emerging Technologies, 2004; OECD, 2005). Health technology can certainly be viewed as a pressure rather than an enabler to overcome shortfalls in the health system (Federal/Provincial/Territorial Advisory Committee on Information and Emerging Technologies, 2004).

As opposed to viewing health technology solely as a system pressure, the Conference Board of Canada proposes Governments view their health systems as economic assets rather than as a drain on the economy (2005). CHIC proposed several possible side benefits of researching and investing in innovative health care technology, including tremendous economic potential. Canada's health sector generates over \$100 billion annually in income and

employment (CHIC, 2003). The global health market is 30 times the size of Canada's (CHIC, 2003). Technology presents tremendous opportunities to improve the lives of Canadians, make the health system increasingly cost-effective, and create opportunities that lead to economic prosperity.

Much of the conversation around using technology is based on logic, hope and an intuitive sense that technology can and must provide solutions to address a shortage of HHR. Wong, MacLeod, and Farrally suggest there is a lack of research examining modern technologies impact on HHR issues (2009). Their review notes the majority of articles addressing the impact of technology on HHR are commentaries and do not contain empirical research. Support for and investment in healthcare technology could perhaps be built upon evidence of the value of using technology to address issues in HHR.

There are benefits and drawbacks to the use of technology. However, the promise of technology to build bridges between problems and solutions means technology will play a major role in continuing health care reform. A horizon scan will be used to identify technologies with the potential to improve Alberta's health system by addressing the shortage of physicians and nurses.

### **Horizon Scanning**

Organizations are increasingly using horizon scans to search out early trends, opportunities and risks to complement their policy development. The early identification and prioritization of new or emerging health technologies has become an essential part of health technology assessment (HTA) (Simpson et al., 2008). This section will briefly discuss the current practice of horizon scanning in Alberta.

In 1999, the Health Ministry of Alberta requested a horizon scanning pilot project to provide advice on technologies that could be expected to have some impact on Alberta healthcare. The pilot project came to an end in December of 2000 and future horizon scanning activities were undertaken by the Canadian Coordinating Office of Health Technology Assessment (CCOHTA) (Hailey, Topfer, Chan, Wills, & Howell, 2001). In 2006, CCOHTA changed their name to the Canadian Agency for Drugs and Technology in Health (CADTH).

CADTH is an independent, not-for-profit organization funded by Canada's federal, provincial and territorial governments to provide credible, impartial advice and evidence based information about the effectiveness of drugs and other health technologies (CADTH, 2009). The current role of CADTH is to encourage the appropriate use of health technology through the collection, analysis, creation and dissemination of information concerning the effectiveness and cost of technology and its impact on health. As part of their role, CADTH is Canada's main source of health technology horizon scans.

CADTH publishes several different types of reports that use a horizon scanning approach and offer a brief introduction to a drug, technology or emerging issue in health care. The process of a more comprehensive assessment of health technologies and services is published as a Technology Report. Technologies and services for this comprehensive analysis are chosen through a prioritization process, and once a topic is chosen it takes approximately one year to complete an assessment (CADTH, 2009).

Although Alberta no longer has a formal horizon scanning organization, it is active in the HTA arena. The selection of topics for an HTA is mainly accomplished through the Alberta Technologies Decision Process, which is the provincial mechanism for the introduction, diffusion and use of publicly funded health care technologies (Institute of Health Economics, 2009). Currently, Alberta uses two processes to determine which technologies will be part of the Alberta Health Technologies Decision Process. Ministry staff can recommend a health technology or health system stakeholders and the public can refer health technologies and services for consideration (Alberta Health and Wellness, 2009).

Hailey et al. noted that one of the interesting findings of Alberta's horizon scanning pilot project was there seemed to be a mismatch between the rapid preparation and delivery of the scan's results and the slower and less focused processes within the health agencies (2001). Based on a review of CADTH and other scanning websites, the results of horizon scans and selection for HTA are infrequently driven by an effort to address a specific concern or policy problem. This project's approach of taking a policy problem and conducting a horizon scan to identify potentially useful technologies may partly address any disconnect between results of a horizon scan and utilization of results by policy makers.

This horizon scan aims to identify and describe technologies that may significantly impact the shortage of physicians and nurses in Alberta. Wild et al. have identified five steps in a horizon scan: identification, prioritization, early assessment and impact prediction, dissemination, monitoring (Wild et al., 2009). This project includes the first four steps, but does not provide for monitoring.

### *Identification*

The Alberta Institute of Health Economics (AIHE) annually publishes, *Health Technology on the Net: A Guide to Sources of Information* (Dennett & Chatterley, 2009). The eleventh edition of this guide provides the main sources and links for this scan. The sites contained within the publication were chosen for their usefulness in HTA literature searches. While AIHE did not employ formal selection criteria, the sites are usually authoritative, reliable, current, applicable, valid, and usable.

At this time the plan is not to search beyond six months of archived material. This search is designed to discover extremely current technologies. Going back

further than six months would significantly add to the breadth of the scan and the results might not be timely.

*Health Technology on the Net: A Guide to Sources of Information* is divided into 12 sections. Each section includes several websites and their links. This guide will be used to systematically conduct a horizon scan. Starting with the first link in the first section, as many free-of-cost, relevant links as time permits will be visited. If a site appears to potentially contain information of technology relevant to the horizon scan, the site will be searched using the following terms.

- Technology
- Efficient
- Innovative
- Shortage
- Productivity
- Distance
- Health worker
- Physician
- Nurse

Another expected source of information not included in the Guide are corporate websites. For example, GE and Microsoft both have health care divisions. Although a technology could first be identified on a horizon scan website, the company's website could provide more information. Information accessed from a company's website will be considered with an awareness of the potential for bias.

#### *Priority Setting for Inclusion in the Results Section*

Once identification has revealed potentially useful health technologies, one very specific question will be used to determine whether a technology is included in the results of this report:

*Does this technology appear to have the likely potential to significantly impact the physician and/or nursing shortage in Alberta?*

One of three answers will be recorded: Yes, Maybe, No. If the answer is yes or maybe, the technology will appear in the results section. If the answer is no, the technology will not be included in the report.

To be considered for the results section a technology must have the likely potential to noticeably or measurably have a major effect on the shortage of physicians and/or nurses in Alberta. To have a major effect the technology would likely have to impact a large worker and/or patient population.

Spread out over thousands of workers, finding just five minutes of efficiencies, could have huge human resource implications. If in the course of a 260 day work year, a physician or nurse could save 5 minutes every shift, that worker would gain back over 21 hours! (5 minutes \* 260 days= 1300 minutes) (1300 minutes/ 60 minutes= 21.7 hours). A technology that saves nursing staff 5 minutes a day spread out over 40,000 nurses could potentially free up almost 870,000 hours or 36,000 days of health human resources.

A technology directed at a smaller but resource intense patient population could be potentially significant. In terms of chronic disease, heart disease and diabetes have the greatest prevalence in Alberta (Jacobs et al., 2004). People with heart disease have hospitalization rates 5 to 10 times those without chronic conditions and they use approximately twice as many physician services. People, age 45 and older, with diabetes use almost twice as many family doctor visits and five times as many hospital days as people without diabetes. Persons living with the combination of heart disease and diabetes have especially high usage of hospital, family physician and specialist services (Jacobs et al., 2004).

#### *Early assessment and impact prediction*

The early assessment and impact prediction phase of this horizon scan will be very brief. Any available information regarding a technology's likely safety, effectiveness, and cost effectiveness will be included in the technology summary.

#### *Dissemination*

This project will present the "yes" technologies in the form of a one or two page brief. The brief will include the name of the technology, technology summary, and the stage of the technology as Investigational, Emerging, or Available. When available, approximate costs will also be provided. The brief will also include comments explaining why this technology seems to have the likely potential to significantly impact the physician and/or nursing shortage in Alberta.

The "maybe" technologies will also be included in the report but will be more briefly presented. The name and a summary of the technology will be provided along with links to the source.

### **RESULTS OF HORIZON SCAN**

The horizon scan occurred between December 15, 2009 and March 15, 2010. During this time, hundreds of online sources were visited. The AIHE *Guide Health Technology on the Net 11<sup>th</sup> Edition* (Dennett & Chatterley, 2009) was very useful both in terms of content and providing structure to the search. Each time a suggested resource was visited, a note was made indicating it had been viewed.

The volume of health technology research was staggering and would have been overwhelming without the clearly defined goal of identifying technology with the likely potential to significantly impact the physician and/or nursing shortage in Alberta. Before the technologies identified as potentially significant are presented, overall impressions and trends will be discussed.

## Trends

During the scanning phase of the project several trends with great promise emerged. For example, gene, stem cell, and nanotechnology therapies could someday play a tremendous role in preventing illness. Certainly, preventing illness on a large scale would significantly impact the use of health human resources. However, a therapy requiring, hospitalization or frequent monitoring could place additional strain on human resources. For many technologies, there is not enough information to predict their impact on human health resources. A technology was not considered for Results, if there was not enough information on how the experimental therapies would be put into practice or how they might affect the shortage of physicians and nurses in Alberta.

Protecting the health and safety of the health workforce is another area with significant potential in terms of addressing the shortage of physicians and nurses. Avoiding lost time due to injury or illness could provide significant benefit. Reducing the number of nurses who leave the profession and delaying retirement would also be valuable (ACHDR, 2009; OECD, 2008). It was surprising, therefore, that the scan did not find much innovative technology directed at reducing the physical or mental strain on health care professionals. There are some technologies like bed lifts (which may be under-supplied or under-utilized) but the scan did not reveal any technologies which seemed likely to significantly impact the shortage by making the jobs of physicians and nurses easier or less demanding thereby reducing injury, preventing attrition, or delaying retirement.

In total four technologies were identified as potentially significant. Another twelve, technologies were identified as promising. Information on these sixteen technologies follows.

Date: January 19, 2010

**Innovative Technology:** Vscan®

**Organization:** GE Healthcare

**Purpose:** Pocket-size visualization tool for point-of-care ultrasound imaging

**Summary:** Vscan is the size of a smart phone. This handheld device will enable physicians and possibly nurses to combine physical examinations with visual inspection into the body. Vscan provides black and white anatomic and color-coded blood flow images in real-time.



**Timeline:**

Investigational  Emerging  Available

**Explain why this technology seems to have the likely potential to significantly impact the physician and/or nursing shortage in Alberta:**

The efficiency and productivity gains that could be gained for clinicians are extremely promising. The portability and potential for more rapid diagnoses with the enhanced physical exam could significantly impact the physician and perhaps nursing shortage in Alberta. Clinical applications include: cardiac, abdomen, urinary bladder, obstetrics and gynecology, pediatric, peripheral vascular applications, thoracic/pleural fluid and motion detection.

One of the most promising aspects of this technology is the immediacy of information and diagnosis. Particularly, in the case of family physicians, a technology that negates the need for follow-up visits could provide significant time and resource savings.

**Cost:** As of March 3, 2010 the cost in Canada for a single unit is \$8600 (S. Clair, personal communication, March 2, 2010).

**Sources:**

<https://www2.gehealthcare.com/portal/site/vscan/aboutvscan/>

<http://www.bloomberg.com/apps/news?pid=20601109&sid=aVWwPivfTiMw>

<https://www2.gehealthcare.com/portal/site/vscan/menuitem.5d3452ce9ca6d61a988c15cd74c84130/?vgnnextoid=9b3ffdbe826e1210VgnVCM100000c7283903RCD>

<http://www.stockhouse.com/News/USReleasesDetail.aspx?n=7634528>

Date: February 23, 2010

**Innovative Technology:** Portable Magnetometer

**Organization:** University of Leeds with funding from the Engineering and Physical Sciences Research Council

**Purpose:** A sensitive hand held device used to detect a number of conditions including heart problems, much earlier than currently available diagnostic techniques such as ultrasound, ECG (electrocardiogram) and existing medical magnetometers.



**Summary:** A magnetometer is a device that measures the strength or direction of a magnetic field. Magnetometer technology has been used for many years in geologic surveys and space exploration. Researchers combined atomic and medical physics to develop this new scanner. Their innovative cardiac scanner provides unprecedented sensitivity to magnetic fluctuations and expects to dramatically improve the process of diagnosing heart conditions.

The current estimate for availability is three years.

**Timeline:**

Investigational  Emerging  Available

**Explain why this technology seems to have the likely potential to significantly impact the physician and/or nursing shortage in Alberta:**

Previous magnetometer technology has been too big, expensive and specialized to be used for identifying heart conditions. This magnetometer will be smaller, simpler to operate, able to gather more information and significantly cheaper than other devices currently available.

This device is expected to be particularly effective in detecting ischemia (blockage of blood vessels). Also, it could shorten the time of surgical procedures

for people suffering from arrhythmia by almost 80 percent, because it offers a much quicker way of identifying which heart node requires cauterization.

The expectation is that skilled nurses as well as doctors will be able to carry out heart scans. The device will function through clothes, further cutting the time needed to perform scans.

The portability, immediacy, flexibility in operator, efficiency and price are all reasons this device has the likely potential to significantly impact the physician and/or nursing shortage in Alberta.

**Cost:** Not currently available.

**Sources:**

<http://www.healthcanal.com/blood,-heart-and-circulation/5458.html>

<http://www.youtube.com/watch?v=gfWxtX5r3iU>

<http://techworldmedicine.net/SpecialReports/PRE20067.html>

Date: February 28, 2010

**Innovative Technology:** Moca Source Code

**Organization:** Moca: A student organization based at Massachusetts Institute of Technology

**Purpose:** Medical media application: The Moca source code, which can be downloaded for free, enables the building blocks that allow workers to use smart phones to record patient data and transmit files to specialists for evaluation, diagnoses and treatment suggestions. This open-source system supports audio, images, location based data, text, and video.



**Summary:**

On February 17<sup>th</sup>, 2010, the first version of the Moca source code was released. This code can be used as foundational building blocks for telemedicine and mHealth applications. Moca technology can be used for a variety of applications including cervical cancer diagnostics, cataracts diagnosis, skin condition treatment, surgery follow-up, and emergency response. This innovative mobile information system can improve patient access to medical specialists for faster, high quality and cost effective diagnosis and intervention. Moca offers open source data collection and collaboration platforms for clinical research and best practice health care delivery for underserved rural populations. The complete Moca system consists of at least one (in most cases several) phones and a web-connected server.

Governments and NGO's are starting to build their own models to solve medical challenges in remote, under-served areas. The Moca platform provides instant infrastructure to capture media (photo's, video) and patient information. The information can be sent to a centralized server and be managed by physicians, specialists or diagnostic software.

Procedures are central to Moca. Procedures are step-by-step workflows. The worker completes a procedure by following a set of questions and prompts. For example, a prompt might involve entering text, checking boxes, or recording audio/video.

**Timeline:**

Investigational  Emerging  Available

**Explain why this technology seems to have the likely potential to significantly impact the physician and/or nursing shortage in Alberta:**

This technology is specifically designed to serve populations underserved by health care professionals. The “sales pitch” for Moca is currently directed at developing countries, but the potential to deliver health care to any underserved region is tremendous. In fact, the ease with which this technology could be managed and integrated into Alberta’s health system is extremely interesting.

Moca is cell phoned based technology. Cell phone technology is inexpensive, personal, and everywhere. The potential uptake for this technology is promising because it is technology people are already comfortable using. One of the challenges of integrating cellular technology is the issue of connectivity. The robust network strategies Moca has developed would be easily utilized and integrated in Alberta.

Theoretically at the most expansive range of application, any number of people could use the Moca platform to collect patient data and/or run procedures. An individual could collect information and upload the information to the medical records system of choice for a doctor to review. The current phone based HealthLink system in Alberta could be expanded with the Moca platform.

For example, AHS could provide the cell phone based Moca application on its website. Any Albertan could download the program and follow a set of procedures to collect clinically relevant information. The Moca platform allows for text and media such as voice, picture or video to be collected. The information could be uploaded to a HealthLink server and sent to a physician or nurse for review. The physician or nurse can use Moca systems to send back information, diagnosis, or treatment plans.

**Cost:** The source code is free. The add-on applications, customizing, cell-phones, etc. would have costs associated. The technology requires at least a 1G phone (around \$100-\$200). The system could be small and inexpensive or extensive with more resources committed.

**Sources:**

<http://www.mocamobile.org/index.html>

<http://www.linuxfordevices.com/c/a/Linux-For-Devices-Articles/Android-app-offers-remote-medical-diagnostics/>

[http://www.boston.com/news/education/higher/articles/2009/10/14/mit\\_program\\_looks\\_at\\_ways\\_to\\_change\\_the\\_world\\_using\\_cellphones/](http://www.boston.com/news/education/higher/articles/2009/10/14/mit_program_looks_at_ways_to_change_the_world_using_cellphones/)

[http://openmrs.org/wiki/OpenMRS\\_Overview](http://openmrs.org/wiki/OpenMRS_Overview)

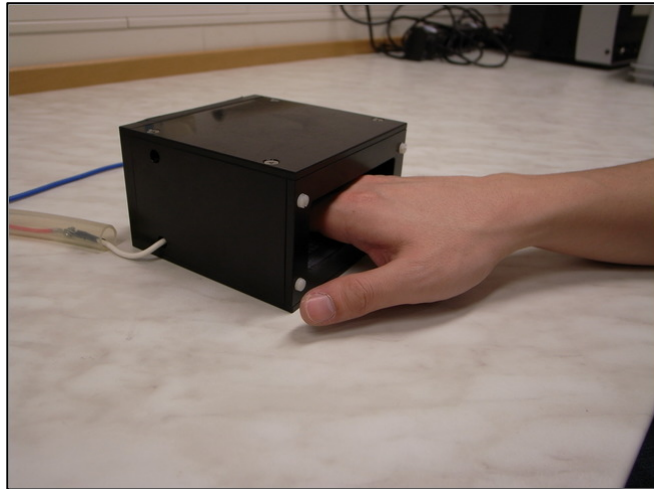
Date: March 3, 2010

**Innovative Technology:** Plasma Gas Hand Sterilizer

**Organization:** The technology is being developed in several laboratories.

**Purpose:** An extremely effective and efficient means of sanitizing hands.

**Summary:** Instead of scrubbing, a person inserts their hands into a box and in an estimated four seconds their hands (including under fingernails) are sanitized.



The plasma quickly inactivates bacteria, viruses, and fungi. Plasma cleaners work by running electrical current through air. The electric current ionizes the oxygen, nitrogen and water vapor in the air; nitric oxide, hydrogen peroxide and particles are created to destroy bacteria, viruses and fungi.

**Timeline:**

Investigational  Emerging  Available

**Explain why this technology seems to have the likely potential to significantly impact the physician and/or nursing shortage in Alberta:**

Physicians and nurses wash or sanitize their hands dozens of times in a day. The time savings could be enormous. As well, if the technology works as well as the research indicates, the ease of use combined with the overall effectiveness could help reduce hospital acquired infections.

**Cost:** The devices do not contain expensive parts and can likely be built for \$100 or less.

**Sources:**

<http://www.nytimes.com/2010/02/14/business/14novel.html>

The following twelve technologies were identified as “maybe” having the likely potential to significantly impact the physician and/or nursing shortage in Alberta. All the information included in the summaries, and in many cases much more information, can be found in the associated links. As of March 22, 2010 each link was active.

### **CANRISK and Hemoglobin A1C Test**

Investigational  Emerging  Available

Diabetes affects approximately two million Canadians and six million more are believed to be at high risk. Traditionally the fasting plasma glucose test (FPG) and the oral glucose tolerance test have been widely used to screen for diabetes. Recently, an assembly of international diabetes experts proposed the A1C test becomes the standard for the screening and diagnosis of diabetes. The A1C test reflects an average of blood glucose concentrations in the previous two to three months. A 2007 systematic review that compared the A1C test with the FPG found both tests were equally effective as screening tools for type 2 diabetes. However, the A1C was reported to be a superior predictor for micro and macro vascular complications.

The A1C test costs between six to eight Canadian dollars and the FPG test costs less than one dollar Canadian. Although the A1C is more expensive it provides more information. Particularly in persons considered high-risk, if the A1C test is performed at the outset, the physician would have more information, more quickly and the need for repeat visits could be reduced. The patient benefits by not having to fast or attend in the lab during a long test.

[http://www.cadth.ca/media/pdf/hta\\_htupdate\\_issue12\\_e.pdf](http://www.cadth.ca/media/pdf/hta_htupdate_issue12_e.pdf)

### **Corus CAD**

Investigational  Emerging  Available

The use of blood tests to diagnose conditions more quickly and easily offers efficiencies that could potentially impact the physician and/or nursing shortage. This non-invasive blood test accurately predicts significant coronary blockage. Currently cardiologists use stress echocardiography, myocardial perfusion imaging, and computed tomography angiography to check for the presence of obstructive coronary artery disease (CAD) in patients with stable chest pain. The results from the blood test take three days to confirm so it is not an appropriate tool in emergency situations.

<http://www.healthcanal.com/surgery-and-rehabilitation/5492.html>

### **Jetstream® Atherectomy System**

Investigational  Emerging  Available

This device was recently cleared by the FDA. For people with peripheral arterial disease (PAD), this device clears away and removes potentially deadly artery clogging plaque in leg arteries. PAD is often associated with high blood pressure, diabetes, heart disease, stroke, and aging. It occurs when plaque builds up on the inside walls of blood vessels causing a blockage of blood flow to the extremities. This device is the first on the market capable of treating an entire spectrum of diseases found in PAD patients. This treatment has the potential to reduce procedure time and minimize vessel trauma (which reduced complications). This treatment for PAD is minimally invasive and can restore blood flow without surgery.

<http://www.healthcanal.com/surgery-and-rehabilitation/5554.html>

<http://www.medicalnewstoday.com/articles/176062.php>

### **LACE Discharge Tool**

Investigational  Emerging  Available

Canadian researchers have developed a simple tool to predict the probability that a patient discharged from hospital to the community will die or be unexpectedly readmitted within 30 days. The tool is called LACE to coincide with the factors:

- Length of stay in hospital.
- Acuity of admission (whether or not is was through the emergency department)
- Comorbidity of the patient
- Emergency room utilization (number of previous visits in the previous six months)

Each factor is assigned a number of points based on its value. The points are added together to form a LACE score. The higher the LACE score the higher the risk of death or readmission. Researchers have indicated this tool could be used to identify the patients most at risk at time of discharge to address health problems earlier and prevent serious complications. Depending on the nursing/physician resources devoted to administering the test; preventing serious complications might have an impact on health resources.

<http://www.healthcanal.com/surgery-and-rehabilitation/6050.html>

### **“Nanobubbles” used to ID and destroy individual diseased cells**

Investigational  Emerging  Available

Scientists at Rice University have discovered a new technique for singling out individual diseased cells and destroying them using lasers and nanoparticles. Single-cell targeting would allow the early treatment of unhealthy cells early. Treatment of cancers before a disease progresses could potentially save health human resources.

<http://www.healthcanal.com/medical-breakthroughs/5514.html>

<http://nanoforum.org/educationtree/healthcare/healthcare.htm>

### **Quanta Home Dialysis Machine**

Investigational  Emerging  Available

This new haemodialysis machine is intended to replace the need for patients with kidney disease to make trips to the hospital several times a week to undergo dialysis.

The Quanta machine uses a sophisticated cartridge to mix the water and salt solutions required to generate the fluid required for dialysis. The cartridge is disposable so there is no need to disinfect the fluid pathways of the machine after each dialysis. The machine could fit with the patients schedule; either short sessions each day, or slow gentle dialysis overnight. Some organizations have developed successful home haemodialysis programs using standard equipment; however, standard equipment machines are complex, large, and heavy.

There are human resource benefits to having people able to self administer haemodialysis in their homes. The new machine is undergoing regulatory rests and trials later this year. It is anticipated the system could launch in the UK in 2011. The cost of a Quanta machine would be less than the standard equipment.

<http://www.devicesfordignity.org.uk/>

<http://www.healthcanal.com/medical-breakthroughs/6287.html>

<http://204.92.98.244/Document.Doc?id=102>

## Remote Monitoring Devices

Investigational  Emerging  Available

There are many new remote health monitoring devices being developed and introduced. One example is the ecg@home. The ecg@home is small enough to fit in the palm of a hand and can record a 10-second electrocardiogram (ECG) without electrode cables by just using the thumbs. The web-enabled machine then can then send the information for analysis.

The time saving for physicians could come from the accessibility of information. Theoretically, a physician could review the data from several patients in a few minutes. If there is a problem, the physician can contact the patient before the health situation worsens. Preventing, the more serious heart condition would have a likely human resource savings. The ecg@home is available in Canada, and there is currently a request into the manufacturer for an approximate cost.

Another promising remote monitoring device is the Clinical Movement Assessment System (CMAS). It is expected the CMAS will provide clinical assessment of fine motor movement, gross muscle strength, hand-eye coordination and patient response to treatment. The closely captured repeat assessments will lead to early warning and detection of deteriorating conditions. The CMAS is undergoing clinical trials.

<http://www.healthfrontier.com/news/index.php>

<http://www.physorg.com/news186924652.html>

<http://www.medisens.com/product.html#product2>

## Robotic Surgical Simulator- RoSS: Simulator Training for Robotic Surgery

Investigational  Emerging  Available

There are a handful of other robotic simulators on the market. The newest offering, RoSS, is based on the widely used da Vinci robot surgical system. RoSS is a surgical robot simulator which uses virtual reality to allow surgeons to practice or rehearse surgeries and experience the operation and feel of a robotic surgical console. The more surgeons trained in robotic surgery; the more human resource savings in terms of both the procedure and patient recovery. One simulator costs approximately \$500,000 US.

<http://www.simulatedsurgicals.com/index.html>

[http://www.google.com/hostednews/ap/article/ALeqM5jU8o4IANVI1-xINo7OVNle\\_2luXwD9E3J2K00](http://www.google.com/hostednews/ap/article/ALeqM5jU8o4IANVI1-xINo7OVNle_2luXwD9E3J2K00)

<http://www.davincisurgery.com/>

### **Screening for Bacteria Prior to Surgery**

Investigational  Emerging  Available

The tests to screen patients for bacteria prior to surgery are available but the procedure of regularly performing these tests is emerging.

Two new studies suggest that there are health and resource gains to be accessed by testing and treating surgical patients for common bacteria prior to surgery. Rather than trying to stop hospital acquired infections by methods like stepped-up hand washing; the studies indicate screening, scrubbing, or pre-treating for harmful bacteria the patient is carrying on their body could be extremely helpful in preventing infections.

Preventing the complications caused by infection is one way to save health human resources.

<http://www.nytimes.com/2010/01/07/health/research/07infection.html?fta=y>

### **Treating Pre-diabetes with Metformin**

Investigational  Emerging  Available

In this study the authors concluded that metformin reduced the rate of conversion from prediabetes to type 2 diabetes. On review, the findings were consistent and robust to rigorous sensitivity analysis. However, the review recommended the researchers conclusions should be interpreted with a degree of caution given the small number of trials in the review. Given the rise of incidents of diabetes and the resources utilized to manage patients with diabetes, if Metformin can reduce the rate of conversion from prediabetes to type 2 diabetes, it could be valuable to continue following the research.

<http://www.crd.york.ac.uk/CRDWeb/ShowRecord.asp?ID=12009106119>

### **University of California San Diego: Centre for the Future of Surgery**

Investigational  Emerging  Available

UC San Diego's Centre for the Future of Surgery is advancing scarless surgery techniques by investigating, developing, testing and teaching procedures that will revolutionize surgery. They have progressed natural orifice surgery by developing procedures which allow surgeons to remove diseased organs through natural openings in the body (mouth, vagina). The patients experience quicker

recovery, less pain, and fewer post operative hernias by avoiding major incisions. Alberta has the Centre for the Advancement of Minimally Invasive Surgery to continue building on surgical advancements; and there are human resource savings to be gained through surgical advancements.

<http://surgery.ucsd.edu/research/Pages/default.aspx>

### **Vitamin D**

Investigational  Emerging  Available

There is a great deal of evidence to support the health benefits of Vitamin D, however, there is a growing body of evidence that indicates many people are vitamin D deficient. A recent study found 59 percent of study subjects had serious deficiencies in vitamin D. Vitamin D insufficiency is linked to increased body fat, decreased muscle strength, osteoporosis, type 2 diabetes, and cancer. Recently, scientists discovered that vitamin D is crucial to activating immune defense cells. The demands on health human resources are impacted by population health and sufficient vitamin D levels are linked with significant health benefits.

<http://dietary-supplements.info.nih.gov/factsheets/vitamind.asp>

<http://www.crd.york.ac.uk/CRDWeb/ShowRecord.asp?ID=12010000312>

<http://www.healthcanal.com/immune-system/6189.html>

<http://www.healthcanal.com/bones-and-muscles/6148.html>

### **RECOMMENDATIONS**

This report has identified technologies with the potential to help address the shortage of physicians and nurses in Alberta. The following four recommendations would help ensure that this potential is realized.

First, the Partners of Stratavera should use their contacts to bring this report to the attention of leaders in Alberta's health care system.

The second recommendation is to designate a person to continue following each of the technologies included in the report. Several technologies are still in the investigational or emerging phase of development and their progress should be followed. It would not take much effort to use the links provided in the report and periodically check on the progress of a technology. This horizon scan is just a first step. Ultimately, in order to fully determine the potential of a technology a Health Technology Assessment (HTA) would need to be conducted. At some

point, if there were a technology someone felt had sufficient promise, they could even put forward an application to the Alberta Health Technologies Decision Process.

Third, designate someone to continue scanning for technologies with the potential to address the shortage of human health workers. The process referred to in this report is well established. Many of the online sources have been subscribed to and automatically send out updates. There are a handful of companies leading the way in developing innovative health technologies. A periodic review of e-mail updates and favorite websites could continue to build the list of technologies with potential.

Fourth, the Partners of Stratavera should use their extensive contacts to explore partnerships between industry, academia, and government to expedite the process of developing innovative technologies that can help solve the HHR shortages affecting most of the world. Potentially, AHS might be approached to see if government would sponsor such a project. With the right investments, Alberta could become a world leader in the development and utilization of technology to address HHR shortages.

## **CONCLUSION**

A healthy population is fundamental to a productive, civil society. The shortage of HHR has been described by leaders in health as the most important health issue in their countries. Health care costs are rising at worrisome levels and even if the money were available, the shortage of HHR can not be corrected by dollars alone.

The purpose of this project was to identify innovative technologies with the potential to significantly address the shortage of physicians and nurses in Alberta. A horizon scan was used to identify several technologies with this potential.

Based on the literature review and results of the scan, four client recommendations were developed. If followed, these recommendations would assist in identifying or developing technologies to address HHR shortages. Empirical support for technology's promise in this area could perhaps build support for increased public and private investment in Alberta's capacity to develop new technologies of this kind.

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