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Is EHR the Cure?
An Examination of the Implementation of an Electronic Health Record in Rural Alberta

by

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Abstract

As Canada continues its drive towards a national electronic health record the costs are mounting. With 256 projects underway the question has to be asked: what are the true costs of such an endeavor? Success hinges on cooperation at all levels and adequate funding in place to see it to completion. Has Canada taken into full consideration the impact that this project will have in the long run? One small part of a much larger project in rural Alberta puts a face on the huge undertaking. Nurses in one former health region adopted not only an Order Entry module but also began using computers for the first time in order to do their work. Nurses are one of the key end-user groups actually inputting the information into these systems. Is data entry something nurses need to be concerned with at all especially at the Order Entry level?

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Introduction

> Because technological innovation is inextricably linked to the processes of social reconstruction, any society that hopes to control its own structural evolution must confront each significant set of technological possibilities with scrupulous care.
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> Langdon Winner
>
> *The Whale and the Reactor:*
>
> *A Search for Limitation in an Age of High Technology*

Ask any Canadian to name a defining national institution and their healthcare system will likely be mentioned. But this valued institution is becoming continually more expensive and complicated to manage.

Managing the Canadian healthcare system offers unique challenges due to its intricacies and many demands. Canada is geographically vast with a dispersed and diverse population with varied and changing healthcare needs. There are many layers of governance involved with the management of the system from the national, provincial, and in most cases, the regional levels. This continues right down to the site administrators who manage the care centres. The service areas include acute care (ambulatory), long-term

care, public health, home care, doctors' clinic, pharmacy, laboratories, and diagnostic services. The list does not include all the support and auxiliary services such as mental health, palliative care, assisted living, walk-in clinics and administration to name but a few. All of these service areas generate vast amounts of information primarily for proper patient care but an important secondary use of the information is to help determine what level of these services are required in any particular place, and to grant proper funding in a timely and responsive manner.

One potential solution for managing this information, which Canada has already heavily invested in, is a national electronic health record (EHR) that, when fully implemented, will allow Canadians to move through the system seamlessly with their accurate health information following them regardless of any corporeal or spatial barriers. The goal is to allow a patient's EHR to follow them from cradle to grave across the vast geography of the land while receiving any type of healthcare service, be it visits to their family doctor, periodic trips to the emergency room, inpatient stays in acute care hospitals, immunizations through public health, and eventual care in long-term care facilities. Doctors, clinicians and care providers will be able to act upon current, consistent and accurate patient information for diagnosis and care planning. In turn, governments at all levels will be able to access the kind of aggregate information from all of these service areas and locations necessary in determining appropriate

resourcing and budgetary needs. In the grand realization of a fully implemented EHR, it will connect all to all and allow responsive funding to be in place to provide the best service possible.

Research Questions Explored

The adoption of a national EHR raises many interesting research questions, especially when a project this vast is embarked upon—one which will ultimately involve every citizen in an entire country. Can a technological solution purported to improve efficiency, reduce costs, improve the flow of information, and ultimately improve healthcare delivery have any possible downsides? Langdon Winner, in *The Whale and the Reactor*, succinctly asks:

> As we "make things work," what kind of world are we making? This suggests that we pay attention not only to the making of physical instruments and processes, although that certainly remains important, but also to the production of psychological, social, and political conditions as a part of any significant technical change. (Winner, 1989, p. 17)

Making the access and flow of health information better for all Canadians by implementing a national EHR necessitates detailed attention to all processes involved in all levels of healthcare provision and the many projects involved in this endeavor are dealing with the technological tools to make this happen, but there is little evidence of any substantive focus on the what the psychological and social conditions are or will be. Studies of technologies tend to be

interdisciplinary by their very nature and there is often difficulty in determining what should be the primary perspective of the research. Winner points out that there are deficiencies in the questions brought to bear on modern technologies that nebulously focus on “computers and [their] social impact” or a sort of technological determinism—“the idea that technology develops as the result of an internal dynamic and then, unmediated by any other influence, molds society to fits its pattern” (Winner, 1989, p. 20). They fail to look behind the technical artifacts to the political and social conditions in which they are embedded. He calls this line of questioning “the social determination of technology.” While it is a necessary antidote to the naivety of technological determinism in seeking to identify the drivers behind any given technology, it does not mean that the technology itself does not matter. To simply uncover the “social origins” of a technology offers “comfort to social scientists,” but he argues that social determinism of technology is really no different than social determination of any given political schema (Winner, 1989, p. 21). Most social science theory does not go far enough in providing a model by which to account for “what is most interesting and troublesome.” Winner suggests that technology is political in its own right and a theory of “technological politics that draws attention to the momentum of large-scale sociotechnical systems, to the response of modern societies to certain technological imperatives, and to the ways human ends are powerfully transformed as they are adapted to technical means” (Winner, 1989, p. 21).

Both Neil Postman (1999), in *Building a Bridge to the Eighteenth Century*, and the agrarian and cultural critic Wendell Berry ask similar questions about technologies. In his article *Why I am Not Going to Buy a Computer* Berry (2009) takes a more bottom-up approach. In other words his perspective on technology is that of the end user. He measures the value of any new tool against the simplest of criteria, such as whether the new technology is smaller in scale, less expensive, demonstrably better, and uses less energy than its predecessor. Wendell ties these questions to the larger socioeconomic ideals of conservationism.

Postman cautions that technological advancements do not necessarily equal progress, and that the promised solutions may lead to problems that did not exist before the implementation for the majority of those impacted by the technology in question. He ponders the questions of whose problems are being solved by the technologies and what problems are created by the technological solutions. These are questions I am asking about the adoption of the EHR. Were the right questions asked before the decision was made to implement this system? Is adopting this new technology to help manage healthcare going to create its own problems that will need resolution? Is this technology faster, more efficient, less costly and better than what it is to replace?

The conversion of health information from the paper chart to an electronic record is no small task in a system as complicated as

healthcare and, once achieved, the digitized health information can no longer be used in the same way as the paper chart. What are the differences and are there advantages? Making notes on a portable paper chart has long been the norm. However, the storage and retrieval of this information has caused difficulty, often resulting in incomplete patient data upon which to base diagnostic and care-planning decisions, and potentially leading to medical errors and duplication of services. The electronic system offers real-time, point-of-care documentation that, if properly interfaced or integrated, allows for access to complete patient data by any clinician in any setting (Blumenthal & Glaser, 2007).

Could this solution cause unforeseen problems by virtue of its own technology? The very act of introducing an electronic system necessitates a change in how doctors, clinicians, healthcare providers, and health administrators do their jobs. To replicate existing practices and processes without careful determination runs the risk of automating and magnifying existing inefficiencies. There is also the problem of integrating the technology into workflow without unnecessary disruption and stress to either the patient or care provider. Imperative to this objective is user acceptance. This is simply stated but difficult to achieve, as witnessed during the system implementation in the rural region in Alberta examined in Chapter 1.

Is an electronic health record a possible cure for an ailing healthcare system? According to David Blumenthal and John Glaser in *Information Technology Comes to Medicine* there are those who believe this.

> Judging from the excited rhetoric of some of its enthusiasts, health information technology (HIT) has the power to transport us to almost a dreamlike world of health care perfection in which the work of doctors and the care of patients proceed with barely imaginable quality and efficiency (Blumenthal & Glaser, 2007, p. 2527).

Or, if not the cure, could it at least help stem spiraling costs and better align services to meet increasing demands? Could it be that these economic considerations, while not necessarily part of the analytics of Postman or Winner, are driving the adoption of the EHR? It does speak to Postman's question of whose problem is being solved.

The financial ramifications of this project cannot be ignored. In 2002, Roy Romanow, then head the Royal Commission on the Future of Health Care*,* released his report confirming the Canadian philosophy of a public health administration, universality and accessibility, while renewing the principles of portability and comprehensiveness, and adding a new standard of accountability. The addition of this new standard signals a changing political disposition towards the Canadian value of socialized healthcare for

all—whatever, whoever, whenever and wherever. Not surprisingly one of the key recommendations to this end is to pursue a pan-Canadian interoperable electronic health record built on the provincial systems, so that each Canadian would have a single personal electronic health record (Romanow, 2002, p. 75).

Langdon Winner stresses that a technology must be critiqued from the vantage of what particular forms of power and authority are embodied within it (Winner, 1989, p. 19). The top-down mandate by the federal government to implement a national EHR would seem to be a logical and valuable endeavour and will benefit all stakeholders. Romanow makes a strong case for an EHR and the potential for a seamless flow of current, complete health information as desirable to patients and care providers alike.

> Good information systems are essential to a high quality health care system. They allow health care providers, managers and policymakers to share information and use the best available evidence to guide their decisions. They can also forge a strong link between quality on the one hand and accountability on the other. Increased use of information technology in health care can also have important benefits for patients...This information will also be linked to research trends and be used to promote population health and in determining funding (Romanow, 2002, p. 75).

Which methodologies will be applied to the data in the reporting to make these determinations should be transparent. For example, if cost analysis is one of the main purposes for which the data provided by an interoperable health information system is used—specifically, for determining budgeting needs—could this then jeopardize valuable services provided to specific groups in areas with low population concentrations, because of the expense of running the programs? Accountability is one of the new guiding principles in this endeavour, and it is not difficult to extrapolate that using this new technology for meeting that goal could mean that the economics will take precedence over Romanow's other stated principles of accessibility and universality. Winner cautions that "technological change expresses a panoply of human motives, not the least of which is the desire of some to have dominion over others even though it may require an occasional sacrifice of cost savings and some violation of the normal standard of trying to get more from less" (Winner, 1989, p. 24). I would argue that one of the government's primary reasons for investing in the EHR is an attempt to move the monies around in a way that will satisfy the principles of accessibility but potentially not at the levels of service that Canadians have grown accustomed to. There were stresses on the system and increasing difficulty in achieving an acceptable balance before the decision was made to implement the HER, so who wins and who loses with this solution?

Finally, can the implementation of a national EHR be fully and successfully achieved unhindered? Will there be positive results or will they be outweighed by any potentially negative outcomes? Key to this is careful planning, sufficient resources and expertise. A delicate balance between gathering the right people together, choosing the appropriate system, and developing a manageable timeline to achieve the right outcomes is paramount. If timelines are too aggressive there is the hazard of poor implementation training and lower user acceptance. System selection often hinges on budgetary restraints; however, if the chosen system cannot be appropriately configured to reflect the business needs of healthcare and it requires constant reconfiguring and augmentation, then where are the cost savings? Business definitely wins in this situation as they would have the opportunity to provide after-market services, and products to support these software suites. Taxpayers are the losers in this scenario, as well as those who actually depend on the system to do their work. If a system is constantly in a state of revision and versioning it becomes very difficult to ever fully benefit from it. Commercially available systems like the MEDITECH suite chosen by rural Alberta are not operational out of the box but require building to fit the environments where they are to be implemented. This requires major commitment to be successful. The other option is to build a tailored system from the ground up but it

carries a prohibitive price tag and requires long term investment to realize its benefits.

> Internally developed systems are unlikely to be feasible as models for broad-scale use of health information technology. Most practices and organizations will adopt a commercially developed health information technology system, and, given logistic constraints and budgetary issues, their implementation cycles will be much shorter (Chaudhry et al., 2006, p. 13)

What is the best solution for Canada and is the level of expertise available for either option? The enormity of a project that involves changes to every aspect of healthcare is one that will have the compromises inherent in any large project. The promises of a national EHR support the Canadian value of universality by providing real-time, consistent health information no matter what kind of service they are seeking and wherever it is being sought. However, financial restraints might put an insurmountable stress on that particular value which the EHR wants to embody. Could Romanow's added value of accountability sound the death knell of Canadian universal healthcare? Is it time for a reality check? Can Canadians really hang on to the idealism of a universal healthcare system? Will this technological solution serve to speed the demise? Or can or will Canada continue to commit to full, extensive universal healthcare,

and if so, could the national EHR aid in supporting it in a more manageable if not altered way?

Thesis Outlined

The thesis is organized as follows. Chapter 1 provides a snapshot of one implementation in one rural region in Alberta that collaborated with all the rural regions in the province to implement the first phase of an EHR from a single vendor. Specifically it traces the preparation and training of one thousand nurses on an order entry module where no electronic system had previously existed. One year post-implementation, a randomly selected group of the nurses were surveyed about their experience with training, how they felt they were communicated with about the project, how they were adapting to the system, and what they overall felt about having computers inserted into their practice. It concludes with a discussion of the results compared against other research on implementations. Chapter 2 connects the experience of the rural Alberta experience in 2005 to the larger picture. It details what exactly is entailed in creating a national EHR and what led Canada to choose to adopt a national EHR in the first place. As well, I attempt to identify who or what the real drivers of this project were. The final chapter addresses theoretical and ethical issues of the implementation from the national and provincial perspective and questions the success of the module implementation and training of the nurses in the rural Alberta region.

Literature Review

Making sense of Canada's pursuit of electronic health records and their implementations, and more specifically its decision to drive towards the adoption of a national EHR, required research into many different areas of study in a variety of fields and to varying sources from government documents and reports, professional journals (in nursing and business), academic papers, research, books and websites. What follows is a brief overview of some of the key issues involved in a project of this magnitude as it impacts many stakeholders. Research on the adoption of computers in the workplace and the use these new tools to replace existing practices were covered in the areas of nursing education and adult learning as it pertains to Investigation into system implementations is not always specific to the healthcare field as it is a relatively new adopter of information systems. Understanding of the electronic health record system is embodied in the field of clinical informatics. Asking the questions of why and how Canada chose to adopt an EHR leads to a multitude of government reports and websites of groups that are intricately connected to this enterprise. The writings of Langdon Winner and Neil Postman influence the larger questions of potential implications, good or bad, to society as a whole of this major technological shift.

Neil Postman's *Technopoly* (1999) and *Building a Bridge to the Eighteenth Century: Ideas from the Past That Can Improve Our Future* (1992) raise the questions of how our world is becoming increasingly mediated by the technologies around us with medicine not being

immune. We accept these new technologies unquestioningly fully believing that they will improve our lives. In *Building a Bridge to the Eighteenth Century: Ideas from the Past That Can Improve Our Future* Postman states:

> The idea that if something could be done, it should be done was born in the nineteenth century. And along with it there developed a profound belief in all the principles through which invention succeeds: objectivity, efficiency, expertise, standardization, measurement, a market economy, and, of course, faith in progress (Postman, 1992, p. 48).

More specifically, in *Technopoly* Postman raises questions about the effects that this increased mediation causes. In medicine and healthcare, we have done so to the degree that we have become suspicious of diagnosis not backed by the latest test and use of high-tech diagnostic tools. Doctors, aware of their patient's expectation, readily order more and more of these tests. Postman marks the beginning of technological mediation with the introduction of the stethoscope. This simple device allowed the doctors of the time to gain more information about the patient by letting them actually hear the heart beat (Postman, 1992, p. 63). Our fascination with all that is new, especially in medicine, has given rise to a whole new division of news

media.[1] Langdon Winner, in *The Whale and the Reactor: A Search for Limits in an Age of High Technology*, cautions that we need a philosophical framework specifically for technology upon which to draw "attention to the momentum of large-scale sociotechnical systems, to the response of modern societies to certain technological imperatives, and to the ways human ends are powerfully transformed as they are adapted to technical means" (Winner, 1989, p. 21).

The report *Building on Values: The Future of Health Care in Canada* (more commonly referred to as the Romanow Report) released in 2002 made the case for an interoperable pan-Canadian health record with benefits to healthcare providers, patients and administrators:

> The electronic health records are one of the keys to modernizing Canada's health system and improving access and outcomes for Canadians…Good information systems are essential to a high quality health care system. They allow health care providers, managers and policymakers to share information and use the best available evidence to guide their decisions. They can also forge a strong link between quality on the one hand and accountability on the other. Increased use of information technology in health care can also have important benefits for patients. It can provide

[1] As witnessed by the a new television program called The Doctors featuring four medical doctors who cover frequently asked questions and highlight new innovations in medicine.

> them with better access to their own health information as well as to relevant health knowledge, which in turn allows them to play a more active role in maintaining their health and making decisions about their medical care (Romanow, 2002, p. 77).

The report called for a continuation of the work already underway by Canada Health Infoway and made several recommendations that culminated in an accelerated effort towards this national goal. Critical analysis of how this technological change could affect the citizenry and healthcare providers is absent, with the exception of concerns raised by the opposition about the high costs associated with the project and its multitude of sub-projects, as witnessed by the woes recently undergone by eHealth in Ontario.[2] The other concerns frequently raised about the conversion of the paper record to electronic format are around privacy. In fact privacy is a growing field, especially as it pertains to all personal information maintained in an electronic format anywhere, not just in healthcare—but that falls outside the scope of this thesis.

The implementation of a national EHR certainly falls into the category of large scale. Yet living and working in a small rural Alberta town and being immersed in a very small part of this huge project

[2] There have been questions raised about how money has been allocated and claimed as expenses, culminating in the dismissal of three CEOs in the past year. http://www.cbc.ca/health/story/2009/08/20/ehealth-review.html?ref=rss

gave me an entirely different perspective on what this meant to one group of stakeholders. The way in which this project was being implemented was directed by a coalition of all the rural regions and upon the implementation model supported by the vendor MEDITECH. How and why they chose the plan led to research into information system implementation and a better understanding of electronic health information systems in general.

Journals like the *Journal of Nursing Informatics; CIN: Computers, Informatics, Nursing; Electronic Healthcare;* and *Computers in Nursing* focus on the transformative effect of technologies on the practice of nursing and key issues and lessons for incorporating systems into nursing practice. Several studies and articles on health information system implementations in other hospitals and organizations provided the opportunity for comparisons to the experience of the implementation of the Order Entry module in rural Alberta. Some reoccurring concerns are identified in these publications, like insufficient training time, the efficacy of using the train-the-trainer approach, the importance of gaining user-acceptance, and inadequate time given to proper process mapping of nursing practice (Smadu & McMillan, 2007; Chaudhry et al., 2006; Lapointe & Rivard, 2005; Kaminski, 2005; Kossman & Scheidenhelm, 2008). Anderson and Stafford, in *"Big Bang" Implementation: Not for the Faint of Heart*, question the wisdom of adopting a Big Bang Go Live, arguing that this model garners mixed results, and many of the

problems in their study were encountered similarly in the rural Alberta experience.

Introducing technologies, particularly computers, can undermine nurse's sense of competency as was the experience of the rural Alberta nurses.

> Research in user acceptance shows that computer innovation is a "competence-destroying" change, and staff who go from experienced clinicians to novice end-users will experience greater stress and less acceptance of the system (Anderson & Stafford, 2002, p. 16).

The experience of teaching computer literacy to nurses directed research into the field of adult education. William Badke, in his article "Information Literacy Meets Adult Learners" (2008), clearly articulates some of the challenges the rural nurses faced when they were required to not only learn a complex software application but incorporate a complex tool into their practice. He posits that working with databases requires lateral thinking as opposed to linear thinking.

> In an analog world, the steps are laid out in order and you follow them. The digital environment seems, to many adult learners, to be flying off in all directions at once. It's a confusing blur of activity that must have some purpose but looks like chaos. (Badke, 2008, p. 48)

This is in no way suggests that nurses are not up to the task nor can it be generalized that they are strictly linear thinkers. Nurses are trained

to be critical thinkers in their practice. They face an endless variety in their practice and are called upon to evaluate, assess, problem solve, draw conclusions and make judgments about each new patient entrusted to their care. This level of critical thinking is not linear but it is not learned overnight either. According to *Canadian Fundamentals of Nursing* there are levels of critical thinking: basic, complex, and commitment. Basic level critical thinkers are novice nurses, often grad nurses, who learn to trust that experts have the correct answer for every problem. When they are taught procedures it is the basic steps, and because of lack of experience and competency they learn to accept the diverse opinions and values of the experts. As they move into the next level of complex critical thinking they have gained more competencies and begin to detach from authority. They start analyzing and examining alternatives independently. The expert level of critical thinking in nursing is commitment. Expert nurses can anticipate the need and make choices without assistance and assume full accountability. Nursing uses a variety of tools to aid them in their decision-making, including care plans, critical pathways, and decision-trees or algorithms—all of which have the steps to take in any given situation laid out according best practices and current standards. The expert nurse with commitment level of critical thinking can make the decisions to move from one plan or decision tree to another with authority and ease no matter what they are presented with in any given case. There is comfort in knowing that one is well trained to

meet any eventuality in a fast-paced and charged environment (Potter, 2001, pp. 233–235).

Returning to Badke, the analogy can be made that a novice nurse could be defined as an analogue thinker. They are very linear and task oriented. They depend on step-by-step instructions in order to complete the task. Badke likens this to a novice driver who is focused on the mechanics of driving. They are more concerned with how much pressure to apply to the accelerator or the brake and when to shoulder check. “Nothing is intuitive. Everything is done by a process of deliberation, based on mental categories that are too locked down to provide the flexibility to drive the machine with ease” (Badke, 2008, p. 50). Now think of the expert nurse as a digital thinker; using the same analogy, they can be defined as true drivers. Badke defines digital thinkers as lateral thinkers with “the ability to change course and imagine many possible, peripheral paths. It requires an arsenal of strategies to make failure in one direction mean success in another” (Badke, 2008, p. 49).

To take this analogy one step further, an expert nurse as digital thinker finds themselves in the situation of learning a completely new tool and process, thus becoming a novice again. Their arsenal of strategies is no longer effective because they are thrust into having to think mechanically, and the new machine that they are expected to drive is not a car but a computer without which they can no longer do their work. Added to this is the fact they are learning this new tool

(both the software and, in many cases, the hardware as well) along with actual novice nurses who have grown up in a digital world. In this case the novice nurse becomes the digital thinker and the expert in the situation. The question arises of who the winners and losers are when technologies are adopted, and in this instance one could argue that it is not only the expert nurses who are made to feel incompetent when faced with using the technology but also the technologically savvy (digital) novice nurses, who find themselves with the upper hand to their expert mentors. If they are basic critical thinkers who need to lean on the expertise of the experienced nurses, this could theoretically undermine the dynamics of this relationship. I would argue that this is a potential unforeseen consequence but one that is not easily quantifiable.

Endeavouring to comprehend why Canada has decided to build a pan-Canadian EHR required research into the current healthcare system and how it came to be. This was well documented in many government reports (the Romanow Report; *Towards a Canadian Health IWAY: Vision, Opportunities and Future Steps; Canada Health Infoway's 10-Year Investment Strategy: Pan-Canadian Electronic Health Record Vol. II Implementation Strategy;* and the yearly reports for Canada Health Infoway). On his website *Mapleleafweb*, J. Makarenko unpacked the Canada Health Act and was useful in understanding the linkages between the provincial and federal government, and what the jurisdictional powers of each are, as well as

the how the transfer payments provinces receive are used to leverage the federal constitutional authority. This aided in contextualizing the key recommendations for the continued pursuit of the national EHR in Roy Romanow's report as it is tied to the Act and its criteria of accessibility, portability, comprehensiveness and universality. The key criterion that connects the Act to the project is information.

> This section stipulates that provincial and territorial governments must provide information to the federal government for the purposes of the Canada Health Act. This would include, for example, providing information on whether a province or territory is meeting the four criteria discussed above (Mararenko, 2007).

Giokas, in *Canada Health Infoway—Towards a National Interoperable Electronic Health Record (EHR) Solution* (2005), describes the political impetus of how a pan-Canadian interoperable health record was decided upon.

> By the late 1990s, several provincial reports were advocating the need for a compatible, integrated system of health records to be developed on a priority basis. The Fyke Commission, as an example, stated: "The electronic health record is the cornerstone of an efficient and responsive healthcare delivery system, quality improvement and accountability." These reports also recognized that the few electronic information initiatives that were in place were

> stand-alone investments: each attempted to solve one problem, at one time, in one place. Against this backdrop, in September of 2000, the First Ministers unanimously agreed "to work together to strengthen a Canada-wide health infostructure." (Giokas, 2005, p. 110)

For the rural experience in Alberta I turned to information on the Regional Shared Health Information Program (RSHIP) website and information provided to me from the former East Central Health, which included permission for reproducing the map of the former region in Chapter 2. Information on how this implementation fit into the provincial plan was obtained from public documentation on the Alberta Health and Wellness website, including use of the provincial map in Chapter 2.

Methodologies

Interdisciplinary Challenges

Postman focuses on the negative effects that the introduction of technologies will have and asks that we identify the winner and losers, cautioning that it influences everything:

> Technological change is not additive; it is ecological…What happens if we place a drop of red dye into a beaker of clear water? Do we have clear water plus a spot of red dye? Obviously not. We have a new coloration to every molecule of water…A new medium does not add something; it changes everything…That is why we must be cautious about

> technological innovation. The consequences of technological change are always vast, often unpredictable and largely irreversible (Postman, 1999, p. 49)

In accord with Postman's position on the transformative effects of technological change, it is difficult to research the effects of the adoption of a massive sociotechnical system like a national EHR from one disciplinary lens. An important problem with a thesis that is interdisciplinary is that it is by its nature a hybridization of two or more research areas and/or disciplines. To complicate this further, in this case two distinct disciplinary approaches have been applied to more than one subject area. Adding to this is the fact that my research has taken me into numerous areas of inquiry that constitute distinct branches of knowledge in themselves such as health sciences (nursing), education (specifically adult learners), project planning, informatics, and technology criticism.

Coming as I do from a strictly humanities background, my grounding in the research methodologies of social sciences is negligible. Yet the questions I have endeavoured to research led to using data involving human subjects, which clearly landed me in the social sciences arena. The technology critiques of Winner and Postman have strongly influenced my questions about the project that I worked on. Both articulated many of the misgivings and concerns I have about the implementation of the national EHR. My role in this enormous project was really very small in the larger scheme, but it was my

experience with the nurses that made me ask what, if any, the consequences were of incorporating this new (to them) technology into their practices. Was it a good thing? Why was there resistance? Would it make their work easier? Better? Would they be able to adapt? Clearly I am not a social scientist but I definitely see the value in these disciplines, and my research in this area helped me to gain a better grasp on the conundrum that is the EHR. While my analysis is far from expert, the social sciences proved to be insightful and very helpful as far as I was able to process the information.

Secondary Use Data

Towards that goal, I was granted permission for secondary use of data from a survey conducted with the nurses in the rural region one year post-implementation, querying the participants on their experience of the training and their opinions about the usefulness of the module. The primary function of this survey was to gather feedback about how the nurses were adapting to the new system and how they felt about the manner in which the first phase of the project was implemented. This was the best way to determine how the human ends identified in both Postman and Winner could be documented in a scholarly fashion. The clinical informatics staff and their teams were developing their training plans for the next phase, which would entail an even larger commitment of time and resources from the nurses, so it was judged important to consult the frontline staff. The survey results were also used for reporting to the senior leadership team. As

this was not primary research it did not fall into the categories of case study, field experiment, or formal experiment.

Methods

As part of strategic planning of the next phase of the project the informatics team decided that the most expedient method was a survey with the goal of ascertaining how improvements could be made on a go-forward basis and to give the nurses an safe and discreet avenue for voicing their feelings and concerns about the adoption of the new system. The questions were determined by consensus of the team and focused on the nurses' experiences and perceptions about the project one year after the GoLive of the first phase. It was circulated via a link embedded within an e-mail sent from the survey software directly to the randomly selected recipients. When the survey results were collected, the team informally gathered to analyze the results using the software analytic capabilities.

Determining Research Questions

As I did not set out to conduct research in the areas of system implementation, clinical informatics, adult education, or training models prior to or during the time of the implementation, any influence I might have had on the project prior to the survey was strictly within the capacity of my position and could not in any way be construed as field research. This project was rich with data that could answer possible research questions. I could make assertions, hypothesize, draw conclusions and put forth reasonable explanations

of the results from the survey, drawing on my experience of the role I had played. It would have been preferable to have had a clearer idea of what my research questions would be prior to the actual survey. Given the nature of the survey questions and my relationship to the participants, in hindsight it would have been helpful to have treated this as an ethnographic case study. As it stands now, the research might not fulfill all the criteria of such a case study, but the results (which are useful already) would be even more significant and the conclusions even more scientifically reproducible if such methods had been brought to bear early on. Not identifying *a priori* what I wanted to measure and how I wanted to quantify the data left things quite wide open. As I wrestled to keep my thesis in the comfortable realm of a technological critique I still needed to define the questions I was trying to answer in terms of the larger critique, using Winner and Postman as guiding influences.

Useful Outcomes

Based on the experience I had with the nurses in the capacity of my work I did have an idea about what some the outcomes might be from the survey. For example, some of the informal feedback from the staff and managers at the sites indicated that the implementation was very taxing on all involved; as this was not the only initiative that was being executed at that time, the staff were expressing fatigue. It was not surprising then that, when queried whether there was a will to continue on with the phase two implementation plans, the majority of

the survey participants answered “not at this time.” Subsequently, based on this feedback the implementation team decided to adopt a staggered roll-out plan. Senior management was in agreement. The fatigue and resistance expressed are in keeping with what Winner would define as the human ends; therefore the survey served to help support my theories about the human costs of the project (Winner, 1989, p. 21). It was the two methodologies of technological critique and social science that aided in articulating these conclusions.

Gordon Rugg and Marian Petre, in *Gentle Guide to Research Methods,* defines secondary data as information that is not necessarily new to the world but can still be useful, in that a “particular assemblage of those bits gives an overview which nobody had before” (Rudd and Petre, 2006, p. 32). The work of this thesis has allowed me to understand more fully the heavy human toll that the EHR has already had, and has given me some indication of what toll it is likely to exact in the future. The social science methods help to lend a measure of precision and quantification to a process that cultural study identifies via ideology, politics, and anecdote. Both techniques point to the same conclusion, although via widely different avenues. Technology studies show us the magnitude of what is at stake. Social sciences tell us the depth of the human cost.

Chapter 1

From the Bedside to the Keyboard: Computers Come to Rural Nursing

> The construction of a technical system that involves human beings as operating parts brings a reconstruction of social roles and relationships. Often this is a result of a new system's own operating requirements: it simply will not work unless human behavior changes to suit its form and process.
>
> Langdon Winner
>
> *The Whale and the Reactor:*
>
> *A Search for Limitation in an Age of High Technology*

Regional Health System in Alberta and East Central Health

Building a national health information system necessitates the cooperation of the entire country. It requires the adoption and building of new systems or reconfiguration of existing ones, and there are currently 265 such projects underway in order to realize this (Canada Health Infoway, 2008).

Rural Alberta Collaborates

In Alberta, one such collaboration has been in progress for five years in the form of a coalition of the then seven rural health regions under the banner of the *Regional Shared Health Information Program* (RSHIP). These seven regions pooled their collective resources (budgetary and otherwise) to choose and implement a multi-phase project that would ultimately produce a completely integrated health information system that would be able to feed the provincial system (also currently under construction) and eventually the proposed national EHR. With the number of Albertans served roughly equaling the same as either of the urban regions, these rural regions combined their budgets and resources, which allowed the possibility of looking into a larger system than would be otherwise feasible. According to statistics available on the RSHIP website this group represented 106 Acute Facilities (hospitals) with a total of 2,686 Acute Beds, 230 Continuing Care Facilities (also known as Long-Term Care) with a total of 4,096 Continuing Care Beds, 79 Home Care offices, and 96 Public Health offices (Alberta Health and Wellness, 2006). The players in the collaboration included Peace Country, Palliser, David Thompson, Chinook, Northern Lights, Aspen, and East Central Health (ECH) (Figure 1-1).

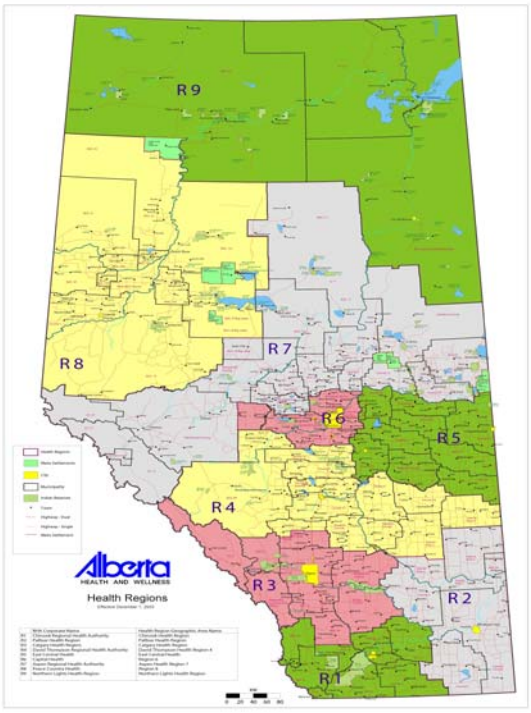

Figure 1-1: Map of Alberta's former nine Health Regions. East Central Health was R5. RSHIP includes all the regions with the exception of Capital Health (R6) and Calgary Health (R3). Permission: http://www.health.alberta.ca/copyright.html

This was a highly coordinated effort to put a single integrated system in place. Successful implementation would generate an EHR for each of its constituents, over one million Albertans, across the seven rural regions.

RSHIP chose an integrated software suite from a mid-sized company in Boston, Massachusetts, called MEDITECH. Briefly, MEDITECH has been in the health information software business since 1969. The proprietary programming language, called MIIS (MEDITECH Interpretive Information System), was developed by the company in 1971 and is still in use today. Until recently, the majority of its

customer base consisted mainly of small-to-medium-sized stand-alone hospitals not integrated with other facilities. While the RFPs that were submitted are confidential, one can surmise why RSHIP chose this company. Aside from the cost factors, one of the value-added features of MEDITECH for the RSHIP group was the inclusion of financial modules. The project of bringing on a customer like RSHIP, divided as it is into seven geographically large, multi-site regions, has proven to be a very large undertaking for this company, not to mention the frequently uneasy tasks involved with customizing an American system to a Canadian healthcare model. An American system like MEDITECH is intricately tied to B/AR (billing and accounts receivable) at all levels because for every visit by an American patient, no matter which service they access, how it will be paid for must be determined before service is rendered. This happily is not the case in Canada, but it has proven difficult to circumvent this aspect of this purportedly customizable system. The financial modules, which do work well and which seemed to be a bonus at the onset, have been the source of much frustration. As well, some of the data elements that are required at the provincial and regional levels have necessitated the building of many, many customized reports using MEDITECH's own report-writing system called Boston Workstation, which according to our own applications specialists can be frustrating and slow. It is not a pretty system and cannot be considered particularly user-friendly but it is robust.

Phase One Implementation

The first phase of the implementation in East Central Health (ECH) consisted of fourteen modules including the Order Entry (OE) module. While the OE module is not the largest or the most complicated (the Laboratory [LAB] and Pharmacy [PHA] modules are far more intricate), it is the key clinical module that feeds information and/or orders to all the other clinical modules.[3] The information generated from all these modules flows to what is in essence the MEDITECH version of the electronic patient record, called the Enterprise Medical Record or EMR.[4]

This phase was implemented across all the participating RSHIP regions on a staggered schedule, and almost all have gone fully live now with all the Phase One modules, with the exception of some of the more resource-strapped regions. All regions have been feeding information to the EMR for close to two years now; however, the switch has yet to be flipped that would allow users to access visit information of patients inter-regionally. In other words, if a nurse working in an ECH facility wishes to access information about a hospital visit her patient had in the Chinook region the previous week,

3 The admissions module activates all patient visits, and is integral in that a visit must be registered/admitted before orders can be placed on the patient.
4 There is understandably a bit of confusion with some of the terminology.

she would not be able to view it and would have to access it the old-fashioned way via fax or phone.

In ECH close to 1000 registered nurses, licensed practical nurses and unit clerks were trained on the OE module within a six-week period from April 2005 to May 2005. During that same period an additional 1000 healthcare professionals and support personnel were trained on the other 13 modules of Phase One. Tension ran high for a variety of reasons. First and foremost, the nursing staff had never had to use computers for any aspect of their work or, in most cases, during their entire career. It was a very tough sell to get the buy-in necessary to achieve user acceptance. Secondly, those departments that were accustomed to using computing and data entry as everyday tools in their working day were required to give up their existing systems, and to replace them with what many felt was an inferior system in order to achieve the interoperability so desired to feed information interdepartmentally, interregionally and provincially. In many cases the systems that were in use were considered superior and chosen for their functionality, ease of use and ability to customize. To give these up for the inelegant MEDITECH system was difficult.

RSHIP in Jeopardy

Phase Two of the implementation of MEDITECH (or, as RSHIP now wishes it to be referred to—RSHIP, so as not to associated strictly to the software) is now currently underway in ECH and the other RSHIP partners. This includes what are termed the advanced clinical

modules, and at the nursing level this means active point-of-care patient charting. In ECH, Continuing Care has been training site-by-site on their module with staggered go-live dates, with an expected completion date of June 2010. ECH has been ahead of many of the other regions, as many of the smaller ones are suffering from acute staffing shortages and reduced funding (since monies are only released when milestones can be demonstrated). ECH has also experienced staffing shortages coupled with other concerns,[5] straining the pace of the implementation. One noted development that threatens any further implementation of the software, and might entirely halt its use, is the total restructuring of Alberta's healthcare system and the complete disbanding of the regional system and amalgamation into a provincial organization now called Alberta Health Services. The problem of what to do with RSHIP remains unresolved at the time of writing. For the group to remain intact (with all of the provincial standards tables) so that they can continue meeting to develop data standards for future modules will prove difficult. The planning has

5 In the spring of 2007 ECH lost its board of directors over the St. Joseph's Hospital infection control problems; specifically, improper sterilization procedures in their CSR (Central Sterilization Room). This prompted the Quality Control Council of Alberta to visit all CSRs across the region and to publish its report. It is interesting to note that the Council offered to do similar surveys across the province but the other regions politely declined the invitations. Consequently the Minister of Health appointed an independent consultant and its own Deputy Minister to take over as managers of the region—an arrangement that persists to this day. With an election looming it does not appear that the fate of the region will be decided for some time yet.

begun and all parties are in attendance. No word as yet on how this will be resolved.

The focus of this chapter is on one small part of this project that occurred in one of the rural regions, formally known as East Central Health (ECH), with the introduction of one module of a multi-module implementation to the largest group in that region—namely the nurses. What follows describes the preparation and training as they were introduced to the OE module.

It also includes how the nurse's computer literacy was assessed prior to the implementation and, if lack of skill existed, what was done; what, if any, were the attitudinal roadblocks impeding the acceptance of the system; an overview of how the training was accomplished; and an analysis of the follow-up survey that was conducted one year post-live.

In 2005 there were nine health regions in Alberta, of which seven were considered rural; the remaining two were the urban regions of Capital Health and Calgary Health (Figure 1-1). ECH was located east of Edmonton and continued east to include Lloydminster. The furthest point west was Bashaw, north was Andrew and south was Bodo.[6] ECH served a population of over 110,000 Albertans in 84 communities (Figure 1-2). Healthcare services provided in the region included homecare, public health, mental health, long-term care, and

6 Alberta Premier Ed Stelmach's home riding resides within the boundaries of East Central Health.

acute care. The location and the degree to which these services were provided was dependant on population concentrations and demographics. Not all sites and facilities provided all services but an effective referral process was in place (East Central Health, 2004).

Demographically ECH was aligned with the province of Alberta according to the census information from the Statistics Canada Census, with 30%-plus of the population age fifty and over (Statistics Canada, 2006). ECH was the second-smallest rural health region based on population (Aspen Health Region was the smallest, serving 78,000, and David Thompson Health Region was the largest, serving close to 300,000—Alberta Health and Wellness, 2006).

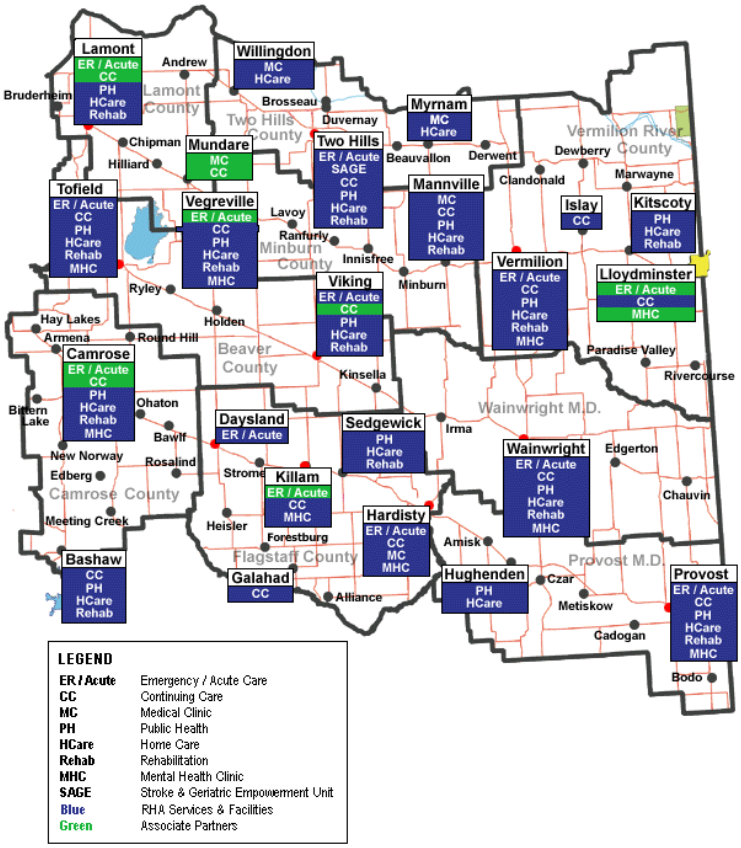

Figure 1-2: Region 5 – East Central Health (ECH) -The legend details the services and locations throughout the region. (East Central Health, 2001) Permission for using the regional map was granted through the published public materials guidelines and Human Resources department of the region.

All regions in Alberta had been tasked with the development of an integrated electronic health record that could transfer information to the provincial record. Interestingly, both the former Calgary Health and Capital Health regions were faced with a more daunting task than their less technologically advanced brethren. For example, Capital Health has over five hundred disparate systems and databases of varying levels of sophistication that operate independently in clinics, care centres and hospitals serving approximately one million Albertans across the region. The work of either linking these systems through interfaces, or changing them over to systems that integrated, would be an enormous undertaking. Calgary Health was faced with a similar situation.

Project Scope

A regional team was recruited for each of the fourteen RSHIP modules, each team including at least ten members with varying roles and disciplines from different sites. For example, the Laboratory (LAB) team consisted of the regional department head, laboratory technicians, and assistants from across the region; the Order Entry (OE) team comprised nurse managers, registered nurses, licensed practical nurses and unit clerks. Recruiting these teams was difficult in a time when staffing was so tight. In order for these modules to be

implemented there was still much work to be done at the regional level before they would be ready to go live. Provincial standards among the seven rural regions were established but there was still building to be completed to reflect individual regional practices.

Training Model

The training model chosen for this first phase was *train-the-trainer*[7] and a *Big Bang GoLive.* Train-the-trainer is a commonplace method of implementation for training employees across a spectrum of industry and is favoured heavily for rolling out information systems. It means exactly what the name implies: a trainer of the product or process to be implemented trains usually two or more individuals who then train all others. In order to use the *train-the-trainer* model for the project, some crucial people needed to be recruited. At each site a super-user for each module was chosen to be the module champion, who would then assist in the training of staff at their own site. The module champion would also have a supporting role during the *GoLive*[8] period and beyond, as they would then act as the go-to person for questions and concerns for their specific module at their

7 The earliest record I could find of this model is *Training Tools: A Train-the-Trainer Manual for the Hospitality Industry* (Winnipeg: Manitoba Business Development and Tourism, 1986?) which outlines the basic premise and steps. This method was strongly suggested to RSHIP by MEDITECH as the most effective for larger implementations, though it should be noted that MEDITECH had not undertaken a project as massive as this up to this point.

8 GoLive (sic) refers to the time when the system is ready to be moved from the test environment to the live database and henceforth work is completed on the system.

site. In the case of the LAB module, due to the relatively low numbers needing training (versus a group like nursing), the team members themselves were able to train all the staff on their module. Order Entry (OE), however, was an entirely different case. OE needed to be rolled out to over a thousand nursing professionals. The OE team of ten members logistically could not train everyone so there needed to be a heavy reliance on these site super-users.

Project Role

In 2005, I was hired as the Regional Training Coordinator in Information Services for ECH. My work in the region for the first year (June 2005–June 2006) focused on the adoption of an Electronic Health Record (EHR), particularly with the nurses in ECH, and their preparation, training and usage of the Order Entry (OE) module. Having no preconceived ideas of the outcomes of this experience, I did not have plans at the time to draw upon this experience for my graduate work.

My main task was the coordination of the training (as my title, Information Services Training Coordinator, suggests) over a six-week period prior to the GoLive date of June 1st 2006 for all fourteen modules and two thousand staff. As mentioned, this was to be a *Big Bang GoLive*—meaning that all the modules would be in use as part of daily process all at the same time. Not only were there the logistics of orchestrating the training region-wide (i.e., orchestrating the set-up of computing labs in sixteen sites) to deal with, there also needed to be

an assessment of staff readiness. Training would be required to help prepare those lacking in either the necessary skills or the confidence to take on a system that would radically change the way in which they were going to work.

My role included developing the training plans, material and communications that would affect this group. As well, I directly taught basic computer skills to help prepare the nurses in using the new system. They were mandated to use the new system with an expected proficiency in a short amount of time. This new initiative caused additional stress in an already strained work environment.

The Nurses Adopt Order Entry Module

The nurses' experience was different from that of most of the others affected by this implementation for a few significant reasons. One, due partly to the fact that this was a rural region, nurses had never had to use a computer for any part of their daily practice. Two, most of the staff resided in small towns and farms with few opportunities for, and/or exposure to, computers apart from those used to do the farm books or by their children in the home. Because dial-up connections to the internet were still often the only method available for a majority of the communities and surrounding areas, it restricted or frustrated recreational use of computers.[9] This was not the case for the other modules like LAB. The small group to be trained

9 The advent of full connectivity of the Alberta SuperNet in 2005 for all schools, health institutions, libraries and government was the only way the introduction of an electronic health record became possible.

on this module had been using various systems for many years. In fact, they had been on three different systems in quick succession prior to switching to the MEDITECH one. Other departments like Pharmacy (PHA) and Imaging Therapies Services (ITS—commonly known as Radiology) were also very used to having computers as part of everyday practice.

Another contributing factor was that many of the nursing staff, being from farming families, subsequently had lived and worked in the same facility for many years. The low career mobility prohibited exposure to the variety of systems in use in many of the larger healthcare settings. One of the effects of working in one place for a long time was the creation of a culture that was resistant to change. This was the case in many of the smaller sites, and it was not uncommon to hear the phrase “that’s the way we have always done it.” That it is not to say the nurses were not dedicated to improving and staying current in their clinical practices and standards, only that the resistance to adopting an electronic system was perceived as outside of, or unnecessary to, their practice.

Resistance to change in nursing is not uncommon. Patricia Curtis and Elizabeth White, “Resistance to Change: Causes and Solutions” (2005), examine some of the underlying factors in nursing culture that contribute to this.

> Whatever type of change is taking place, all major change can result in feelings of achievement, loss, pride, and

> stress...that because change disrupts the balance within a group, resistance should always be expected. (p. 19)

How the personality of an organization (or parts of an organization) develops is “transient and dynamic” through the “psychosocial interactions of its members.” Each has its own “unique personality, its own level of maturity, language, behaviours, support systems, and cognitive and emotional needs” (Curtis & White, 2005, p. 18). This would describe the smaller rural sites where there is lower staff turnover lending to a stronger organizational “personality.” That is not to say that there were not people in these sites who welcomed the change, but if this fear of change is emanating from the senior nursing staff then the influence would be more strongly felt in the group.

> With organizational change, an individual may be experiencing cognitive dissonance in relation to their satisfaction with the current functioning of the organization and their belief that change would not improve the functioning of the organization…it will be difficult for the individual to maintain a sense of personal control. The consequences of this include uncertainty, loss of predictability, loss of stability, fear of the unknown and stress (p. 17)

First Step: Assessing Skill Readiness

Assessing the computer skills of nursing staff was the first undertaking, because if supplementary training was necessary in order

to prepare the staff then the timelines would be tight. We began by meeting with the managers and team leads from all the sites to outline the upcoming implementation and what skill level the staff would require in order to be successful on the new system. The staff were aware of the upcoming move to computers and many expressed varying levels of fear and distrust. Some of the older nurses had been threatening to take early retirement or quit altogether. Site managers expressed concerns about the increasingly tight job market. Alternately, there were nurses who feared that they would not be able to gain the necessary skills and thus would be forced from their jobs. The managers and team leads agreed that a survey was the best course of action. This survey[10] would be the first of two in this process and its sole purpose was to determine how many staff members would require training and how nursing staff felt about computers in general.

Computer Skills Survey

The first survey that was distributed asked questions that would document respondents' perceived abilities and also their general attitude towards computers (Appendix 1). Primarily, the questions were about computer use in the home and frequency ratings. The available answers ranged from "No/Don"t Know" to "Regular Basis." The option of the answer "If Required" would suggest that the

[10] Permission for use of this survey was not part of the application made to the Review Ethics Board, as the survey's purpose was simply to ascertain training needs prior to module training, and actual data from the survey is not in secondary use in this thesis—apart from reporting how much basic computer skills training was required.

respondent might be either fearful, reluctant or even antagonistic towards computer use. Informal, non-technical language was purposely used in the hope that it would allow the staff to express their concerns safely in a non-threatening way. Each manager was given the survey to distribute to their staff and were asked to collect the results. The managers were asked only to submit the numbers of staff requiring extra training from their site so the process of coordinating the training could begin. From the information gathered it was established how many would need the training. The team and managers decided that if a respondent expressed any misgivings, even if they had assessed their computing skills as adequate, the training would be offered to them. The module training (OE) was mandatory but this additional computer skills class was not. However, those who thought they might benefit from the extra help were strongly encouraged to sign up for the class. There was some discussion about using on-line tutorials to disseminate the training, but in the end this was decided against because there was not sufficient time to vet and choose appropriate ones. Also, the preparatory training was deemed as too important to leave people to gain the skills on their own. Moreover, there was no assurance that those who truly needed the training would be able to access an e-learning module on a computer without some assistance, and this was an additional burden that could not be accommodated in already staff-strapped facilities. It would be an excellent opportunity to be able to assess staff readiness first-hand

and identify areas where there might be issues for the upcoming module training.

According to these initial results, over 30% of the nursing staff asked for or were strongly encouraged to sign up for a skills class. From here, we needed to develop a three-hour class teaching the very fundamentals of computer use and then schedule the training across the region. In consultation with the Order Entry clinical informatics lead and team, we decided that a maximum of four to six participants per session was optimum for a class that required intensive hands-on training. This meant that a minimum of fifty classes would be offered. The decision was also made to adopt a just-in-time training model for all the training including this basic skills class. This meant that these classes needed to be scheduled in the two-month period prior to the module training. Since the module training would take nursing staff out of schedule rotations for a minimum of one day, and since the nursing union specifies guidelines about the number of hours worked, we decided that a three-hour session was the maximum time allowable. In retrospect many would have benefitted from at least an entire day.[11]

Developing the Skills Course

The actual skills required to use the system itself were a familiarity with the keyboard (including function keys[12]), using a

11 ECH deals regularly with thirty-three separate union agreements across the spectrum.
12 MEDITECH was at the time completing a keyboard-driven interface but has since slowly incorporated a modicum of mouse interface.

mouse, logging on and off, the ability to navigate into and out of programs and screens, using tab function, and saving input. New users also needed to become familiar with the Windows environment and have a cursory understanding of server technology in order to access the program itself on the computer. For someone who has avoided using a computer this was a steep learning curve.

It was challenging to develop a three-hour workshop that would adequately cover the aforementioned skills with proper pacing and hands-on practice while not overwhelming the learners. The strategy was to always give the big picture rather than focus on strictly task-oriented processes, with the reasoning that isolated tasks without context become meaningless. Thus, while there still had to be a breakdown of each of the skills into step-by-step practice to teach precisely *how* things needed to be done, there was also an attempt to build in the logic of *why* each step was necessary.

Although many of the respondents had been around computers, and in some cases did use them in a very limited way (most often to get pictures from digital cameras or play electronic card games), they only knew how to do the one or two tasks and would use the exact same steps to perform them. They would be unable to troubleshoot

However, because of its origins this additional mouse interface is not very user-friendly(for example, right-click is not available). Users are much more efficient if they resist treating the system as a Windows interface.

any difficulties that might be encountered; thus they were not confident enough to try anything new.

Much of what daily users do on computers is a culmination of skills learned along the way. These skills build upon each other and are frequently applicable across a spectrum of similar tasks. My personal experience of being largely self-taught on most computer applications is that if something works to the desired effect in one program then it would likely garner similar results in another. It is easy to think that the steps we perform almost automatically are intuitive and logical, but in fact they are quite the opposite. In developing the course we needed to approach each task and concept from the perspective of someone who viewed computers almost like an incomprehensible foreign language. The goal was to introduce the participants to key concepts and tasks, coupled with a rudimentary understanding of how these skills could be generalized across a broad platform of computer applications. The loftier goal was to empower the new users to independently try new things on the computer without fear of breaking it or getting hopelessly lost. The added challenge was to develop a course that would be general enough to engage a wide spectrum of learners. As Tara Fenwick and Mark Tennant (2004) point out in *Understanding Adult Learners*:

> There is no generic essentialised “adult learner” who can be described in ways that accurately and responsibly portray the

> myriad differences between people and the changes they experience. (p. 73)

As this was a very resource-intensive project, the task of implementing the skills classes became my responsibility. It did afford the unique opportunity of introducing a group of similar individuals to a new skill and then tracking their progress using these skills. The fact that the skills in question were computer skills, and that this group of highly trained (nursing) professionals had never needed computers up to this point, made it unusual in today's society where computer are ubiquitous in most professions.

Basic Computer Skills Sessions Begin

We asked the managers to group the trainees by skill level where possible to further maximize the limited class time. However, as I began conducting the sessions it quickly became clear that no two sessions would be the same. Even though the skill level did not vary widely, the attitudes towards computers did. Based on the survey results and the information the managers had relayed, we surmised that there would be ambivalence towards computers and about having them inserted into their daily nursing practice, so each session began by surveying the class. They were asked what their experiences with computers were, how they felt about computers, and if they were worried about having to use computers in their practice. This proved very effective in gauging the general skill level of each class and if there would be difficulties with attitudinal barriers.

Negative emotions like anxiety and anger are not uncommon according to a recent study, “Computer Anxiety and Anger: The Impact of Computer Use, Computer Experience.” Jeffrey Wilfong (2006) concluded that “the relationship between the computer use (frequency and duration), computer experience, and self-efficacy beliefs of users” (26) were predictors for computer anxiety and anger symptoms. Furthermore, a user’s assessment of self-efficacy was directly correlated to the emotion they felt; in other words, when the user felt that their self-efficacy increased, the negative emotions decreased.

One of the most difficult tasks in almost every class was teaching the learners how to log on to the computer. The choosing of passwords, understanding the difference between a user ID and a password, and moving from field to field was often enough to completely unnerve many. This is understandable when one considers the skills involved when this seemingly simple and often odious task is broken down to its conceptual parts. For example, it requires a cursory understanding of security as well as a grasp of the differences between a home-use computer and a networked computer. Knowledge of the keyboard and how it differs from a typewriter keyboard is also needed. Picking a password alone was enough to derail the new users as the rules (alphanumerical with at least one capitalized letter and one number) confused them. Confusion and consternation reigned when they attempted to understand the functions of the *enter*, *tab*, *shift,*

and *caps lock* keys and how they differed. This process of getting a class of six to successfully log onto the computer could take up to forty minutes.

Order Entry Module Training

Immediately after the initial classes in basic computer skills were completed the training on the OE module began. The high numbers (one thousand trainees) and short timelines (six weeks) necessitated running numerous classes simultaneously. Frequently there were as many as six OE classes conducted a day in the labs across the region. Each eight-hour[13] class consisted of an average of eight learners, one instructor and a site super-user. It proved to be barely enough time to cover all the material necessary to use the system efficiently.

Admitting Patients: An Uneasy Fit

Attention must be paid to one segment of the module that was not a comfortable fit for the nurses—registering and admitting patients. In fact it had never been part of their scope of practice. This had always been the work of unit clerks and admitting personnel, but in such a rural region this service was not provided around the clock in most sites. Prior to going onto the electronic system the practice was that after hours (evenings and nights) the nurses on duty would take the patient information on paper and leave the actual admitting to the day staff. This could no longer be the case with the new system

13 The class was eight full hours of instruction not including breaks.

because a patient needed to admitted or registered[14] into the Admitting (ADM) module before any doctors' orders could be placed. Often on evening and night shifts at most of the small sites there was only one nurse and an LPN on duty; hence, this addition to their workload was not well received by the nurses.

Because a patient must be admitted into the system in order to use the OE module, training began by teaching this process. The portion of the ADM module required was accessible within the OE module, and this portion was taught to the nurses in two hours. (The entire ADM module includes a great deal more, and the training that Admitting and Health Records staff were given took an entire two days.) In retrospect this proved to be an insufficient amount of time as the results after GoLive bore out in light of the numerous mistakes that were made. The one aspect of admitting that has caused the majority of the problems was searching for the correct patient when a patient name was being entered. The system takes the user through a number of searches (up to nine) through the local regional database, then the universe[15] or Enterprise Medical Record (EMR), with a variety of search parameters including date of birth (DOB), partial name, and exact name match. This would seem to add a valuable level of security in ensuring that the correct patient is chosen, but it did not turn out to

14 Registration refers to outpatients (i.e., Emergency Room), who need to be put into the system before orders can be placed. Admitting is for inpatients.
15 The Universe in MEDITECH terminology refers to the Enterprise Medical Record (EMR) that is fed by all modules at all regional levels.

be the case. The procedure was very confusing because the screens look very similar and nurses, unused to health information and clinical informatics terminology, were overwhelmed with this process.

Consequently two problems began happening immediately. First, the incorrect patient would be chosen in a search and the visit information (tests, orders and results) would be attached. Secondly, a new record for the patient would be created when in fact they already had a record in the system, resulting in duplicates. Both problems resulted in many hours of work for health records personnel fixing these overlays[16] and duplicate records, but more importantly these errors were significant patient safety concerns. For example, if a doctor was looking for specific medical history for his/her patient to make accurate diagnosis and care planning, it would be incomplete at best or completely inaccurate at worst.

One might question how so many errors could occur in a small rural health region until one considers the challenges of using demographic information (DOB, name and address) to locate the correct record and how that can lead to these errors. For example, someone who goes by the name “Joe Smith” might actually be Allen Joseph Smith, or there might be two or more Joe Smiths with differing birthdates. The more accurate way of searching for the correct patient

[16] Overlays occur when the information of one patient overlays another patient’s health information because the incorrect record is chosen in the search.

is to use their Unique Lifetime Identifier (ULI),[17] which needs to be entered into the patient name field (a non-intuitive location) and the name would be found. Even with this method the nurse is still required to go through a more limited number of searches and often there are data discrepancies that the nurse needs to reconcile, like differing addresses, name spellings, etc., and then properly update the record with the accurate information.

Cognizant of this problem, the regional Health Records department vigilantly ran constant reports on the system during the initial post-live period to pick up these inaccuracies, which numbered over 200 in the first two weeks. Extra on-site training was provided on a one-to-one basis and plastic patient cards with bar-coded ULI numbers were issued to patients at the time of registration. Bar code readers were distributed to all the sites and placed at all computers used for registration and admitting. Then within a few months a centralized registration process was introduced where sites without twenty-four-hour registration staff could now call in from their sites to have their patient registered or admitted by a qualified staff. Not all the sites are utilizing this service at the time of writing but this and the other measures have alleviated the problems to a great degree.[18]

17 In Alberta this is the personal health care number (PHN).
18 Issues around data integrity regarding patient demographics (name, address, etc.) have been ongoing and global, in that updating this information in the myriad of locations where it currently exists involves constantly asking the patient at the point of service to verify the information on file. This problem has been largely alleviated

Nonetheless, this was all very time-consuming and has led to frustration. The common complaint is that it is viewed as non-nursing activity and takes away from direct patient care.

Searching in a database was not comfortable for many of the nurses. It required a skill set and way of thinking that was foreign to many of them. William Badke, in his article "Information Literacy Meets Adult Learners," explains that "adult students who are learning to drive databases tend to have few strategies and limited ability to move laterally. Taking them from awkward to adept is a key task of information literacy." (Badke, 2008, p. 49)

Given that only two of the eight hours of training were devoted to the complicated task of searching for patients, it was not surprising that the team found that the nurses struggled with this particular function.

Only after teaching the nurses how to register and admit their test patient could the rest of the module be taught. OE consists of tasks that are part of the scope of practice for nursing and which have always been carried with paper charts, faxes, phones and hand delivery. The routines to be taught included entering a variety of orders such as lab tests, radiology, dietary, and allergies. Tracking order status, changing function, running reports, and performing admission maintenance tasks such as patient transfer and temporary

through the integrated system with all departments working from the same record; however, the data on file at the provincial level is not necessarily in synch at this time.

location[19] were also covered. This made for a very full day, and after about 2:30 in the afternoon the team reported that many of the nurses were having difficulty absorbing any more training. Many more functions could have been taught but the team made the decision to restrict it to what the nurses needed to know to start using the system at GoLive.

Project Communication to the Region: Information and Education

The other critical component of the implementation was communicating the project's intentions, timelines and outcomes to the staff and general public. There was dialogue and structure set up for communication among high-level administrators leading to the formation of RSHIP, and as the provincial standards team were formed and the work of developing data standards across the seven rural regions began. There was further communication at the regional level, but up until this point there was very little information reaching the front line. These standards teams consisted of members from all departments from each of the regions, but because many of the members were seconded into the interim positions and because they met off-site (usually in Nisku and Red Deer, Alberta), it did not facilitate easy lines of communication with their home sites. By the

19 This is electronically moving the patient into a different module, most often to the Operating Room Management (ORM) module, so that the staff in that area can access the patient's record for the duration of the operation and their time in the recovery room.

time they had struck their module teams and began building their specific modules back in their own regions under strict timelines, the work of communicating, while not overlooked, was not their first priority.

In our region we decided that a campaign consisting of meetings with the site leaders, posters, and a bi-monthly newsletter were the most expedient tactics for getting the information to the frontline staff. Much of this work became my responsibility and my degree in English coupled with my complete lack of clinical experience oddly suited me to the work. The newsletter became the key focus and the goal was to make it informative and educational. I intentionally used a casual tone and attempted to infuse it with humour where possible, which, considering the subject matter, was challenging. As to the educational component, the method I used to teach my decidedly non-technical audience about complicated technological concepts was interviewing the Information Technology and Clinical Informatics staff (generally the team leads) on concepts like integrated systems, data repositories, the Alberta Supernet, and the flow of information. I would ask enough questions until I was satisfied that I could in turn explain the concept in lay terms in the newsletter. I relied heavily on analogy in order to convey meaning and would always tie the key concept to their current practice. For example, I used the similarity of pneumonic tube systems used in large businesses like Costco to send cash from the tills to the office to illustrate how packets of data were sent from one department

to another. I then drew the comparison to their then-current practice of using triplicate forms and sending copies to various departments and locations via fax, interoffice mail and/or walking down the hall to physically deliver the request or order. These newsletters proved to be quite popular and requests were made from other RSHIP regions to share them, which were obliged (Appendix 2).

One Year Later—Time to Check In: The Post-Implementation Survey

After one year of using the system, the nurses were polled on their overall experience with the implementation and subsequent use of the system. The questions focused on the training (both basic computer skills and module training), their perceptions on how well they were prepared for the change, how that upcoming implementation was communicated, their experience with using the system and their feelings about the usefulness and value of the system on the whole. This survey was used to help guide the region with the planning for the next phase of the system implementation, namely point-of-care charting, as well as to gauge user acceptance and pinpoint areas for post-implementation support. In addition, I received permission from both the University of Alberta Faculty of Arts Review Ethics Board and the senior leadership of East Central Health for secondary use of the data in my research (Appendix 3, 4).

Data Collection Method

With the assistance of the Medical Services Coordinator (MSC), I developed an electronic survey using Androfact™.[20] The MSC recommended that a group of one hundred nursing professionals would provide an adequate sampling for our purposes. I did not question this at the time but retrospectively perhaps a larger sampling would have provided stronger statistics. The recipients (identified only by a numeric system ID) were randomly selected by the electronic survey system to participate voluntarily. An introductory letter that clearly identified me, my role and purpose of the survey was inputted into the system by the MSC and Androfact notified the recipients of the survey via e-mail. Complete anonymity was doubly ensured not only by the numeric identification assigned to the recipients but by having the data from the completed surveys collected directly into the system's internal database. In order to view the results secure authentication was required. At that point the recipients could choose to take the survey housed in Androfact and were also advised of their complete anonymity and of the option that they could abandon the survey at any given point.

20 Androfact™ is a web-based healthcare surveying application used primarily to assess patient satisfaction, though East Central Health has used it to survey staff on various programs and initiatives.

The survey itself used mainly Likert[21] scale ratings in which the respondents were asked to rate statements. Using this rating scale allowed for statistical data to be generated and the Androfact system allowed for a variety of analytic reports to be generated. There was also the opportunity for respondents to express their thoughts with open-ended questions. The qualitative information this provided allowed for contextual interpretation to contrast and compare with existing studies as well provide opportunity for the nurses to give their opinions and provide unmediated feedback to the team and management.

Forty-five percent responded. Demographically, 71% were registered nurses and 24% were licensed practical nurses. The majority of the respondents were over 40 years old while at the other end of the spectrum only 4% were between 20 to 29 years old (Figure 1-3). Eighty percent had worked in the region for over five years and of that number 49% of the group had been with the region for over ten years (Figure 1-4). This sampling was slightly older than the regional demographics, with the average age of nurses being 44.3 according to the region's operations analyst. Nationally, the average age of registered nurses in acute care was 41 years old and the average age of nurses working in long-term care was 47, according to

[21] Developed by Rensis Likert, an American educator and organizational psychologist. It is a form of psychometric scale often used in questionnaires, and is the most widely used scale in survey research. It most commonly takes the form of a five-point ordinal scale. http://en.wikipedia.org/wiki/Likert_Scales .

the Canadian Nursing Association statistical report from 2006 (CARNA). According to the Canadian Institute of Health Information (CIHI, 2006) the national average was 45. In Alberta 38% of the nurses in the workforce were 50 years or older in 2006, while British Columbia had the highest age of 46.4 and the highest percentage of nurses (43.5%) over 50 years. Newfoundland had an even demographic split with the national lowest average age of 42.2 (CIHI, 2006). According to the same report, this trend will continue as the average age has continued to increase, as demonstrated by comparing data from the 2003 census which put the national average age for registered nurses at 44.5. Similar national distribution statistics from 2006 showed over 60% of licensed practical nurses in the workforce were over 40 years of age.

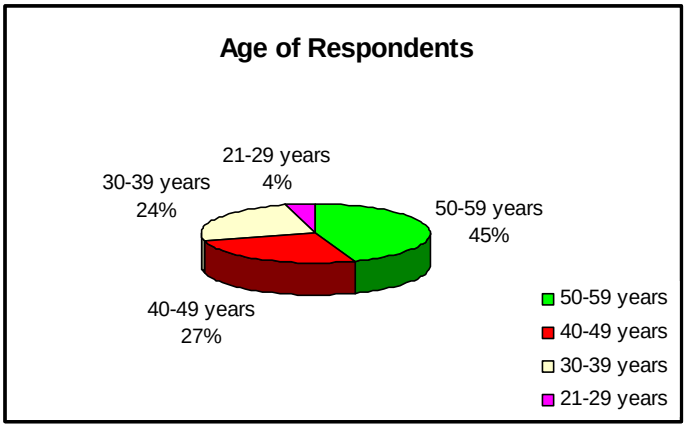

Figure 1-3: Age of respondents

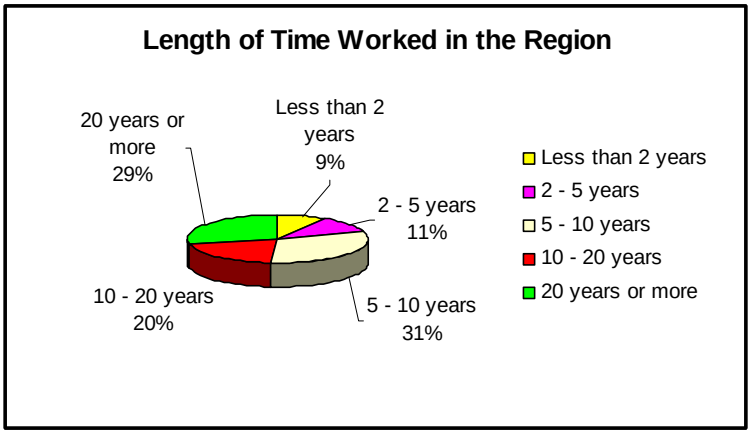

Figure 1-4: Length of employment with East Central Health Region

Survey Results

The initial questions in the survey queried the respondents on their perceptions about the decision to adopt the system, the implementation planning, and their confidence in the region in regard to the implementation. Overall, the nurses were neutral about the objectives for adopting an electronic system (49%) while 24% were strongly in favour. Yet, when asked if they had confidence in the region over 50% responded that they did. Accordingly, the percentages were generally the same or better when the nurses were asked whether they felt that there was adequate planning (Figure 1-5).

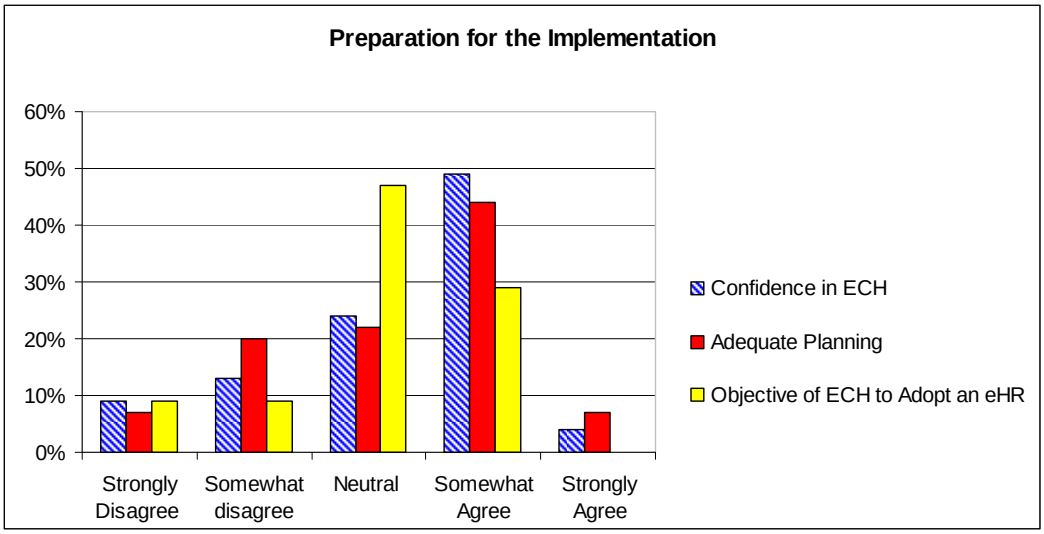

Figure 1-5: Overall confidence and understanding of why the region decided to join RSHIP and how well the implementation was planned.

Were the Communications Effective?

Communication about the project was also important, and the survey asked about two areas specifically: communication about

RSHIP and MEDITECH and, secondly, ECH communications about the implementation of Phase 1 to the frontline staff.

Nurses responded with general satisfaction to a number of statements regarding how well information about RSHIP and MEDITECH was conveyed. The exception was the statement, "I understand why RSHIP chose the MEDITECH system", with which 25% strongly disagreed. This could be due partly to distaste for the system, as some comments like "GET A BETTER SYSTEM THAN MEDITECH"[22] and "I find meditech (sic) from the dark ages" would suggest (Figure 1-6). These comments, though few, would indicate that these respondents have experience with other health information systems in order to make comparative statements such as this.

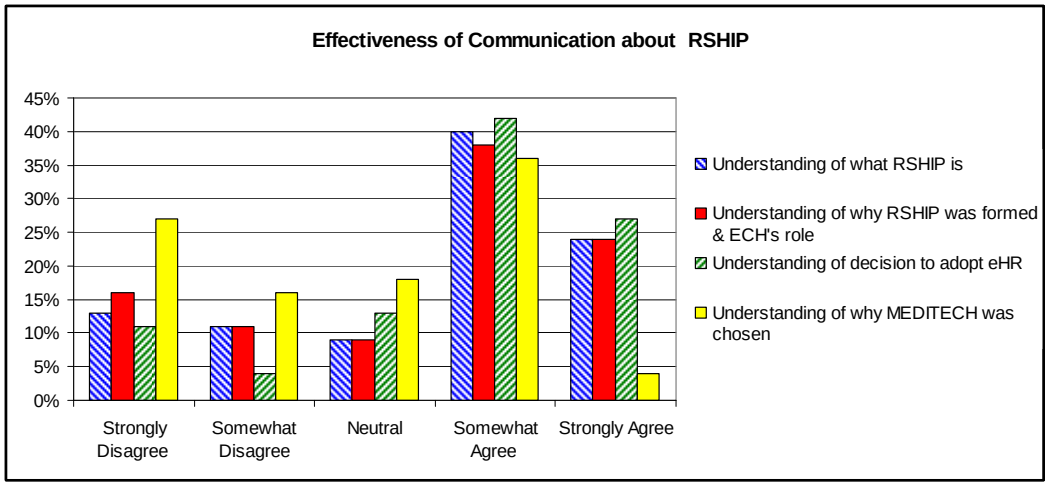

Figure 1-6: Responses to statements about the communication about RSHIP and MEDITECH.

22 This comment was written in CAPS which could mean the writer was just working in the system, which requires Caps Lock to be on, or they are using them for strong emphasis.

Statements concerning ECH communication to the staff about the implementation again met with varying responses—notably that the communication was frequent enough and that they felt they could trust what was told to them. Asked whether they felt that they were a part of the process, the overall response was more negative with 40% disagreeing or strongly disagreeing; and as to their understanding what their role was in the process only half somewhat agreed or strongly agreed, and 22% gave a neutral response while the remainder disagreed (Figure 1-7).

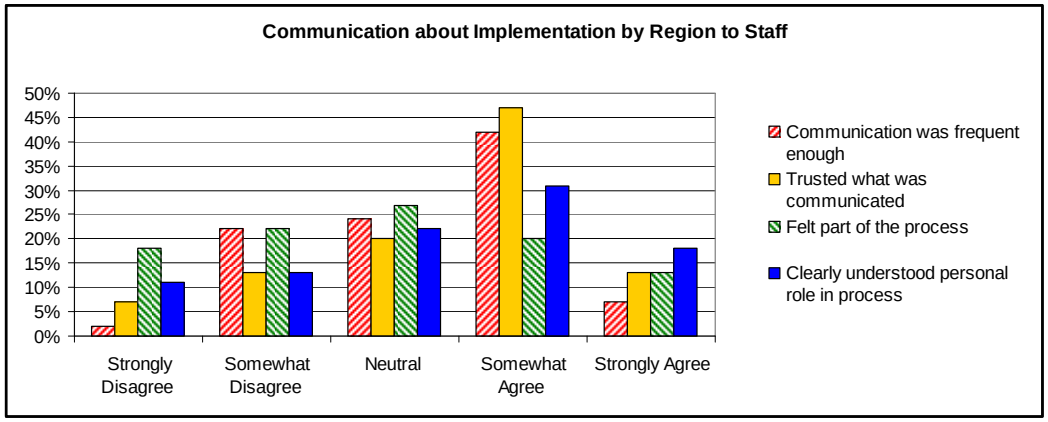

Figure 1-7: Staff responses to queries about the communication about the implementation and their perceptions of inclusion

Were the Nurses Prepared for the Module Training?

The next questions were geared towards discovering the respondents' attitudes about computers and his or her perceived skills. All the respondents owned a home computer[23] and when asked to rate their general feelings towards computers, 44% said that that

23 The survey did not query if the computer was in the home prior to their training at work.

"computers did not scare them as much as before" while 13% said that they thought they were useful but that they still felt uncomfortable using them; 11% percent said they were anxious to learn more and 18% said they loved them. At the other end of the spectrum 9% chose the response "I managed well without computers in the past."

Questions about the nurses' skill readiness to adopt the system yielded varying results. Asked if they were given opportunity to acquire adequate basic skills, the results differed in that 33% somewhat agreed, 16% strongly agreed, 33% gave a neutral response. Fifteen percent disagreed with the statement (Figure 1-8). Conversely, the nurses were asked if they felt their computer skills were sufficient[24] prior to the module training and 43% somewhat agreed, 37% remained neutral, while the remaining 20% disagreed. Interestingly, no one strongly agreed with this statement (Figure 1-9).

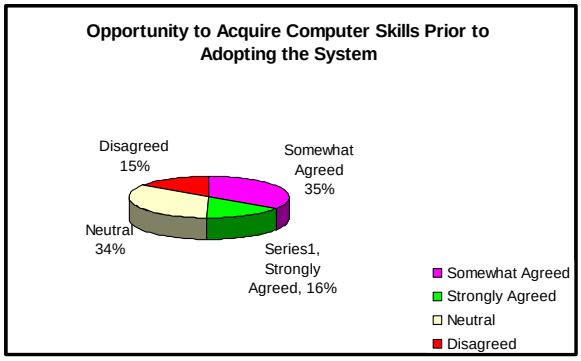

Figure 1-8: Asked if they were given the opportunity to acquire adequate computer skills before module training

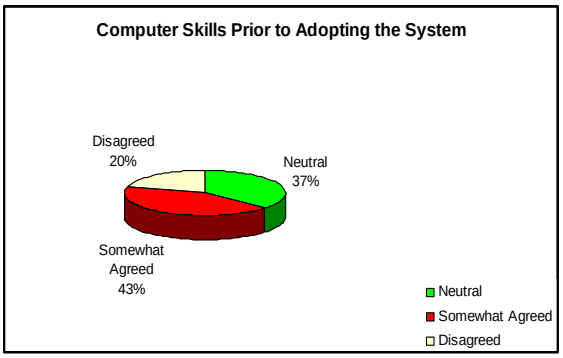

Figure 1-9: Nurses' perception of their own computer skills before any of the offered and mandatory training

24 This was their self-perception of their prior skills; hence those who felt their skills were sufficient did not avail themselves of the offered basic skills training.

How Well Were the Nurses Trained?

The next questions dealt with the OE module training which 91% of the respondents received prior to GoLive.[25] The reaction to the statement that they were adequately trained prior to the system going live were dismal, with 24% somewhat disagreeing and 11% strongly disagreeing. At the other end, 42% somewhat agreed and 11% strongly agreed. The remainder was neutral. While the majority was in agreement the large percentage that did not would point to a less than successful implementation (Figure 1-10).

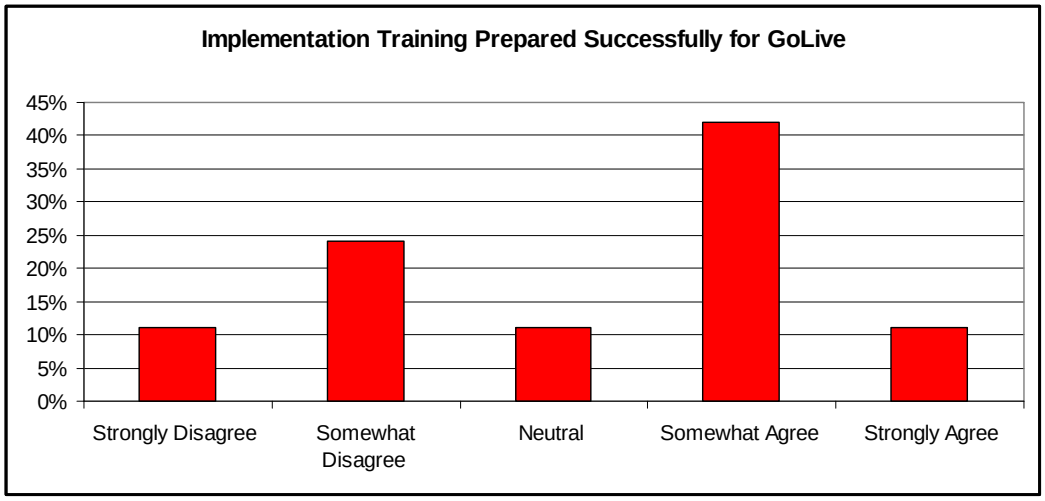

Figure 1-10: Nurses were asked if the training adequately prepared them to use the system successfully in the live environment (as opposed to the test database where they were trained).

Perceptions of the System's Usefulness

25 June 1,2006 marked the first day when the maintenance training plan was augmented; thus 9% of the respondents received their training in regularly scheduled regional training sessions that have been offered for the last two years (incidentally I have been the primary instructor of these classes).

The survey then focused on the nurse's perception of the system's effectiveness, speed, accuracy, and work flow in the ordering process after one year of using the Order Entry module.

The nurses were asked to respond to statements about the effectiveness of the electronic system versus the paper-based method of processing doctors' orders. An overwhelming 47% agreed that the information available was fuller and more accurate and 37% agreed that it streamlined the ordering process; however, 29% gave a neutral response to the latter statement. The nurses responded very critically to the statement that the system allowed for direct patient time, with over 70% either disagreeing or strongly disagreeing with this statement (Figure 1-11).

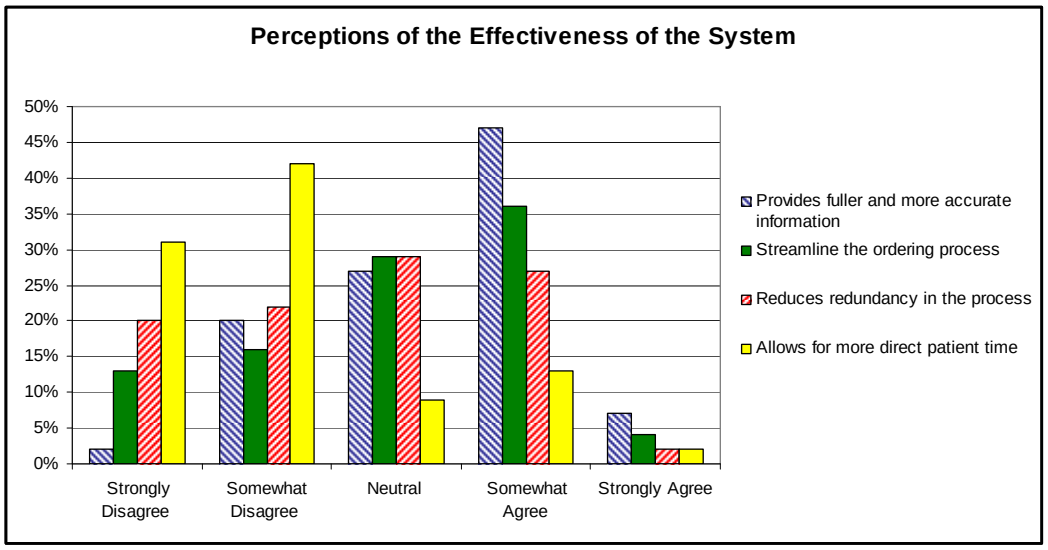

Figure 1-11: Nurses were asked to respond the statements about the differences between the former paper system and the present electronic system.

When asked if the overall order entry process had increased in speed, 45% of the nurses said it was slower and 13% stated that it was significantly slower than the paper-based system (Figure 1-12).

Twenty percent said it was only slightly faster and 16% chose not to answer the question (one of the highest non-responses in the entire survey).

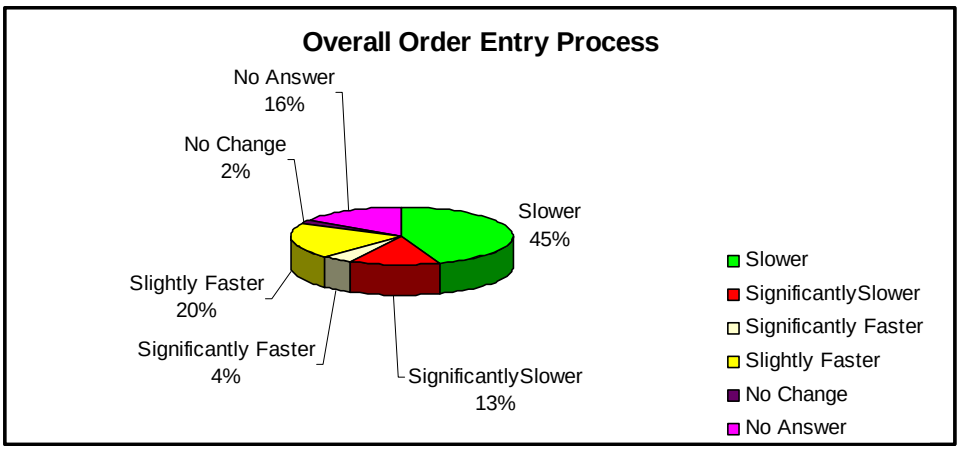

Figure 1-12: Time difference for processing orders (entering into the system versus the paper-based system)

The nurses were then asked if they felt that an electronic system had improved workflow on their unit and a resounding 63% said it was slower (20% stating it was significantly slower). Again there was a large percentage (13%) who did not respond (Figure 1-13).

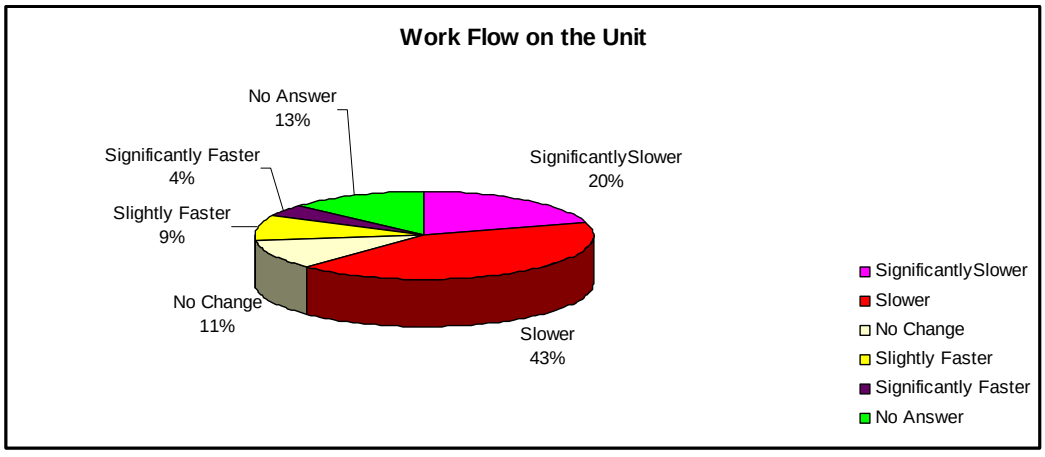

Figure 1-13: Time difference and efficiency of work flow on nursing units using electronic system

Asked if test results were received faster on the new system, over 35% said it was faster; however, close to 30% stated there was no change and again 16% did not respond. The fact that 20% thought that results from tests were slower was surprising when one considers that the majority of these results flowed in from the integrated LAB and ITS (Imaging Therapies, more commonly referred to as Radiology). Formerly, these results would either have to be phoned, faxed or physically delivered or picked up from these departments (Figure 1-14).

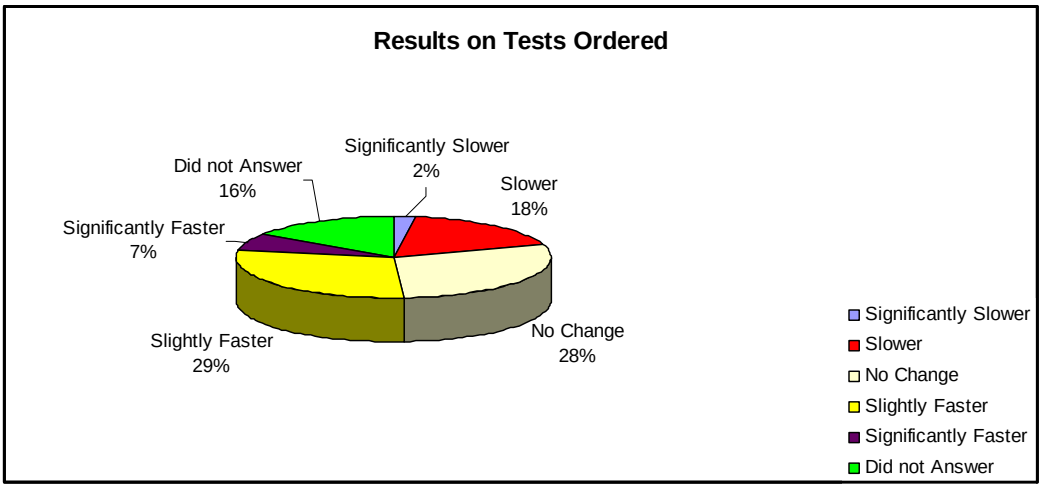

Figure 1-14: Amount of time for test results to be delivered back to the OE module.

Moving Forward: the Nurses Weigh in

The last section of the survey was specifically designed to garner feedback for planning the next phase of the implementation.

Point-of-care[26] charting is the next building block in developing a fully realized electronic patient record which includes assessments, care planning, vital signs documentation, and nursing notes. The task of building and implementing this phase has been large and complicated, and a thorough investigation of it falls outside of the scope of this thesis; however, some of the feedback was very telling about the general feelings about how the beginnings of the system were implemented and about acceptance of the system itself. When asked if they thought that Phase One was enough for the time being, over 45% agreed and 21% were neutral. Asked if they felt that electronic charting on the system would improve workflow by keeping all relevant information in one location, participants were close to an even split, with 22% remaining neutral. The majority (75%) said that it was difficult to envision how e-charting would impact overall patient care but most (58%) felt that e-charting would not decrease paperwork or workload (Figure 1-15).

[26] Generally “point-of-care” refers to the bedside or wherever the patient is receiving direct care.

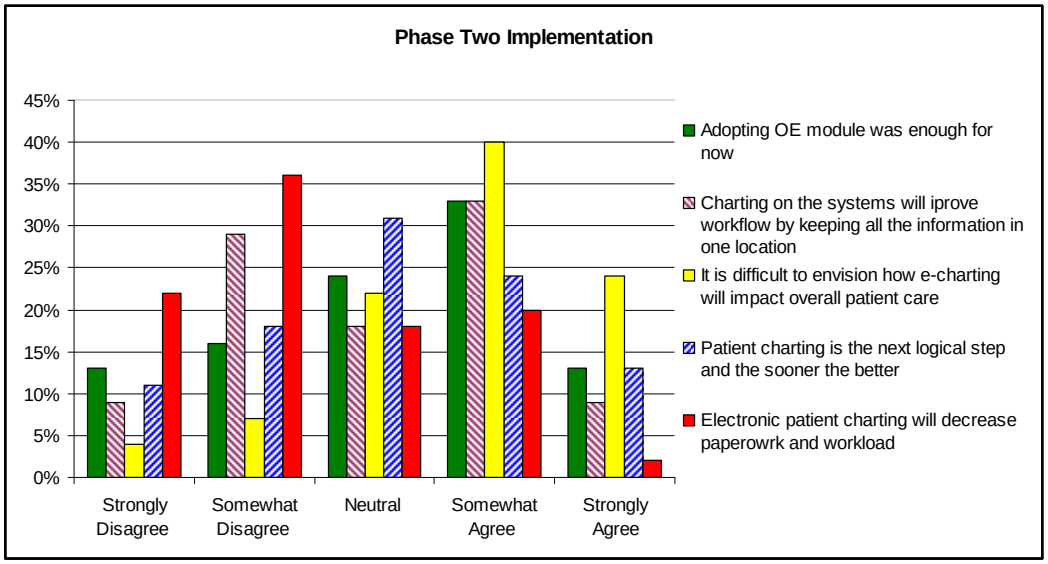

Figure 1-15: Nurses were asked to respond statements about electronic charting which is part of Phase 2

The respondents were then asked if they had suggestions for improving the next phase of the implementation and the comments were both useful and telling. Several commented on aspects of the MEDITECH program that they found inefficient, such as the numerous log-ins required,[27] which they found to be time-consuming and frustrating. The numerous pick-lists or look-ups[28] the users are confronted with when looking for specific orders and tests (the respondent making this comment referred to them as "pop-ups") were also identified as irritants. As mentioned, this survey was conducted

27 Currently the user is required to log onto the computer network then launch the program and log in again. Single sign-on has been researched and proposed and at this time has been tentatively approved but not given the resources to go forward.

28 A look-up or pick-list is generated from the built-in lists within the system (most of which were created by the team) which provide the user with a choice of responses. The majority of the fields require pre-defined choices in order to preserve data integrity.

one year post-live when the nurses were still relatively new to the system, so there was and still is a reliance on these look-ups, but once they become familiar with the more common orders they can simply free-text the mnemonic into the fields. There was also a request for more sophisticated interfaces such as biometric sign-on and touch screen technology. This was telling in that the nurses, after finally adopting a computer system, were now aware of the more advanced systems available.

As to the training and future implementation planning, a number of the nurses said they wanted “better-trained instructors” and more on-site support. The train-the-trainer model (team members and site super-users who had very little practice on the systems before having to teach their peers) made this infeasible but, based on the feedback, evidently this was not the optimum approach from the end-users’ perspective. The nurses also said they wanted more training and practice time before having to use the system live. Again, the tight project timelines made this impossible for this phase.

Lack of proper staffing levels and resources were commented on. Some said that, until this situation was rectified, pushing ahead with further implementations was not a welcome prospect, while others suggested that the implementation should go forward, as one respondent stated, “because I can see it improving our ordering system and help with inventory.”

The overall assessment by the nurses about the implementation and the system itself cannot be interpreted as strongly positive. In their opinion, the system had only moderately improved workflow and, although it had sped up results from tests and procedures ordered, it actually had also made the order entry process slower. Their view on the outcomes of using the train-the-trainer model again was not positive either in the Likert statements or the open comments. Some context needs to be offered. The experience of the trainers during the implementation was that there was too much to teach effectively in the time allotted, and that in an eight-hour period fatigue became a concern in the latter part of the day. During the implementation, nurses and trainers alike reported that there was not enough practice time and that they could not remember many processes after they left the learning environment. The nurses were encouraged to practice in the test database prior to and even after GoLive, but this was rarely done given the staffing shortages. When the region was in the planning stage and decisions were being made on how long the training would need to be, the OE team wanted twelve hours (1.5 days), particularly in light of having to teach the registration process, which took at least two hours.

Stephan Timmons (2003), in the article "*Nurses Resisting Information Technology,*" found that these types of responses are the most common criticisms with system implementations and posits a variety of possible reasons. They include nurses' concerns that using

the system would degrade their care-planning skills if they are restricted by the parameters of the system. Also cited is double documenting because of non-integration to other systems. Nurses also complain that using the system takes them away from patients, and they feel that patients and their relatives do not view a nurse in front of a computer as performing useful work (Timmons, 260–264). These types of comments have been made anecdotally about the MEDITECH system and, though not captured in the survey, when added to the comments within it they provide a fuller picture of some of the concerns expressed by the respondents. While the Order Entry is not actually part of care planning, there are restrictions built in as to what can and can not be ordered according to what is inputted into the dictionaries. Order Entry must be inputted at the nursing stations because COWs (Computer on Wheels) are not yet implemented, so this does take the nurses away from their patients.

Debra Kirkley and Maribeth Stein (2004) in their article "*Nurses and Clinical Technology: Sources of Resistance and Strategies for Acceptance*," do not underplay the difficulties of transitioning form paper to computer for nurses:

> Most seasoned nurses were educated to document on paper charts, and portability itself can be a significant issue. Nurses recognize that paper is more convenient to carry around with them, and they are accustomed to folding up and tucking the piece of paper in their pocket, or carrying it

> on a clipboard from room to room. Conversely, computers—even when available on a rolling cart—are simply not as small or portable. In addition, the prominence of a computer screen visible to the patient can pose a problem, especially for a nurse still transitioning to full competence on use of the system (Kirkley & Stein, 2004, p. 24).

White and Curtis also indicate that one of the key factors for generating resistance occurs when nurses are not involved in choosing the system or process, or what they term as “psychological ownership referring to the feeling tied to an object/organization and having a feeling of possessiveness for that object/organization...Individuals may be less likely to resist change when it is self-initiated, evolutionary and/additive as these types of change do not threaten fundamental self-needs, or psychological ownership” (White & Curtis, 2002, p. 17). Training new undergraduate nurses on computer charting as part of the current curriculum would lend to this desired psychological ownership.

Did the Train-the-Trainer Model Work?

As to the inexperience of the trainers and site super-users themselves, it should be noted that none of them had formal training and little, if any, job experience in adult education. There was an attempt to rectify this gap by offering a one-day workshop prior to the

actual training.[29] It focused on instructional basics like pacing, delivering information, managing classroom environment, and dealing with disruptive behaviours. While most found this helpful, there was no chance to practice the skills before going out to train their peers. Also, the project timelines with MEDITECH were such that the building and testing of the modules, as well as visits from the various module specialists from Boston, were occurring right up to the week before the training was slated to begin. This did not leave time for the trainers themselves to practice on the system before they were required to teach it to the frontline staff.

Changing Business Processes: Were the Nurses Ready?

The troubles discussed concerning the added task of having to register patients after-hours before any orders could be placed did not aid in the acceptance of the system with nurses. In fact the difficulties have led to the creation of a full-time position in the health records department that solely draws up reports and monitors the nurses' registration entries to ensure data integrity and to guard against duplications and overlays. There is now also an implementation underway to provide centralized phone registration for evenings and nights, delivered from the only hospital in the region that currently has registration staff working 24/7.

[29] This was an additional responsibility assigned to me. I was prepared for this by a three-day Master Facilitation workshop through the regional Staff Development department.

Changing business process by requiring the nurses to register patients when it was never part of their scope of practice caused consternation and confusion, and likely contributed to a lowered acceptance of the system. As Paul Pancoast says in *A Process Redesign Approach to Successful IT Implementation*:

> Process redesign (reengineering) makes quantum changes to core business processes, allowing much greater performance improvements than can be achieved by incremental change. …This usually involves much more than merely streamlining the existing processes and removing unnecessary steps. It often means completely revising people's job descriptions, removing existing tasks, and adding new ones. Process redesign is necessary for organizations to take full advantage of technological solutions. Process redesign is usually perceived as threatening by the people it affects. If process redesign is so difficult and painful, why do it at all? In healthcare, we simply no longer can accept the status quo. Healthcare requires a major shift in thinking, policy, and processes. (Pancoast, p.269)

Changing policy and process was somewhat of a catch-up affair as a result of the implementation. When the software was delivered and the building began it became obvious that there would have to be some process changes that were not anticipated. The nurse managers

were consulted about the changes prior to the training and the team was cognizant that the change would not be well received, but there was little that could be done about it at the time. Subsequently, policy was introduced; however, the processes were again changed in order to accommodate incorporating the system more comfortably.

The other purpose of the survey was to provide feedback from the front line to aid with implementation planning, and it proved to be very useful. Phase Two is currently underway with rolling out the Patient Care System (PCS) charting module in long-term care only. Long-term care was chosen to go first because long-term care is slower-paced and it is easier to evaluate how the system will fit into the scope of practice, thus easier to make the adjustments necessary before proceeding to the higher-staffed and busier acute settings.

Situating the Rural Alberta Experience

Because of some of the lessons learned from the first phase, the region decided that we would go ahead with Phase 2 but at a much reduced pace. We are now implementing the charting module site-by-site with staggered GoLive dates. This was in response to not only the feedback from the survey but from managers across the regions and other regions as well. The Big-Bang GoLive in Phase 1 was very difficult for most of the rural regions and it is one of the reasons that the majority of them have decided to hold off on further implementation at this time. Another added advantage of a staggered roll-out is that multiple training teams are not required, so we have

been able to hire a full-time trainer. It is the trainer who works with the team members in the sessions, as opposed to depending on team members teaming with site super-users to deliver the training. Another difference is the length of training required is a full two days, with time allotted strictly for practice. So far with the sites that have now gone live, things have gone more smoothly and the staff is much more relaxed. This is not to suggest that this more protracted rollout will be able to be sustained, as it does extend project timelines considerably.

Overall many of the issues that were raised during and after the implementation could have been avoided had better long-term planning and extended timelines been afforded to the project at the outset. Acknowledging the value of investing in expertise in the field of adult education, instead of relying heavily on existing employees and secondments, would have improved the experience for the staff in the first phase. Some key traits of the adult learner are that they are autonomous and self-directed, and that they come to the class with an accumulated foundation of life experiences and knowledge that may include work-related activities, family responsibilities, and previous education. Importantly, they are goal-oriented and relevancy-oriented with a focus on the aspects of a lesson most useful to them in their work (Preziosi & Mujtaba, 2006). Clearly in the case of this implementation it was impossible to take into full consideration these attributes of the successful adult learner. Had the investment been made in educating the trainers better in the area of adult education by

contracting an adult education specialist, it would have ensured better outcomes. Another option would have been that RSHIP could have invested in and developed a central training centre for all the trainers involved in the various projects across the rural regions. Taking the lead set by the vendor that the train-the-trainer model and the Big Bang GoLive were favourable implementation strategies caused great stress for all involved, as the post-live survey and the slowed or stopped implementation plans of ECH and the other rural regions would suggest.

Will MEDITECH be the system in use in five years in the rural regions? At the time of writing there is much upheaval in Alberta's healthcare, and as of April 2009 the health regions have been restructured. There is much speculation that the MEDITECH system will be replaced, but there is consensus on one thing—there will be no reverting back to paper in the future. Instead there will likely be many computer-based system implementations in the future as Alberta transforms its healthcare delivery into a single entity.

Chapter 2

Why an EHR?

> At issue is the claim that machines, structures, and systems of modern material culture can be accurately judged not only for their contributions to efficiency and productivity and their positive and negative environmental side effects, but also for the ways in which they can embody specific forms of power and authority.
>
> Langdon Winner
>
> *The Whale and the Reactor:*
>
> *A Search for Limits in an Age of High Technology*

This chapter includes an analysis of the motivation for the decisions to adopt a national electronic health record, as well as a discussion of the politics behind the decision-making. Included is a discussion of what the implications will be for the country at every level—national, provincial, regional and facility levels—and what is needed to make the project a reality.

A logical place to begin this is at the bottom or, in other words, at the facility level where ECH nursing professionals are now required to enter all doctors' orders on the system in order to provide patient care.

The nurses involved in the MEDITECH implementation in 2005 were told that the OE (Order Entry) module was one of the primary building blocks of a much larger system for the region. The module was part of the first phase of a five-part implementation of the entire suite of software, with the end result a fully integrated[30] database that would generate an electronic patient record (EPR). This would in turn feed information to an electronic health record (EHR). The multi-phase implementation would take place over a minimum of five years,[31] and it is this EPR that is the ultimate goal for the region. But that is only the beginning, because this is part of a much larger project that encompasses the entire country.

Reasons Given

The justifications given to the many skeptical new users in these small rural sites was best outlined by Commissioner Kenneth Fyke in the report *Caring for Medicare: Sustaining a Quality System Commission on Medicare* (2001). To summarize, with an electronic health record, information is accessible no matter where a patient is obtaining services within the region. Also, diagnostic tests do not need to be repeated if results from recent testing are available. All care providers have access to information on a need-to-know basis, which

30 That the MEDITECH system can be considered fully integrated with a seamless flow of information within and between modules is a matter of debate, as this is generally achieved by many background jobs and report-writing to force this to occur.
31 Three-and-a-half years into the implementation, Phase 2 modules, which include electronic charting, are now just being slowly deployed.

ensures that care plans are “complementary and seamless.” Patients do not need to endlessly repeat or explain the same things as they move from one department to another. This is very different from a paper-based system where information flows between departments and other hospitals via phone, fax and/or courier. User acceptance is critical for successful adoption of an electronic system, and these reasons do suggest improved efficiency and the potential for better patient care (Fyke, 2001, p. 68).

To understand why the decision was made to adopt an EHR in rural East Central Health in the first place, an understanding of how this connects to the larger picture is in order.

A Brief History of Canadian Healthcare

The Canadian healthcare system has continually evolved over the last sixty years. What follows is a brief overview of its development, with a focus on the major change agents leading to the drive towards a national Electronic Health Record (EHR).

Canadians embrace publicly funded healthcare insurance wholeheartedly; indeed, it is the one of our most dearly held and defining Canadian institutions.[32] The beginning of this system in Canada was introduced by Saskatchewan Premier Thomas Douglas in 1947. Universal hospital insurance was passed into federal legislation in 1957 as *The Hospital Insurance and Diagnostic Services Act*. The

32 In 2007 CBC ran a contest to determine who Canadians considered to be the “Greatest Canadian”—Thomas (Tommy) Douglas was the clear winner http://www.cbc.ca/greatest/ .

adoption of this insurance was not without its detractors and doctors led the charge, going on strike for three weeks in Saskatchewan in 1962.

By 1964 Justice Hall proposed a national plan and in 1966, under Lester B. Pearson, *The Medicare Act* passed, which covered 50% of the health costs of the provinces and territories. The primary focus of this model of healthcare coverage was doctors and hospitals, which reflected the healthcare delivery methods of the time.

Doctors continued to charge direct fees to patients for some procedures throughout the 1970s and 1980s. In 1984, the *Canada Health Act* was passed unanimously by Parliament, replacing the preceding acts, and one of its primary goals was to address concerns about these direct fees. The Act states that "continued access to quality healthcare without financial or other barriers will be critical to maintaining and improving the health and well-being of Canadians" (Section 3). The Act further says that the provinces, through their health insurance plans, must provide equal health-care coverage to all residents, without direct charges (Lawlor, 2001).

The Healthcare Budget: How Much and Who Gets it?

Healthcare is one of Canada's largest federal expenditures, and the mechanism used to distribute funds to the provinces and territories is called the Canada Health Transfer (CHT). In the 2007–08 fiscal budget the CHT cash transfer reached $21.3 billion (Finance Canada, 2007) and constitutes nearly one third of its annual budget (CIHI:

NHEX Trends, 1975–2006).[33] The cost for healthcare now sits at 10% of the GDP (Conference Board of Canada, 2007). Even though healthcare policy is predominantly the work of the provinces and territories the federal government wants an account of, and input into, how this money is spent.

> The provinces alone have the authority to regulate basic health care institutions, including the operation of hospitals, terms of employment for health care professionals, and the structure of health care insurance schemes. (Makarenko, 2007)

The provinces have jurisdictional authority on how to regulate their healthcare but it is necessary to understand how healthcare and federalism link.

> Under Canada's constitutional framework, the federal government is permitted to provide program funding in any area of public policy, regardless of whether it falls under federal or provincial jurisdiction. In the context of health care, this enables the federal government to contribute

33 "As part of the Fiscal Balance package, Budget 2007 commits to moving to equal per capita cash support for the Canada Health Transfer (CHT) when legislation is renewed in 2014–2015 to respect the agreement on the 10-Year Plan to Strengthen Health Care, as signed by all First Ministers. CHT cash levels are currently set in legislation up to 2013–14, providing predictable, sustainable, and growing funding to provinces and territories. CHT cash transfers will reach $30.3 billion in 2013–14."
http://www.fin.gc.ca/toce/2007/afr2007_e.html

> financially to programs and initiatives operated by the provinces. (Makarenko, 2007)

The Canada Health Act in conjunction the CHT carries great weight and effectively ensures conformance. The chief technical officer for Canada Health Infoway, Dennis Giokas, explains that “the federal government helps fund the jurisdictional healthcare system only if the jurisdiction is in compliance with the Act” (Giokas, 2005, p. 109).

How does the government monitor the provinces’ and territories’ compliance with the Act? Canada is geographically large and the public healthcare system has changed a great deal from the early part of the last century, when it consisted mainly of privately operated hospitals and small doctors’ offices. The population has grown and so have its needs and users’ expectations of the system; hence, so too have the escalating costs. The 2004 report *Understanding Health Care Cost Drivers and Escalators* from the Conference Board of Canada states:

> Although an aging population and health care price inflation are important contributors to cost increases, they do not explain all of the observed expenditure growth. Instead, it is the increased utilization of health care, by Canadians of all ages, that has been a primary determinant of health care costs in recent history. (Conference Board of Canada, 2004, p. 63)

One of the factors which accounts for the growing usage of healthcare is the increasing number of diagnostic tests available. This is

coupled with a heightened awareness of the population brought on by rather sophisticated information made available via the internet and the barrage of advertisements by the pharmaceutical companies. Secondly, an aging population necessitates changes to how healthcare is delivered. An acute setting (a standard hospital stay) is not always the best option. Care for the aging has changed and diversified to include assisted daily living, home care, and palliative care along with more standard long-term care programs. How to disperse funding to these many demands on healthcare dollars requires detailed information garnered from many, many sources.

CIHI: How the Government Gets the Information

The *Canadian Institute for Health Information* (CIHI) was founded in 1994 in response to the 1991 report released by National Task Force on Health Information on “improving cooperation among the wide spectrum of health constituencies”; it serves as a clearinghouse of information from all sources of Canadian healthcare.

CIHI is an independent, non-profit organization funded by the provincial and federal governments. As the name suggests, the Canadian Institute for Health Information collects and maintains a number of datasets from across the country relevant to our healthcare system. They work closely with governments to assist them in understanding their health systems. The data collected are supplied by hospitals, regional health authorities, medical practitioners and

governments. Their focus is on healthcare services, health spending, health human resources, and population health.

Information from the health authorities alone (also known as regions) comes from many sources such as community care (which includes the ever-growing home care and designated assisted living), public health (which includes immunization), acute care and long-term care. With so many diverse sources, the information has not always been consistent or in formats that can be easily compared and analyzed.

An Electronic Solution Is Proposed

From 1994 to 1999 the move towards a more unified and encompassing system began to take shape. Reports from a variety of commissions and task forces, provincially and federally, pointed repeatedly to an overarching electronic solution to the problem of a system that was becoming increasingly diverse and consequently more unwieldy.

Although not specifically initiated to look at the health sector, in 1994 the *Information Highway Advisory Council* (IHAC) was formed by the federal government to study “the development and use of the information highway for the economic, cultural and social advantage of all Canadians.” One of the recommendations in its final report was to create an “advisory council to identify new information technology applications for the health sector” (Health Canada, 2004).

Also in 1994 yet another advisory group, the *National Forum on Health* (NFOH), was launched by Prime Minister Jean Chrétien to recommend innovative ways to improve the healthcare system. In 1997, NFOH concluded that a prime objective should be the rapid development of an evidence-based[34] health system. The group also proposed the creation of a nationwide population health information system (Health Canada, 2004).

Then in September 1997, the Canadian Network for the Advancement of Research, Industry and Education (CANARIE)[35] issued a vision paper describing a Canadian health *Iway*, defined as

> a virtual "information centre" that is created and used by communities and individuals across Canada. It will be open and accessible, yet assure sufficient confidentiality and privacy to assist decision-making by health professionals and patients, support research and training, facilitate management of the health system, and respond to the health information needs of the public. (Health Canada, 2004)

34 "Evidence-based healthcare is the conscientious use of current best evidence in making decisions about the care of individual patients or the delivery of health services. Current best evidence is up-to-date information from relevant, valid research about the effects of different forms of health care, the potential for harm from exposure to particular agents, the accuracy of diagnostic tests, and the predictive power of prognostic factors." (First annual Nordic workshop on how to critically appraise and use evidence in decisions about healthcare, National Institute of Public Health, Oslo, Norway, 1996)
35 Now CANARIE Inc.—Canada's Advanced Internet Development Organization

In 1997 the momentum began to build in earnest. In August, then Health Minister David Dingwall established the *Advisory Council on Health Infostructure* which, given an 18-month mandate, submitted its final report in February 1999:

> It affirmed that setting up a nationwide health information highway could significantly improve the quality, accessibility and efficiency of health services across the entire spectrum of care in Canada. The Council's four objectives included: developing a Canadian vision of a health information system on the information highway and identifying the essential needs it should meet; generating a federal action agenda to implement the most vital components of the system; suggesting collaborative mechanisms to achieve a Canadian consensus on an integrated health information system; and identifying issues, challenges and barriers to the effective use of information and communications technologies, and recommending possible solutions (Health Canada, 2004).

The same year, Health Canada also established the *Office of Health and the Information Highway* (OHIH) "as Health Canada's focal point for all matters concerning the use of information and communications technologies (ICTs) in the health sector" (Health Canada, 2004). The scope of this office includes "knowledge development, partnerships and collaboration, and federal policy development" (Health Canada, 2004).

Finally, in the 1997 budget, then Finance Minister Paul Martin announced $50 million over three years for a coordinated national health information system “to ensure that health care providers and planners across the country have the right information at the right time” (Department of Finance, 1997).

More committees were struck, reports were tabled, and forums were held over the next few years. To highlight but a few: the *Advisory Committee on Health Infostructure*—a group of senior-level government officials,[36] and the Fykes Report from Saskatchewan, referred to earlier in this chapter, outlining the deficiencies in the Saskatchewan system and detailing the benefits of an electronic system, and an EHR in particular.

Merging onto the Highway: Canada Health Infoway

Many people were advocating for the same solution, which led to the creation of *Canada Health Infoway*, with the First Ministers unanimously agreeing “to work together to strengthen a Canada-wide health infostructure” by developing EHRs and common data standards to ensure compatibility (Saranummi, 2005, p. 122). With $500 million initial federal funding, the independent, nonprofit organization was launched.

36 The Advisory Committee on Health Infostructure is tasked with identifying impediments to creating information management and information technology for the health system, as well as a security framework and a business model for that “would identify the major steps in the process and the players, and highlight critical issues and interrelationships between stakeholders.” (Health Canada,2006)

Members of *Infoway* include all 14 Deputy Ministers of Health, and it bills itself as “Canada’s catalyst for collaborative change to accelerate the use of electronic health information systems and electronic health records (EHRs) across the country” (Canada Health Infoway, 2008)

The Romanow Report

A discussion about the history of healthcare in Canada is not complete without at least a cursory examination of the *Romanow Report*. Minister Romanow released his controversial report in November 2002 with dire predictions for the sustainability of a “universally accessible, publicly funded health system over the long term,” citing issues of spiraling costs, an aging population, and changing healthcare delivery models and expectations (Saranummi, 2005, p. 122). In order to uphold the principles of the *Canada Health Care Act* of accessibility, portability, universality, comprehensiveness, and public administration, Romanow states:

> Accountability must also be improved. Health care in this country is now a $100 billion enterprise, one of our society’s largest expenditures. Yet no level of government has done a very good job accounting for how effectively that money is spent. (Romanow, 2002)

He goes on to make his case for new transparency in the system and to assert that Canadians, being the primary stakeholders and, indeed, the owners of the system, deserve to know the facts about how

budgets are being spent, and why there are long wait lists (to name a few things). The key is information:

> We live in an age of laser surgery and are unlocking the mystery of the human gene, yet our approach to health information is mired in the past. We gather information on some health issues, but not on others. And much of the information we gather cannot be properly analyzed or shared. (Romanow, 2002)

Not surprisingly, Romanow's recommendation for this new proposed transparency was a series of measures, including accelerating the integration of health informatics, and providing an electronic health record for Canadians.

> If we are to build a better health system, we need a better information sharing system so that all governments and all providers can be held accountable to Canadians. (Romanow, 2002)

Returning to the rural Alberta experience, if *Canada Health Infoway* is the result of the drawn-out process to reach agreement on adopting a national electronic health record, then it is not hard to imagine the numerous steps involved in actually installing a computer in a small hospital and teaching nurses how to use only one part of an electronic system that will ultimately flow up to the proposed national record. What follows is an introduction of the players and their roles in

implementing the necessary pieces in order to achieve the ultimate goal of a national EHR.

At What Cost? The Investment So Far

To date the federal government has committed $1.2 billion to Canada Health Infoway. The EHR they are tasked to create is defined as “a secure and private lifetime record of an individual’s health and care history, available electronically to authorized healthcare providers. It is designed to tie together the output of a number of information systems” (Canada Health Infoway, 2007). There are some systems in place in Canada that could feed information; however, there are many more in development. Infoway disperses funds and acts as a banker of sorts in that it then co-invests an average of 75 percent towards the implementation costs of approved projects throughout the country (the provinces and territories are required to pick up the tab for the remaining costs). In order to distribute the funding, Infoway uses a “gated” model tying reimbursement to “specific implementation milestones.” Infoway (i.e., the federal government) has the accountability the government seeks.

The key project requirements are as follows. The project must demonstrate value and benefit to Canadians. Projects must comply with all privacy legislation and agreements. Each project contract must have predefined milestones and deliverables that are tied to the funding, which includes achievements in technology and user adoption. The milestones must be achieved before the next level of funding can

be dispersed. Moreover, “The solutions and their outcomes must have beneficial results that may be replicated and deployed on a pan-Canadian basis.” (Giokas, 2005, p. 130)

Interoperability: Working Together

The idea of “pan-Canadian” means that the national EHR must be able to accept data from many sources and that data must comply to preset standards set by Infoway. The goal here is interoperability, and the work of establishing data standards has been arduous and is ongoing. There has never been a concerted effort of this magnitude to agree on what things should be called or to have set definitions. Naming conventions vary not only at the federal level but between provinces and between the various regions in the provinces, and even between the sites within regions.

Alberta Netcare

One of the numerous projects under development across Canada which form the essential building blocks of a national EHR is *Alberta Netcare*. Alberta Netcare defines itself as

> The single name for all projects and activities related to Alberta’s Electronic Health Record…Alberta Netcare will create an integrated electronic health record solution that will eventually be accessible by every health provider. By creating one integrated province-wide system, Alberta Netcare will link clinics, hospitals, pharmacies and other

> points of care to patient information. (Alberta Netcare, 2008)

How Alberta Netcare came into being is a bit confusing. Alberta Netcare used to be known as Capital Health netCARE which, as the name suggests, served the Capital Health Region (Edmonton and area) but changed the name to reflect its new role. With upgrades to its existing system, the Alberta Netcare Portal 2006 has been launched as the next generation of the Alberta EHR, which will serve as the viewer for all available provincial health data.[37] Any system that the regions in Alberta choose to implement must be able to send data that can be viewed by the Netcare Portal and ultimately be standards-compliant and compatible with the national system.

37 In East Central Health, lab results from the provincial labs have been available from Capital netCARE though they have mainly been delivered via fax, with the exception of doctors' offices with access to that system.

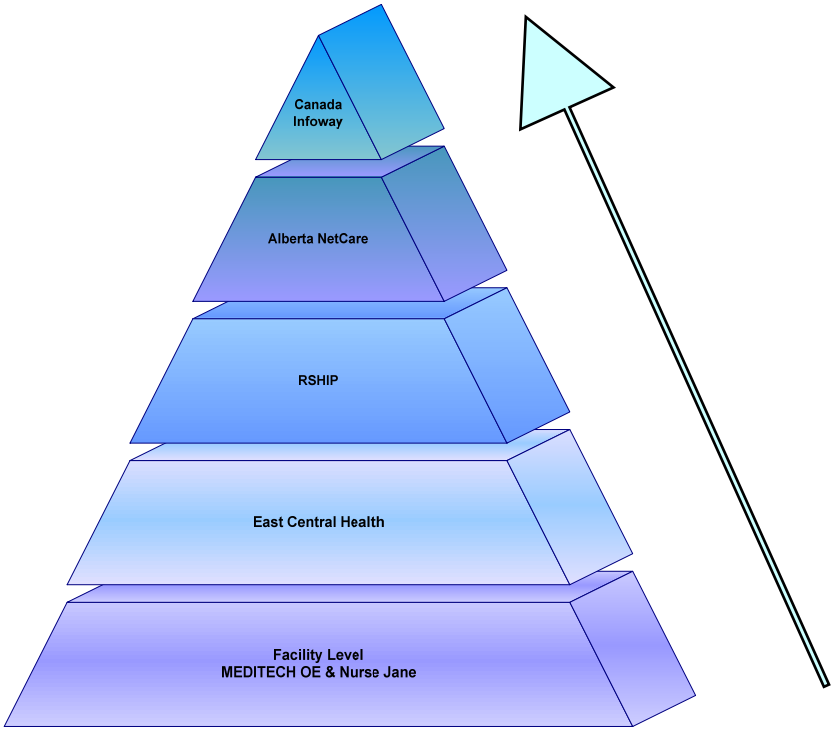

Figure 2-1: Anatomy of the National Health Record

From the Bottom to the Top: How the Information Flows

This simple diagram (Figure 2-1) shows how a facility fits into the scheme of Canada's pursuit of a national electronic health record as well as how health information flows. Now that all the building blocks of a national health record are being laboriously put in place across the country, the question of exactly what type of information each layer will contain is a natural one. Concerns about the safety of the data, and the rights of access by whom and where, are outside the scope of this thesis, but research, policy, and law have been debated across the disciplines. Still, it is important to have at least a basic level of understanding in order to grasp how information flows up and down. I purposely chose a triangular shape to illustrate the layers of

information. At the bottom is where ECH and the nurses are because this is where the most patient data resides. Now, all test results and information, medications ordered during a visit, diagnosis, reports, access to radiology images,[38] and summaries are available to the care providers. This type of information is available for all the visits a patient has anywhere within the seven participating regions and can be viewed in the EMR. That said, a nurse cannot view information on the patient unless the patient is in their care, i.e., the patient in question is currently down the hall in a bed on the unit they are working in. The records are locked down by location and care provider roles. Thus a doctor would have more access than a licensed practicing nurse.

There is a level of information that gives an even more complete record of a patient that is outside of this diagram, and it resides with the patient's family doctor. This record contains all visits outside facilities with references to the visits a patient might have at a hospital. For example, if a patient breaks a leg and is treated in an ER the family doctor is notified. In ECH the electronically generated report is currently faxed because the doctors' clinics are not linked (interfaced) with the MEDITECH system. Doctors are currently being

38 Access to digital images from MRI and X-ray are now possible by the recent introduction of the PACS (Photographic Archiving and Communication System). There are no longer any films in ECH and this region is one of the first to go live across all sites. This would not have been possible without first implementing an electronic system to view them. Although it is slightly outside the purview of the electronic record, it is a highly desired addition from the standpoint of doctors and clinicians alike.

trained to access the EMR from their clinics (outside the facilities) using a fob,[39] a device used for remote system access and secure internet connections. However, adoption by physicians has been slow because it is not useful enough, and they are holding out for both their own module to be implemented and the Phase Two charting modules to be in place. Doctors have been strongly encouraged with excellent incentives (i.e., money[40]) to adopt POSPs (Physician Office System Programs) for their clinics so that they too can feed information to the provincial record. Once again this has been a slow process.

Privacy Secured

The next level above RSHIP (which contains the multi-region MEDITECH EMR) in the diagram represents Alberta Netcare. All the information that is gathered from a patient's visit, whether in the doctors' office or a hospital visit, does not flow freely to the provincial level. The bulk of the data remains at the point of care, and access to this information is subject to a myriad of controls with the key one being the patient's permission. This needs some qualification; that is, the data does not flow up or down with identifying information like the names of specific patients without their expressed permission. Various groups like the provincial government and/or CIHI require reporting on

39 A fob is a small electronic device approximately the size and shape of a remote car door lock. The fob generates a seven-digit code every minute that must be used in conjunction with the user's ID and password when remotely logging in to the system.
40 For a full description of the incentives offered to the doctors to entice them to adopt POSP systems see:
http://www.posp.ab.ca/interested/

any number of things. For example, both might ask for statistics on the number of Albertans with Type 2 Diabetes to develop strategic chronic disease funding. The statistics do not require names to be attached to the raw data. It is much easier to provide those statistics from an electronic source with standardized data elements.

This would suggest that indentifying patient information never moves up without permissions. In fact it does, in the form of the recently released patient registry at the provincial level. The patient registry will house the most accurate demographic information on all Albertans.[41] This is updatable from the regional site level to ensure that any changes are captured.

A situation that points to the importance of this development happened in the first two weeks of go-live in ECH. As previously mentioned, ECH predominately consisted of small hospitals in small towns that could not afford the luxury of after-hour admitting staff. This would seem to be a simple task, except that patients do not necessarily stay in one place or use the same name (Frank vs. Francis); moreover, several often belong to the same large family that usually lives in the vicinity. This requires choosing the correct patient from lists of patients with similar names or identifying information. As described in Chapter 1, in the MEDITECH system this means that the nurse must work through a number of searches, depending how closely the demographic information given by the patient matches up

[41] For more information see: http://www.albertanetcare.ca/211.htm

with other records in the system. This could involve up to nine searches. The system looks for exact matches and partial matches within its own local databases and up to the EMR. This was very stressful when the nurse was simply trying to get the patient registered so that work could proceed. ECH was not the only region that experienced similar difficulties. A number of adjustments to processes were introduced to manage this problem; however, with the introduction of the provincial registry the searches now start with the local database and then move directly to the registry. This registry will now serve as the "source of truth" and will hopefully decrease such occurrences in the future.

In June 2009 Canada Health Infoway presented their report, *New Directions*, detailing some of the data elements, or as they term them, "interoperability enablers" (p. 22). Currently identified for collection by Canada Health Infoway for the national EHR are demographic information (client provider, service delivery location), clinical information (drugs, laboratory, diagnostic images and reports, visits or encounters, clinical documents, referrals, conditions and immunizations), and clinical orders (drug and laboratory). A consensus has been reached on the nomenclature (naming conventions) that will be implemented across all platforms.[42]

[42] According to the same report Canada Health Infoway has decided to go with SNOMED CT: "The purpose of the International Health Terminology Standards Development Organization (IHTSDO) is to acquire, own and administer the rights to Systematized NOmenclature

Discussion:

In conclusion, the goal to create an interoperable EHR for Canada is proving to be a massive undertaking. In July of 2004, Infoway engaged Booz Allen Hamilton to develop a 10-year implementation strategy based on rolling out EHR functionality. “The ultimate goal would be to have an integrated, interoperable EHR that spanned the entire care continuum in hospitals, physician offices, public health offices, mental health facilities, long-term care facilities, and home care” (Booz Allen Hamilton, 2005).

The report given in the *Canada Health Infoway’s 10-Year Investment Strategy: Pan-Canadian Electronic Health Record—Booz Allen Hamilton (Vol. II Implementation Strategy)* (2005) outlines how this will (hopefully) play out.

> The first-generation system consolidates patient data for viewing, the second generation allows for the documentation of care and basic decision support, and the third generation provides the capability of physician ordering and improved decision support. (Booz Allen Hamilton, 2005)

The report cautions that “both the pace of implementation and the functionality implemented will have a direct impact on when the financial benefits of the EHR are realized. The longer the timeframe to complete implementation the more remote the benefits become.” The

of MEDicine Clinical Terms (SNOMED CT), other health terminologies, and/or cross-maps to allied standards and other relevant assets (collectively known as "Terminology Products").

Booz report encourages an aggressive implementation in order to offer key functionality to care providers to achieve necessary user acceptance, but also cautions that a realistic approach for the roll-out awareness of resource restrictions (not only money but “intellectual capital” and skilled workers available to carry out the implementation) is necessary.

At this point, many questions remain unanswered about the overall success of the national electronic health record. In 2004, the Conference Board of Canada weighed in on the status of the mega-project:

> To date, adoption of such technology in Canada has not been swift. It is difficult to determine whether a lack of progress toward electronic health records and decision-making is a result of pressure from interests that benefit from the status quo, or a result of federal and provincial governments’ reluctance to invest the billions of dollars necessary to establish such systems. (Conference Board of Canada, 2004)

More recently Canada Health Infoway in their *New Directions* (2009) report has adjusted their projections of EHR availability to 50% of Canadians by 2009 to 2010. Even if $500 million in new funding were to be announced, there are many factors that could extend that goal even further. For example the adoption of the SNOWMED requires the cooperation of all vendors to ensure proper interfacing and carries a

price tag of 25 to 55 million dollars with an 8 to 9 million dollar yearly maintenance fee. For new projects this can be incorporated, but for ongoing and completed projects this will require major upgrades (p. 23).

Theoretically the goal of a national health record would seem to be a good idea and would offer many benefits to Canadians. But do Canadians even realize this project is in progress? And are they aware of how resource-intensive it has been so far, and for the foreseeable future? Research for public announcements in the form of press releases revealed very little with the exception of the reports released by Canada Health Infoway and Health Canada. There are editorial pieces that for the most part support the government project.[43] Will the benefits outweigh the stresses incumbent on such a project? Returning to the Romanow Report and the call for transparency in the healthcare system, if this is one of the best tools for achieving this transparency, will the forging of the tool exact too high a cost? This tool is a lofty goal and one that is forecasted to cost in the neighborhood of over $10 billion before it is fully realized. Simply

[43] *Andre Picard (Globe and Mail)* Don't skimp on funding electronic health records
http://www.theglobeandmail.com/life/health/article655191.ece
Michael Evans (Globe and Mail) The real holy grail of medicine
http://www.theglobeandmail.com/life/article671247.ece
Stephan Strauss (CBC) Why our health records haven't gone digital yet
http://www.cbc.ca/technology/story/2009/07/13/f-stephen-strauss-electronic-health-medical-patient-records-explainer.html

getting to the point where there was the political will to embark on this venture cost several hundred million of the taxpayers' money. But Canada is not alone in this pursuit. In the release *Barack Obama and Joe Biden's Plan to Lower Health Care Costs and Ensure Affordable, Accessible Health Coverage for All,* U.S. President Obama is also committed to these same goals for the same reasons put forward by the Canadian government. His healthcare plan claims that the realization of this will ultimately bring enormous cost savings:

> Most medical records are still stored on paper, which makes them difficult to use to coordinate care, measure quality, or reduce medical errors. Processing paper claims also costs twice as much as processing electronic claims. Barack Obama and Joe Biden will invest $10 billion a year over the next five years to move the U.S. health care system to broad adoption of standards-based electronic health information systems, including electronic health records… A study by the Rand Corporation found that if most hospitals and doctors offices adopted electronic health records, up to $77 billion of savings would be realized each year through improvements such as reduced hospital stays, avoidance of duplicative and unnecessary testing, more appropriate drug utilization, and other efficiencies (Obama, 2008, p. 3).

The American goal is five years. With the constant advancements in technologies, especially in the area of medical diagnostics, there are

potential conflicts that could arise in five years' time with health record software adopted today, as it may not be capable of interfacing or integrating with the newer medical systems.

Some provinces might not be able to sustain the costs and resources of carrying the implementation to a fully functioning EHR, thus leaving them behind richer and more populated provinces. This could be viewed as a stepping stone to a two-tiered system that Canadians have always protested against whenever the idea of privatizing parts of healthcare are raised. But Peter S. Winkelstein, in *Ethical and Social Challenge of Electronic Health Information,* refers to the slow but steadily growing penetration of health information technologies in the United States:

> Another promise for which there is as yet no empirical support is return on investment (ROI). EHRs are expensive and complex to install. Savings from reduced file room staffing and square footage, along with savings from reduced dictation expenses, may not fully cover the cost of the EHR. As a result, one can imagine a "have" and "have not" condition, where some practices (perhaps specialty practices in affluent areas) can afford EHRs, but other practices (perhaps inner-city primary care) cannot. That disparity could jeopardize the quality of care for the patients of the "have not" practices. It could also interfere with public health issues because data from the "have

> not" patients would be much less readily available and therefore underrepresented in public health databases (Winkelstein, 2005, p. 144)

The process by which monies have been distributed to the provinces for the various projects is by having them demonstrate achievement of set milestones, and this has its drawbacks. Heavy investment has already been made throughout the country on wide-ranging projects small and large. The experience in rural Alberta can be viewed as very large in scope based on geography and its attempt to incorporate many regions, sites, and businesses. But as far as the population it serves (1 million) it would be considered minute compared to a major city like Toronto, with a population of 5.54 million in the greater Toronto area, attempting a similar collaboration (Toronto, 2009). The vendor chosen (MEDITECH) was confident that it would easily be able to meet the needs of the regions, but it has proven to be challenging due to the very fact that the project is so spread out. It can be argued that having seven regions implementing simultaneously in so many locales and with so many teams (i.e., seven order entry teams and seven lab teams) was not an efficient or cost-effective way of achieving their milestones. That said, even with Alberta amalgamating into a single body, with an entire provincial budget that will no longer be regionally split, and the access to the best expertise, the project might not prove to be any easier or effective. As mentioned, the two largest regions have yet to be able to

come to consensus on what kind or kinds of systems will work for them. The likelihood of agreeing upon a single system that will meet all needs for all areas across the province is small.

In the uncertain economic times currently besieging both the U.S and Canada, the cost of these projects might prove to be too heavy and the aggressive timelines for the projects may need to be scaled back, thus extending the projects' life cycle. Canada did not commit new monies to the project in the 2008 Federal Budget.

Chapter 3

A Post Mortem on the Implementation: Was It a Success?

> But let us say that we have found a technological solution to a problem that most people do have, that we have some notion of who will pay for it, and that we are aware of those who might possibly be harmed. And let us suppose further that there is a will and even an enthusiasm to move ahead with the project and to speak favorably of its prospects.
>
> Neil Postman
>
> *Building a Bridge to the Eighteenth Century: Ideas from the Past That Can Improve Our Future*

The experience with the nurses in rural Alberta described in Chapter 1 touched on a number of areas that impacted the implementation of the first phase of an interoperable electronic health record, centring on the rural nurses' receptiveness to adopting the technology and the efforts made to prepare the nurses to go onto the system. The second chapter of this thesis focused was on how a national electronic health record has been deemed the technological

saviour of a burdened Canadian healthcare system and the plans for its implementation.

In this chapter I will pose the following question: Was the implementation a success? This will not be a simple answer but one that frames the exploration that I want to make. The question must be asked from a range of perspectives and at many levels in order to answer it properly, and it is unlikely to render a definitive answer. As in Chapter 2, which examined how the rural nurses found themselves in front of a computer in order to do their work after years of capably performing their duties without it, the scope will be broad.

To guide this inquiry there are two other questions that need to be addressed in order to properly identify some of the key players who have a vested interest in the success or failure of the project. Neil Postman succinctly poses it, in Building a Bridge to the Eighteenth Century: Ideas from the Past That Can Improve Our Future, when he suggests that when asking, “What is the problem to which this technology is a solution, it is wise to follow with the question, Whose problem is it?” Perhaps more importantly, we must also ask, “What new problems might be created because we have solved this problem?” (Postman, 1999, p. 56)

What are the problems that this technology will solve? Canada’s healthcare system is diverse, complex, geographically dispersed, and increasingly expensive. I have traced the origins and impetus by all levels of the Canadian government to realize a national electronic

health record. The goal stated in sources like the Romanow Report and the annual reports from Canada Health Infoway is that with an EHR each Canadian will be able to access healthcare anywhere in the country, have their full medical information accessible to the practitioners, caregivers and ultimately themselves through a fully integrated network of systems from the site level (hospitals, health centres, clinics etc.) to provincial/territorial systems and ultimately to a national system. This record will follow each Canadian from cradle to grave. The federal government and its ministry Health Canada along with, and aided by, CIHI and Canada Health Infoway have been offering this as one of the best solutions for unrestricted[44] access to proper, full care for all Canadians regardless of social, economic or geographic barriers. It is also argued that it will aid in decreasing wait times. In their 2007–8 annual report Canada Health Infoway goes even further:

> Once implemented, these systems will provide health care professionals with quick access to accurate and complete patient information. In addition to enabling better decisions about diagnosis and treatment, electronic health record systems are essential to a modernized health care system that provides improved

[44] By “unrestricted” I am not implying that the safeguards pertaining to security and privacy will not be adhered to, only that anyone who has the proper permissions will have access to the information they require to support their decision-making.

> accessibility, quality and productivity. The transformation of health care in Canada is taking hold. From reducing wait times to improving patient safety and access to quality care, e-health solutions are starting to make a difference. (Canada Health Infoway, 2008)

Infoway is deeply invested in the success of the 254 projects that are underway or have been completed across the country at this time, and the report states that they are "quickening the pace." Infoway has approved $311.5 million this year alone, with a lifetime-to-date project approval total of $1.457 billion (Infoway, 2008). Interestingly, in the 2008 federal budget no additional funds were committed to the initiative, which jeopardizes Infoway's ultimate goal of providing 50 percent of Canadians with an EHR by 2010.

> While the total cost of the Canadian vision is estimated at $10 billion to $12 billion, it is important to remember that, when the system is fully implemented, the estimated benefits to our health care system will be $6 billion to $7 billion annually. (Infoway, 2008)

A Patient's Perspective

From a patient's perspective, having all one's medical and health information housed in one place to serve as the ultimate source of truth which a physician can quickly access is desirable. According to the Infoway report, an independent 2007 public research survey, 88%

of Canadians believe electronic health records will improve delivery of healthcare (Infoway, 2008). Electronic records versus the traditional paper record offer the added value of using an integrated or completely interfaced system where the information is made available immediately. Crane and Raymond, in their paper "Fulfilling the Potential of Clinical Information Systems," argue that

> Paper-based information systems are not a viable long-term option for meeting the changing demands of health care delivery settings. Clinical decision-making should be driven by point-of-care information accessed by providers in real time. Paper-based systems for information storage and retrieval have high failure rates that can lead to duplication of service, delays in treatment, increased length of hospital stay, and increased risk of medical errors caused by absence or inaccessibility of data.

Will What Works Now Work in the Future?

Can or will a national EHR actually deliver on the promises? Drs. David Blumenthal and John Glaser, commenting on the American experience in their paper "Information Technology Comes to Medicine" (2008), posit that realizing this transformative vision depends on the design of the system and its capacity to produce the information required.

> It is one thing to digitize the current medical record, so that the information clinicians now collect is available to them in electronic form. It is another thing to make certain that all the data needed for the purposes of improving quality and efficiency are collected and to install new software applications that can retrieve these data, organize them, apply decision algorithms, and provide the result to clinicians and managers when and where they need it.
>
> (Blumenthal & Glaser, 2007, p. 2527)

They go on to say that the products available now are designed to meet the present needs but not necessarily the needs of the future. Experience drawn first-hand from East Central Health's implementation of the OE module supports this idea. Even though the MEDITECH system is commercially developed to support current information needs, any electronic system is only as good as how it is configured.

Building It Properly

While building the OE module to reflect regional standards and policies, the team members went to the sites to interview staff and map current processes. This was a revealing exercise in that many of these practices involved many steps that were not always clearly understood but were always complied with. One anecdote that circulated among the Order Entry team during the implementation detailed in Chapter 1 was about a nurse describing the steps

performed at one site on how a particular test was ordered. It included faxing a copy of it to another office for what was assumed to be part of the reporting requirements. Upon further investigation it was revealed that this was no longer required and had not been for some time. The receiver of the faxes was a new employee who did not know what should be done with the received fax, and when she asked she was told they no longer required it so she could shred it. This was news to the sending site but because it had been part of this process for as long as anyone at the site could remember, it was simply done. In this case if an error such as this is not identified prior to building a system it could easily lead to building in reporting functionality that would be largely pointless. Omitting careful analysis of current processes increases the possibility of futilely capturing, recreating or even fossilizing inefficient or unnecessary function in the electronic system.

With the tight timelines afforded to the team, they gave it their best effort to capture the information and work flow in the module; however, after two years, users have raised numerous issues that continue to require alterations to the system. This task is not always as simple as it might initially seem. Because this is a highly integrated system, if a change is requested in one module it invariably affects flow in other modules and this is never a simple change. For example, if an order change or addition is requested in the OE module, then it must be determined how this will affect data flow to the receiving module and the change, if approved, must change there as well. Next,

if necessary, the change/addition needs approval by the provincial standards team so that the information will flow properly to the EMR[45] and that the other participating regions agree to it. Finally, because MEDITECH is built using its own language, a specialized applications analyst may need to write a background job. This is all very resource- and time-intensive, so changes are made frugally.

Choosing the Right Tool

The rural Alberta experience of choosing a software suite from a mid-sized American firm was based at least partly on the fact that there are other provinces and regions in Canada using it, including the Interior Health Authority and Fraser Health (British Columbia), the District Health Authorities of Nova Scotia, and the Provinces of New Brunswick and Newfoundland and Labrador.[46] MEDITECH boasts having a 40% share of the Canadian market.[47] Moreover, MEDITECH has been in the business for 39 years and has spawned numerous supporting businesses that offer exclusive software to enhance MEDITECH functionality at every level.[48] In fact there is an

[45] Enterprise Medical Record is where all information from all the participating regions flows to and is ultimately housed in the centralized data repository in Red Deer.
[46] Retrieved 20 July 2008 http://www.MEDITECH.com/AboutMEDITECH/pages/welcomeaboard_alberta.htm.
[47] To read the release: http://www.MEDITECH.com/aboutMEDITECH/pages/newsinternational.htm.
[48] These companies allow MEDITECH to promise almost any sort of functionality a customer may require with their additional products and services, though in my conversations it was not always made clear

organization called MUSE (Medical Users Software Exchange) that is devoted solely to connecting MEDITECH users to these companies.[49] This could be read in two ways: one, MEDITECH is a firmly established medical software company and its affiliations prove its popularity and stability; and two, MEDITECH, because of its proprietary closed-shop approach to development, requires this extraordinary support network to allow it to meet constantly changes in technologies and processes.

My research on other available commercially developed systems (apart from their own marketing material) and their effectiveness in multi-discipline healthcare yielded unsatisfying results. In *Systematic Review: Impact of Health Information Technology on Quality, Efficiency, and Costs of Medical Care* (Chaudhry et al., 2006) a review of 867 articles from 1995 to 2004 were extracted by the researchers; of that only 257 studies met their criteria, and they concluded overall that "little evidence is available on the effect of multifunctional commercially developed systems":

> A disproportionate amount of literature on the benefits that have been realized comes from a small set of early-adopter institutions that implemented internally developed health information technology systems... Missing from this literature are data on how to

that these additions were not part of the stand-alone MEDITECH system.

[49] MUSE hosts yearly national and international conferences that connect supporting vendors with MEDITECH users. For more information: http://www.museweb.org/ .

> implement multifunctional health information technology systems in other health care settings…The limited quantitative and qualitative description of the implementation context significantly hampers how the literature on health information technology can inform decision making by a broad array of stakeholders interested in this field. (Chaudhry et al., 2006, p. 19)

The results of searches for studies about health information system implementations in Canada were negligible, and I found myself mainly combing through government reports that would fit the descriptions of non-critical proponents of adoption. I had often wondered why we, as a province, could not develop a system that would reflect the Canadian model of healthcare delivery, and, taking into account the investment dollars that the Canadian government has committed, whether this would even be feasible. The same study found excellent reports from institutions that had developed internal systems over "long periods in a gradual, iterative fashion," but these types of systems were "not feasible for broad-scale use of health information technology." Most organizations favour the commercial products given logistic constraints, budgets and short implementation cycles (Chaudhry et al., 2006, p. 13).

What Does History Tell Us?

Research on the Canadian experience thus far leads me to another plausible explanation for the popularity of commercial systems

and particularly MEDITECH. While looking through the reports and following the trajectory of the various provincial and regional adoption of health information technologies, certain names repeatedly appear as keynote speakers at conferences, and these same names are listed as consultants and project leads hired by these organizations to assist in vendor selection and project and implementation planning. A reasonable explanation for this is that, because Canada is relatively new to this field, there is a thin veneer of expertise; ergo the hiring choices are limited. The corollary of this is if the experience is gained with a specific product and implementation style then it would make sense to build on this and share the growing body of knowledge.

That said, if these consultants and project leads are drawing from the same data in order to make informed decisions about product choice and how best to build and implement these systems, they are running the risk of inadvertently becoming promoters of single vendors. This is exacerbated when it is a company that develops in-house like MEDITECH, which can then dictate with whom and with what it will interface. Once the contract is signed and the investment is made in a multi-module, many-phased, highly integrated system that promises to cover all needs across an entire spectrum of care, it becomes increasingly difficult to back out. This is especially true when pay-out from funding sources is contingent on achieving certain milestones. But, as Liette Lapointe and Suzanne Rivard (2005) argue in *Clinical Information Systems: Understanding and Preventing Their*

Early Demise, abandonment is not out of the question and implementation failure is high (2005, p. 92).

Adoptions of medical technologies have been constant over the history of modern medicine. Postman, in *Technopoly: The Surrender of Culture to Technology* (1992), argues that the acceptance of the stethoscope was the beginning of a complete reliance on technologically mediated medicine—particularly in diagnosis (Postman, 1992, p. 90). In the last decade these diagnostic technologies have become increasingly more sophisticated with the introduction of MRIs (Magnetic Resonance Imaging), PACS (Picture Archiving Computer System), CT Scans (Computed Tomography) and laparoscopic and computer-assisted surgery, not to mention the battery of tests available to order. “As knowledge progresses, certain intolerabilities (diseases, obstacles to knowledge, limitations in provision) are overcome, giving rise to new health problems and challenges” (Bunton, 1997, p. 57). The growing public interest in health and health technologies have led to a whole new segment of media focused on these new advances, and subsequently higher demands are placed on doctors to administer them (Bunton, p. 59). All of these technologies produce results, which in turn create more data that need to be meaningfully stored, and made available for analysis and action. Dr. Litvin, in “In the Dark—The Case for Electronic Health Records,” argues that the concept of a national EHR system has gained popularity because there is “finally recognition among physicians that

medicine is an information science" (Litvin, 2007, p. 2455). Whether one would wholly agree with that could be debated but suffice it to say that the practice of medicine generates reams of information. How this information is acted upon is raises ethical concerns which are outlined by Paul Winkelstein, in *Ethical and Social Challenges of Electronic Health Information:*

> One of the promises of EHRs is that the information they contain can be used to provide automatic alerts such as drug-drug interactions and suggestions for treatment or diagnosis. This naturally raises the question of who is in charge of making medical decisions, the clinician or the computer? The "standard view" is that human clinicians should retain the ultimate authority to make decisions and that computers should provide advice only. There are two reasons for this standard view. One is simply that computer decision support systems have so far not been shown to be clinically useful, especially in general diagnostic situations. This does not mean, however, that such systems will never be useful, only that the construction of useful systems is complex (156).

Solutions Creating Problems?

Returning to Postman's suggestion to specify the problem the technology is trying to solve, the majority of the studies I reviewed generally identified doctors and patients as key stakeholders, and the

problems that the technology is trying to solve is ready access to real-time information for diagnostic and care-planning purposes. Most of these were American studies so there was mention of billing and insurance in reference to hospital and clinic usage, and a Canadian parallel might be made to who I would argue are the primary stakeholders of this technology—the government and all levels of administration. Collection and meta-analysis of data would be impractical without computational power.

Winkelstein cautions that flaws in methodologies can be problematic. Inherent value judgments that are embedded into the outcome and quality measurements within a system may not be apparent in the reporting. He cites cost effectiveness and resource management as measures that could have deleterious results for decision makers (Winkelstein, p. 147). Two of their principal functions are the allocation of budgets and policy development, and in order to do either adequately these bodies need to act on good, objective information.

The types of information outlined are being collected now but the means are varied. For instance, data concerning frequency of the treatment of strokes is collected first at the facility level on the patient's chart (paper or otherwise), then the monthly statistics are sent to either the regional level, or if there is not a regional system, then directly to the province. The data are analyzed for trends and the development of programs and budgeting of funds is based on these

aggregate reports. In the case of East Central Health, the information collected about instances of stroke in the region was sufficient to allow for funding to launch a new initiative called *Telestroke*, which allows patients and their team of caregivers in small rural hospitals to have real time access to stroke specialists in Edmonton via a video conferencing system.

Currently the method of gathering data is a mélange of varying sources and formats ranging from verbal reporting, spreadsheets, and tables. Lack of standardized terminology renders some of the data unusable. Without any type of reporting system in place it would be impossible to match perceived needs with hard data to aid with funding and provisioning decisions. That reporting the information can be made infinitely easier using standardized data and a coordinated system of collection makes adoption of electronic health information systems a solution to this problem. Based on these arguments, the pursuit of a national EHR would seem to be a sound decision. But as Winner, in *The Whale and the Reactor*, pointed out:

> Judgements about technology have been made on narrow grounds, paying attention to such matters as whether a new device serves a particular need, performs more efficiently than its predecessor, makes a profit, or provides a convenient service. (Winner, 1989, p. 59)

Can a Tool Have an Agenda?

Taken in the context that the technology is a tool, however complex, used to meet an end (i.e., standardized data usable for decision-making), I would then argue that the tool is imbued with a political agenda. For one, the data has been and is already being collected, and the tool will make it more convenient and efficient, with the added bonus of decreased administrative time and—one might assume—great cost savings. But let us not lose sight of what the data is that is being collected. Blumenthal and Glaser caution:

> One central, often unspoken question is whether HIT (Health Information Technology) is best viewed as one more in the long list of technologies that modern medicine has effectively accommodated over the years without great disruption or whether it is something fundamentally different, a potentially transformative force that ultimately will bring about a radical redesign of the processes by which care is delivered. (Blumenthal & Glaser, 2007, p. 2527)

According to the *Electronic Health Information and Privacy Survey: What Canadians Think - 2007* survey, prepared by Ekos Research Associates for Health Canada, while Canadians have an increasing tolerance for healthcare providers having access to their personal health information, the survey found “strong (and modestly rising) agreement with the perception that there are few types of personal information which are more important to protect than personal health

information." Without entering a discussion about the privacy and security of the information being collected, I would posit most Canadians are not aware, or perhaps more accurately, have never considered, that their health information has been reported in aggregate form for many years. Aggregate data is stripped of its identifying elements like name, age, and date of birth, which arguably are most of its defining human attributes. Successful standardized terminology will give rise to data in an unprecedented, sterile state upon which decisions will be based and which will inform where funds are allocated, and which programs and services will be provisioned. It will be removed thoroughly from its source, and with the move for acceptance of complete standardization in reporting that will be necessarily applied to ensure data integrity, the information will be rinsed clean of elements that will not quite fit, or will be made to fit within the defined parameters. It will be this data, then, on which pragmatic economic calculations can be brought to bear, and on which health policies are developed.

Many, Many Stakeholders

This analysis would be too simplistic without adding that the government must mediate and negotiate with many interest groups (e.g., Friends of Medicare) and professional governing bodies (i.e., the professional associations for the doctors, nurses, and health services) with often conflicting agendas when it comes to policies and decisions about the healthcare system. Thomas Osbourne, in "Of Health and

Statecraft" in *Foucault, Health and Medicine*, in analyzing approaches to developing health policy, quotes Foucault himself: "The problem raised is, therefore, that of the relationship between an infinite demand and a finite system" (Osbourne, 1997, p. 173). Returning to the *Canada Health Act* promises of accessibility, portability, universality, comprehensiveness and Romanow's assertion that "no level of government has been effective in accounting for how the money is spent," it is not surprising that technological answers are sought for solutions to these complex problems. Canadians have an expectation of the government to provide policy, direction, and structure to ensure the legislated promises of the *Canada Health Act*.

The question of whose problem is it could be reframed as who will gain the most benefit? Is it the various levels of government and health administrators who will have clearer, standardized data for their purposes, or the doctors who will have full patient information on which to base their diagnosis? Or is it the patient who will be able to move through the healthcare system confident that their correct medical information will be accessed whether they are in a clinic, health centre, public health office or receiving care in their own home? If this becomes a reality then all will benefit for the reasons stated.

In establishing the main beneficiaries and some of the potential hazards of this technology and what problems it will solve, the next obvious query is what will be lost in the process? The stakeholders I have not yet addressed are the nurses, particularly the rural frontline

nurses, who have had little or no say in the adoption of this new technology. Do they benefit? And if so, will the benefits translate to making their work better or easier? These are important questions as they are the critical link in the multilevel process. Nurses are the first point of contact in nearly every healthcare environment with the exception of laboratories. They initiate all visits and are one of the first to collect information on patients.

Did the Implementation Measure Up?

Referencing the post-implementation survey in Chapter 1, the nurses stated that they had a number of concerns about the implementation of the module and about the system itself. Research suggests that many of their concerns are not unique and, as suggested earlier, abandonment of a system and implementation failure are not uncommon. According to the survey results, the ECH nurses did not feel that the promised integration lived up to its pledge, even suggesting that getting results back on tests ordered was slower than before. The survey was conducted one year post-live, focusing on the only module that they were using thus far for entering orders, and they were not yet charting on the computer. The nurses' comments about lack of knowledgeable trainers, insufficient support immediately following when the system went live, unclear benefits, slower work flow, and decreased direct patient time are oft-cited reasons for low user acceptance in the current research (Kossman, 2005; Nagle 2008; Lapointe & Rivard 2005).

The issues concerning lack of knowledgeable trainers and insufficient support can be attributed to three reasons. One, there was a thin layer of expertise to draw upon within the rural organization, coupled with the intense competition for qualified clinical informatics personnel throughout the province. With all rural regions jockeying to fill the many positions available simultaneously while the urban regions were offering higher wages for the same work, the situation was challenging.

Two, largely depending upon the vendor-driven implementation model and timelines put intense pressure on the teams to determine regional standards, build their modules, process map workflow at the sites, recruit site super-users, test the modules then immediately train the end users. Lynn Nagle and Peter Catford (2008), in *Toward a Model of Successful Electronic Health Record Adoption*, point to the process-mapping function itself as critical to success, and in the case of the ECH it was done by seconded team members with little or no experience in this area.

> Process analysis is an area to which few organizations have directed enough attention and investment in order to understand the implications of new clinical applications. Moreover, the requisite skills are not necessarily within every organization's domain of expertise. (p. 84)

Both a slower workflow and the introduction of computers were inconvenient for some and caused great consternation for others.

There were considerable discussions and vendor demonstrations of available hardware like COWs (Computer on Wheels), handheld devices or PDAs (Portable Digital Assitant), the merits of which were compared to desktops. In the end it was decided that, for the Phase One desktop computers at the unit, desks were favored because it was deemed the most logical place for a floor nurse to place orders. If there was to be bedside charting this would not have sufficed. Installing the computers at the unit desks was difficult in most cases as many of these stations were designed to accommodate a paper charting system and featured overhead banks with many filing slots which proved awkward when placing the monitors. Because the paper chart is still currently in use, this creates a very cramped working area. As well, due to the lack of space there were a limited number of computers that could be installed at the nursing stations, necessitating installing them in out-of-the-way locations like closets and small reference libraries. Concurrently using both paper and electronic ordering is cumbersome and will remain so until the paper chart no longer exists.

> Deploying technology solutions without a good understanding of the current and future process implications (e.g., changes to work, communication or policy) is a recipe for failure if not a false start or protracted rollout. (Nagle & Catford, 2008, p. 84)

Because the Big Bang GoLive of Phase One was excessively taxing on staff and management, the implementation of the advanced clinical applications like charting are rolling out at a much slower pace, and it will take eighteen months to two years before the continuing care sites (also referred to long-term care) are all live on the system. This revised schedule will leave the acute care sites without e-charting for a minimum of two years. This is a long time to expect staff to endure this cumbersome workflow without clear benefits to them. Kossman and Scheidenhelm, in *Nurses' Perceptions of the Electronic Health Records on Work and Patient Outcomes,* argue:

> Patient care information systems with a poor "fit" to workplace needs can lead to increased errors related to entering or retrieving information or to hampered communication and coordination among team members. Systems that do not support nurses' work practices, through disconnects in location or documentation design, lead to lower acceptance. (Kossman & Scheidenhelm, 2008, p. 70)

Although the nurses were consulted on matters concerning work process, and hardware placement, it cannot be argued that they have been a driving force behind the adoption of this technology. It has definitely been a top-down enterprise, the value of which is yet to be enjoyed by them. In the editorial, "Nursing Informatics and Nursing Culture. Is There a Fit?" June Kaminski, an RN and PhD student, writes:

> Even though nursing is the largest professional group within the health care profession, nursing still remains relatively powerless…This limits the ability of nurses to exercise autonomy and self-determination to control what counts as knowledge in their field, or to demonstrate knowledge about professional nursing practice and to use that knowledge in appropriate ways for health care (Kaminski, 2005).

My observation over the last three years has been that there is always concern and deference paid to the doctors in the region, which is understandable because they are legally responsible for the care orders they prescribe, while nurses are tasked with carrying out those orders. The physician module, CPOE (Computer Physician Order Entry), which will have the largest payoff for them, is not slated to be implemented until a number of the building blocks are in place. Consequently, the doctors are currently growing impatient; hence there is low acceptance of the system so far. They are able to access the EMR, but because they cannot place orders or make notes, and they find the log-in process cumbersome, they are generally uninterested. Moreover they were quite vocal about how work processes had slowed down initially while the nurses became accustomed to the system. This caused additional stress to the nurses in an already charged atmosphere.

Lastly, related to the first reason—competing for a limited pool of resources—there was insufficient overall resourcing and investment. Infoway acknowledges that “the financial hurdles of implementing electronic medical systems are significant.” RSHIP received ninety-two million in funding for the project to be dispersed among the seven regions and to build the elaborate data repository in Red Deer. The core implementation team in our region (hired specifically to the project, not seconded from their regular positions) numbered five. Additionally there were a half a dozen systems analysts hired to take on the large task of evergreening the existing servers and computers, as well as installing additional ones (over a thousand were needed to accommodate the influx of new users). This sharp increase in spending on computers and technologies was dimly viewed by many who raised pointed questions about why so much was being spent on computers when the region could be hiring more nurses and creating new positions. This perception of the undue amount of money spent on computer technologies has persisted; however, it is difficult to separate initiatives that involve strictly technologies and infrastructure from projects that are essentially clinical with integrated technological components. For example, once Phase One of the system was live, it paved the way for implementing a PACS system in radiology, allowing the entire region to become filmless. This implementation was fast and successful with instant benefits for all stakeholders but it was very

expensive. Because it was monitors and computers that replaced films and envelopes, the PACS system is perceived as an IT initiative.

> Moreover, comparative studies demonstrate that the information technology (IT) spent as a percent of hospital operating budgets typically averages around 2.0%, but is inconsistently reported and difficult to compare. (Nagle & Catford, 2008, p. 87)

In last year's budget in ECH, Information Services accounted for only less than 3%.

As a participant in this entire process I would argue that the workload was too heavy, not only for those that were hired specifically for the project but for the others who returned to their positions afterward. A result expected by those who did return to their regular positions is that they would become the unofficial site champions for the system, and this turned out to be the case. This creates additional workload that is not commensurate with their job descriptions. It remains to be seen if they will step up for the next phase.

I would describe much of what I contributed to fall outside of my job description (under the category of "other duties as assigned") especially in view of the communication piece that I undertook. The communication was vital to the project, specifically to the frontline workers who had not been directly addressed up until this point, and while there is a communications department they too were not adequately resourced to take on the role. The organization viewed this

project as largely an IT initiative as opposed to a clinical one, thus the assumption was that the communications should naturally come from that department. I argue that this should have been a dedicated position which should have been in place a full year ahead of the actual implementation. The person filling the position would have had time to develop and deploy a complete communication strategy that would have worked towards creating a positive culture for the adoption of these technologies.

Was this implementation a success? Based on my observations and experience with the Phase One implementation and specifically of the OE module in East Central Health, and comparing it with the literature review and the post-implementation survey, my conclusion is a qualified no.

Strictly speaking, ECH was successful in bringing the fourteen modules online on June 1, 2005, as planned. The measures set forth by Infoway were met, the milestones were achieved and, at the more granular level, the nurses are actively using the module and are tentatively looking forward to a system that will be more useful to them. Representatives from MEDITECH praised the region for their GoLive, saying it was one of the best they had witnessed. Based on these criteria, then, yes, it was a success.

In view of the lack of resources dedicated to the project, the vendor-driven implementation plan which created great stress on a burdened workforce, the subsequent move to a more protracted roll-

out, a system that is not yet delivering the promised benefits to the nurses, and a continuing lack of user acceptance, then, no, the implementation was not a success.

When all the arguments are weighed about whether or not the implementation of Phase One, and in particular the Order Entry module, by the nurses in East Central Health was a success, the answer is not clear. Initially, not long after GoLive, I considered the project to be a success based on the markers outlined by the RSHIP and MEDITECH, and on the fact that the nurses were actively using this module. However, now I would say that no, it was not. I have reached this conclusion in the course of my research, which necessitated examining all aspects of the process of this implementation. There are three primary reasons I have reached this conclusion.

One, investment and planning were inadequate up front during the preparation phase at the provincial level. Basic skills training should have been better resourced across all the regions. East Central Health was one of the only regions that applied a portion of the allotted budget for dedicated training and it was still woefully under-resourced. With 30% of the nursing population either requiring or requesting this training, it would have greatly decreased the stresses had this resource need been identified at least a year prior to implementing the first phase.

Two, the models of train-the-trainer and a Big Bang GoLive, as dictated by the software company, were not the best options for this kind of undertaking. The dependence on super-users as co-trainers was not effective. East Central Health was the sixth of the seven regions to use this method and it would have been useful to re-evaluate whether this was the right choice after the first few regions attempted it, before moving on to the remaining regions. I would argue that it was not in light of the fact that none of the regions are using this model for implementing Phase Two (and as previously mentioned many are not moving ahead at this time).

Three, understaffing put unrealistic pressure on all involved. The teams themselves were largely made up of seconded positions, but because of the shortages many of these members continued with their duties at their home sites in some capacity. The site managers have been under intense pressure because of the shortages, and the addition of demands created by this implementation was severe.

Conclusions

In my research I found the studies on other implementations helped with the question of how well nurses did or did not adopt electronic systems (Kossman & Scheidenhelm, 2005; Berg, 2001; Nagle & Catford, 2008; Curtis & White, 2002; Lapointe & Rivard, 2005; Curtis & White, 2005) and my research into adult education provided insight into the experience of the nurses learning the Order Entry system in our small rural region in Alberta. But my questions of the

long-term impact of engaging in this enormous project went largely unanswered. It was the technology critiques of Langdon Winner and Neil Postman peppered with the homespun logic of Wendell Berry that influenced and directed my research into the implementation of the national EHR. Having a very small role in a relatively small project in this massive technological shift led me to asking many questions, but what I continually came back to is this: Has this been thought through properly and have the long-term implications been taken into consideration? I began by asking if adopting this new technology to help manage healthcare going to create its own problems that will need resolution? Is this technology faster, more efficient, less costly and better than what it is to replace?

Winner cautions that “scrupulous care” must be taken in any process of social reconstruction if a society “hopes to control its own structural evolution.” He argues that technological innovation is invariably connected to these reconstructions thus particular attention must be paid to each significant set of “technological possibilities” (Winner, 1989, p. 21). A national interoperable electronic health record is a socio-technical system that certainly qualifies as one such structural evolution. Understanding why Canada has reached the decision to adopt this technology from an economic and political standpoint would seem to be justified. Healthcare is one of the largest expenditures in the budget and is becoming increasingly so, and with the changing demographics and needs it is complicated to manage.

With the highly valued universal healthcare in jeopardy of simply becoming too expensive to provide at its current level, solutions for managing it more efficiently are being sought. The Canadian healthcare system is managed in a largely hierarchical model with monies distributed top-down, based on demographics, population distribution and demands from both taxpayers and governing provincial and regional bodies. A technological tool that holds the promise of capturing and housing data from all clinical and healthcare settings, and which can then be used in aggregate form to determine funding, would be attractive to a cost-conscious government. This however is not the key advantage that the government is promoting to the citizenry. The focus is on an accurate, complete electronic health record that will promote patient safety and smoother access to the system. Both rationales are valid but Winner argues that sociotechnical systems must be judged for the forms of power and authority they embody (Winner, 1989, p. 19). Without reading nefarious motive into why the government is aggressively moving forward with this enterprise, it can be argued that the success of this project will give the federal government unprecedented control over budgetary disbursement. This is not to suggest that the current system of transfer payments to the provinces could be overridden, but it is the government after all that has final authority on the funding. Using aggregate data statistically is not necessarily a purely objective means of basing funding decisions. CIHI is an independent branch of the

government, but it is funded by the government and its task is the collection of data from all areas of healthcare, and it is the government that directs what is to be collected. I would argue that the decisions that are based on this collected data are influenced by whatever the political agendas are of the ruling government of the day.

How the national EHR is being implemented involves the cooperation of many different groups, governing bodies, organizations and individuals. The funding for this venture is largely based on the multitude of ongoing projects achieving specified milestones. This has put considerable strain on smaller rural entities like the rural area in Alberta that this thesis focused on. Could a project model that is not as intricate have been adopted?

The fact is that in order for a national EHR to be completely successful there must be wholesale adoption of standardized terminology in order to ensure data integrity. This has yet to be achieved. The experience of the rural regions working towards this goal was challenging, and this effort is now underway nationally with the adoption of SNOMED CT [50]by Canada Health Infoway, but one could argue that this should have been in place and implemented in existing systems—and long before any new systems began implementing.

[50] For more information on SNOMED CT—the decision to adopt this terminology system was not announced until 2007 (http://www.infoway-inforoute.ca/lang-en/about-infoway/news/news-releases/160-canadas-ehr-initiatives-to-benefit-from-snowmed-ct-terminology-standard)

I would argue that this required complete standardization has great benefits but is not without some issues. First of all, standardized terminology will help enforce best practices and care standards, especially when embedded within an electronic system using pick-lists and built-in dictionaries. This requires the care providers and clinicians to choose options within specified parameters. Lacking the option of extensive narratives or notes on the paper chart reduces the chance of subjective interpretation or misinterpretation. Secondly, this prompts the users to follow established routines thus ensuring that the treatment that a patient receives is optimal and consistent no matter where. On the negative side, I would argue that this standardization could potentially create dependency on the systems to do the thinking, and studies suggest that nurses worry that their patient-centred care approach will suffer (Kossman & Scheidenhelm, 2008).

Returning to the analogy I made in the beginning, of a digital thinker versus an analogue thinker (using William Badke's premise), I argued that a novice nurse is like the analogue thinker and the expert nurse is the digital thinker. An analogue thinker is one who is paying attention to the act of doing work in a very rote fashion, whereas the digital thinker is one that intuitively makes decisions on the fly drawing from a breadth of experience. Consider a novice nurse who begins their career working with an electronic system that guides them every step of the way in all aspects of ordering, charting and care planning. Suppose also that older expert nurses are aging out of the system at a

rapid pace. Where is the mentorship that has been a cornerstone of nursing practice going to come from—the computer? Valuable knowledge transfer could be potentially lost in this technological shift. Winner reminds us that “the construction of a technical system that involves human beings as operating parts brings a reconstruction of social roles and relationships” (1989, p. 11).

In the end I do feel not I have adequately answered my own questions but I have tentatively reached a few conclusions. One, I do not think that Canada as a nation has taken into full consideration the impact that this enormous project will have in the long run. It will be profound and will change the way healthcare will be provided from here on in. The model chosen, of having a multitude of projects implementing in various stages simultaneously across the country, is a precarious endeavour. It hinges on complete cooperation at all levels and adequate funding in place to see it to completion, and thus is optimistic and fragile. Thirdly, committing all health and medical information of each and every citizen of the country into what will essentially be a gigantic database gives the governing bodies’ unprecedented access to this information. Policies and commitment to transparency must be in place to ensure the security and proper use of the information. Lastly, if nurses are one of the key end-user groups of the system actually inputting the information into these systems then work needs to be done to ensure that these skills are in place prior to system implementation. The question arises if data entry is indeed

something that nurses need to be concerned with at all especially at the Order Entry level? If it is necessarily going to part of their skill set when charting systems are adopted then education in clinical informatics should become part of ongoing compulsory education as well as integrated into nursing programs.

Do I think that adopting a national EHR is a good solution? I will give a qualified yes. I think the benefits to Canadians will be positive if this system can deliver on its promises while upholding the values of accessible and universal healthcare that Canadians hold dear. However, I do feel that some of the issues raised in this thesis merit ongoing study and critique.

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Appendix 1

Dear Future *MEDITECH* User

Attached is a quick self assessment that will help determine if **Basic Computer Skills** training is recommended for you as we approach the implementation of the *MEDITECH* system.

What is MEDITECH?

MEDITECH is a highly integrated database program consisting of financial and clinical modules. Each module represents various departments and/or processes like Pharmacy or Order Entry. These modules are currently being standardized and tailored to meet the needs of our region by teams made up of staff like you from across the region. Each of these modules work together to ultimately provide an electronic health record called an EMR (Enterprise Medical Record) which follows a patient no matter where they access health care within the region. Eventually, this EMR will also feed to the provincial health record.

Why MEDITECH?

East Central Health Region is a full participant in the Regional Shared Health Information Program (RSHIP) vision of sharing a single electronic health record, and the adoption of the *MEDITECH* system along with the six other non-metro regions.

MEDITECH, a recognized leader in electronic health records and clinical informatics, successfully leads health groups of all sizes and descriptions through the involved process of implementation of its highly integrated system. The RSHIP initiative is unique in that the level of integration will be unmatched in North America.

How it will affect me in my daily work?

Beginning June 1st all regional and associate care providers will begin using the *MEDITECH* system in their daily work. As mentioned, the *MEDITECH* system is highly integrated which means the information about a patient that you input on your unit feeds and coordinates with information from other departments instantly. For example: lab results will be available on a patient's EMR within minutes of being inputted in that department. Apart from improved efficiency this will only enhance patient care.

You will be hearing and reading a lot about *MEDITECH* over the next several months and you will have opportunities to have your questions answered. But first steps first, in order for you to be successful on this new system you will need some basic computer skills. Please complete the attached self assessment and if your score indicates that **Basic Computer Skills** training will benefit you then please tell your manager by August 1st. Information about where and when the training will be conducted will follow.

Thank-you, your cooperation is greatly appreciated.

Sincerely

Janice Trueman
IS Training Coordinator

COMPUTER SKILL SELF ASSESSMENT

Circle the number in the box that corresponds closest to each statement. Add the totals of each column and enter the number at the bottom i.e. if you answer "Don"t Know" 3 times then your total for that column is 12.

Statement	No /Don't Know	Never	Rarely	If Required	Regular Basis
I use a home computer.	4	3	2	1	0
I am connected to the internet at home.	4	3	2	1	0
I have logged onto a computer at work.	4	3	2	1	0
I access the ECH Intranet.	4	3	2	1	0
I use e-mail at home / work	4	3	2	1	0
I browse the internet online	4	3	2	1	0
I use internet banking.	4	3	2	1	0
I have filled out a form on the computer.	4	3	2	1	0
I enjoy working on the computer.	4	3	2	1	0
I am comfortable using a mouse to navigate	4	3	2	1	0
Column Totals					

Column Totals

No/ Don't Know	
Never	
Rarely	
If Required	
Regular Basis	
Overall Total	

Scores
If you scored between:

30-40: Basic Computer Skills Training is highly recommended.

15-29: Basic Computer Skills Training will improve your comfort level with the computer.

0-14: Basic Computer Skills Training is unnecessary.

Appendix 2
Sample of Implementation Newsletter

east central health

MEDITECH talk

Volume 1 Issue 3 Sept 29, 2005

IN THIS ISSUE:

REGULAR FEATURES:

Etc…

As mentioned in the first issue, this section is for pretty much anything. Quizzes, contests, pictures, cartoons, upcoming events – you name it. As matter of fact, I could use a bit of help.

If you have anything you would like to share please send it along to

I strongly advise it, or you might get another joke like the following:

"Hey! Where am I going and what am I doing in this hand basket?!"

What exactly does *Integrated* mean?

Over the last few issues the term 'integrated' has been tossed about and frequently, people confuse the terms *interface* and *integrate* as they refer to computers. Many people think they mean the same thing. Not so, however, this confusion is understandable.

Interface

Simply put, *interface* is when two systems 'talk' to each other. For example, the computer sends a document to the printer, and tells it to print it. Because this is not the friendliest relationship at times, the printer might refuse to do so. However when the planets are correctly aligned and the printer is in a good mood, your document will be printed. These two systems are *interfaced*.

Most of you are familiar with *Medipatient* and LIS (Laboratory Information System). This is also an example of two systems that are *interfaced*. Patient demographic information can be updated in either one, then copied, and sent back.

Integration

I found this definition:

Integration [of databases] typically is accomplished by creating small, object-oriented software elements, or "wrappers" that let a single overlaying, often browser like, desktop application interact with….blah blah, blah (http://www.bioon.com/book/biology/genomicglossaries/bioinformatics_gloss.asp.htm)

Let's try that in English, shall we? Remember old Joe Patient? With the MEDITECH system his demographic record (ADM/MRI/ABS), and diagnostic information (LAB) are current and accessible because these modules share tables of common dictionaries or lists. Information is not sent back and forth from system to system but rather the modules work from, and share common standardized lists.

What makes the MEDITECH system so unique is that all the modules are integrated and have the ability to access and feed information to and from the tables they share.

Still confused? Let's look at a non-computer example: you and your friend join the social committee at work and are asked to cater a luncheon for the mucky-mucks at a big meeting. Unfortunately, you work in different offices and must communicate via phone, and fax to plan the menu, food, linens, dinnerware etc.

The best way to do this is for both of you to make a list that you both constantly update with the decisions that you have made. It is an awkward way to plan the event but the luncheon is a smashing success nonetheless. Exclaims of "The shrimp puffs are to die for!" filled the room. This is an example of interfacing.

Fast forward to a few years later, both you and your friend have quit your jobs and have started a successful catering company. You both have teams working with you. This enables you to cater simultaneous events, and you both plan these events using a master list of suppliers, financial info, recipes etc. This process allows you to improve consistency, efficiency, quality control and just make things go smoothly. Well, what do you know, you're integrated!

I hope this helps to clear up the definition of these two similar yet very different concepts.

RSHIP

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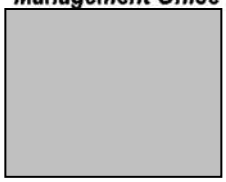
ECH Project Management Office



Mnemonic Mnonsense

I C U like mnemonics! (Get it? 'I' 'see' 'you'...you're such a smart cookie). This week's quiz:

CWS

☒ Country Western Singer – duh!

☑ Nope, its **Community Wide Scheduling**

Fooled you with that one, eh? Community Wide Scheduling is one of the modules you will be learning all about in the very near future.

Dream Teams

Do you remember where we finished off last issue? We were exploring the multi-module team ADM/MRI/ABS, or the Patient Information Team. We left you with some nail biting questions concerning old Joe Patient and his information, the least of which is where does Joe's information go after Joe leaves the Admitting desk?

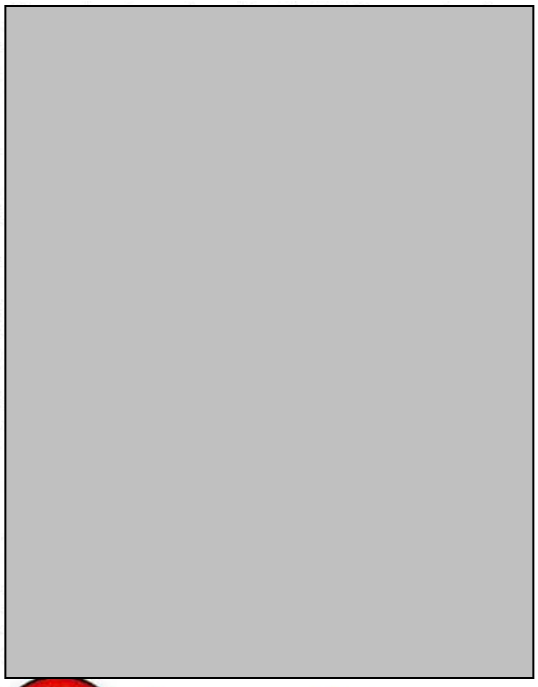
Next Joe's information is managed in the MRI module which looks for incomplete data, maintains correspondence records, locates/tracks charts, and enables us to view his visit history no matter where he pops up with the seven rural regions. This is a very good thing for Joe because, unless his wife is with him to help with the particulars, there is no telling how many records Joe might have across Alberta. MRI can merge, unmerge or edit data as necessary. These changes then flow back to ADM. The MRI functions will be used by Health Information personnel.

The ABS module uses information collected in the ADM module to create a patient abstract. An abstract is how information is prepared so it can be sent to Alberta Health. More information can then be added before submitting the data. The Abstracting module will be used by Health Information personnel so Joe doesn't really need to be concerned about that.

It is because of this one team and its three modules, Joe Patient can be assured that the most up-to-date information is available to the health care providers even if his wife is not with him to keep things straight. Team Lead Amy Wieschorster and her crew will be working very hard over the next nine months to make this a reality.

But surely that's not the end of Joe's visit? Will Joe need more tests? Will he make it to his golf game? Will his wife have to come to Camrose? This and much more ahead.

The PMO Corner



I have a question!

What! No questions yet? Well fine then, I guess I'll just have to make one up this time.

Dear MEDITECH talk

I never thought I would have a reason to write to you but I have a burning question: How good do my computer skills need to be in order to use MEDITECH?

Signed: Worried in Wainwright

What a very good question, Worried. You will need very basic computer skills like logging in and logging out, moving a mouse, clicking on items you need, and some typing. But worry no more, if you work in Acute Care (including Long Term Care) your manager has or will be giving you a self-assessment to help you identify your skill level. If you need more training it will be provided for you on-site between January and March 2006. These no-cost sessions will be small groups, and will last approximately 2 hours. Details will be provided in the 2005-06 Staff Development Calendar. If you work in Community Care, this same training will be provided for you in the next calendar year for the MEDITECH modules you will be using in Phase 2 coming 2007.

Appendix 3
Explanation of Survey Purpose from East Central Health

Alberta Health Services
East Central Health

Medical Services Coordinator
4703 -53 Street, Camrose, AB T4V 1Y8
Office: (780) 608- 8597, Fax: (780) 608-8600

October 1, 2008

To Whom It May Concern,

Subject: Janice Trueman Master Thesis

Dear Sir, Madam,

I understand there were some concerns/issues raised regarding the use of data collected in East Central Health for inclusion in Janice's thesis paper. I am writing to clarify the purpose and role of the original survey from which Janice exported information to assist with her paper.

a) In early 2007 East Central Health purchased a program called Androfact a extremely effective survey tool which can be managed provide a wide variety of surveys all relating to health care services. The Health Quality Council of Alberta does also use the same vendor for patient's survey's validating the regional use for this same purpose.
b) A regional and I am sure Provincial Privacy Information Assessment (PIA) identifying the usage and purpose, along with a security review was completed and has been accepted/approved by the PIA office. The program allows for very controlled anonymity measures which are managed by one survey project coordinator and once identified and approved for the individual survey become unchangeable.
c) The original and primary purpose of the survey which Janice was using for the thesis was to identify whether the process used by East Central Health when rolling out a new provincial computer program was widely accepted by the front line workers.
The Meditech program was a new adventure in which 7 rural health regions were involved with to streamline record and data collection and management. This program was very controversial and fraught with problems including extensive resource requirements and required us to look at the impact we were making on the staff working with the new tools. Another purpose of the survey was to acquire a satisfaction rating and information for planning future implementations which were planned in the coming months.
d) As the Meditech program was looked upon as a Quality improvement initiative and the subsequent survey was to assess quality assurance ethical approval was not required to collect the data nor utilize the data to improve upon the education system in East Central Health
e) A disclaimer identifying the secondary use by Janice Trueman was clearly identified on the front cover of the survey letting participants know the information would be used in preparation of a Master's Thesis.

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f) The selection process for survey participants was electronically generated ensuring no identifiable information would ever be available to the survey manager or to any person looking at summary information identified by the responses.

In conclusion Janice was working in good faith with the region and was fully approved by East Central Health to draw on any information in the survey which would help with her paper

Sincerely,

Patrick Crumley
Medical Services Coordinator
Medical Services East Central Health
Co Chair East Central Health Ethics Committee