

# Centres for Health Evidence Demonstration Project

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## **Abstract**

This paper will report on the establishment of the Centres for Health Evidence (CHE) Demonstration Project in both Edmonton at the University of Alberta and in Winnipeg at the University of Manitoba. The CHE Project brings together a variety of partners to support evidence-based practice using Internet-based desktops on hospital wards. There is a discussion of the CHE's cultural and political experiences. An overview of the research opportunities emanating from the CHE Project is presented as well as some early observations about information usage.

## **1. The Project**

This paper will report on the establishment of the Centres for Health Evidence (CHE) in both Edmonton at the University of Alberta Hospital and in Winnipeg at the Winnipeg Children's Hospital (affiliated with the University of Manitoba). The aim of the CHE is to package, disseminate and present health knowledge in ways that facilitate its optimum use. The project promotes the practice of evidence-based health by presenting knowledge-based resources and summaries to health care professionals via Internet-based technologies located in the hospital environment. The CHE is not a research project unto itself; rather it is an implementation project that is creating numerous research opportunities for the health informatics and information science communities.

This long-term initiative to bring evidence-based practice (EBP) into the hospital environment has begun with the CHE Demonstration Project. The CHE is a multi-disciplinary and multi-sector initiative that brings universities, health authorities, and the private sector together. The Project commenced in March of 1999 and the demonstration phase will end in September 2000. Overall, the Project has a \$1 million budget, half of which was provided by Health Canada's Health Infostructure Support Program. The lead corporate partner for the CHE is InfoWard Inc., a health informatics company based in Edmonton that provides the software for the CHE. In Edmonton, where the focus is on adult health, the contributing partners are the University of Alberta, the Capital Health Authority, the John W. Scott Health Sciences Library and the Alberta Heritage Foundation for Medical Research. CHE desktops have been placed in the General Internal Medicine and Emergency wards at the University of Alberta Hospital. Winnipeg has concentrated on child health and placed desktops throughout the Children's Hospital. Manitoba's partners include the University of Manitoba, the Winnipeg Regional Health Authority, the Neil John Maclean Health Sciences Library and the Children's Hospital Foundation of Manitoba.

The long-term goal of the CHE initiative is to create a national network of Centres across Canada. These Centres will create specialized CHE desktops for a variety of disciplines and education levels within the health care system, including pediatrics, adult health, emergency medicine, nursing and undergraduate medical students. The Centres will also contribute original material to the growing body of EBP educational tools and resources - critically appraised topics, cases, guides and other similar materials.

## **2. The CHE and Evidence-Based Practice**

The CHE is founded upon the basis of evidence-based practice (EBP):

Evidence-based medicine is the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence-based medicine [EBP] means integrating individual clinical expertise with

the best available external clinical evidence from systematic research. (Sackett et al. 2000)

EBP is a relatively new train of thought in health care and, as with all new initiatives, there are barriers to its implementation (McColl et al. 1998; Guyatt et al. 2000; Molesworth, 1998). However, the logic of using published research, systematic reviews, and clinical practice guidelines in making decisions is starting to gain widespread acceptance across the healthcare community (Ebell et al. 1999; van Weel and Knottnerus 1999; McMaster 2000, 1). EBP provides physicians not only with the ability to find information but also to assess that information in order to determine if it will benefit their patient(s).

In Canada, the federal government has been taking steps towards making evidence-based changes to its policies for the current system of health care. In 1999, Alan Nymark, the Associate Deputy Minister of Health indicated:

We need policies based on evidence that is available today, not 30 years ago. And when the evidence is not available we will need to build the evidence, and the associated analytical capacity. We will also need a policy framework that uses evidence to effectively make decisions. This policy framework will have to look at the health system as a whole (Nymark 1999a).

In October, Mr. Nymark reinforced the government's commitment to EBP:

...recognizing the need for a more evidence-based system, the [1999 federal] budget made significant investments in improving health information systems and in promoting health-related research and innovation (Nymark 1999b).

But, how can better information yield better health? In order to enact the principles of EBP, three key factors must be present. First, health care decision-makers must have the skills to discern "good" from "bad" information. Second, changes in knowledge must trigger changes in health practices at all levels, not

only among physicians. And finally, proven and documented improved outcomes must arise from altered practices.

The difficulty at present is how to teach EBP and how to make its adoption in the clinical environment as efficient and effective as possible. The objectives of the CHE are to:

- provide information convenience by having the right information in the right place at the right time,
- support information discrimination to separate valid and important information from that which is misleading and distracting and
- study information integration to explore the relationships between information and action.

The CHE, as a health informatics project, is helping health care professionals make this transition by giving them the tools they need to "make crucial decisions when every second counts" (McMaster 2000, 1). By providing access to the most current research where it is most beneficial, the CHE is on the cutting-edge of healthcare in Canada.

### **3. The Desktop**

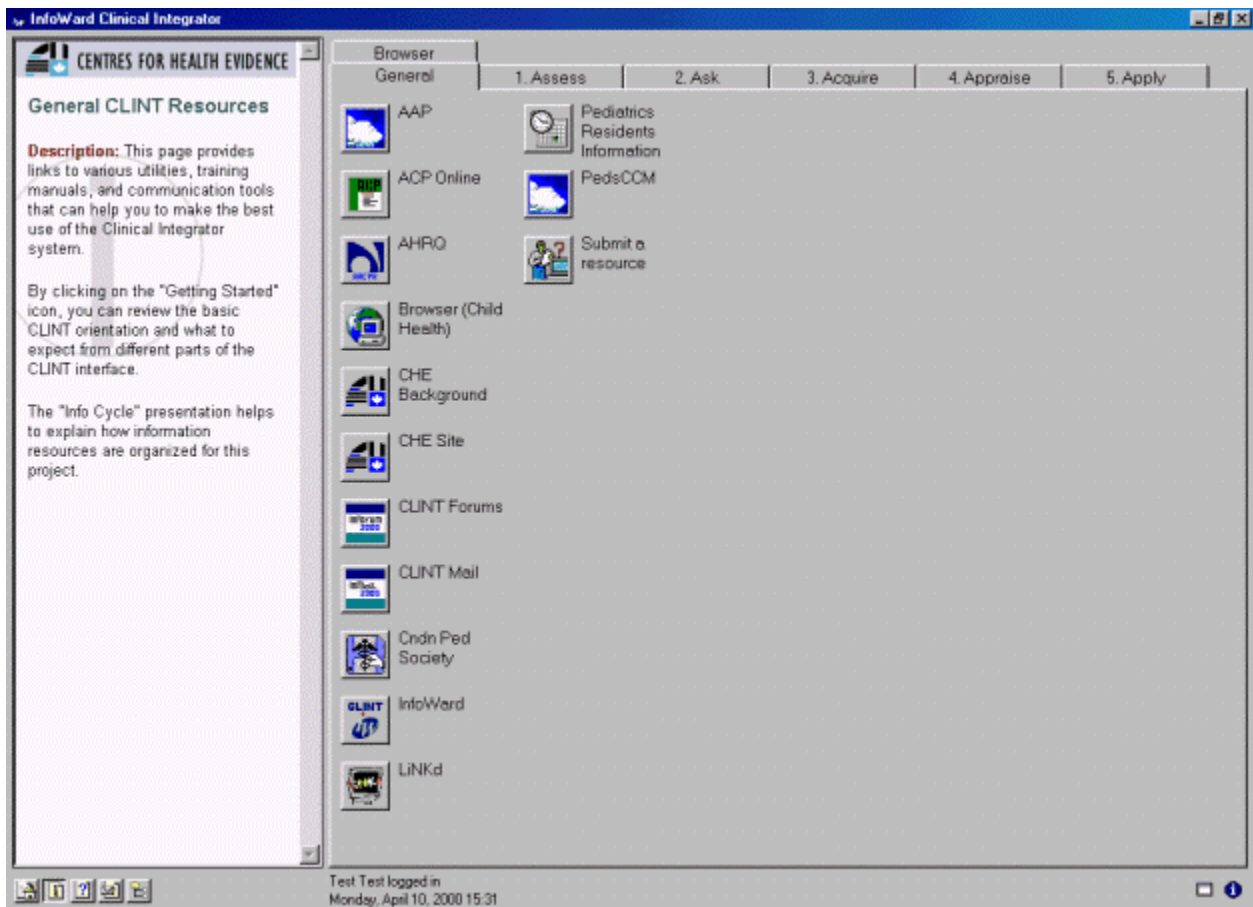
The CHE desktop gathers the best electronic resources to provide health care professionals with the knowledge-based information they require while working in the clinical environment. It includes bibliographic databases such as *MEDLINE*, CD-ROMs such as the *Spiral Manuals* and websites such as the *InfoBase of Clinical Practice Guidelines* from the Canadian Medical Association. The technology through which the CHE desktops are delivered is InfoWard's Clinical Integrator (CLINT™) software.

An Editorial Committee, comprised of physicians, librarians and nurses, chooses the resources for the desktop in each Centre. The Editorial Committee evaluates existing and potential resources according to their usefulness to health professionals and whether they are evidence-based. Resource particulars that may be used in evaluating resources include:

- Resource description (i.e., general description based upon examination of resource);
- Copyright statement (i.e., who has copyright for the resource);
- Assessment of validity, accuracy, attribution, authority, disclosure, uniqueness, substantiveness, completeness, coverage, audience, language, currency;
- Assessment of the form of the resource, including navigation elements, appearance, user support, appropriate technologies, structure;
- Assessment of process criteria such as information integrity (i.e., is the web site/resource durable and maintained), site integrity/currency, system integrity;
- Assessment of the "EBP" focus;
- Third-party reviews.

In the hospital, many unusual medical situations occur, some of which will be beyond the practitioner's knowledge. Ultimately, a decision about the best care for the patient must be made. Faced with such a situation, how would typical health practitioners gather information to make a decision? Traditionally, they would rely upon their own acquired knowledge and experience, try to find the information in a pocket reference book, or consult with a colleague or superior. As a last resort, they might make a trip to the library to obtain the information needed to make a sound decision about this patient. These methods are quite common and will continue to be used in health care settings throughout Canada. However, in the Winnipeg and Edmonton hospitals participating in the CHE, a new and powerful tool has been added to the health care arsenal of knowledge resources – the CHE electronic desktop. Medical professionals who need information to help their patients can access a computer on the ward, double-click on the CLINT™ icon, enter their password and be presented with an electronic desktop containing the resources they require to help them make decisions.

**Figure 1: CHE Desktop**



Each tab on the desktop contains a select number of free and licensed electronic resources, which are delivered to the hospital via the Internet. The CHE has provided everything from simple links to web sites to CD-ROMs run through a metaframe application. Within the CHE desktop, the online tips and structured abstracts provided for each resource continuously reinforce EBP principals. As well, schedules, announcements, alerts and other messages can be posted for viewing. The advantage of the CHE desktop is that it can be used 24 hours a day, 7 days a week, 365 days a year; any time a health care professional needs it.

Using the CHE desktop, practitioners can search knowledge-based resources for the information they require to answer clinical questions. While in their clinical environment, they are able to locate pertinent information, and using that information, make better informed decisions which will ultimately result in the improvement of patient care.

Educational materials are provided on the desktop in order to help CHE users through the information process of formulating an answerable question, understanding which resources to use to answer that question, and critically appraising the literature they find. If there is time after completing a search, CHE users can also copy a few sentences of the relevant literature into an e-mail or a CHE forum to share with their colleagues.

Each CHE desktop is tailored for a particular group. For instance, pediatrics residents use a desktop specifically created for their needs. This desktop might include tips taught in that day's academic lecture or yesterday's clinical rounds. For example, nurses in General Internal Medicine (GIM) have links to nursing tools and resources of interest to them, in addition to many of the resources that GIM physicians already have on their desktop. Different groups can tailor the textbooks, journals, databases and organizational websites on the desktop to the subject specialty of their group, while maintaining the same core set of evidence-based resources and educational materials as other CHE participants.

Each of the two Centres has an Education & Content Specialist with a Masters of Library and Information Studies degree. The Specialists provide training to users in their Centre as well as write EBP educational guides and programmes for the benefit of all CHEs. Each is well versed in the resources pertaining to their Centre's primary area of focus, general internal medicine or pediatrics, and is responsible for creating and maintaining the CHE desktop, as well as educating users and promoting desktop use. For example, in a CHE training session, practitioners can learn the skills of how to assess literature and improve their searching skills in *PubMed*.

#### **4. Research and Data Capture**

The CHE encourages research emanating from the project's implementation. An Investigator Group has been formed and is comprised of physicians, nursing faculty, librarians, epidemiologists and others interested in health informatics. These Investigators can initiate specific research protocols based upon the CHE projects and the data collected.

In terms of research tools, CHE is well stocked. One of the strengths of CLINT™ is that it was designed with research data collection in mind. Using DataView™, researchers affiliated with the CHE will be able to collect raw and aggregate data by group. This data can be used alone or in comparisons with other groups of users. Those groups can be different types of users (e.g. residents vs. faculty) or by geography. Types of data being collected include:

- The number of times a person logs in.
- The time period for which a person is logged in.
- Which resources a user visits and for how long each resource is used.
- Keystroke capture. For example, what search strategies are users typing in for PubMed searches.

In addition, the CHE has access to InfoWard's Surveyor™ online technology. This technology allows the CHE to create online surveys. Surveyor also uses algorithms to supply instant feedback to the person completing the survey. Short surveys can be administered when users login or logout of the CHE desktop, or when they click on a certain electronic resource. As well, because CHE desktops are based on groups within a hospital environment, very tailored informatics experiments can be conducted.

One of the research projects currently underway is a study of how librarian instruction to pediatric residents affects usage frequency and the quality of searching specific online resources. Pediatric residents in both Edmonton and Winnipeg are being used as subjects and their searches in *PubMed* and *MD Consult* are being tracked through CLINT™. Librarians in both Centres are involved with training pediatric residents in the use of the CLINT™ system and search techniques for particular resources. Both quantitative and qualitative measures will be used in this research project. Usage patterns and any direct use of quality filters or other search strategies can be measured quantitatively through the CLINT™ database from keyboard inputs, usage numbers, and time spent in each resource. Qualitative measures include surveys before and after



training to determine pre- and post-training proficiency and comfort levels with searching, as well as instruction evaluations. In addition to in-person training, prompts such as tips and other educational messages pertaining to the targeted resources will be employed within CLINT™. Researchers can then follow the effect of each type of educational intervention and determine which methods have the greatest impact on both resource use and search quality.

Some of the insights gained since the CHE project began are discussed in the next section of this paper. These insights are derived from initial evaluation of some of the data collected by CLINT™, informal feedback sessions, and user queries through e-mail and telephone communications. It should be noted however, that this project is still in a demonstration phase and ongoing evaluation is necessary. We have chosen to highlight a few key examples of what we have learned over the short course of the project's inception, about health practitioners' information seeking behaviours and the cultural and political implications arising from this project's implementation.

<b>Group</b>	<b>Number of Users</b>
University of Manitoba: Pediatricians (Faculty)	61
University of Manitoba: Pediatric Residents	21
University of Manitoba: Pediatric Nurses	23
University of Manitoba: Pediatric Pharmacists	3
University of Alberta: General Internal Medicine Faculty	19
University of Alberta: General Internal Medicine Residents	64
University of Alberta: General Internal Medicine Nurses	100

## **5. Information Seeking Behaviour**

The "Top Ten" resources used by all the groups, starting with the most used, are:

1. UAH Tandem (the local system in Edmonton for obtaining patients' lab results)
2. *UpToDate*

3. *MD Consult*
4. Browser (the internet)
5. *Harrison's Online*
6. E-mail (CLINT™ provides its own package which uses a pop3 server for access)
7. Residents Information Centre (local call and rotation schedules as well as academic events)
8. *PubMed* (the *MEDLINE* index that is freely available through the National Library of Medicine)
9. *ACP Online*
10. *Spiral Manuals*

Of these ten resources, the lab results are used the most but the figures for these are for Edmonton only. However, it can safely be assumed that lab results would be in the top ten for pediatrics users in Winnipeg as well. From this list, it is evident that e-mail and the Internet are very important tools for both finding and receiving information, although this may be of a more personal rather than of a medical nature. (There is no data capture about e-mail transmissions.) Quick reference materials such as *Harrison's Online*, *UpToDate* and the *Spiral Manuals* are well used. Interestingly, large databases like *MD Consult* and *PubMed* also figure prominently as frequently used resources. Thus, there is a good mix of quick reference and literature databases being used by all groups. When the " Top Ten" information is broken down by user group for both General Internal Medicine and Pediatrics, different usage trends become apparent. For instance, the most used resource for nurses in both specialties is the Internet (browser). Resources that are highly used by the pediatric nurses are databases such as *CINAHL*, *CancerLit*, *PubMed* and *Nursing Journals* (provided by the University of Manitoba Health Sciences Library). From the data collected, it is apparent that pediatrics nurses frequently consult literature rather than quick-

reference resources such as *Harrisons Online* and the *Merck Manual*. GIM nurses, on the other hand, spend far less time searching and more time accessing resources such as lab results (UAH Tandem), drug manuals and online textbooks.

Residents in GIM and pediatrics use CLINT™ for a different purpose than the nurses. Because they can access their e-mail through CLINT, it is one of the top four resources among GIM Residents. Similar to the GIM nurses, GIM residents spend a lot of their time using quick-reference sources such as the Residents Information Centre (produced by the CHE), *Harrisons Online* and *UpToDate*. Many of the pediatrics residents do not have e-mail accounts or have not registered their e-mail with CLINT™'s pop3 server. As with the pediatrics nurses, residents focus upon searching for literature using large databases such as *MD Consult*, *PubMed* and the *Cochrane Library*.

**Table 2: Frequency of Resource Usage by Pediatrics and GIM Residents**

Electronic Resource	User Group			
	Pediatrics Residents		GIM Residents	
	Low use	High use	Low use	High use
<b>E-Mail</b>	Y			Y
<b>Medline</b> ( <i>PubMed, MEDLINE: UofM Libraries, GratefulMed</i> )		Y	Y	
<b>Quick-reference resources</b> ( <i>Harrison's, Merck Manual, Spiral Manuals, UpToDate</i> )	Y			Y
<b>MD Consult</b>		Y		Y
<b>Residents Information Centre</b>		Y		Y

## **6. Cultural Implications**

The primary challenge facing the CHE is facilitating a change in the medical culture in each Centre. "The resistance of physicians to using computers is their perception that it decreases productivity" (Appleby 1997, 30). There is also general suspicion of external information impinging on a physician's decision-making expertise; "Physicians are highly educated professionals who value their clinical autonomy...much physician resistance to guidelines and formulas, anything that can be characterized as cookbook medicine, derives from the perspective of autonomy and virtuosity" (Furrow 1999).

When the project began in 1999, in the University of Alberta Hospital, computers with Internet access were available in very select areas of the hospital. In the Winnipeg Children's Hospital, computers with Internet access were only located in a few physicians' offices and there were none on the wards. Evidence-based practice has been taught in both Centres; however, having access to resources in times of decision-making has been a difficulty. As well, in both cities, the hospitals have been under strict budget cuts or scrutiny, which has been greatly felt on the "front lines" in terms of staffing and resources. And of course, the eternal problem, health care professionals are extremely busy; "most physicians do not have the time or inclination to do adequate research" (Furrow 1999).

These are some of the challenges that faced the CHE Project at its onset. However, it appears that the need for timely information is outweighing the challenges. In both Centres, the response to the project has been very enthusiastic. Within each city, there has been increasing call to expand the project to other parts of the hospital, to other hospitals within the city, and to other parts of the province.

### **6.1 Factors of Success**

Both the Winnipeg and Edmonton CHEs have been experiencing rapid growth and increased usage of their desktops. Furthermore, numerous anecdotal reports have been coming out where residents, faculty and nurses are actually using the desktops as part of their decision-making process. One General Internal

Medicine resident in Edmonton notes the time when he was called to treat a patient with paroxysmal nocturnal hemoglobinuria, a syndrome where her immune system was attacking her red blood cells. The resident had never seen this condition and he was able to use the CHE desktop to find a treatment and stabilize his patient (McMaster 2000, 1).

In both Centres, an instrumental factor in the CHEs' success has been positive internal champions. It is necessary to have enthusiastic, outgoing people on the wards to remind people of the CHE desktops, to incorporate the desktop into their teaching and encourage colleagues to use the desktop as a regular part of their workday.

Giving usage of the desktop to the residents first has been very important. As a group, the residents are generally familiar with technology, so they are more open to using electronic information sources to help them in their decision making. When experienced medical faculty are given their passwords, they may initially be more reluctant to use the computer to find information, as their computer skills may not be as advanced as the residents. As well, faculty may see such usage as an obvious admission that they do not have all the answers. However, when residents are using the resources and bringing references to the physician's attention, faculty members become worried that they are falling behind and make a greater effort to learn about the CHE desktops and EBP. This has resulted in some challenges to diagnosis and "competitions" to find the best information to help patients.

It is vital for the desktops to be perceived as important by the medical professionals who are teaching the residents. In both Centres, the primary resident instructors have gone to great lengths to incorporate the CHE desktops into their teaching regimes, rounds and mind set. For instance, in Winnipeg, CLINT™ has become a regular part of the evening Journal Club and weekly Intake Rounds because the CHE Education Specialist attends these events and is able to work one-on-one with the residents and faculty. This has helped to greatly increase the profile and status of the project within the hospital culture.

Another factor in the success of these desktops is that the CHE desktop can be installed anywhere there is a PC and a good Internet connection. Users have been able to get used to the desktops and resources in their homes and offices, so it is not intimidating when they want to use them in a critical situation in the hospital.

## **6.2 Other Cultural Observations**

Although the Project has only been operational in the hospital since October 1999, a number of observations have been made concerning culture and acceptance of the CHE desktops. In Edmonton, the General Internal Medicine wards had been exposed to electronic desktops in previous projects utilizing earlier versions of CLINT™. PC computers with Internet access have been on the wards for about two years. Although the Demonstration Project was welcomed, users were not overly excited about getting accounts and trying the new resources. In addition, the earlier projects had encountered technical problems with the software and electronic resources; users had not forgotten these problems, so this skepticism presented an immediate barrier that had to be overcome.

In Winnipeg, everything about the CHE was new. There were only a few "dummy" terminals on the wards for checking lab results and there was no Internet access at all. In the space of a few weeks, nine computers were installed and hooked into the hospital Internet backbone, and all the residents received their CHE passwords. While not everyone rushed to the computers immediately, there was a great deal of interest and excitement generated by the newness of these tools.

Another interesting observation in both Centres was "information jealousy." The original project plan called for residents to be the primary focus with faculty coming on a few months later, followed by nurses and medical students. In both Centres, residents received their passwords first. In Winnipeg especially, a number of demands came from faculty who wanted their passwords right away.

A number of the residents commented on how they were enjoying this "power" they had over the other staff who had not been given access yet.

Another interesting cultural phenomenon has been the disregard of passwords. Even while the residents were enjoying their privileged status, sharing of passwords was not a problem. Unfortunately, the secrecy of passwords was not long lived; once more faculty got their passwords, the sacredness of one's password disappeared. While there are pronounced hierarchies in health care, it seems the sharing of passwords is universal. It was quickly discovered that the Winnipeg residents had shared their passwords with the nurses and medical students and had no qualms about saying they would continue to do so. In Edmonton, physicians have blatantly told CHE staff they are sharing their passwords with others. Warnings and changing passwords do not seem to have alleviated the problem. The attitude seems to be if one isn't paying for something directly, everyone else should have access to it too!

There is a genuine concern of image with the project - a fear of being left behind. The CLINT™ system allows for identification of non-users. In Edmonton, a brief survey was sent to eleven non-users asking why they were not using their account and if they planned to use it. Because the CHE has a limited number of accounts, non-users were asked if they would give up their accounts so another person could have access. With all responses, the non-user indicated (sometimes emphatically) that they wanted to keep their account. In Winnipeg, three non-users were contacted and two of them responded that they had not had the time to try CLINT™. Both asked to retain their passwords and are now using the desktop.

## **7. Political Considerations**

### **7.1 Intellectual Property**

As previously mentioned, the CHE involves many partners, all of whom would like to take something away from their involvement with the Project. What there is to take away is intellectual property and data, and a number of issues are yet to

be resolved in this area. Some of the intellectual property being created by the CHE is:

- Desktop arrangement. What layout will lead to the optimal usage of resources by health practitioners?
- EBP tips and knowledgebase summaries. These are created by CHE staff in conjunction with a private partner. Who owns this content?
- EBP educational tools. Cases of the week, and critically appraised topics are some of the tools that will be created by residents and faculties with assistance from CHE staff.
- Usage data. The aggregated data collected from hundreds of users about their information habits is valuable to researchers, but also to publishers, knowledge management companies and also to the universities themselves (libraries for example).

Before the Project began, several partners expressed concern over intellectual property issues to the principle investigator. The government granting agencies outlined their stand on intellectual property via the signed contracts and detailed letters of support. There has been concern that an appropriate amount of the CHE's created content be available in the public domain. The universities have taken a stand for their rights pertaining to intellectual property. Also, CHE and its corporate partner have entered into negotiations with the final result expected to be an agreement outlining what may be freely shared and what could be a commodity that both entities could financially benefit from. At the time of writing, the various partners have not pursued intellectual property issues; the general consensus has been that this is a demonstration project and if it is not given full support, then there will not be any intellectual property at all.

Regarding the usage data, the CHE Investigators Working Group is working on guidelines pertaining to how usage data may be utilized and by whom.

## **7.2 Allocation of Resources**



Each CHE in the Demonstration Project purchased enough licenses for 100 users. As the popularity of the project has grown, it became apparent that decisions would have to be made by the Operating Committees as to who would get access to the CHE desktops. In Edmonton, where there are more residents, the allotment of licenses was clearly defined based on the initial target groups of the Project. The allotment was used up with residents, a select number of faculty and a group account for nursing staff. Additional user groups, such as physicians and nurses in Emergency as well as physicians in Pediatrics, Hematology and Cardiology have expressed early interest in joining the CHE Project. However, with the 100 Edmonton accounts used up, these groups would have to pay to join in. Thus far Pediatrics, the Emergency physicians and Hematology have come up with their own funding and received CHE desktops.

In Winnipeg, there are fewer residents, so more slots are available for faculty. There has been much lobbying to the CHE Winnipeg Operations Committee from enthusiastic groups who want to participate - Neonatology, Radiology, and Emergency as well as the undergraduate medical student body. Each of these groups has seen the general pediatrics residents using the CHE desktop and wants to have access as well. The Operations Committee requires a written request from interested groups. Each request is assessed based on the group's participation in the residents' education programme. The Head of Pediatrics, who is also the lead investigator in Winnipeg, makes the final decision after discussion in the Operations Committee.

In both cities, various negotiations occur between interested groups and the Operations Committee in that Centre. This was particularly true of the undergraduate medical programs. The programs want their undergraduates to have full-time accounts. At this time, the program did not want to pay for access. However, the Operations Committee in each CHE realized the importance of exposing students to this evidence-based practice tool as early in their education as possible. Thus each student receives a CHE password for the time they are doing a rotation through that Centre's specialty area. The password is changed

with each new rotation. This is a short-term solution, but meets everyone's needs in this instance.

## **8. Conclusion**

The CHE is already a remarkable achievement because of its successful implementations in Edmonton and Winnipeg. The next task is to formulate research projects using the CHE as a "laboratory" for testing information science hypotheses. As more CHE Investigators begin research projects, a body of new information will emerge surrounding the effectiveness and applicability of using the CHE electronic desktop and education resources within the clinical setting, and how such use contributes to the promotion and growth of evidence-based practice in health care. Of course, the long term research plan for CHE will be testing the hypothesis of evidence-based practice itself and presenting proof that evidence-based practice does lead to improved decision making and better patient outcomes.

## **Acknowledgements**

The CHE Demonstration Project acknowledges the generous contributions of the Health Infostructure Support Program (Health Canada), the Alberta Heritage Foundation for Medical Research, the Universities of Manitoba and Alberta, the Capital Health Authority, the Winnipeg Regional Health Authority, and the Children's Hospital Foundation of Manitoba.

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